The above chart shows that the Planning Support Services Unit had been added to the Planning Studies Section to take on the responsibility of responding to all daily urgent technical requests which are not within the scope of work of any of the other Units under the Planning Studies Section. The Comprehensive Planning and Studies Unit, part of the Planning Studies Section, was divided into two groups, one group being responsible for following up the strategic plan and budget in order to revise the projects and investment costs for the Municipality's annual and five year plans and for preparation of the annual urban development plan. The structural plan group was made responsible for the preparation of the planning database, conducting in-depth studies of the structural plan elements, specifying projects within the annual and five year plans and specifying the cost of investment and building development programmes. A Unit was also added to follow up the implementation of planning projects as part of the Executive Planning Section, this to be done in association with the Planning Studies Section with regard to the studying and the allocating of housing, investment, industrial and public services lands and to follow up on the implementation of projects and their effect on the land, as well as the compensation that would be required as part of the urban planning procedure. The following table illustrates the distribution of employees within the Planning and Surveying Department during the period 1999 – 2002.

Table No. 4 Employees in the Planning and Surveying Department, 1999 – 2002

Year	1999	2000	2001	2002
Number of employees in the Planning & Surveying Department	275	265	266	281
Number of employees in the Planning Studies Section	37	38	40	37
Number of employees in the Executive Planning Section	43	43	41	45
Number of employees in the Surveying Section	169	157	156	167
Number of employees in the Advertising Section	26	27	29	32

The main duties and responsibilities of the Planning and Surveying Department and affiliated sections are as described below:

In general terms, the Planning and Surveying Department is responsible for following up on the implementation of the structural plan through the preparation of a comprehensive study of all planning elements, so as to identify present and future planning issues and to lay down the general objectives for each element according to the Emirate's development programme. It is also expected to lay down the general policies required to achieve these objectives. These, in turn, are translated into a number of development projects, for which the investment costs are defined in co-ordination with the technical departments within the Municipality.

The Department is also responsible for updating the five year plan on an annual basis, to cover the next five year period, this to be done in such a way as to identify those areas where development will take place and the particular development projects required. The first year of the plan is used as the basis for preparing the annual investment budget for the Municipality.

It is also responsible for suggesting, and then implementing, once approved, the Municipality's policies, laws, directives and procedures relating to comprehensive development, including social, economic and urban planning, as well as the development of planning legislation relating to architectural designs and to the allotment and survey of land, to ensure that development is carried out in a systematic way.

Another task is that of a regular follow-up of and continual updating of plans related to the comprehensive urban development of Dubai through preparation of a planning database which can be continually and systematically updated in co-ordination with the relevant technical administrations within the Municipality, other Government departments and the private sector.

Within this framework, the Department prepares detailed studies and executive drawings relating to the planning and design of new residential and industrial areas, studies on land allotment, conducting development studies of the city and re-planning of the existing built-up areas, these tasks being undertaken within a framework of preserving existing architectural features that are of historical value.

Development work is to be evaluated, in terms of the solutions offered and the recommendations made, within the light of the Municipality's overall vision and of the Emirate's objectives for development, while the Department is charged with supervising any work, in co-ordination with other concerned parties, with relation to the development of the Emirate's architecture and the implementation of approved plans, this work being carried out in accordance with the approved budgets.

The Department also prepares and implements programmes for the development of its workforce, within the framework of what has been agreed with the relevant section of the Personnel Department.

Quarterly reports are prepared on the work of the Assistant Director-General for Planning and Building Affairs Department, these reports indicating the achievements made in terms of the development plan and the agreed programme of work, as well as identifying any obstacles faced and making recommendations on the procedures required to overcome them, in accordance with the relevant directives.

The Department also carries out a variety of land surveys. These include surveys of properties, preparing of location plans, specifying the borders of plots, matters related to land distribution, advice on specifying the Qiblah (the direction of the holy city of Mecca), making a register of the existing basic services, like roads, water supply, communications links and the sewerage network, this work then being followed by the preparation of the relevant mapping.

It participates actively in the process for approving applications for commercial and advertising permits, ensuring that the applications correspond to the approved plan and planning regulations.

In association with the Personnel Department, it works to implement planning operations and programmes of workforce development so as to ensure that the human resources of the Municipality are sufficient to meet the requirements placed upon the Municipality with regards to development.

Another task is that of ensuring active and effective linkage between the comprehensive

and detailed plans and the existing plans for infrastructure and services, including roads, transportation, sewerage, water, electricity and telecommunications. This involves the arranging of regular meetings with the bodies concerned to ensure that any problems can be satisfactorily resolved.

Finally, the Department is in charge of reviewing and monitoring outdoor advertising in the Emirate and of ensuring that this is done in accordance with the Municipality's policies on the issue and in accordance with the rules and regulations and approved procedures.

Planning Studies Section

The Planning Studies Section is responsible for conducting comprehensive studies in those matters that relate to the specifying of the appropriate development and strategy for the Emirate, including strategies such as those for housing services offered to the community and policies specific to environmental, social, economic, architectural, industrial and cultural issues. This is done through the preparation of comprehensive planning studies for the Emirate of Dubai as a whole, including both the urban and the rural sectors. It also prepares detailed plans and studies to develop various areas of the Emirate, prepares a planning information database, which is continually updated, prepares executive drawings for planning and design of new housing and industrial areas and studies the allocation of land and the specification of particular functions to be carried out in particular land areas.

Executive Planning Section

The Executive Planning Section is responsible for the development of planning legislation relating to building design and land allotment and for monitoring building development in the city to ensure it corresponds to the city plan. This work is carried out through the preparation of planning laws for all types of land use in Dubai, of executive plans, the distribution of lands earmarked for various types of use, the revision of all applications for suggested uses in various areas, the conducting of inspections and the monitoring all types of land use and activities.

It also offers advice to the public with regard to implementation of and queries related to land allotment, monitors and evaluates development projects and encourages private investment so as to ensure that the required facilities are provided, in line with the Emirate's general policy. In this sphere of activities, it also specifies the mechanisms for carrying out approved investment and planning projects and follows up their implementation, in close co-ordination, where appropriate, with other establishments and agencies.

Surveying Section

The Surveying Section is responsible for surveying locations, preparing the drawings necessary for planning, development and operations and other related activities such as compensation, road borders, changes to properties, mapping building plots, preparing other maps, preparation of network grids, land reclamation, making changes form an engineering viewpoint of certain structures and working out the Qiblah (direction of the holy city of Mecca). It is also responsible for the maintaining of a database containing details of properties, land plot numbers and details of landowners.

Advertising Section

The Advertising Section is responsible for monitoring advertising texts, billboards and advertising boards and other displays relating to fairs and exhibitions as well as roadside posters within the Emirate of Dubai. It also examines suggested designs for advertisements to check for the proper use of language, undertaking regular inspections and monitoring the activities of advertising companies and professional signboard writers. This latter is undertaken to ensure that they have the qualifications, artistic abilities, necessary equipment and required permits to practice this profession. The Section also prepares, designs and produces advertising billboards and leaflets relating to the Municipality's advertising campaigns and provide guidance on the approved specifications and measurements for advertising billboards.

Computerisation of the Planning and Surveying Department

Considerable effort has been made on introducing the use of computer technology into the Planning and Surveying Department, to facilitate the planning process.

The process began in 1990 with the introduction of five computers and a computer server to address the task of making digital copies of plans and maps. At the beginning of 1993, this was followed by the introduction of a further three computers for use in the preparation of social and economic surveys of sample groups and to make surveys of land use and industrial areas, in response to needs identified as part of the 1993 – 2012 Dubai urban structural plan project.

In April 1994, trials began on a Geographic Information System GIS, with the preparation of a sample survey of industrial areas. This work was carried out in association with Intergraph, who designed the required software.

In 1994, a further fifteen computers were obtained, these being assigned to map-numbering, while in 1997 fifteen more were introduced, being used to tackle the task of digitising plans for 30 specified urban planning areas, covering a total of 60,000 plots of land.

Building on that success, the number of computers then rose to 250, with increased capacities, permitting coverage to be extended to 115 planning areas, covering 110,000 plots of land.

The data is updated on a daily basis and includes a planning system that permits surveyors undertaking fieldwork to obtain details of the relevant locations on an immediate basis.

Data has also been entered into the system for land use, whether for housing, for commercial use or for other purposes, and relating to the legislation affecting each plot, such as permitted uses, heights of buildings and the distance that must be maintained between the boundary of a plot and any building on it. Computer printouts of maps showing ownership can be produced.

Since 1995, the Emirate of Dubai has been linked to the international ITRF co-ordination network, in association with the University of Hanover.

Also of importance has been the increased use of the GPS (Global Positioning System) facility, which reduces the cost of producing points of control and also speeds up the process of map production, as well as reducing human error. Thus the production of co-ordinates for a single plot of land can now be done in one minute, rather than fifteen minutes, each surveyor can create survey control points at a rate of 14 points a day, rather than the previous 7, plots

can be quickly located and approvals for maps and plans can be obtained within sixty seconds.

Now approval of new plans and maps can be achieved at the rate of one a day, instead of the previous rate of one every week, and the approval of amendments can be obtained within an hour, instead of the whole day that was previously required. The system also makes it possible to obtain information about any particular plot in one minute, rather than in fifteen minutes.

The Development of Construction Planning in the Emirate of Dubai

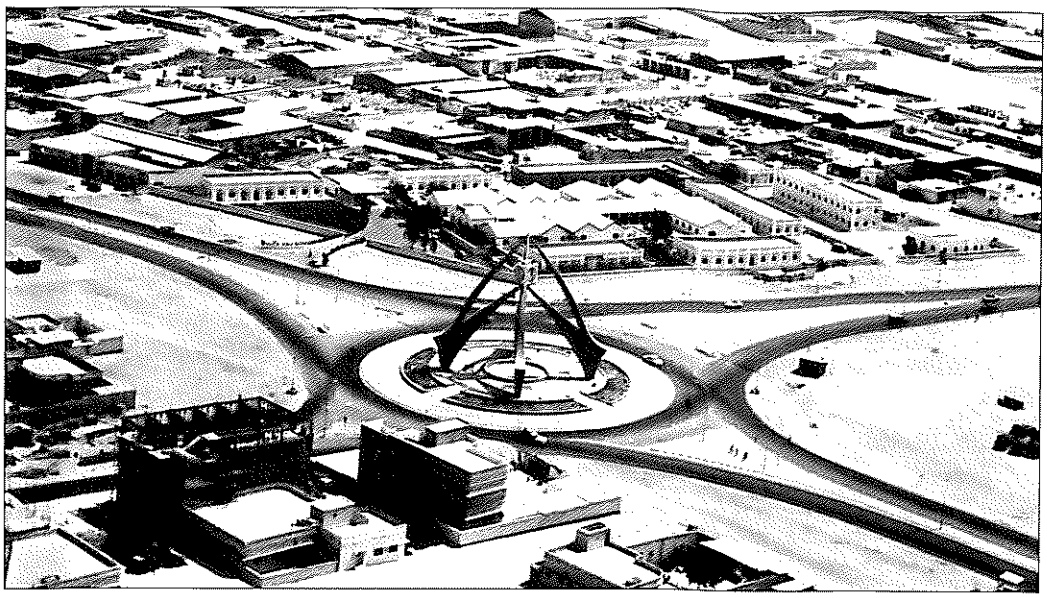
First Stage: The Stage of Urban Development, 1900 – 1955

During this period, urban development in the city of Dubai was relatively slow, reflecting the rate of economic growth and of population. The majority of the population lived in the Al-Ra's and Shindagha areas of Bur Dubai, at the mouth of Khor Dubai, as shown in the following photographs.

The Khor (Creek), as well as the Arabian Gulf into which it opened, provided an important source of income for the population of the city, through fishing, the pearling industry and some other, limited, commercial activities.

In 1955, the total urban area amounted to only 3.2 sq. kilometres, although this was significantly larger than the 0.2 sq. km of built-up areas in 1900. Over the same period, the population grew from an estimated 3,250 in 1900 to 56,000 in 1955.

Urban Development in 1955



An old picture of the Clock Tower

Second Stage: The Stage of Planned Urban Development (1955 – 1970)

As part of the forward-looking vision of H.H. the late Sheikh Rashid bin Saeed Al Maktoum, Ruler of Dubai, which included recognition of the necessity of planning ahead for the Dubai of the 1960s, the Municipality began the process of planning for the buildings of roads as well as the provision of health services. As part of this, an aerial survey of the city was undertaken and the consultants John Harris and Partners were commissioned in 1960 to draw up a development plan.

In general, the strategy for the development of land use was based on a relatively limited expansion outside the original area of the city, to provide land for additional housing and for industrial use, this being away from residential areas.

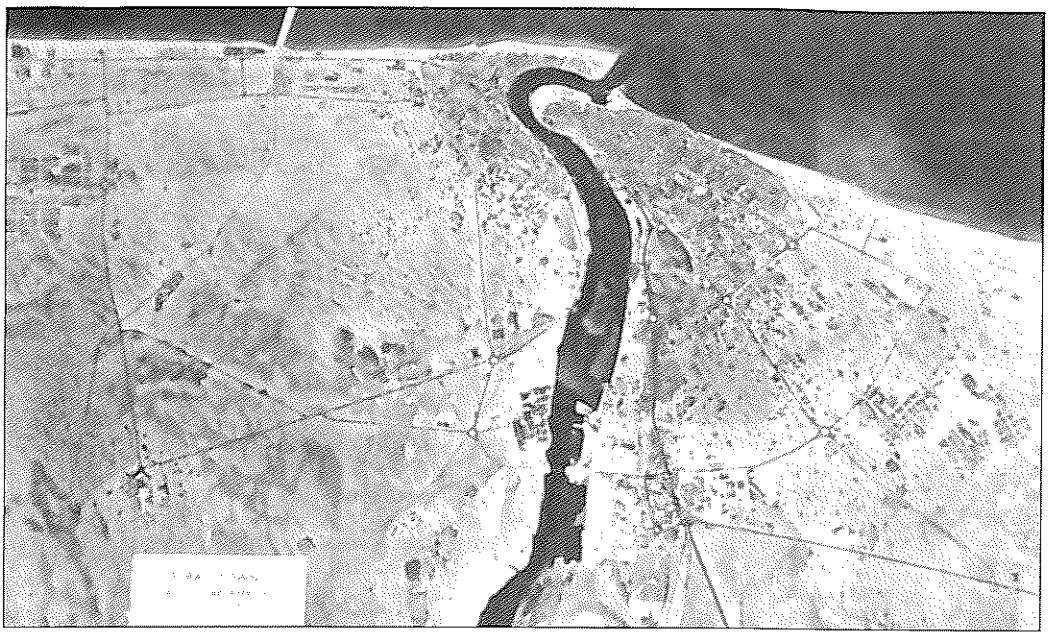
The key objective of the planning strategy was to promote the expansion of commercial activity within the central area. The plan suggested, for the first time, the need for a network of roads to be established within the city to meet the rising need for transport, and also suggested that a balance should be struck between the various demands for land, such as residential housing, commercial use properties, industrial areas and utilities and public services. A growth in building development indicators followed, and then the drawing up of the first master plan for the city, laying down the basis of the main axes of development. At this time, in 1960, the urban area covered a total of 5.3 sq. km, with a population of 60,000 and a population density of 11,321 per sq. km.

In the same year, the Engineering Section was put in charge of carrying out city planning and for surveying land use.

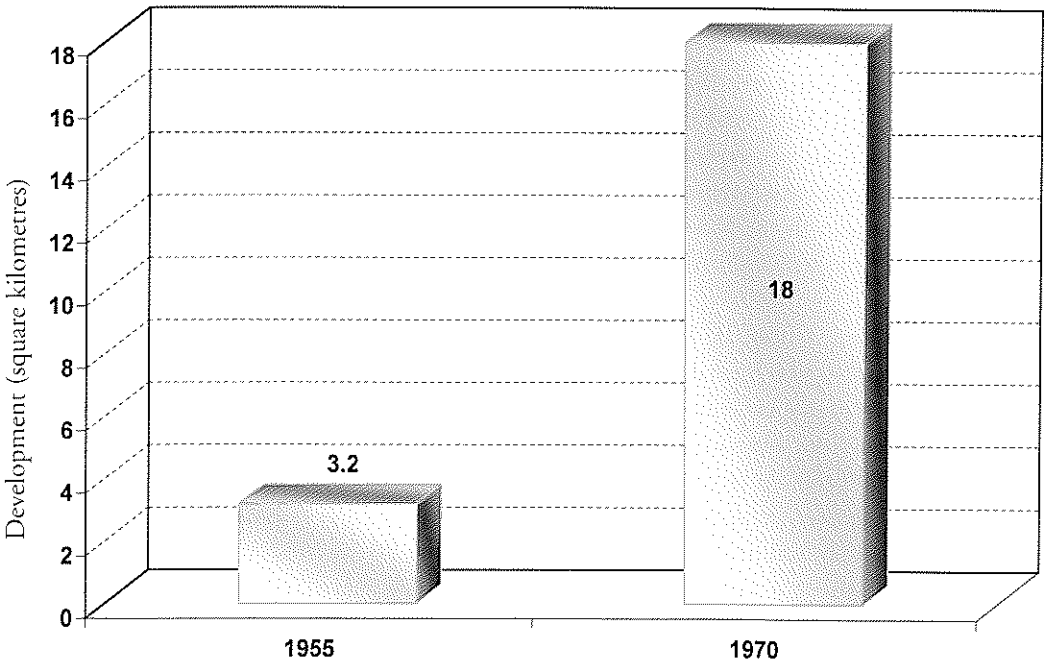
By 1963, major accomplishments included the completion of new roads, the allotment of land for industry in Deira and Bur Dubai, the allocation of land for schools, public parks and government buildings, the construction of Al-Maktoum Bridge, the allocation of residential plots

of land beyond the built-up areas and the supply of water, electricity and telephone services. The Surveying Section was in charge of aerial surveys and of surveys of land use, so as to help in planning for the locating of new roads and other projects.

Urban Development in 1970



Increase in Urban Development, 1955 – 1970 in square kilometres



The organisation and regulation of the construction industry also began, with the issuing of laws and building regulations. This helped to stimulate construction of high-rise and medium-sized buildings in the central commercial areas, leading to a more efficient use of the available land. Much of this activity took place along the waterfront of the Creek. Other development included the expansion of the road network and the construction of Dubai International Airport.

By 1970, the built-up area had increased to around 18 sq. km, representing an annual rate of increase of 12.2 per cent since 1955.

The master plan was sufficiently flexible to take account of changes in land use, such as those affecting the road network as a result of the construction on major projects like Dubai International Airport, on which work began in 1971, and Mina (Port) Rashid, on which work began in 1972. The plan also paid attention to the need to preserve historical buildings, part of the heritage of the city.

Following the beginning of oil exploration, leading to the discovery of oil offshore in 1966 it was recognised that there was a need to pay more attention to the industrial sector, because of the formation of oil service companies. In 1965, land was allocated for the establishment of the Al Khubaissi Industrial Area, covering 1.2 sq. km., followed by the Al Ramoul Industrial Area in 1969, covering 3.91 sq. km.

Stage Three: The Transitional Stage, 1971 – 1980

During this period, a number of developments took place which had an impact on the planning process and the administration of construction projects.

Insofar as the planning process was concerned, the main changes included the creation of numerous architectural practices and construction companies as well as the carrying out of a number of construction projects being implemented as part of the 1970 Master Plan. One of these was the Al Shindagha under-pass. The rapidly-increasing rate of urban development and other changes made it easier to provide for an absorbing of new ideas in the field of construction and of modern architectural design. This latter aspect was integrated with the traditional architectural heritage of Dubai, and facilitated the preservation of a large number of such buildings.

During this period, new developments in terms of infrastructure as well as the creation of the social and economic structure for the fast-developing city were carried out in accordance with the vision laid down in the Master Plan.

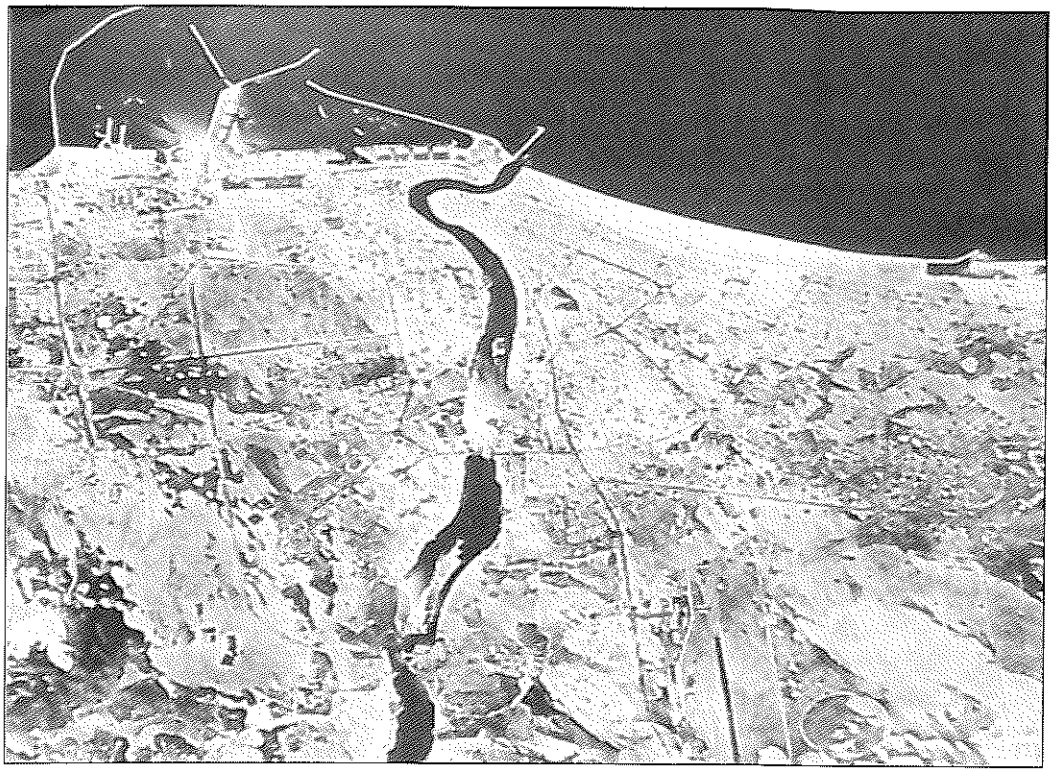
A number of modern industrial units were also set up which helped to transform living standards.

The key challenge facing the Municipality was that of ensuring that the required expansion of the utilities network was carried out, in accordance with expectations.

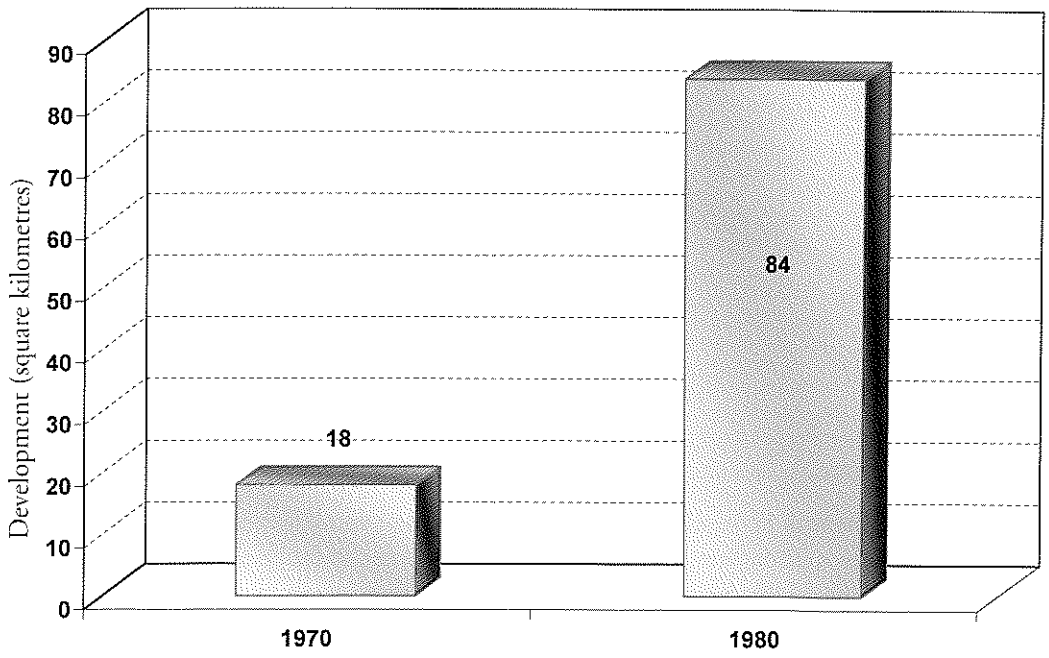
A review of the statistical data shows the speed of growth within Dubai, which could not have been achieved without support from the Municipality.

Thus the total built-up area increased from 18 sq. km, in 1970 to 84 sq. km, in 1980, the population rising over the same period from 100,000 to 276,000. Population density fell from 5,556 people per sq. km, in 1970 to 3,289 people per sq. km in 1980, thanks to an expansion of the built-up area at a rate of 16.7 per cent a year, which outstripped the rate of population growth, at 10.7 per cent a year over the decade from 1970 – 1980.

Urban Development in 1980



Increase in Urban Development during 1971 – 1980, in square kilometres



Fourth Stage: Start of the Urban Planning Stage, 1981 – 1993

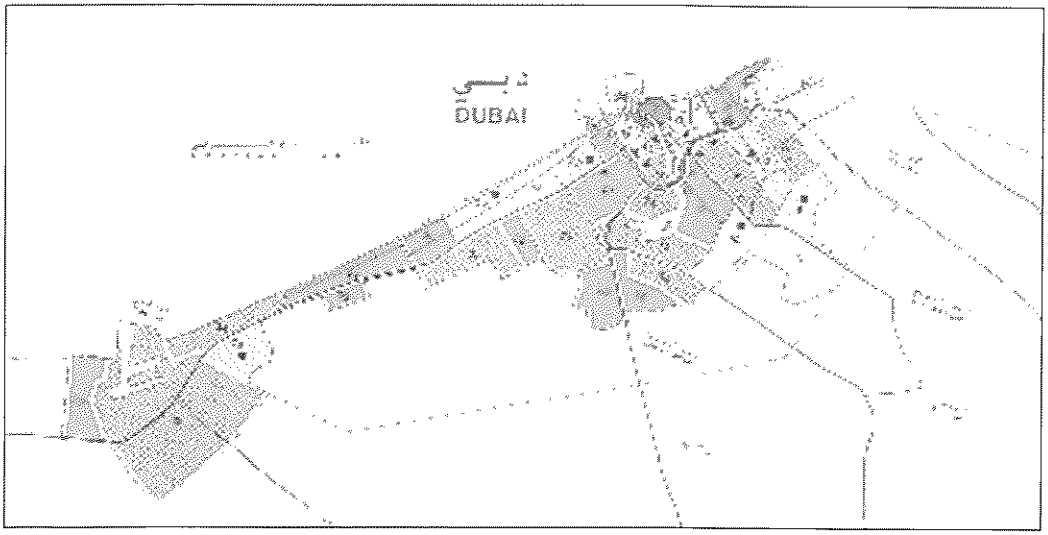
During the 1970s, there was a marked and massive increase in the economy of Dubai, leading to major investment in public utilities and to a significant increase in average incomes. This led, in turn, to an increase in the population and to rising demand for land in the suburbs of Dubai City, where housing policy had previously ensured that a relatively low population density had been maintained.

Other features of the changes included an expansion of the areas used by industry far beyond the residential areas and at a considerable distance from the central commercial area, leading to a reduction in the negative features that arose from the industrial activity that previously took place in these areas. This re-location of industry was fuelled by the provision of public land at low cost.

In 1985, the Municipality commissioned an international firm of consultants to prepare a comprehensive development plan for the Emirate of Dubai up to the year 2005, this work being undertaken under the supervision of the Planning Section. The study commenced with a review of the procedures and plans then in place, followed by a specification of all aspects relating to planning, including its objectives and aims, and the opportunities provided for future development, as well as more general policies for development.

The consultants were also commissioned to draw up a general strategy for the development of the Emirate, to include a re-shaping of the built environment so as to achieve a balance in the distribution of general services and construction throughout the city, as well as to ensure that maximum benefits were obtained from services and public utilities. This part of the study also reviewed ways of reducing the cost of future development.

Urban sectors in the Emirate of Dubai, 1985



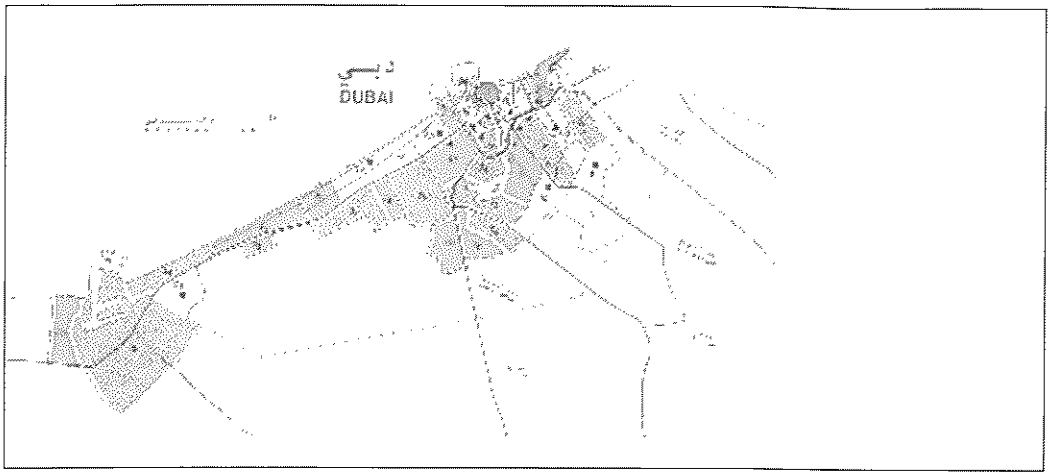
The planning framework upon which the study was based had two key components. The first divided the Emirate as a whole into a total of 37 individual sectors, to facilitate study of the individual needs of each sector. The second component specified those sectors which were to be considered as urban, to help in the planning of the distribution of public services, as shown in the

map which follows.

It was intended that the plan should take into account projections for the future development of economic activity and should also make recommendations related to development policy and to projects put forward for consideration. The map which follows presents an overview of the 1985 comprehensive development plan.

In terms of land administration, a number of key laws and regulations were already in effect.

Comprehensive Development Plan, 1985 – 2005



These included 12 Municipal Orders issued in 1970, covering the construction of buildings and specification of particular areas for land use, the Height of Buildings Law of 1973 and a number of executive regulations.

In 1985, a number of new regulations were prepared and issued, these being seen as important tools to facilitate the carrying out of the development plan. Among them were by-laws classifying areas by type of use, criteria related to land Unit, regulation of advertising and by-laws covering Environmental Protection.

The Comprehensive Development Plan was the first of its kind dealing with forward planning for building development in Dubai which linked social and economic factors with development plans and future needs for planning in the urban area.

Fifth Stage: The Structural Plan for Dubai's urban areas, 1993 – 2015

The completion of the comprehensive development plan was not, of course, the end of the process. It required annual amendment because of the impact of both local changes and developments within the region which had an impact both on the environment as a whole and on planning. Such changes included aspects such as the continued expansion of urban areas and changes to the roads network and to patterns of land use, as well as changes in terms of social and economic factors and population growth and distribution. These all meant that there was a continual need to monitor the process of implementation of the plan so that aspects arising from unforeseen changes which were in conflict with the plan could be addressed and so that the overall development strategy could be preserved.

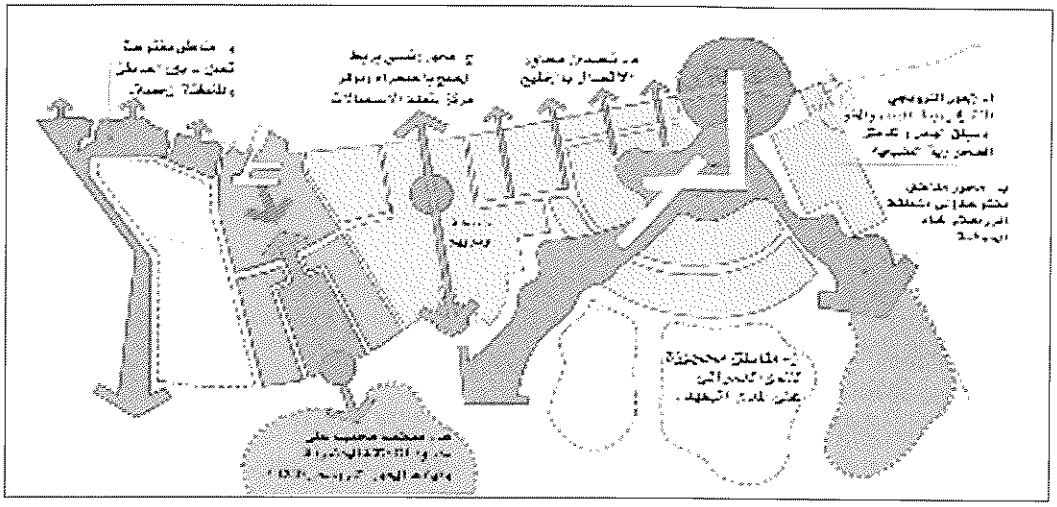
In 1993, therefore, the Planning and Surveying Department prepared a new structural plan for the urban areas of the Emirate of Dubai. One key objective was to ensure that investments in sectors such as public services and utilities were of maximum benefit while another was to create the conditions to encourage private investment.

In accordance with guidance provided by higher authorities, the Department commenced by carrying out detailed studies of each aspect of the planning process and by identifying priority areas, with a view to preparing a long term strategy for comprehensive development. All relevant issues and potential obstacles were identified for all sectors of development while policies and strategies that required immediate or future implementation on a city-wide level were also identified. The structural plan which subsequently emerged was then adopted as an official document to be used as a long term reference for the strategy for future development. This plan was drawn up in such a way that, while remaining comprehensive in scope, it was also sufficiently flexible to permit the rapid changes at a local, regional and international level to be taken into account.

Four functional axes were identified on the basis of which planning for balanced growth both at an urban and at a city-wide level could be undertaken. These were as follows:

- Industrial Axis (Jebel Ali Port – Jebel Ali Free Zone – future International Airport)
- Mina Siyahi Axis
- Ra's al-Khor Axis (Recreational/ Cultural/ Environmental)
- Rural Axis (Al-Khawaneej and Al-Aweer)

Urban components in planning for the development of the Emirate

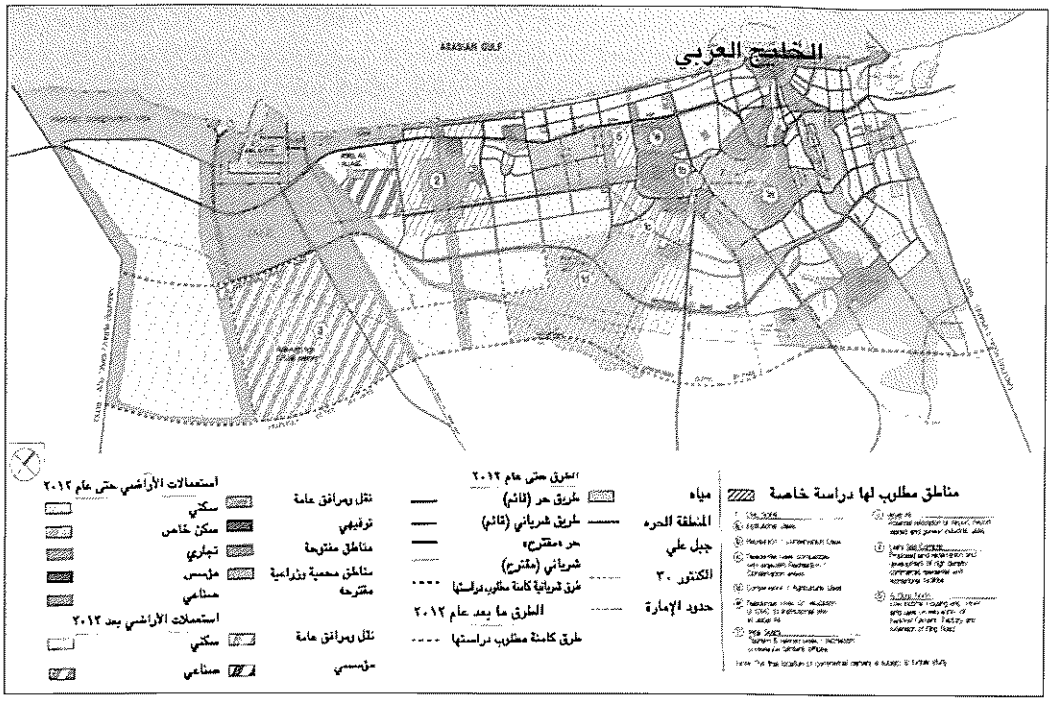


In order to achieve the objectives of the structural plan, a working group was formed consisting of specialists in the field of economics, housing, industry, environment, public utilities, public services, roads, transportation and land use. Each of these aspects included key issues, objectives and policies, and the role of the planning for comprehensive development consisted, therefore, of co-ordinating between and harmonising each sector in the drawing up of policies for the future.

The structural plan for Dubai's urban areas for the period 1993 – 2012 was then

approved, laying down a comprehensive and strategic plan for growth. The following map provides details of the structural plan.

Structural Plan for Urban Dubai, 1993 – 2012



This lengthy period is expected to see a large increase in the total developed area and in population. In 1993, the developed area covered 149.3 sq. km and population was 611,000. By 2012, the developed area is expected to increase to 604.8 sq. km and population is expected to rise to a total of 2.1 million, representing an annual rate of increase of 6.4 per cent. The total workforce is expected to rise to 1.5 million.

If these projections are achieved, then an additional 504 sq. km of land will be required for development of various types by 2012, and one task of the Planning and Surveying Department, in association with other relevant authorities, is to investigate to see whether actual development coincides with the projections.

By 2002, the developed area had already increased from 149.3 sq. km., the 1993 figure, to 220 sq. km, while population had risen from 611,000 in 1993 to 863,000 in 2000. This represents an annual rate of increase in developed areas of 3.9 per cent from 1993 to 2002 and an annual population increase of 4.5 per cent from 1993 to 2000. The largest percentage of developed land is that used for housing.

The rapid rate of development has meant that the basic asset of land must be used wisely, to be of benefit for the Emirate's economy and to sustain economic growth. To support this, the Planning and Surveying Department prepared by-laws on classification and defining land use within Dubai. These provide an importance reference document for decision-makers, and include not only maps of all residential and commercial plots of land but also

provide all of the information relevant to each plot.

The by-laws classified the land to be used for light, medium and heavy industry and also commercial land use by neighbourhood, central areas and the suburbs, as well short term land use types related to temporary housing areas such as workshops and consultants' site offices. The by-laws divided the housing areas in Dubai into nine groups, according to the height of the residential buildings and the location of private villas as well as other residential uses. They also included other Units related to residential and commercial areas, agricultural areas, nature reserves and archaeological sites, in addition to laws relating to car parks.

Also included were legislative and executive aspects and all procedures relating to planning use applications, their revision and approval according to the laws in place, the follow-up process and the mechanism for ensuring their implementation in accordance with the approved plan, as well as an article relating to appeals against decisions made by the Engineering Committee.

Sixth Stage: Implementation of the Structural Plan for Dubai's Urban Areas, 1993 – 2015

Like other fast-developing cities, Dubai has seen major changes since the original approval of the structural plan for the urban areas in 1995. These have included a massive expansion of construction and changes in land use, as well as the expansion of road and utilities networks. This has required the allocation of more land for construction, to meet present and future anticipated demand. In order to keep abreast of these changes and to ensure the implementation of the structural plan in accordance with the suggested objectives and policies, a review of the mechanism for implementing the structural plan was required.

The Dubai Municipality, through the Planning and Surveying Department, therefore prepared a 'strategy and programme for implementing the structural plan for Dubai's urban areas' to permit it to specify the steps required to carry out the plan. Implementation of this required two steps: coordination between the objectives and policies for the structural plan, and the programmes and policies of local and federal offices to ensure that future plans for local and federal offices correspond with the structural plan and, secondly, the creation of a comprehensive planning database based on a large number of planning surveys (social and economic surveys by samples, land use surveys, an industrial areas survey, private sector establishments surveys, a rural areas survey, a comprehensive statistical survey, aerial photography, geometric photography, a survey of urban and rural locations and a general services survey) in addition to a complete geographical survey of the land in the form of maps, aerial photographs and satellite pictures.

Dubai Municipality has also undertaken the following work to facilitate development of the planning process:

- Entering of data on land use, whether residential, commercial or for other purposes, and data on the legislation relating to each plot of land in terms of the permitted uses and buildings

The following table illustrates the expected social, economic and building indicators for the urban areas in Dubai during 2005(*)

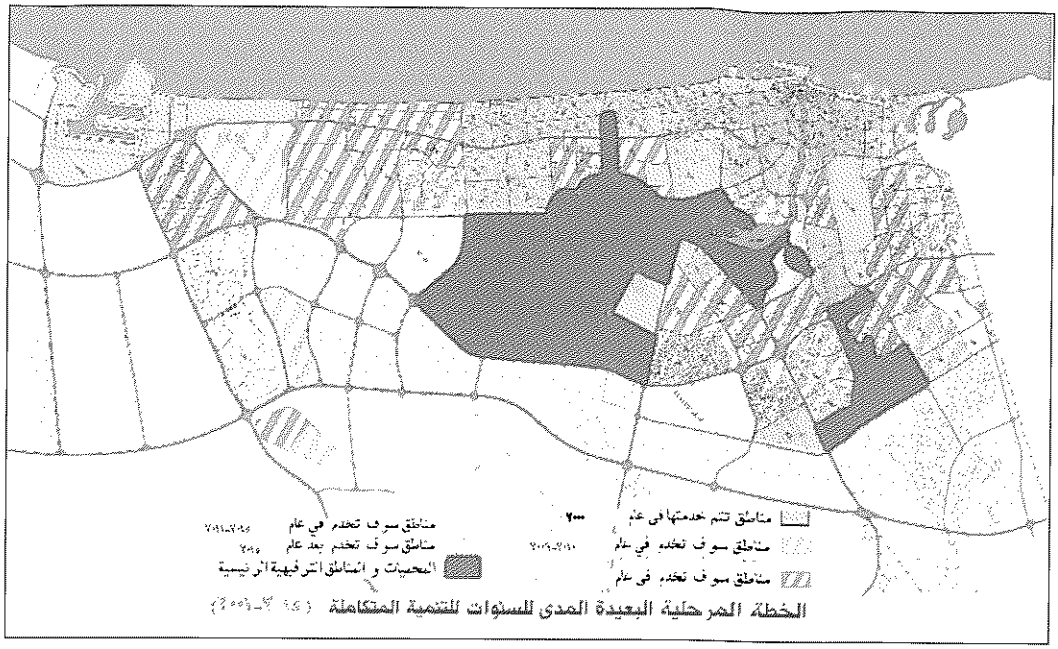
Item	2005	2010	2015	Target Year
Population capacity of urban areas in Dubai, including the Jebel Ali Free Zone	1,317,166	1,748,432	2,287,478	2,749,595
Total population number (expected)	1,192,866	1,567,890	2,065,788	-
Labourer concentrations in urban areas	269,836	351,946	462,789	468,366
Labourer concentrations in the Jebel Ali Free Zone	50,072	74,487	117,077	153,429
Total number of families	233,251	306,011	391,249	444,465
Number of school students	188,021	248,131	322,543	378,150
Total number of workforce	685,332	939,786	1,266,069	1,478,659
Rate of economic growth	6%	6%	5.6%	-
GDP per capita, in Dirhams, at fixed 1995 prices	59,299	72,286	79,808	-
Total areas developed, in square kilometres	244.3	309.1	386.7	604.8
Additional areas required for development (in square kilometres)	110	164	147	-
Population density (Person/ Square kilometere	5,187	5,416	5,681	4,030
Additional industrial land in square kilometres	0	10	10	-

* For the target year, that being defined as the year in which the city's maximum capacity in population is achieved, according to construction laws and present population density within the city.

heights stated on the ownership maps, this data then being printed out on A4 paper, using a new key feature, PID.

- Linking the Emirate of Dubai with the new international ITRF coordination system in conjunction with the University of Hanover.
- The following maps illustrate the long term strategies up to 2015 as well as the five year strategic plan up to 2005.

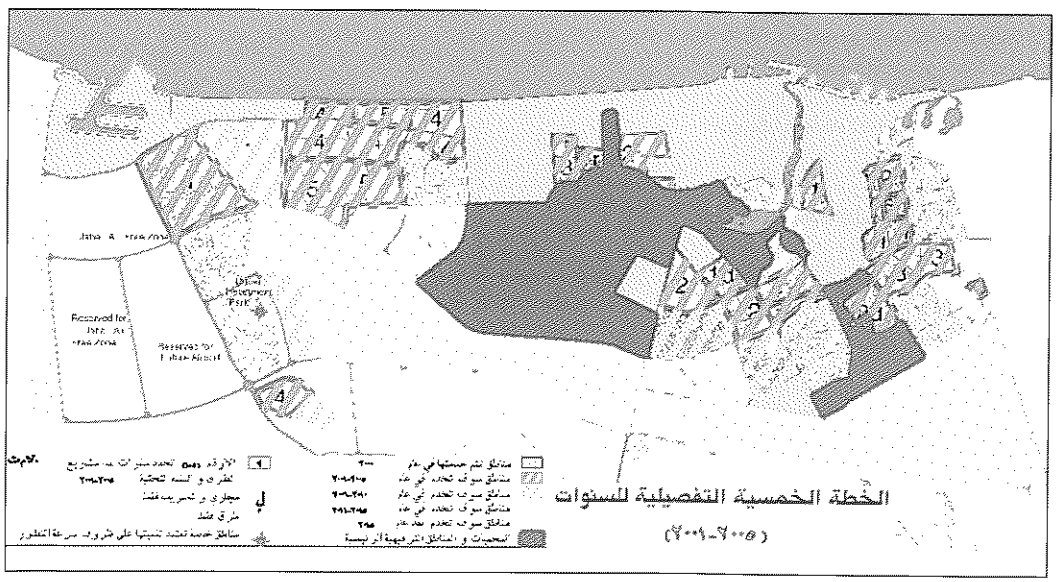
Future Strategic Plan, 2000 – 2015



The areas which will be developed up to 2015 are as follows:

2001 – 2005: 110 sq. km.
2006 – 2010: 164 sq. km.
2011 – 2015: 147 sq. km.

Strategic Five Year Plan, 2001 – 2005



In 2000, the area being provided with services covered 203.9 sq. km., with an area of 244.3 sq. km. to be provided with services by 2005.

The following tables provide the main development indicators during the years 1993 – 2005

Comparison between building development indicators, 1993 – 2005

Indicator	Indicator value in 1993	Indicator value in 1997	Indicator value in 2000	Indicator value in 2005
Area developed (in square kilometres)	149.3	187.8	203.9	244.3
Annual rate of building development	3.9%	4.7%	5.2%	3.8%
Population (in thousands)	611	764	863	1,193
Average annual population growth	6.4%	5.8%	5.1%	5.0%
Number of workforce (in thousands)	218	403	483	685
Average annual growth in the number of labourers	8.9%	7%	6.8%	5.9%
Average annual growth in residential land use	5.5%	8.7%	9.2%	3.8%
Average annual growth in residential/ commercial land use	4.2%	11%	14.1%	7.7%
Average annual growth in commercial land use	5.3%	5.3%	5.6%	3.4%
Average annual growth in industrial land use	5.5%	6%	7%	5.0%
Average annual growth in transportation land use	1.7%	6.1%	7.3%	5.4%
Average annual growth in sports & government services land use	2.8%	0.7%	1.3%	2.4%
Percentage of green areas within the developed areas	1.5%	2.8%	3%	8%
Population density (person/ square kilometre)	4,092	4,308	4,229	5,187
Development of green areas (in square kilometres)	2.2	3.4	4.6	6.8
Green area per person (in square metres)	3.6	4.5	5.3	5.6
Road expenditure portion per person (in Dirhams)	946	786	859	220
Sewerage expenditure per person (in Dirhams)	839	233	270	212
Family average per thousand population	2.6	2.5	2.6	2.8
Average population per doctor	452	435	430	410
Average population per Health Centre	24,400	28,800	30,000	40,000
Average water consumption per person (Gallon/ Day)	98	102	105	110
Average electricity consumption per person (in thousand kilowatt hour/ year)	837	200	290	300

Source: Strategy Programme for implementation of structural plan for urban areas in Dubai 1999, Dubai Municipality

Planning Elements:

Industrial Development

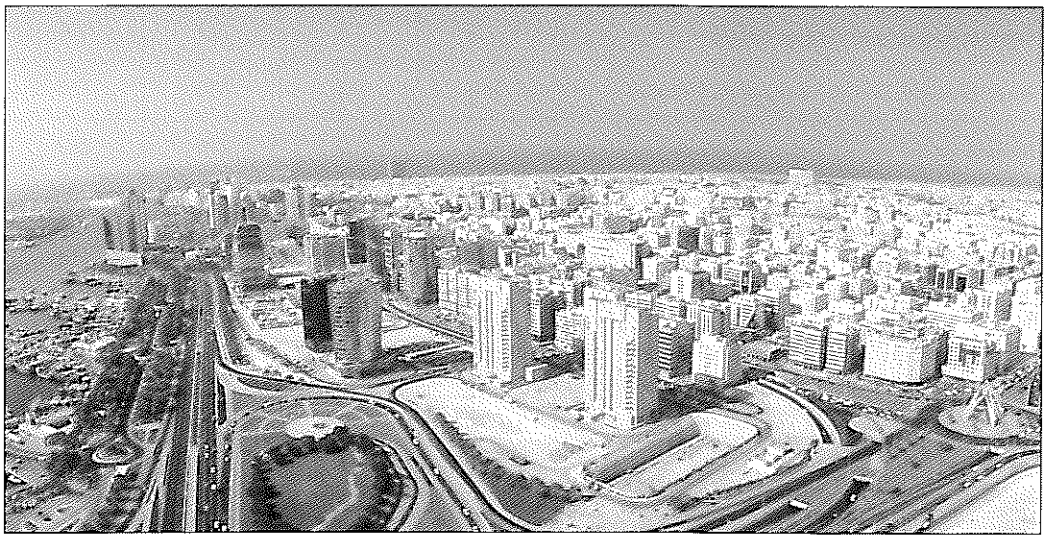
The Dubai Municipality is responsible for the implementation of the economic development strategy for the industrial sector prepared by the Department of Economic Development insofar as the requirements for industrial land are required. The Planning and Surveying Department of the Municipality is directly involved in this process. Land for industry and warehousing is allocated in accordance with the general land use plan, the Planning and Surveying Department having set aside 34.4 sq. km, for this purpose, or 68.5 per cent of the total land area of 50.2 sq. km that is required. 31.6 sq. km. of the land allocated by the Department had been developed for industry by 2002. A total of 36 sq. km. is expected to have been allocated by 2005.

General Services

The Planning and Surveying Department is responsible for evaluating community needs for requirements such as general services and for making proposals for meeting them, in accordance with the specified planning criteria for the Emirate of Dubai. It is also responsible, in collaboration with other concerned bodies, for suggesting suitable locations in which general services facilities can be built. By 2002, 20.5 sq. km. had been allocated for this purpose.

Housing

The Planning and Surveying Department plays an important role in planning new residential areas and in following up on their construction. It is also responsible for preparing strategies and policies related to the future development of the housing sector and for suggesting amendments, if required, to the planning criteria used by other authorities. By 2002, it had allocated 76.3 sq. km. of land for residential and for mixed residential/commercial use, with a total of 82 sq. km. expected to have been allocated by 2005.



An aerial view of Dubai City

The following was the position at the end of 2001 for new residential areas set aside for the provision of housing for Emiratis, as well as for other residential areas in which all plots had been distributed.

No.	Residential Area	Number of plots	Comments
1	Al-Towar	858	Completely distributed (100%)
2	Al-Qusais	480	Completely distributed (100%)
3	Al-Mehaisna (3)	695	Completely distributed (100%)
4	Al-Mizher (1)	1,618	Completely distributed (100%)
5	Al-Mizher (2)	1,336	Completely distributed (100%)
6	Jumeirah (1,2,3) Al Safa, Al Manara, Umm Suqeim	1,575	Completely distributed (100%)
7	Umm Suqeim	3,568	Completely distributed (100%)
8	Al Barsha (1)	169	Completely distributed (100%)
9	Al-Barsha (2)	3,867	Completely distributed (100%)
10	Nad Al Hamar	1,729	Completely distributed (100%)
11	Al Mizher	2,065	High percentage distributed (100%)
12	Al Mehaisna (1)	922	Partially distributed
13	Al Quoz	1,436	Partially distributed. A small section of one block is frozen due to old infra-structure
14	Al Mimzer	603	Partially distributed
15	Zabeel	478	Private area
16	Nad El Sheba	204	Partially private area
17	Al Warqa (1.2.3.4)	5,679	Partially distributed & distribution is commencing under a housing finance programme
18	Oud Al Mateina	2,250	Engineering work is under way
19	Al Barsha South	6,000	Engineering work is under way
20	Nad El Sheba/ Umm Al Hassa	4,132	Engineering work will be implemented later
21	Al Khawaneej	2,650	At the planning stage
22	Al Jumeirah Camp	1,529	At the planning stage
23	Al Wasel	530	At the planning stage

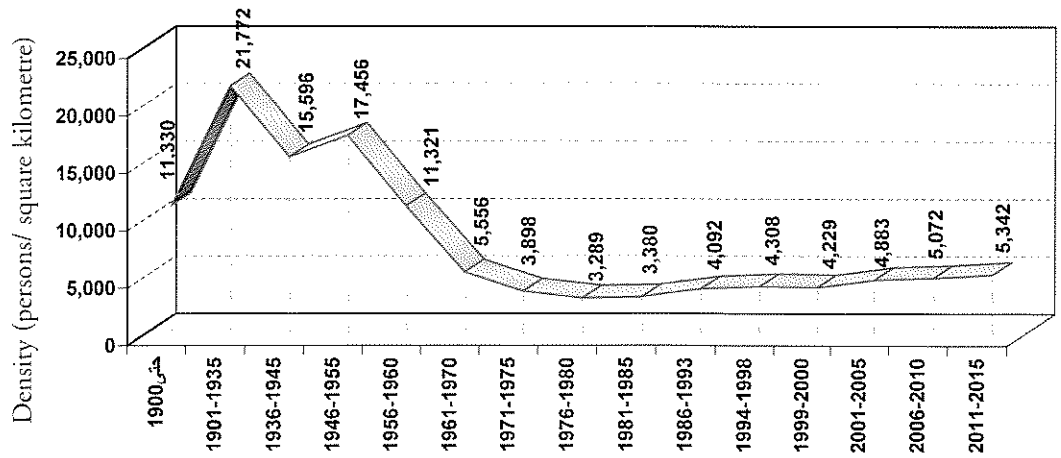
Total number of planned plots in the planning stage	44,373
Total number of plots distributed up to the end of 2001	21,853
Total number of undistributed plots	22,520

A review of the history of the building of Dubai indicates that in 1900, the total built-up area was only around 0.2 sq. km. By 2000, it had risen to over 204 sq. km. and by 2015 is expected to reach 387 sq. km., as shown in Table 5.

Table No. 5. growth of built-up areas and population in the Emirate of Dubai, 1900 – 2015

Period	Area developed in square kilometres	Population	Density: person/square kilometre
Up to 1900	0.2	2,266	11,330
1901-1935	0.8	17,418	21,772
1936-1945	2	31,192	15,596
1946-1955	3.2	55,858	17,456
1956-1960	5.3	60,000	11,321
1961-1970	18	100,000	5,556
1971-1975	47	183,187	3,898
1976-1980	84	276,300	3,289
1981-1985	109.7	370,788	3,380
1986-1993	149.3	610,926	4,092
1994-1998	187.8	809,061	4,308
1999-2000	203.9	862,387	4,229
2001-2005	244.3	1,192,866	4,883
2006-2010	309.1	1,567,890	5,072
2011-2015	386.7	2,065,788	5,342

Development of population density in built-up areas of the Emirate of Dubai, 1900 – 2015 (persons/sq. km.)



As shown in the previous table, by 1960, the built-up area amounted to 5.3 sq. km. By 1980, this had risen to 84 sq. km., an annual rate of increase of 14.8 per cent. By 2002, it had reached 220 sq. km., an annual rate of increase of 4.5 per cent compared to 1980.

During the years 1998 – 2002, the rate of urban growth was 3.2 per cent a year, with average annual population growth over the same period amounting to 6.3 per cent.

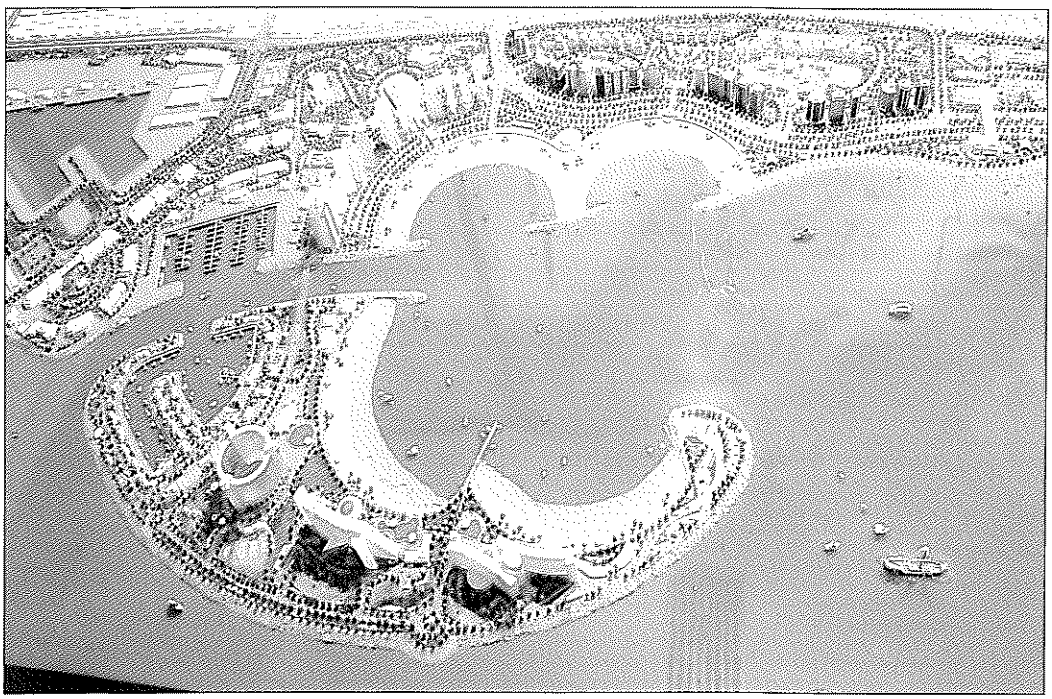
The growth in construction and the large increase in the amount of built-up land are among the key results of the process of urbanisation which has transformed Dubai from a coastal town dependent on fishing to a centre of business for the entire Middle East, within a space of no more than twenty years.

From 1986 until 2002, a number of major projects were completed and numerous detailed plans and studies were carried out, to contribute to this process of growth. Among these were:

- The Comprehensive Development Plan for the Emirate of Dubai 1986.
- The Structural Plan for Urban Dubai (1993 – 2015) - 'Future aspirations for Dubai'
- Studying the needs of industrial areas.
- The Dubai Investment City.
- Implementation, in stages, of the Housing Plan.
- Proposed plan for the expansion of the Ra's al-Khor Industrial Area.
- Plan for the Vegetable and Fruit Market.
- Storage of cars for the Ports and Customs Department
- Establishment of the Second-hand Car Market
- The Al-Jadaf Project.
- The project for the development of Al-Deira Corniche.
- The Development Plan for Hatta.
- The Five Year Plan for the Municipality's suggested services up to 2005.
- The suggested road network for 2000, 2005 and 2015.
- Stages of implementing the five year plan for general utilities.
- Recreation and wild life reserves.
- Specification of refuse backfill locations in Dubai.
- Nature Reserves in the Emirate of Dubai.

- Treatment of hazardous waste
- Specification of new locations for quarries and re-planning of areas after cessation of quarrying.
- The University City.
- Al Warqa residential project.
- Planning of Oud Al-Mateina area.
- Planning of al-Khawaneej area.
- Planning of the First Warsan area.
- Planning project for the Nad El Sheba and Umm Al Hassa residential areas.
- Planning for the Al Aweer rural area.
- Re-planning of general services in Shabiyat Al Qusais area
- A comprehensive system for planning land use within Dubai in order to achieve sustainable development.
- Study of the effects of strategic planning on land development policies in Dubai City.
- Structural Plan capacity for Dubai's urban areas.
- Construction development strategy for the Emirate of Dubai.
- Analysis of the present situation and evaluating the future requirements of the Civil Defence.
- Studies of the private and Government schools in the Emirate of Dubai.
- Studies of costs and revenues relating to roads.
- Studies on the effects of traffic
- A comprehensive study of transport in the Emirate of Dubai.
- A study for the expansion of Jebel Ali Free Zone.
- Provision of housing for Emiratis.
- The Environmental Report for the Emirate of Dubai.
- A study and evaluation of general services in Al-Mizher, Areas 1 & 2.
- A study of the general services requirements for Mirdif.
- Evaluation of primary health care services within Dubai's urban areas.
- Proposals for the development of therapeutic tourism in Dubai.

- Re-planning parts of the Al Mamzar and Al Nahda areas.
- Plan for equestrian schools in Al Khawaneej.
- A housing area for low income families in Oud Al Mateina.
- An initial study of the Jebel Ali coastline.
- A study of the Al Abraj area on Sheikh Zayed Road.
- Re-planning Al Khawaneej area and preparation of detailed plans.
- Re-planning of Al Nazwa residential area.
- Re-planning of Al Habab residential area.
- Planning of labourers' residential areas in Ra's al-Khor industrial area 3.
- Planning new industrial area in Hatta.
- Development of Al-Jumeira beaches.
- Engineering work in various parts of Dubai City.
- Engineering work in Al Barsha area south.
- Planning for Al Barsha area south.



Development of Deira Corniche, a part of plans for the future

Transactions completed by the Planning and Surveying Department, 1996 – 2002

Item	Unit of measurement	Total
Public Utilities	Number	34,909
Compensation	Number	4,569
Land amendment work	Number	1,190
Allocation of land for public utilities	Number	2,059
Allocation of industrial land	Number	6,248
Audit of survey maps	Number	41,679
Other industrial transactions	Number	2,384
Legislation forms	Number	9,397
Planning Statement Reports	Number	8,192
Review and audit of building applications by the Building Licencing Committee	Number	49,312
Number of follow up/continuation licences completed by the planning representative from the Economic Develop. Office	Number	180,851
Number of posters	Number	23,770
Number of designs	Number	1,595
Number of three-dimensional displays	Number	101
Number of jobs implemented in the advertisements workshop	Number	8,962
Number of jobs implemented outside the advertisements workshop.	Number	3,811
Number of points read in detailed topographical surveys	Number	469,286
Length of Travosat	Km.	11,978
Number of control points achieved in Travosat	Number	4,714
Length of lines within the balance network of control points (control point levels)	Km.	1,342
Satellite readings	Number	19,334
Number of height points	Number	20,235
Information request for survey control points	Number	7,256
Number of points for specifying road boundaries	Number	3,342
Number of survey control points created	Number	9,357
Maintenance of survey points	Number	37,296
Locating Landmarks	Number	21,254
Specifying the Qiblah (Direction of Mecca)	Number	302
Other Survey Work	Hour	12,540
Specifying Building Plots	Number	11,100
Building Plot Certificates	Number	16,429
Certificates of building plot review.	Number	6,602
Certificates of Completion	Number	10,131
Survey of farms	Number	1,242
Survey for issue of location maps	Number	3,261
Location visits	Number	795
Public Utilities	Km.	884
Planning Amendments	Km.	945
Number of location maps for residential and commercial use	Number	57,162

Source: Annual reports of the Planning and Surveying Department, 1996 – 2002

Contracts and Purchasing Department

The Contracts and Purchasing Department is one of the key departments of the Municipality, particularly in view of the rapid development of construction within the city and the Emirate as a whole. The success of any institution or organisation in carrying out its projects depends to a very considerable extent on the provision of successful administrative support and on its contracts procedures. This requires a proper development of strategies related to contracts, both those of a standard form and others.

The Contracts and Purchasing Department of the Dubai Municipality is the focal point in organising the relationship between external clients, represented by companies and individuals, and the internal clients represented by the various administrative units of the Municipality. As such, it is responsible for inviting tenders, signing contracts, choosing the best contractors and consultants and for avoiding disputes and disagreements on the interpretation of contracts.

It is also responsible for the whole process of preparing and evaluating tenders, for ensuring that the process of selecting winners is transparent and for the efficient administration of the negotiation process. The Dubai Municipality has earned a reputation for high efficiency in terms of inviting tenders and awarding contracts, a reputation of considerable importance, given the fact that many of the contracts are worth billions of dirhams. It is worthy of note that there have been no disputes between the Municipality and its contractors and suppliers, who have clearly developed full trust in the Municipality. Throughout its existence, and, most significantly, during the phase of rapid development from 1985 onwards, not a single complaint or allegation of unfair practice has been received.

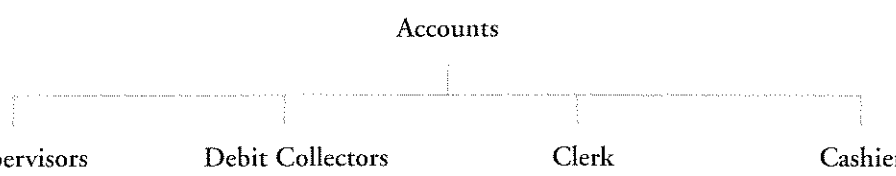
The Department is also responsible for issuing of and storage of all goods and items required by the Municipality's various units, including equipment and machinery.

Looking ahead, the importance of the Municipality is likely to increase because of the introduction of new laws relating to privatisation and, consequently, the creation of joint ventures with the private sector for carrying out new projects. This will require the development of new systems and procedures related to contracts that are in accordance with international best practice and the development of e-commerce.

Development of the Contracts and Purchasing Department

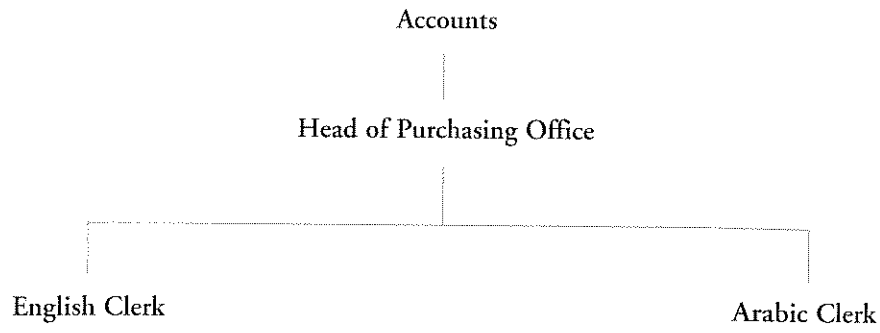
In the early years of the Municipality's existence, the purchasing process was very limited and simple. The task of handling purchases was allocated from time to time to individuals who lacked any specialist knowledge, with a clerk from the Accounts Office being placed in charge of the process, as shown in Chart No. 1.

Chart No. 1. Organisation Chart for the Accounts Office when established in 1957



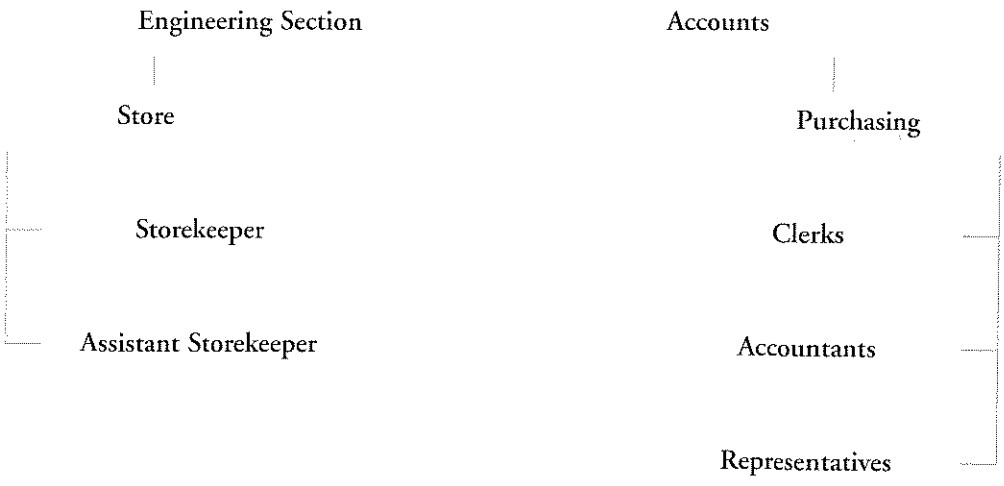
The subsequent development of the Municipality and the expansion of its activities had a significant effect, naturally, on the amount and the diversity of the purchasing that was undertaken, requiring the creation of a dedicated office for the purpose. In 1964, therefore, a Purchasing Office, affiliated to the Accounts Office, was established, with a head and two clerks, as shown in Chart No. 2. At this time, purchasing was only undertaken to cover immediate needs.

Chart No. 2. Organisation Chart for Accounts, 1964



Although the quantity of purchases increased, the expanding activities of the Municipality meant that shortages in some items began to appear. This was addressed by arranging for purchases of more items than were needed immediately, and a store became necessary. This was set up in 1969 and was affiliated to the Engineering Section. This formed the nucleus of today's Stores Section, and had, at the time, a storekeeper and an assistant storekeeper, as shown in Chart No. 3.

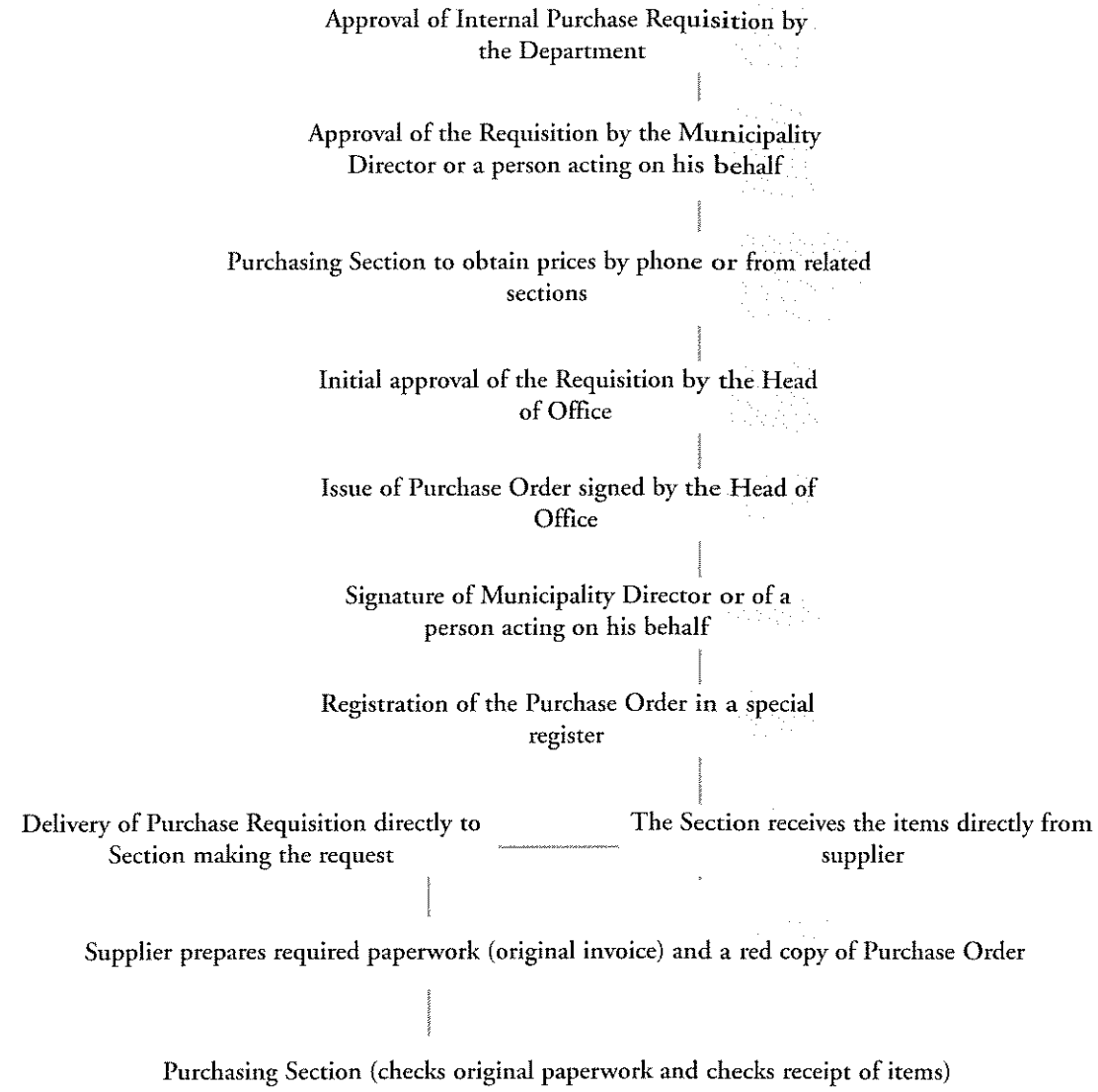
Chart No. 3. Organisation Chart for Accounts and Engineering Sections in 1971



In 1971, the status of the Purchasing Office was changed, it being raised to that of a Section, which remained affiliated to the Accounts Department. It was staffed by a Head of Section, clerks, sales representatives and accountants.

The process of purchasing also developed, with the introduction of more formal procedures. Special Purchasing Forms were designed and approved, while Internal Purchase Requisitions and Municipal Purchase Orders were also created for items needed, making a clear distinction between the party requesting items, the party responsible for purchasing and the party responsible for receiving them from the supplier.

The procedure then in place can be explained as follows:



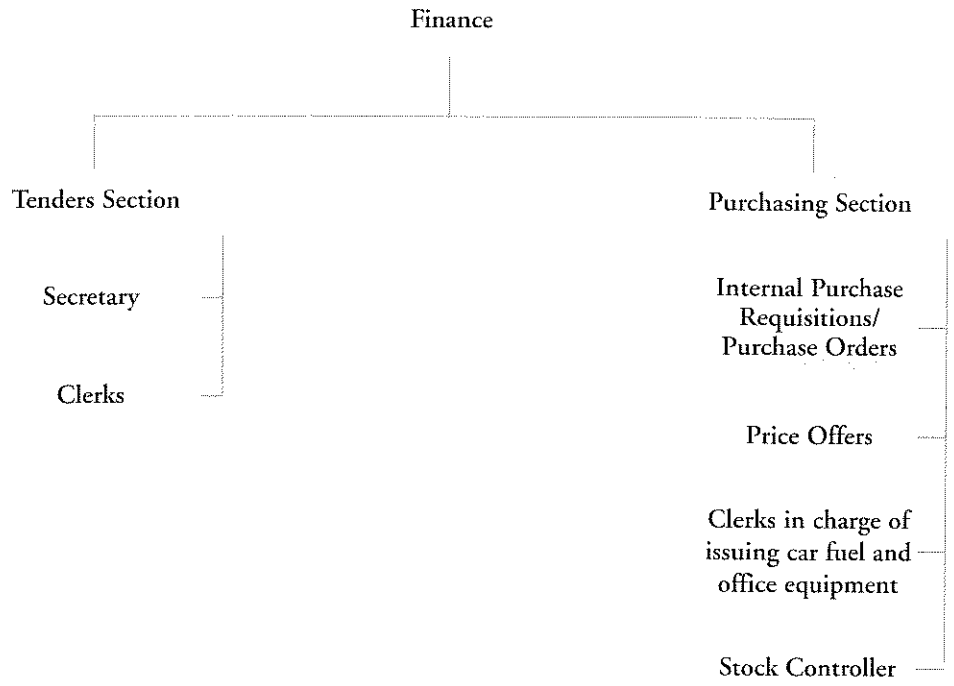
The following Administrative Orders defined the procedures to be followed:

- In 1974, Administrative Order No 65/1974 was issued in respect of controlling and organising the purchasing process, appointing one employee in each department to be responsible for the receipt of purchased items.
- In 1976, the Stores Section was moved to the Accounts Department by an Administrative Order which defined the authority relating to the approval of Purchase Orders as follows:

Maximum authority limits for approving Purchase Order amounts		
Head of Purchasing Office	Assistant Director General of Financial Affairs	Municipality Director and his Deputy
10,000 Dirhams	30,000 Dirhams	Above 30,000 Dirhams

In 1978, a major re-structuring of the Finance Department got under way. An office for Quantity Surveyors was established which was linked to the Engineering Section, and a Tenders and Contracts Section was also established, linked to the Finance Department. This was given the responsibility for inviting tenders and for organising contractual relationships with contractors and suppliers. This is illustrated in Chart No. 4.

Chart No. 4. Organisation Chart for Finance in 1978



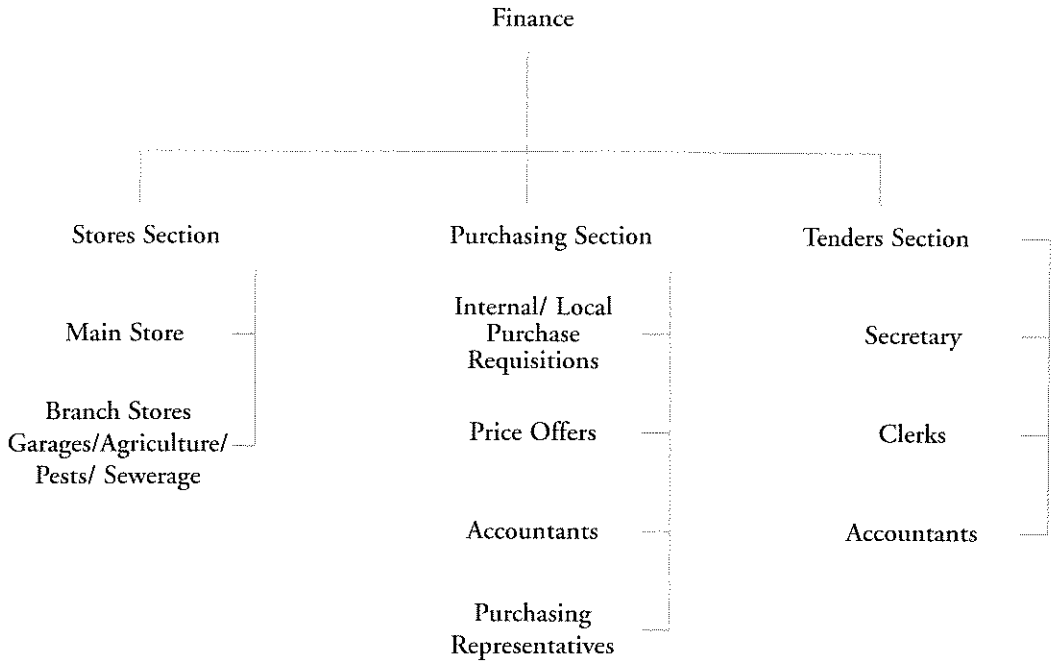
In 1979, another Administrative Order was issued to regulate the preliminary phase of purchase operations, laying down that no less than three quotations must be obtained, each of which must arrive in envelopes sealed with red wax.

On 13th September 1980, Administrative Order 103/1980 stipulated that compliance with the tenders and contracts law was mandatory. The Assistant Director of Financial Affairs was also given some of the authority to approve purchases that had previously been limited to the Director of the Municipality, notably a limit of Dh 50,000 for tenders and Dh 10,000 for direct purchases.

A Purchasing Committee was also established headed by the Assistant Director of Financial Affairs with the Head of the Accounts Section, the Head of the Purchasing Section, the Head of the Tenders Section and the Head of the Section concerned as members. This committee was given the task of making a weekly report on purchase requisitions to the Municipality Director for his approval, following which they were sent to the Financial Committee of the Municipality at the end of each month.

In 1985, the Stores Section, including the branch stores and the Quantity Surveying Section were transferred to the Finance Department. Numbers of employees in each section also increased, these changes being shown in Chart No. 5.

Chart No. 5. Organisation Chart for Finance in 1985



Establishment and Development of the Stores Section

The Stores Section was established in 1969. At the time, it was called the Engineering Store, and was part of the Engineering Section. The store itself was adjacent to the present Clinic and Medical Services Section near Al-Ittihad Square and consisted of a four-room building, in which used furniture, basic building materials and equipment for maintaining buildings and street lighting were stored.

Since there was no single body responsible for all stores, each section of the Municipality also began to establish its own stores, such as the Pest Control Store, part of the Pest Control Section, the Agriculture Store, the Roads Store, the Veterinary Store, the Health Store, the Stationery Store and the Confiscated Goods Store. All of these were subsequently integrated under the Stores Section.

Main Store

The nucleus of today's Al-Rashidiya Main Store was a cement store set up in 1971

In 1976, a Stores Controller, a Storekeeper and a number of labourers were appointed, while in 1980 additional storekeepers and assistants were added, making a total of six employers, besides the manual labourers.

Agriculture Store

This store was established in 1974 at an agricultural nursery in Hor Al-Anz , as part of the Agriculture Section.

Pest Control Store

Established in 1977 as part of the Pest Control Section, it had 3 rooms for the storage of insecticides, disinfectants and spare parts. It was located in the Engineering Equipment Stores, located in the present Municipality employees' car park. Storekeeping was rudimentary, extending only to a simple ledger.

Contracts and Purchasing, 1985 – 1995

The growing amount of Municipality work, along with the increase in the number of its various unit and employees, made it clear that there was a need for re-structuring of the contracts and purchasing procedure. This need was made more apparent because of the fact that there was an evident conflict between some of the Administrative Orders dealing with this work.

With the assistance of the United Nations Development Programme, therefore, studies were carried out that resulted in a number of suggestions for changes in working procedures as well as for the creation of a Contracts and Purchasing Department.

An initial step, on the administrative side, was the recruitment of Dr. Wael Bunni, an expert in financial disputes from the International Arbitration Committee. He was given the task of developing the Municipality's contracts and purchasing system and of preparing an internal 'white paper' on legal contracts. A committee was also formed to study costs and the nature of the existing co-ordination between the relevant organisational units, such as Tenders, Contracts, Purchasing, Stores and Quantity Surveying.

Among key results to emerge from this study was a decision to introduce the use of computers into the Purchasing and Stores Department in 1987. Among items produced on computers were all

Purchase Orders, price lists produced for the Purchasing Committee and statements relating to payments due to suppliers.

In the Stores Section, all items were entered on to a computerised database, being classified and coded according to international norms.

Receipts and Payments Vouchers were issued and recorded automatically, a major step forward in the organisation of Purchasing and Stores accounts. This new system also made it possible to produce reports with ease, something which had not previously been possible, this in turn serving as a first step towards both an expansion of the scope of work and a reduction of cost, as important parts of Department policy.

It also became possible to adopt unified procedures and computer systems in all stores and simplified the procedure of creating new stores in other departments. Thus the Stores Controller became responsible for the Al Rashidiya Store, the Spare Parts Store (Garage), the Pest Control Store, the Agriculture Store, at Hor al-Anz, and the Drainage Store, at Garhood.

The Stationery Store, the Confiscated Items Store and the Scrap Compound were placed under the supervision of Administrative Affairs, while the Property Store, for office and domestic furniture, was supervised by the Personnel Department.

On 6th February 1989, Administrative Order No. 50 was issued, providing for the establishment of a Department for Supplies and Contracts, to include the Purchasing, Stores, Tenders and Contracts and Cost Monitoring Sections, as shown in Chart No. 6. Later in the year, the name of the department was changed to the Contracts and Purchasing Department, under the terms of Administrative Directive No. 333 as illustrated in Chart No. 7.

Chart No. 6. Organisation Chart for Supplies and Contracts Department in 1989

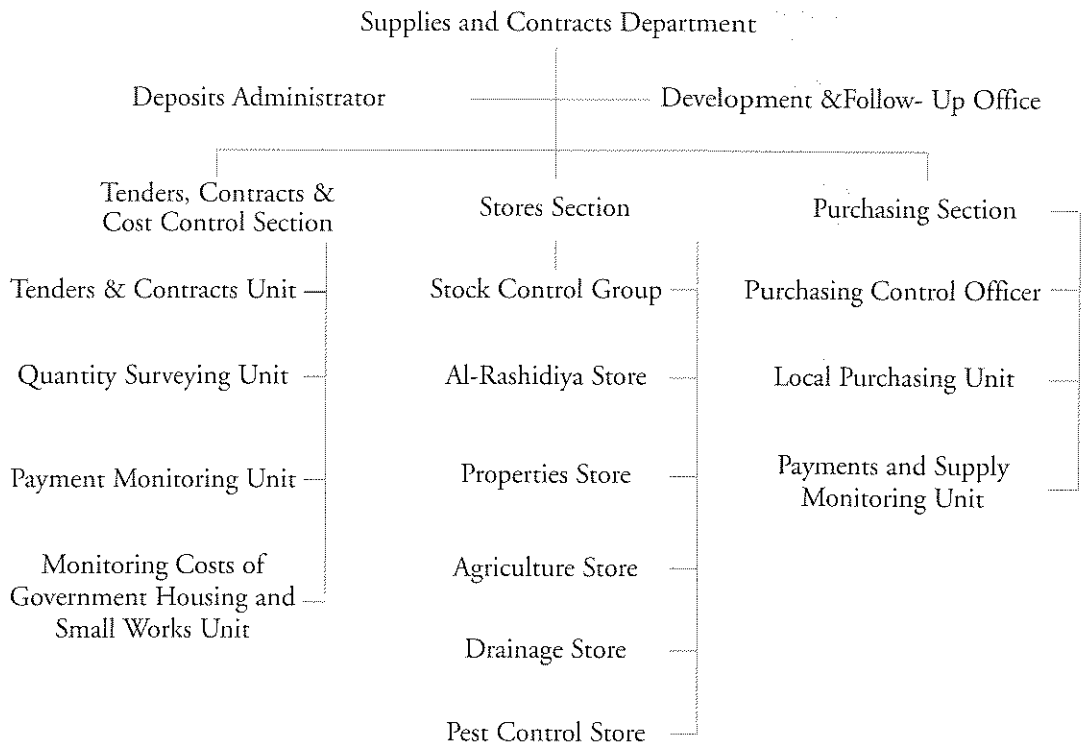
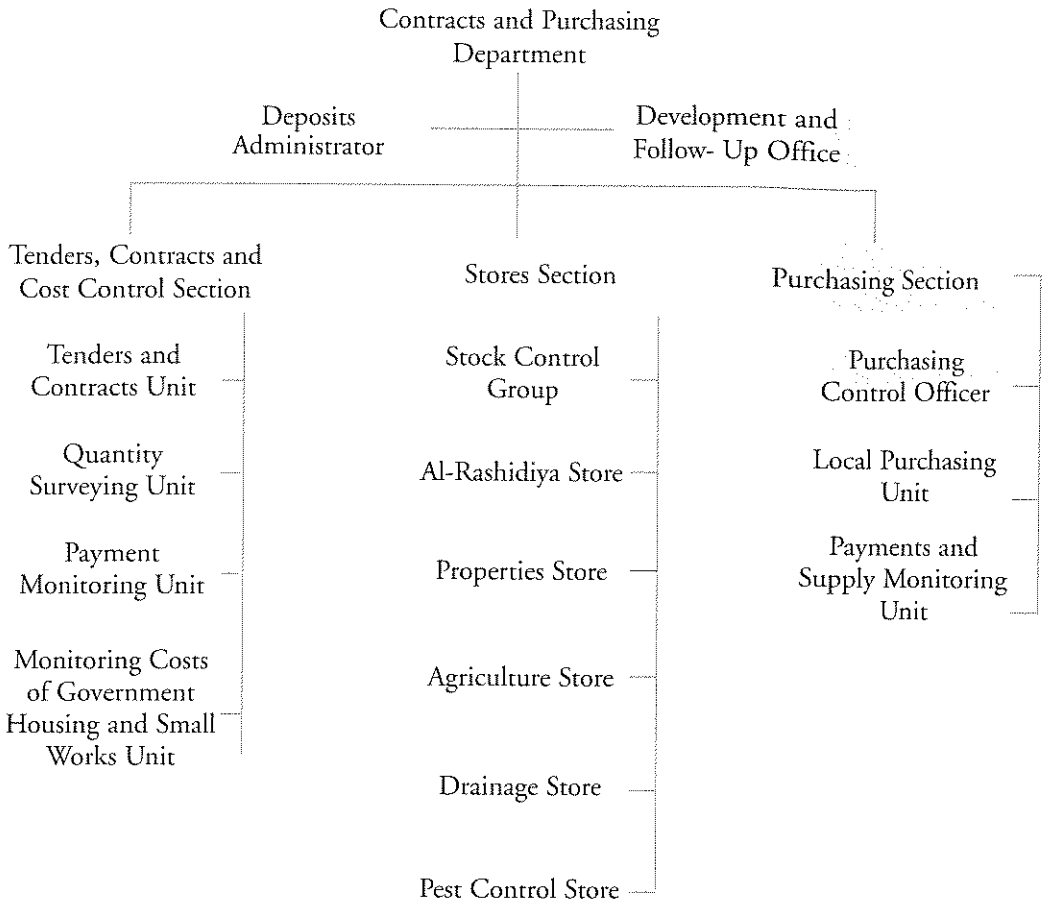


Chart No. 7. Organisation Chart for Contracts and Purchasing Department in1989



In 1990, the Provisions Section was added to the Department by Administrative Order No. 5 for 1990.

The changes in structure led to the introduction of a number of new practices. These included full documentation of work methods, proper co-ordination among the various units so as to address the issues of overlapping responsibilities and authorities and to clarify lines of communication, simplify procedures and unify the system of monitoring work performance. Other steps were taken on the allocation of work and associated costs while the first steps were also taken to introduce a real degree of Emiratisation, by allocating jobs and associated responsibilities to UAE citizens.

Third Transformation 1995 – 2000

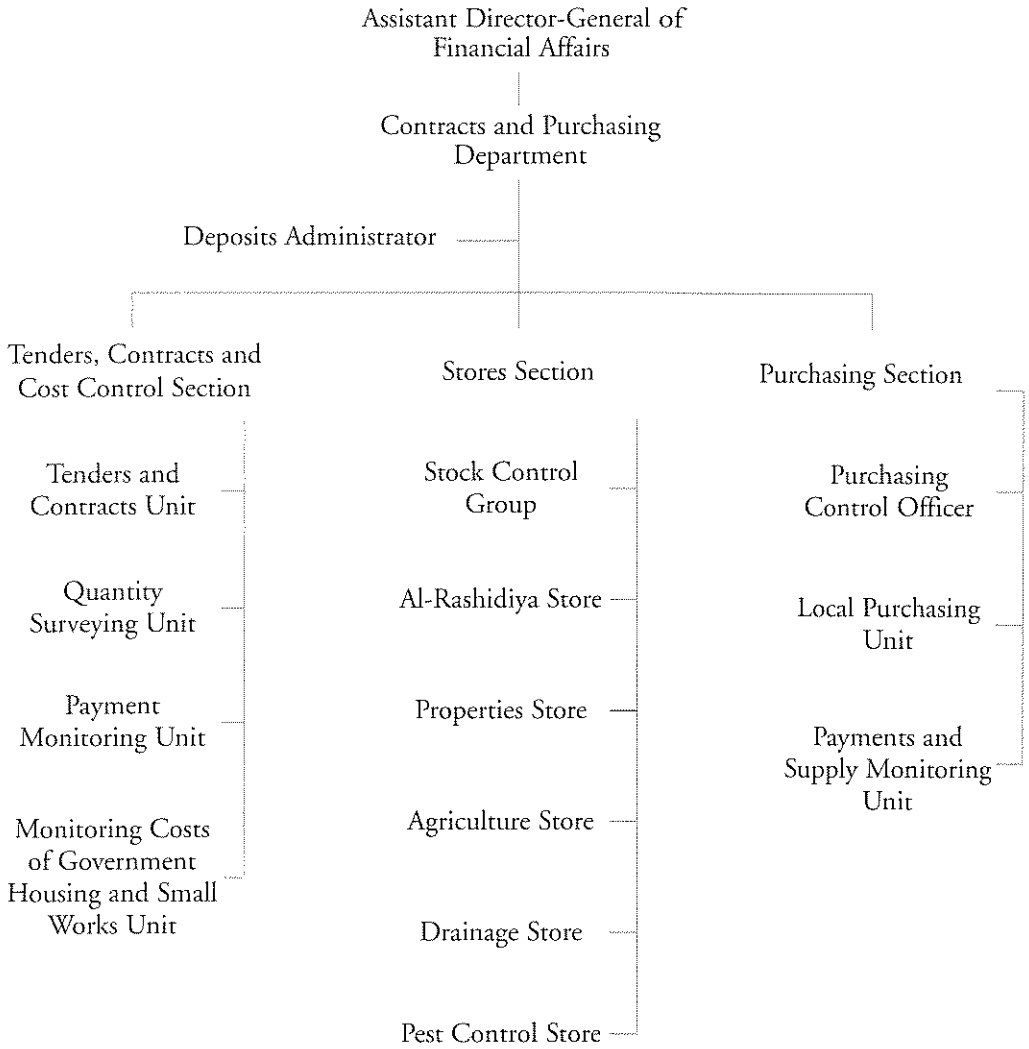
At the beginning of 1995, work began on a comprehensive study to update many of the services provided by the Department and to define the various levels of authority within the organisational units of the Contracts and Purchasing Department. The increased size and

number of projects being carried out by the Municipality, as well as the general increase in Municipality duties made it essential to improve the quality of the services offered to meet the expectations of customers both within and outside the organisation.

To achieve this, a number of new computer systems were introduced. These included the Engineering Projects System, the Purchasing System, the Stores System, the Fixed Assets System, the Financial Payments System, the Tenders System and the Electronic Archiving System.

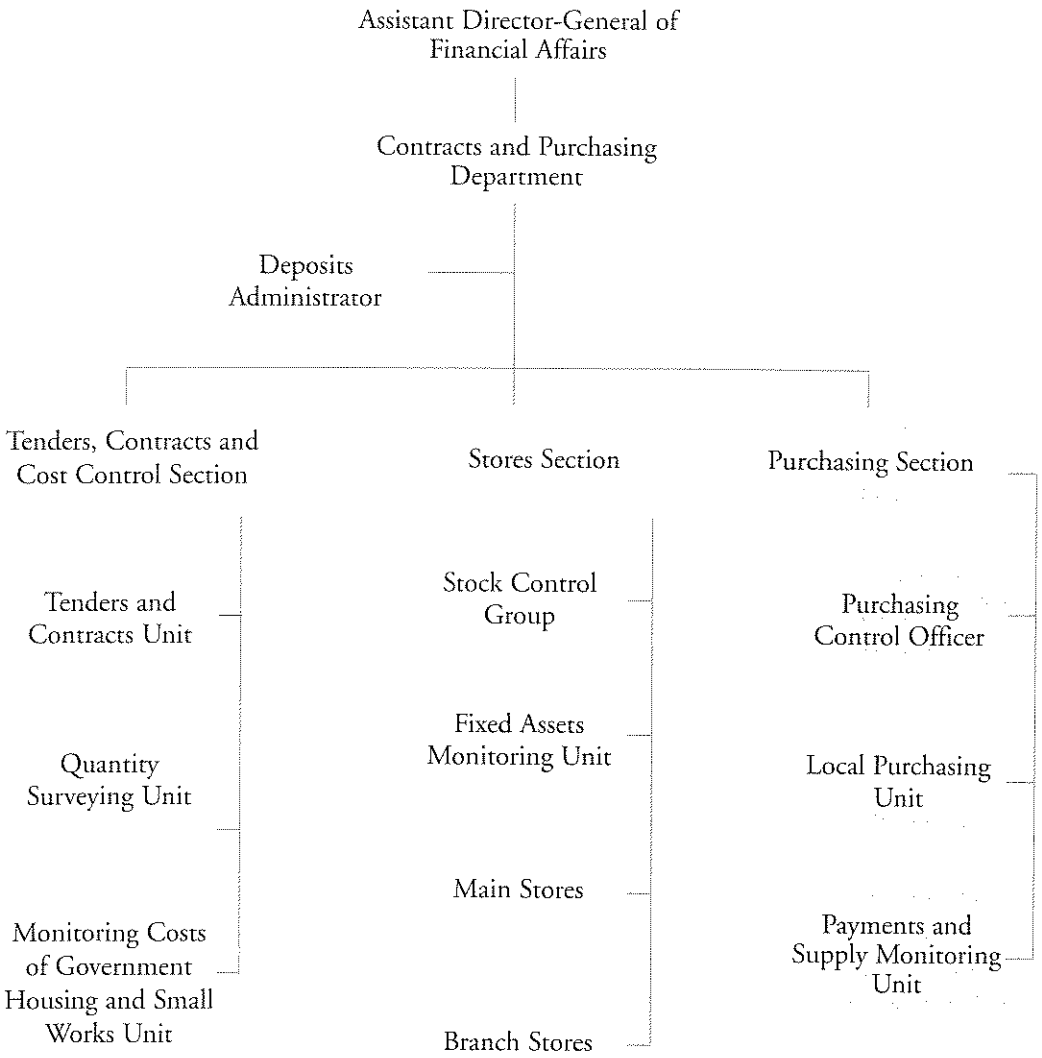
These were developed using the Department's own resources and in collaboration with the Information Technology Department. One key development was the establishment of a master database as a portal of entry, an important step forward in offering all services in such a way as to ensure that they were being undertaken in line with the requirements of the e-Government plan, as shown in Chart No. 8.

Chart No. 8. Organisation Chart for Contracts and Purchasing Department in 1995



In 1997, Law No. 6 was issued to organise the purchasing and contracts process for Government offices in the Emirate of Dubai. This was followed by the issuing of a number of Municipality Administrative Directives to lay down the framework for implementation of the Law. These required minor amendments to the Department's structure, which were made in 2000 in accordance with the terms of Administrative Directive No. 109, as shown in Chart No. 9.

Chart No. 9. Organisation Chart for the Contracts and Purchasing Department in 2000



A work procedures manual was also approved within the Contracts and Purchasing Department in 2001.

The Main duties and responsibilities of the Contracts and Purchasing Department and its affiliated sections

The Contracts and Purchasing Department is responsible for purchasing services, inviting tenders and entering into contracts in order to provide goods and materials for the Municipality according to the specifications required and in a cost-effective manner. It also undertakes quantity surveying, prepares documentation for Municipality tenders for small projects and organises special insurance services for all Municipality requirements.

Other responsibilities include the storage of materials in a proper manner and for monitoring the Municipality's fixed assets, as well as briefing of consultants and contractors working on Municipality projects.

Purchasing Section

The responsibilities of this Section include:

- Preparation and issuing of memoranda and local purchasing orders to obtain goods and materials from the local market.
- Issue of purchasing orders to obtain goods and materials from the external market, when such are approved on the basis of prevailing circumstances..
- Receiving price quotations and studying them.
- Auditing and correcting payments arising as a result of purchase orders.
- Carrying out wholesale purchases after collecting and consolidating requests from within the Municipality that permit such procedures.

Stores Section

The Stores Section is responsible for:

- Ensuring that the Municipality Stores and their contents are maintained in a correct and safe manner.
- Ensuring that the receipt and delivery of goods to the stores are carried out according to the relevant regulations and procedures.
- Arranging the sale of redundant and unused items by auction.
- Monitoring and following up on the Municipality's fixed assets.

Tenders, Contracts and Cost Control Section

This Section has the following responsibilities:

- Revision, announcement and issue of documentation for tenders.
- Revision of special contracts for Municipality projects related to materials and services.
- Revision of payment certificates and demands for payment and ensuring compliance with contract terms.
- Provision of internal quantity surveying services.
- Provision of effective services in respect of disputes arising from the implementation of projects.
- Revision of tenders presented for the Municipality's construction projects and compiling analysis reports.
- Briefing of contractors and consultants and re-evaluating them on a regular basis.

Development of computer systems in the Contracts and Purchasing Department

Stores System

The new stores system, with many new administrative and technical features, was implemented in August 1999 to replace the previous system, which had only a limited capacity and to take over its functions.

It was designed to complement the Municipality's policy of centralising the system, yet facilitating a decentralisation process that permitted the establishment of separate stores throughout the Municipality, whether main stores, parts stores or local, branch stores, as well as creating 'virtual warehouses', for stock control and monitoring of usage in all departments, sections and Units.

Simple procedures, like the WorkFlow process, coupled with an effective authorisation system and data security, allow the Stores Section to control the system fully in terms of setting up and granting permission for procedures such as establishment of a new store, adding a new user and designing new authorities.

The system has two levels of accounting, at the level of both the stores and the administrative units, allowing flexibility, while it is also designed to make it easy to expand the services offered to departments and sections and their affiliated units.

The stores system includes an item classification system and an enquiries process which is specific to the Stock Control Unit. This simplifies the process of monitoring stocks and making the necessary decisions with regard to the purchasing process.

Another feature is a Bin Location System which establishes and defines the stock available in each store and which is linked to the geographic information system, GIS.

A duplicate balance system incorporates an instant balance system, which has both an approval feature and a feature to cancel approvals, providing for flexibility in the case of mistakes, and also a system of balances carried forward.

Able to produce high quality reports, especially with regards to administrative information, the system is easily linked to other computer systems in place, such as the Purchasing System and the Vehicle Maintenance System, and has technical features that permit the establishment of effective inter-facing with other technologies such as those used in the archiving system and the bar code system.

Purchasing System

Implementation of the Purchasing System began in 1999. It has been of very considerable help in introducing the system of e-purchasing which was launched in 2001, permitting employees to request and receive authorisation electronically for purchase requirements and requisition orders.

The System is electronically linked to various Municipality sections, including the Stores Section, permitting purchasing requisitions to be prepared electronically and at a distance, a feature of particular importance, since the Municipality has a total of around 150 work locations, spread throughout the Emirate of Dubai.

People requesting an item fill in a form on their computer screens and transmit it

through the computer network to an employee authorised to give approval, following which it is forwarded to the Technical Department, if any technical items are required, and then on to the Stores Section. There the item is checked against the stock available. If it is not available, following the receipt of approval from the Stores System, the Purchasing Section reviews the request. Automated approval is then given by an authorised employee from the Contracts and Purchasing Department and the requisition is sent to specialised companies on the Municipality's list of registered suppliers, for quotations to be obtained. After these are received and opened, the requisition is then transferred by computer to the Budget Department, for a financial commitment to be made, following which a Purchase Order is issued, this, once again, being approved electronically.

Benefits of using the system

The system produced a number of major benefits for the work of the Department.

It was possible, for example, to reduce very substantially the amount of time required to audit purchase requisitions, since enquiries relating to the requisitions, prices, the purchase order, the statement number or document number could be made electronically.

The enhanced accuracy arising from the electronic method of creating, storing and checking information meant that there was a marked reduction in mistakes made due to human error while the use of paper was dramatically reduced, helping to implement the department's policy on this aspect of its work.

All data related to purchasing is now produced by a unified method and system, while the electronic form of storage not only increases efficiency but also reduces the amount of space required for paper files.

The simplicity of data retrieval by computer has also facilitated the production of reports, both in terms of speed and of accuracy, while less manual work is required in auditing and revision of documents.

The links established with the stores system made it easy to check the availability of items in stock while there were also cost savings since employees no longer needed to travel between their places of work and the department's offices such as the Stores Section and the Purchasing Section.

More generally, the system made it easy to collect information on purchases at Unit level within each department and helped the departments themselves to follow up on their purchases and to monitor their expenditure in relation to their budgets. The overall saving of the time and cost related to purchase requisitions proved to be beneficial throughout the Municipality, while the new system also made it easy, at every stage of a purchasing process, for requisitions to be returned to their initiators to provide information on whether they had been rejected, amended or approved.

Finally, the system was designed in such a way to make it easy to link it to the Internet.

Manpower and the Emiratisation of jobs

Between 1975 and 2002, the number of employees in the Contracts and Purchasing Department increased considerably, in line with the general growth of the Municipality's work and workforce. The graph below shows this expansion in manpower.

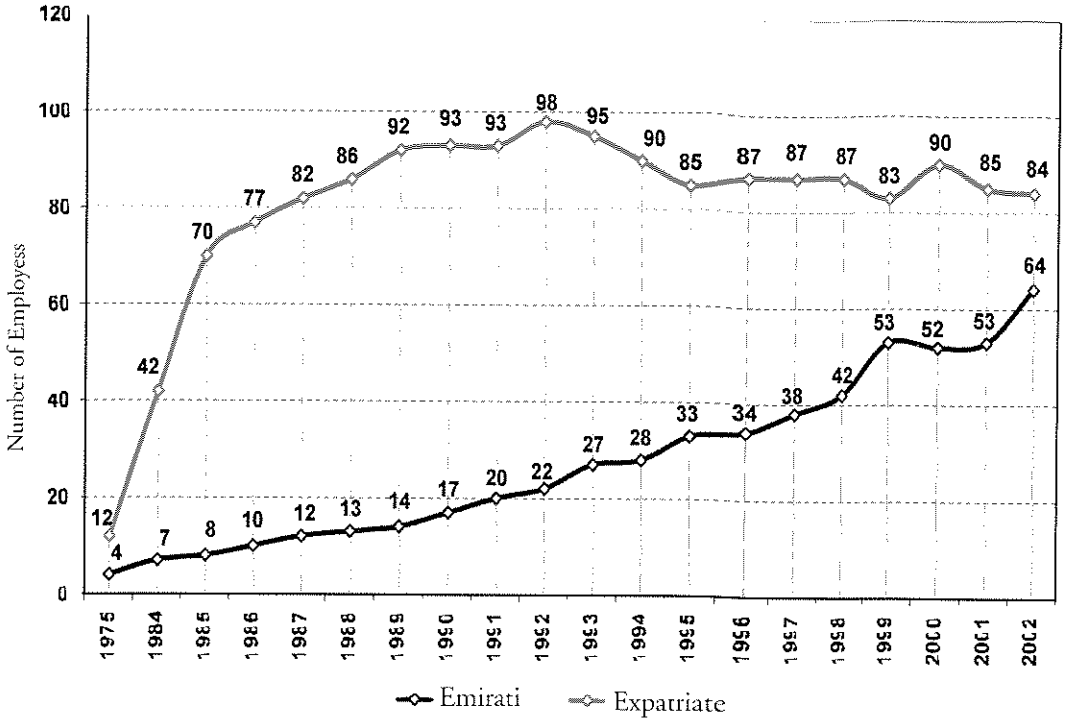
By 1999, the percentage of Emiratis in the Department had risen to 39 per cent, higher than the target. This has been achieved as a result of a special programme designed to train Emiratis in a number of fields where, in 1995, an Emiratisation programme had been difficult to implement because of the lack of trained personnel and because of the fact that there were no courses of higher education dealing with these particular fields. One such type of work was quantity surveying, and, to tackle this deficiency, the Municipality started a programme of training Emirati graduates in local quantity surveyors' offices. Successful discussions were also held with the Higher Colleges of Technology on the introduction of special courses while agreements were made to send Emirati students to study quantity surveying in several Australian universities.

The Contracts and Purchasing Department workforce in 1999, showing the percentage of Emiratisation

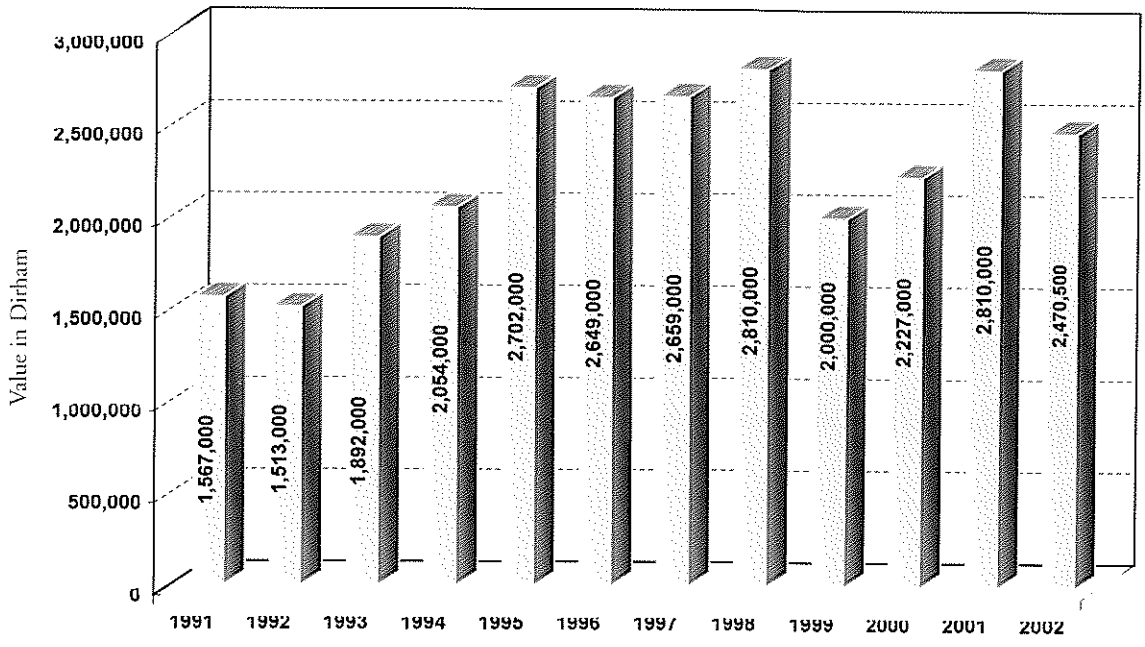
The Contracts and Purchasing Department workforce in 1999, showing the percentage of Emiratisation

Section	Emiratis	Expatriate	Total	Percentage of Emiratis
Contracts and Purchasing – Administration	8	4	12	67%
Purchasing Section	14	12	26	54%
Stores Section	18	50	68	26%
Tenders, Contracts and Cost Control Section	13	17	30	43%
Total	53	83	136	39%

Employees in the Contracts and Purchasing Department, 1975 – 2002



Value of properties insured, 1991 – 2002

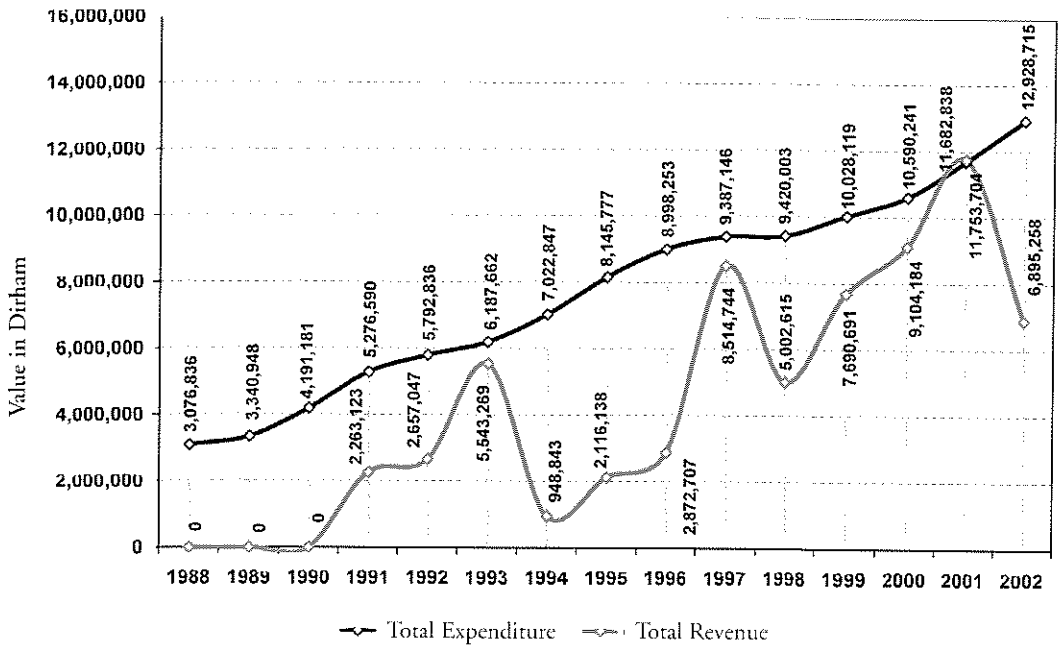


Expenditure and revenue for the Contracts and Purchasing Department, 1988 – 2002

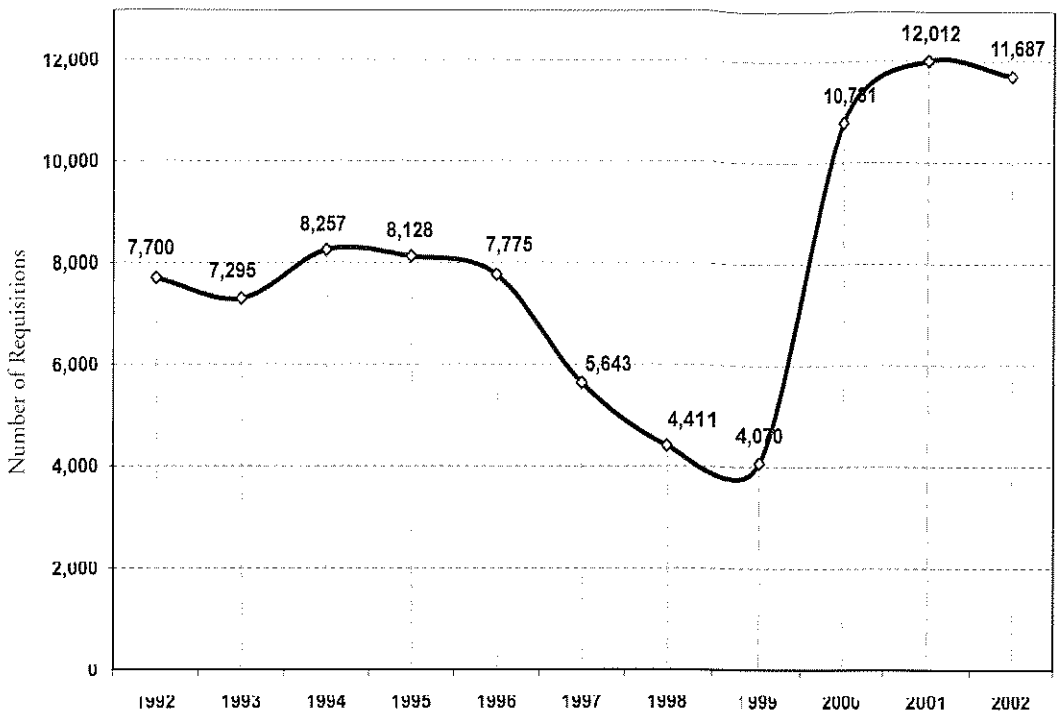
(in uae dirhams)

Year	Total Expenditure	Total Revenue
1988	3,076,836	0
1989	3,340,948	0
1990	4,191,181	0
1991	5,276,590	2,263,123
1992	5,792,836	2,657,047
1993	6,187,662	5,543,269
1994	7,022,847	948,843
1995	8,145,777	2,116,138
1996	8,998,253	2,872,707
1997	9,387,146	8,514,744
1998	9,420,003	5,002,615
1999	10,028,119	7,690,691
2000	10,590,241	9,104,184
2001	11,682,838	11,753,704
2002	12,928,715.91	6,895,258.39
Total	24,611,553.91	65,362,323.39

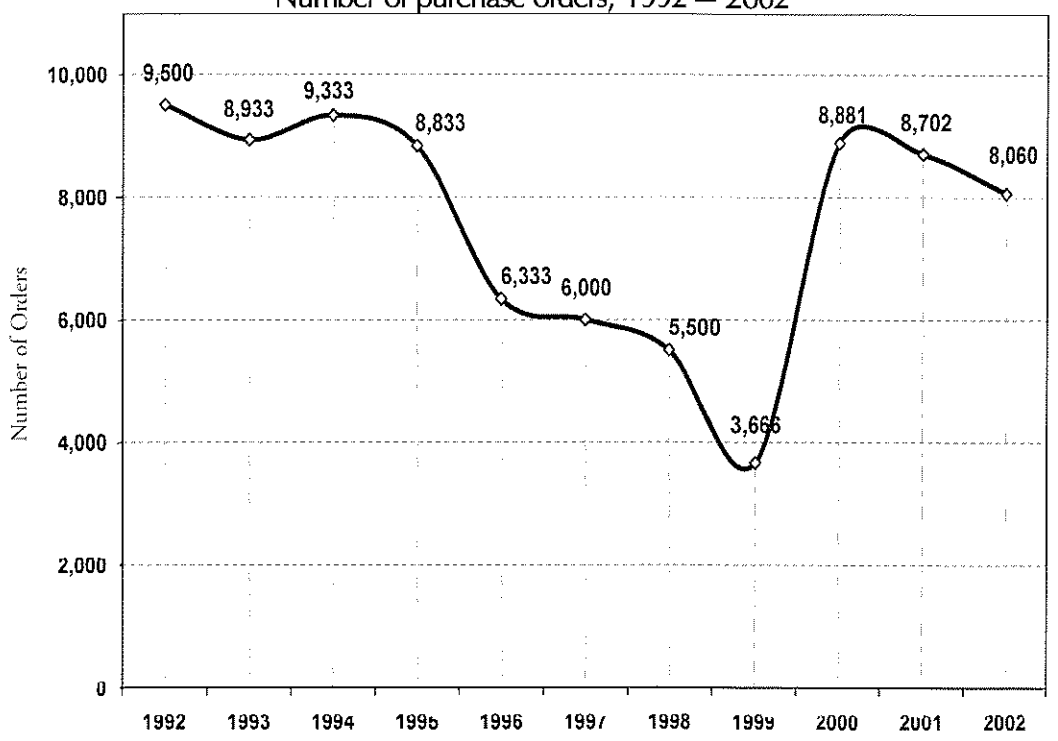
Expenditure and revenue in the Contracts and Purchasing Department, 1988 – 2002



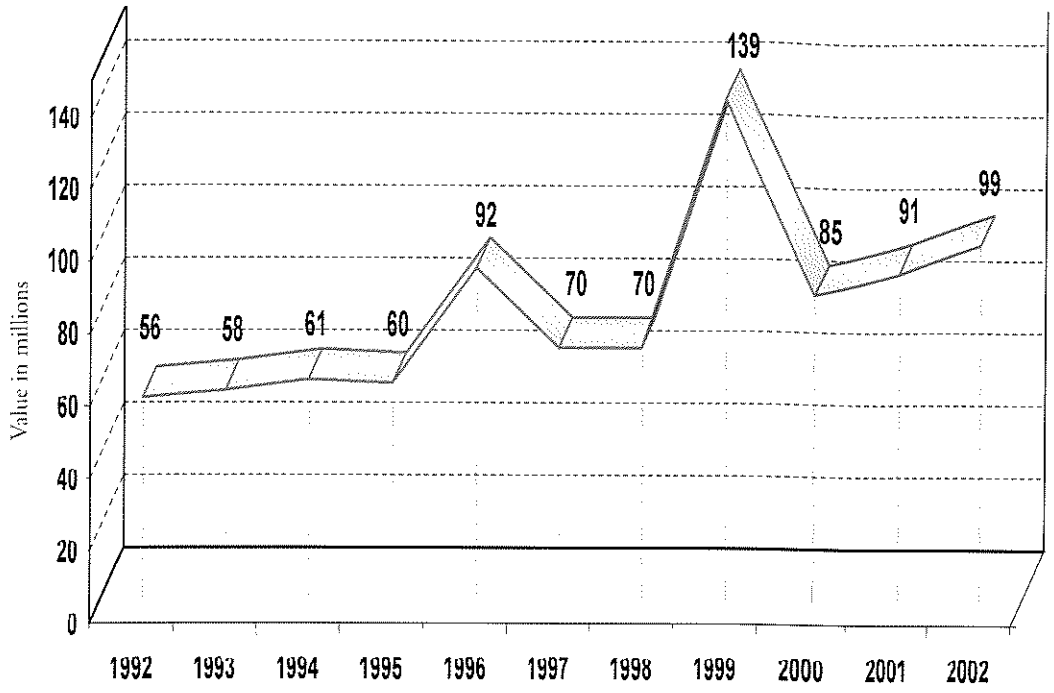
Number of purchase requisitions, 1992 – 2002



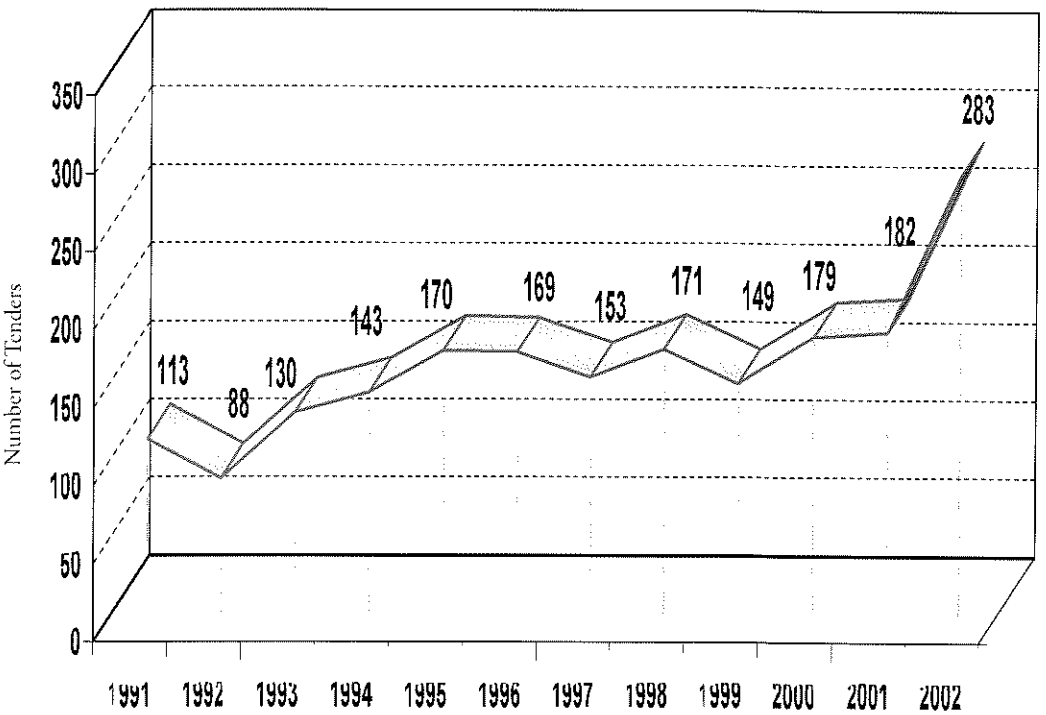
Number of purchase orders, 1992 – 2002



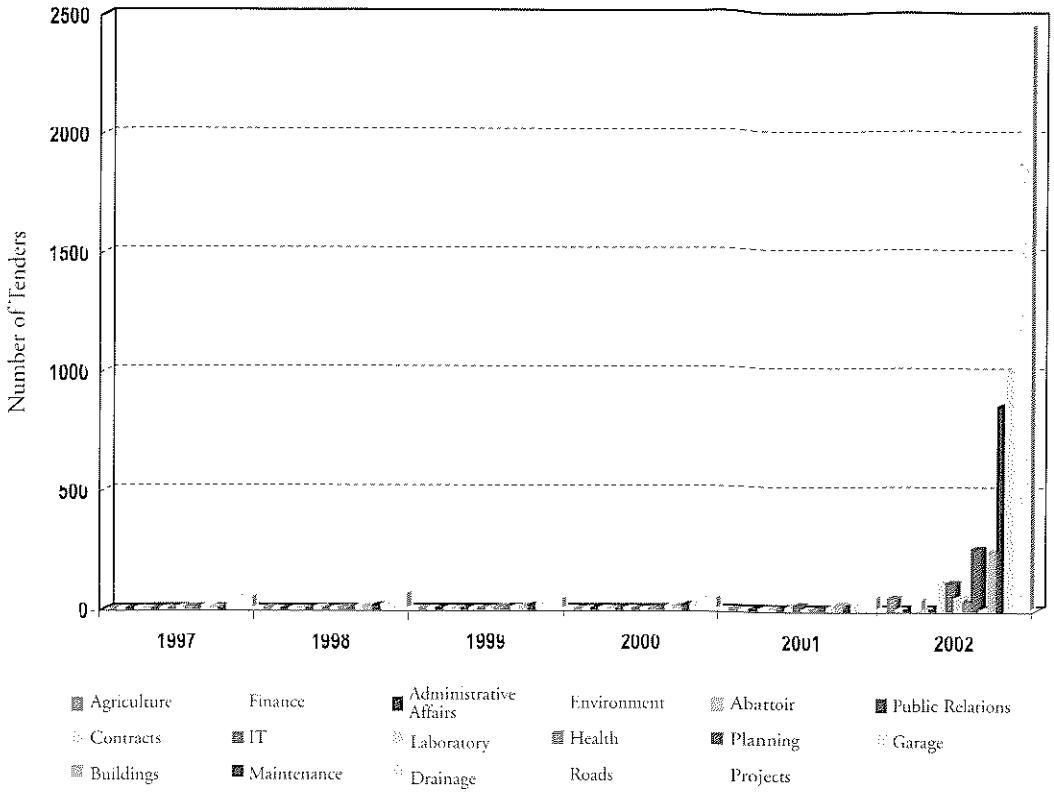
Value of purchase orders, 1992 – 2002



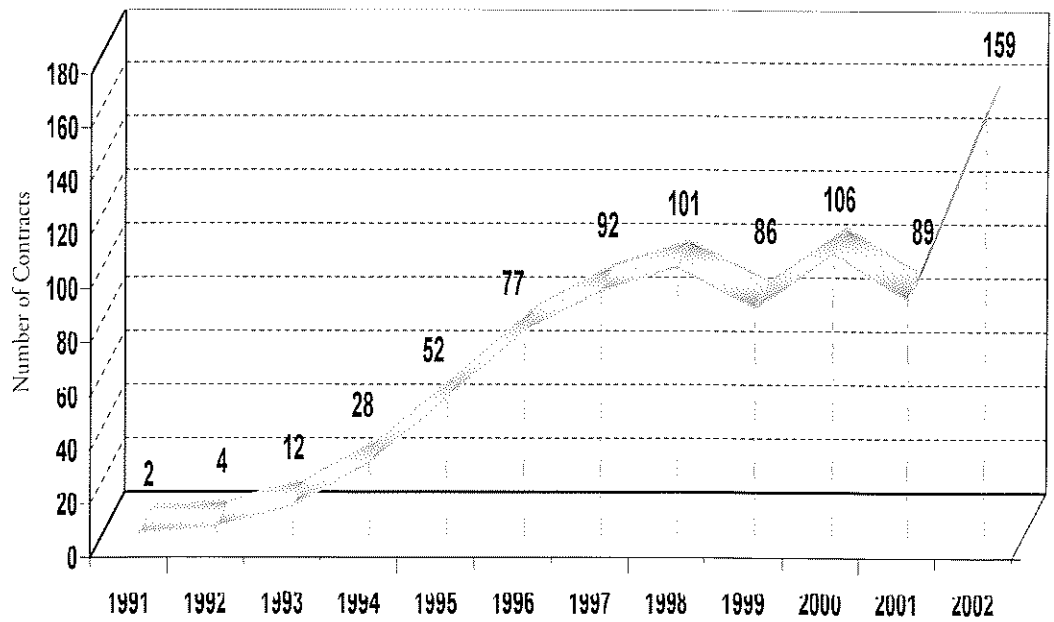
Number of tenders, 1991 – 2002



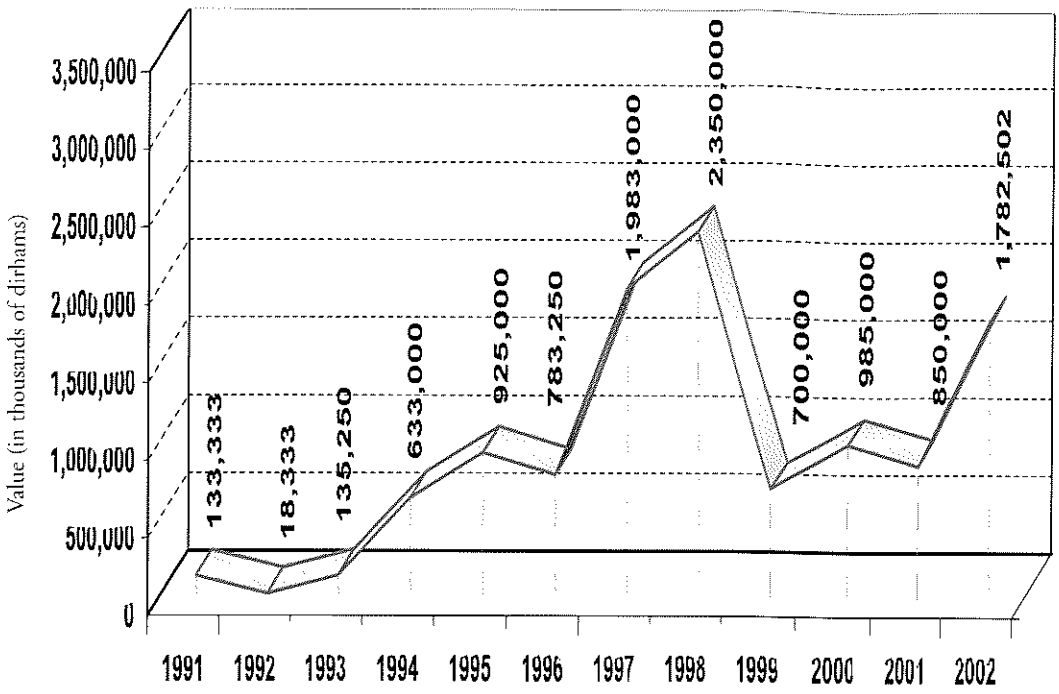
Number of tenders handled by the Department, 1987 – 2002



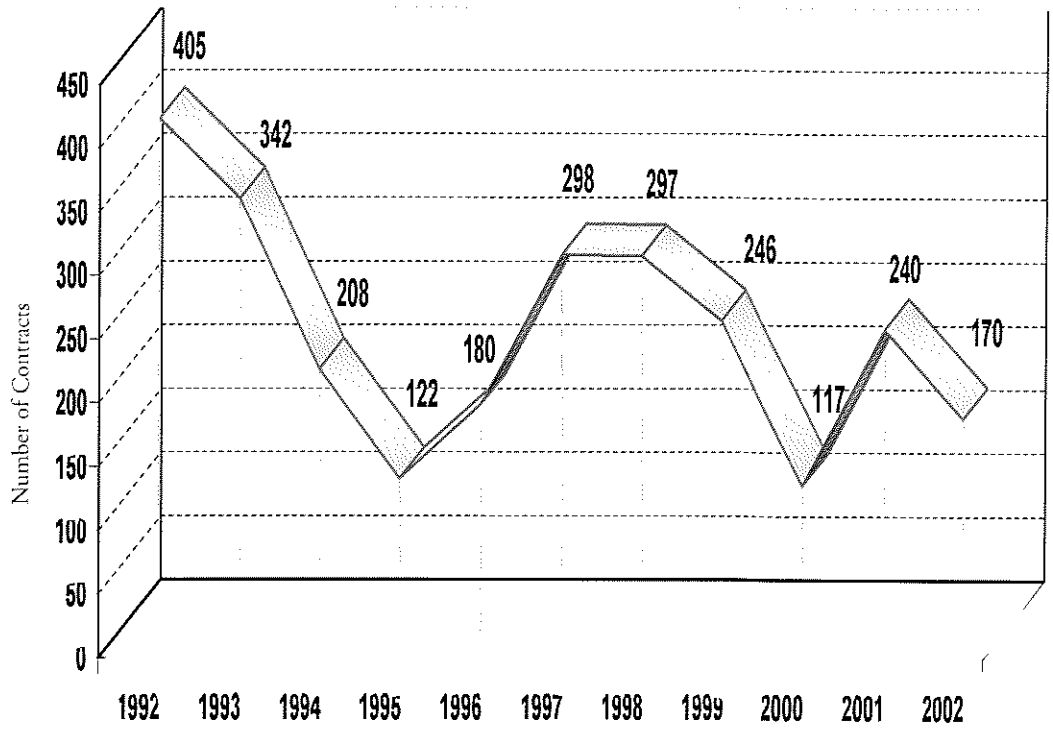
Number of contracts for construction projects, 1991 – 2002



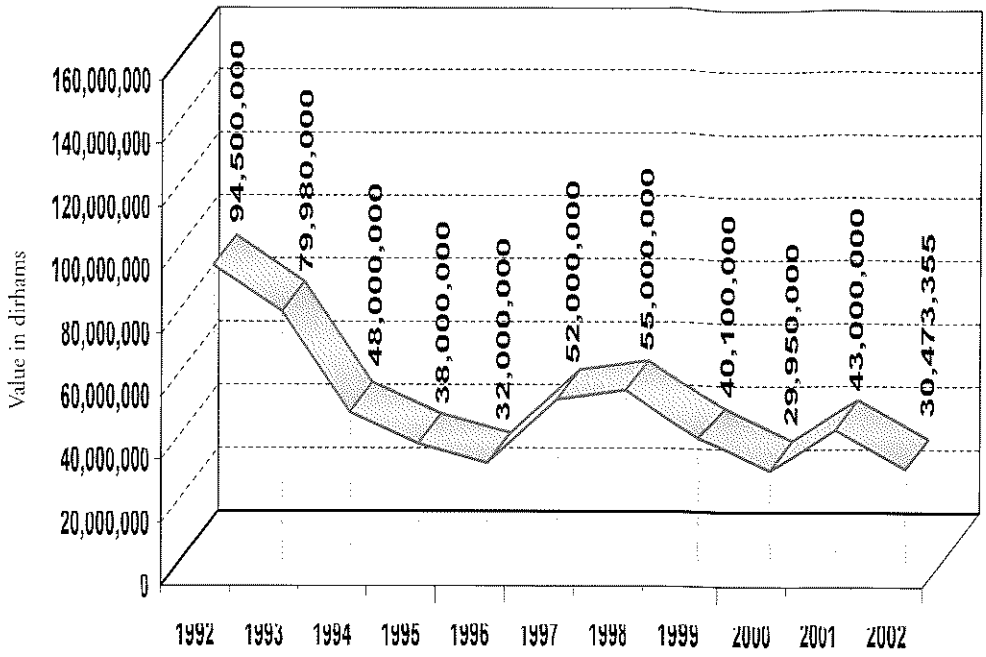
Value of construction projects, 1991 – 2002



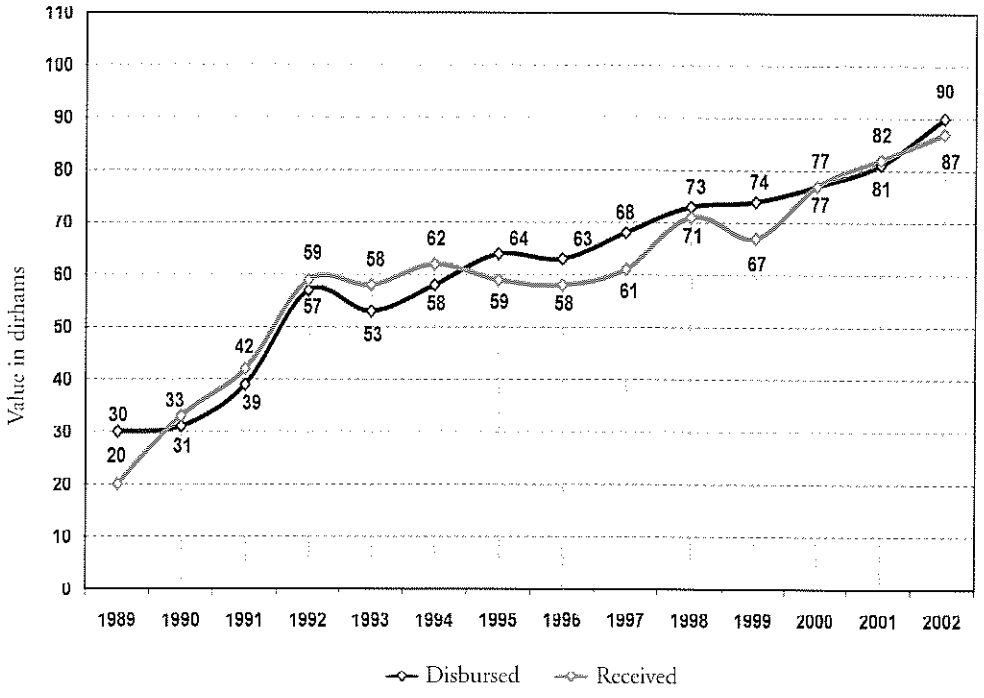
Number of Government housing contracts, 1992 – 2002



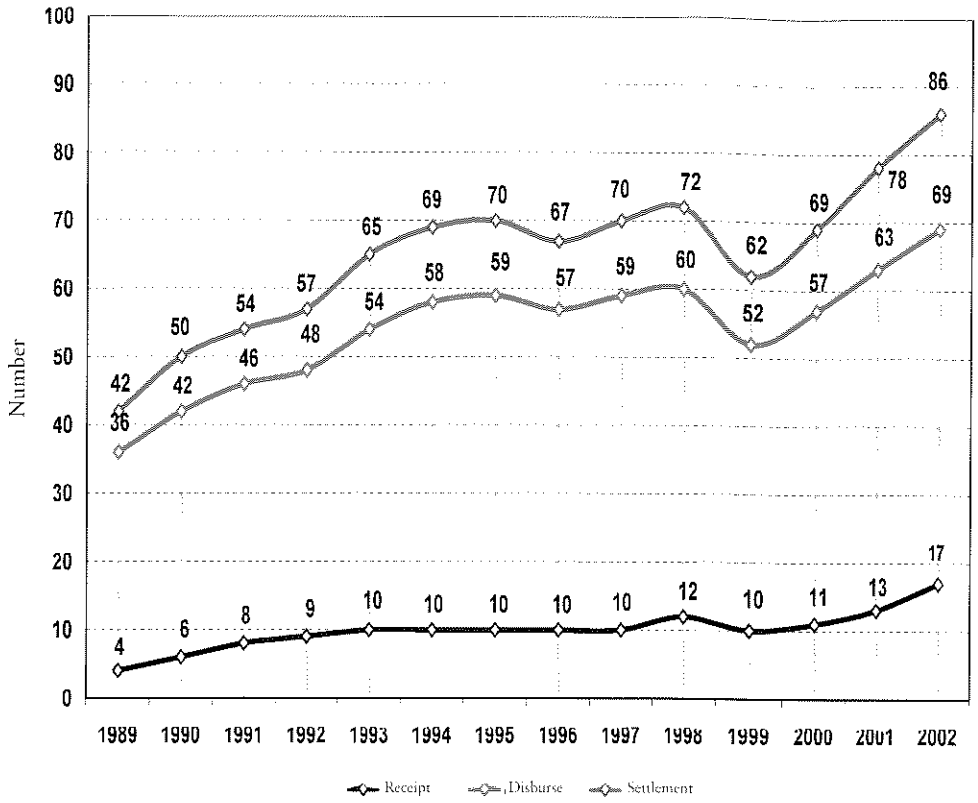
Value of Government housing contracts, 1992 – 2002



Value of received and disbursed items, 1989 – 2002



Stores movement, 1989 – 2002



Roads Department

Through its Roads Department, the Municipality is responsible for managing road projects in the Emirate of Dubai, in association with internationally-qualified consultants who directly oversee any work being undertaken by contractors.

Dubai's expanding road network provides the essential infrastructure upon which the Emirate's commercial and economic prosperity is based. Among the key features of this network are the three crossings of Dubai Creek, the Al-Maktoum and Garhoud bridges and the Shindagha underpass, which link Dubai and Deira, as well as the main arterial roads running through and around the city.

The first tarmac road to be constructed was Al-Saif road, adjoining the Creek on the Dubai side, which was built in 1960. This was followed by a number of other projects, including, importantly, the 450 metre-long Al-Maktoum bridge, built in 1964. In 1967, a number of tarmac roads were laid in the Al-Ra's and Burj an-Nahar areas, while street lighting was also introduced for the first time.

In 1975 the 560 metre long Shindagha two-way underpass was constructed under the Creek, while in 1976, the third crossing, the 600 metre long Garhoud Bridge was built.

Key components of the road network on both sides of the Creek include Al-Maktoum Street and Khalid ibn al-Walid street, linked to both Al Maktoum Bridge and the Shindagha underpass, thus providing for easy circulation of traffic, not only in the built-up areas but also connecting to areas where major construction is still in progress, such as Al-Shangha, Al-Ra's, Al-Fahidi, Al-Sabkha, Al-Karama and Al-Riqqa. This, in turn, helped to stimulate development in other areas, such as Port (Bur) Saeed, Hor Al-Anz and Al-Mateina in Deira and Al-Hamriyyah, Al-Jafiliah and Jumeirah in Bur Dubai.

In 1984, thanks to help from the United Nations Human Settlements Programme, the services of Dr. Farouk Khalifa as a Roads Consultant were obtained. He was first appointed as Head of the Roads Section, later becoming Consultant for the Roads Department between 1986 and 1988.

By the end of 2002, Dubai's road network extended to over 7,358 kilometres.

The origins of the Roads Department can be traced back to the establishment of the Engineering Section of the Municipality in 1960. The Roads Section was then created as one of its affiliates, coming under the Municipality's Chief Engineer.

As shown in Chart No. 1, this remained the case until 1987. Chart No. 2 shows the formal creation of the separate Roads Department, which took place in accordance with Administrative Directive No. 315, in 1990.

Between 1994 and 2002, there were several further amendments to the Organisation Chart, as shown in Charts Nos. 3, 4, 5 and 6.

Chart No. 1
Organisation Chart for the Roads Section in 1987

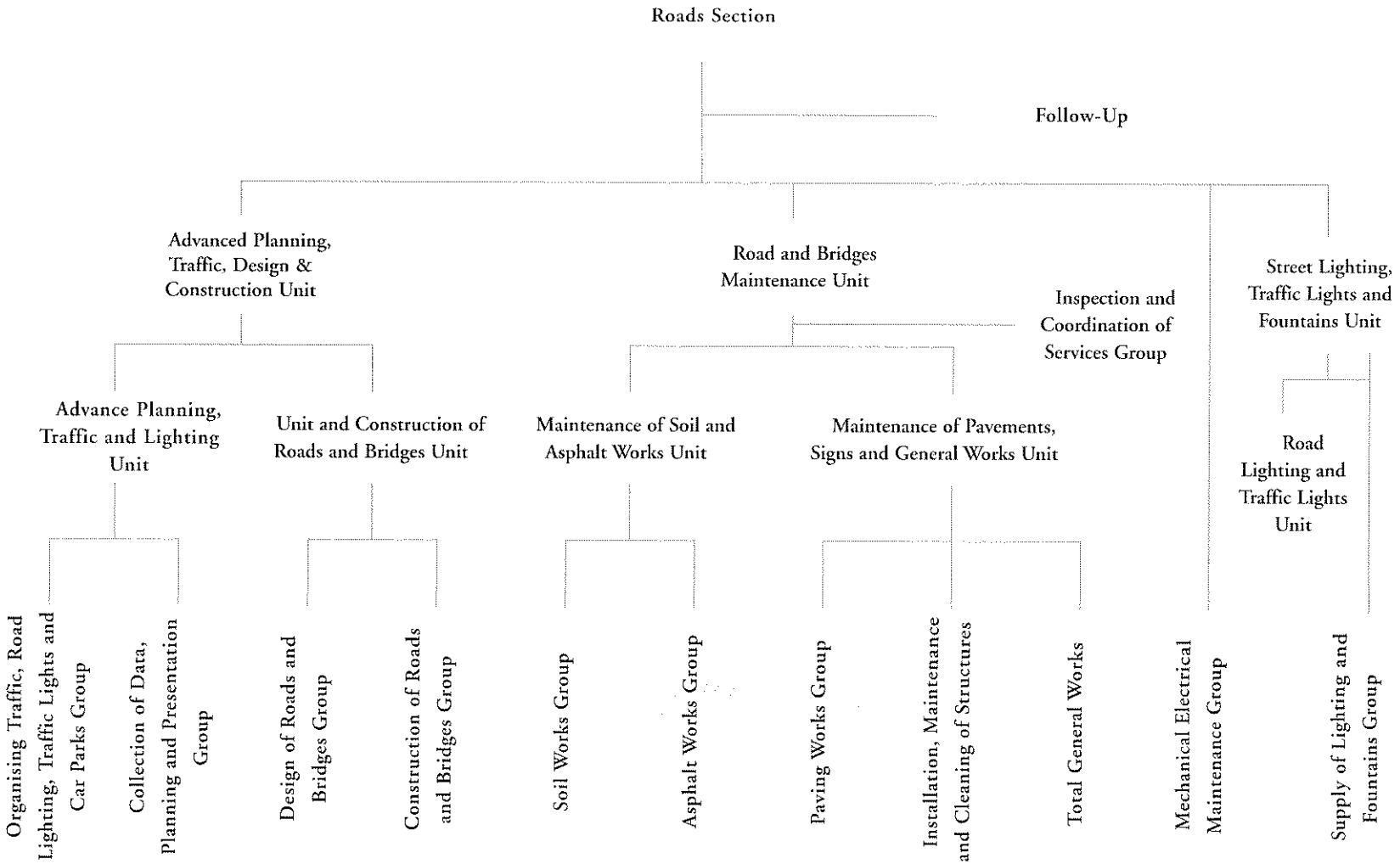


Chart No. 2
Organisation Chart for Roads Department in 1990

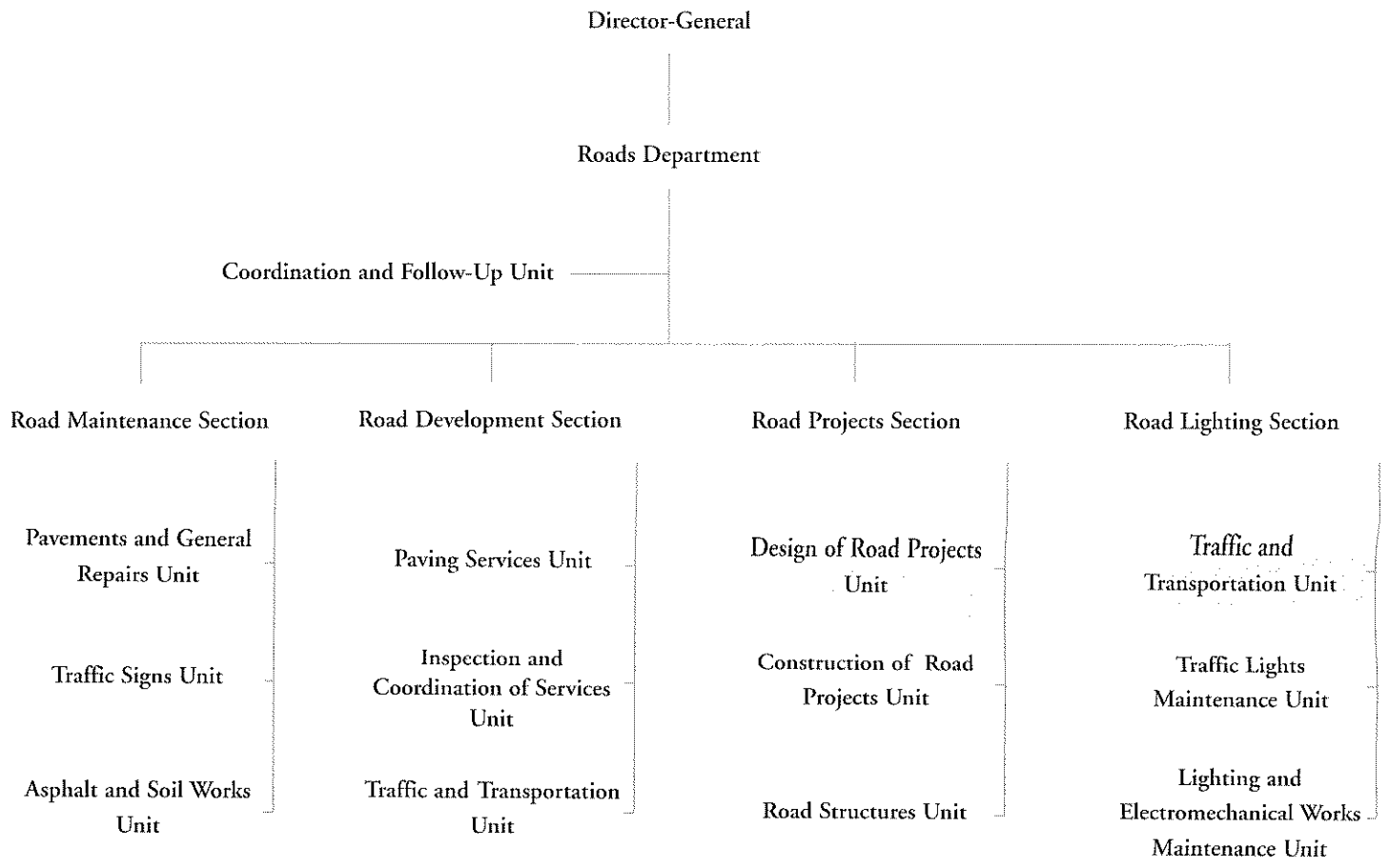


Chart No. 3
Organisation Chart for the Roads Department in 1994

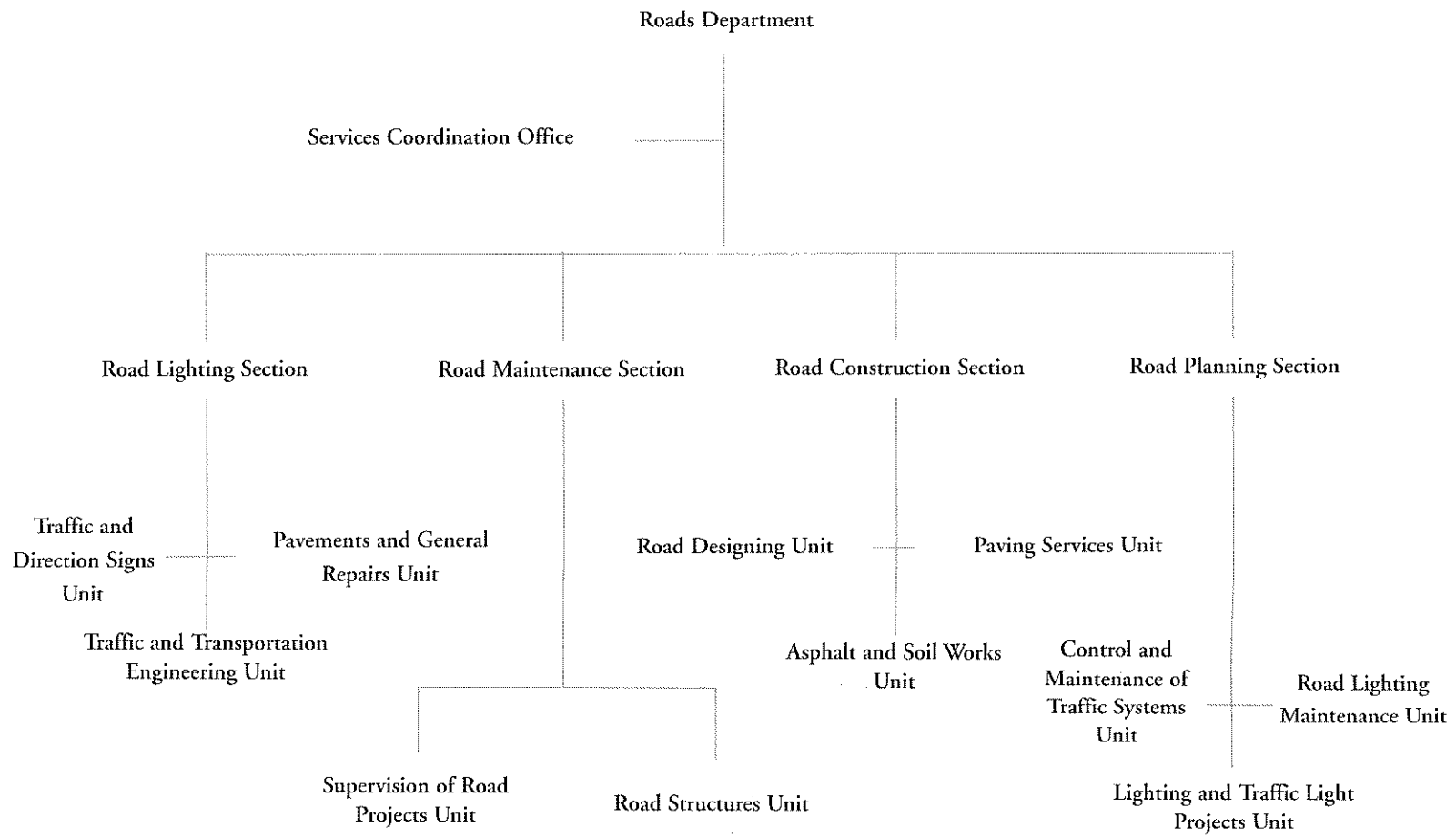


Chart No. 4
Organisation Chart for the Roads Department, December 1997

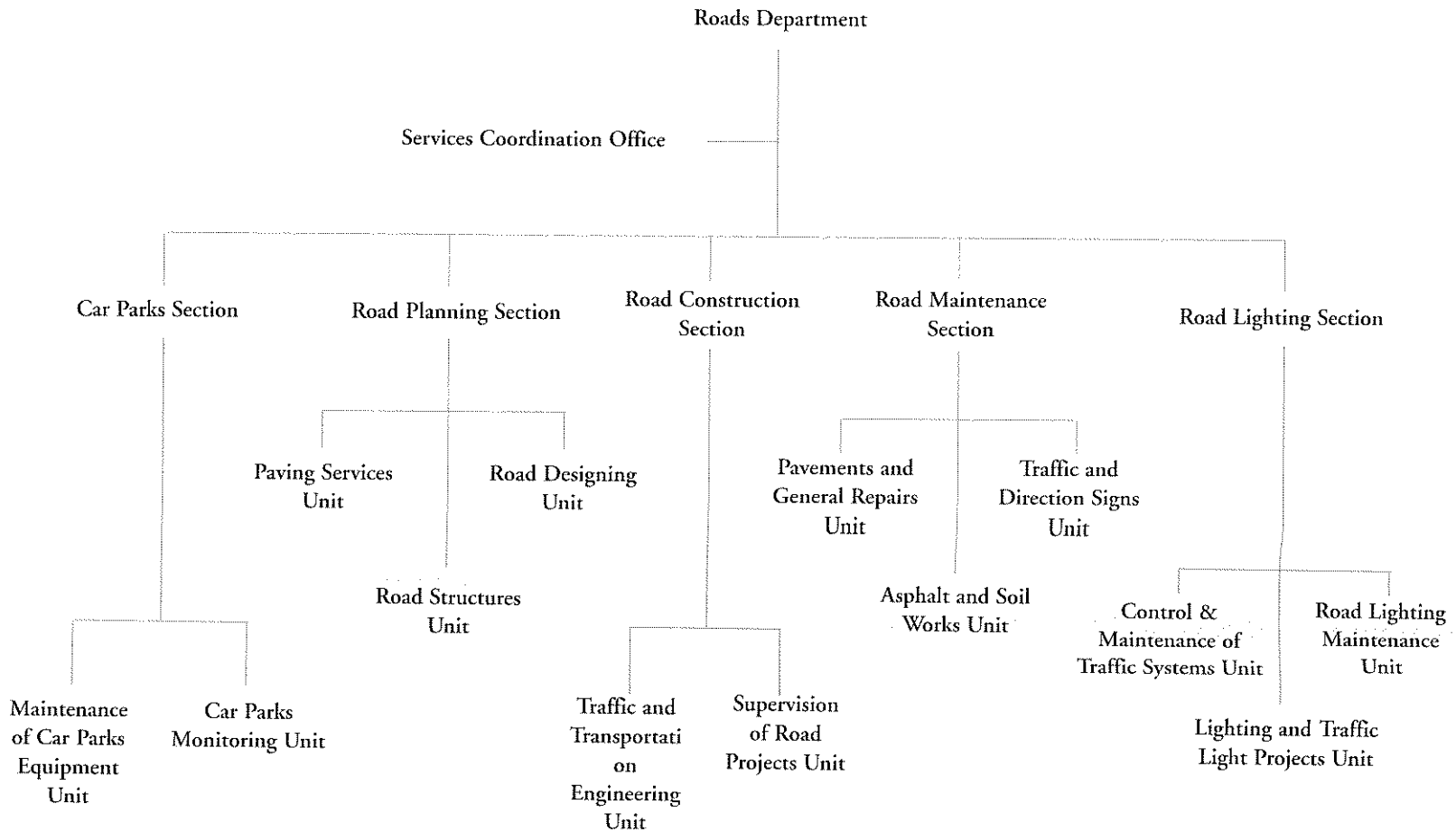


Chart No. 5
Organisation Chart for Roads Department, January 1999

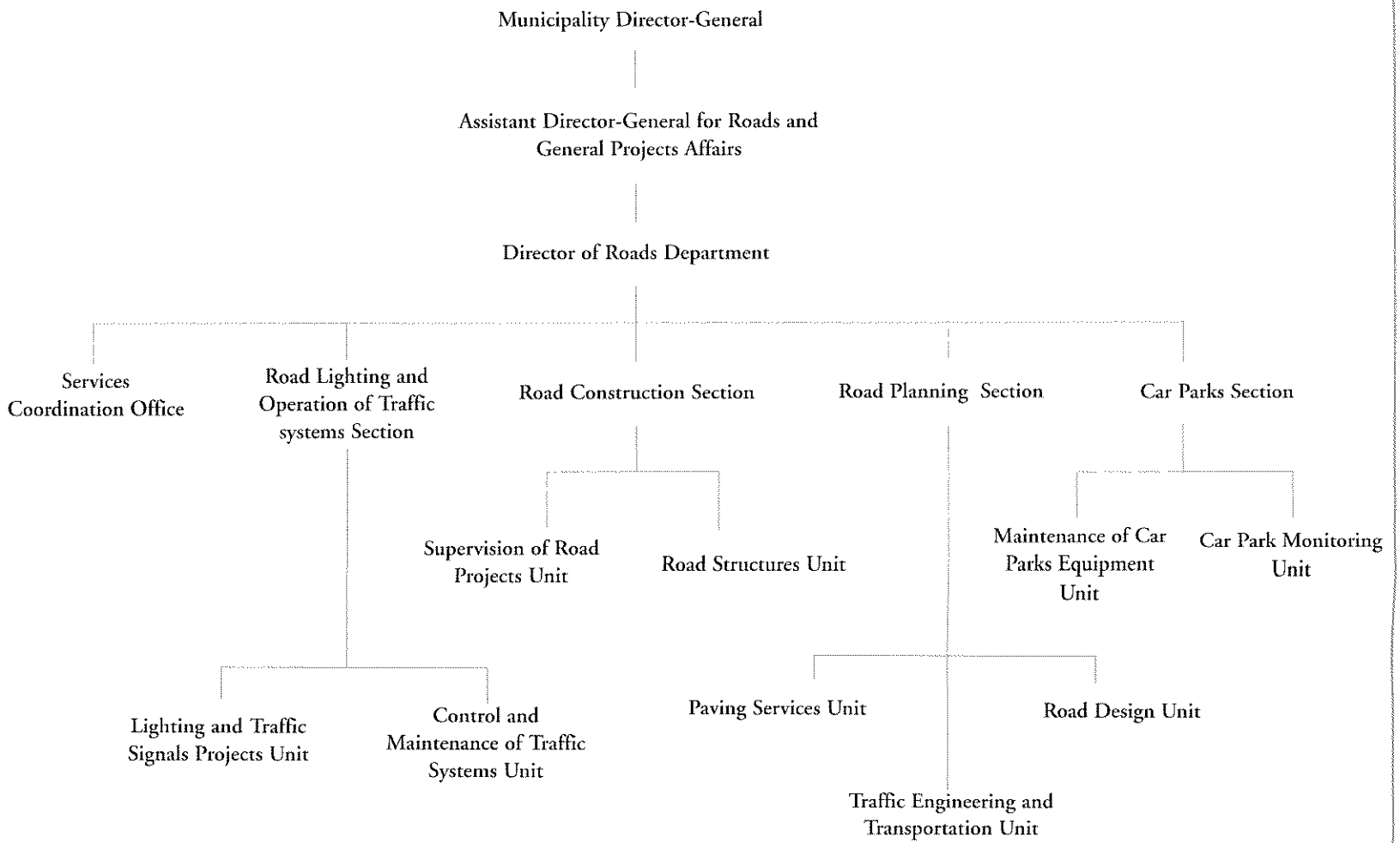
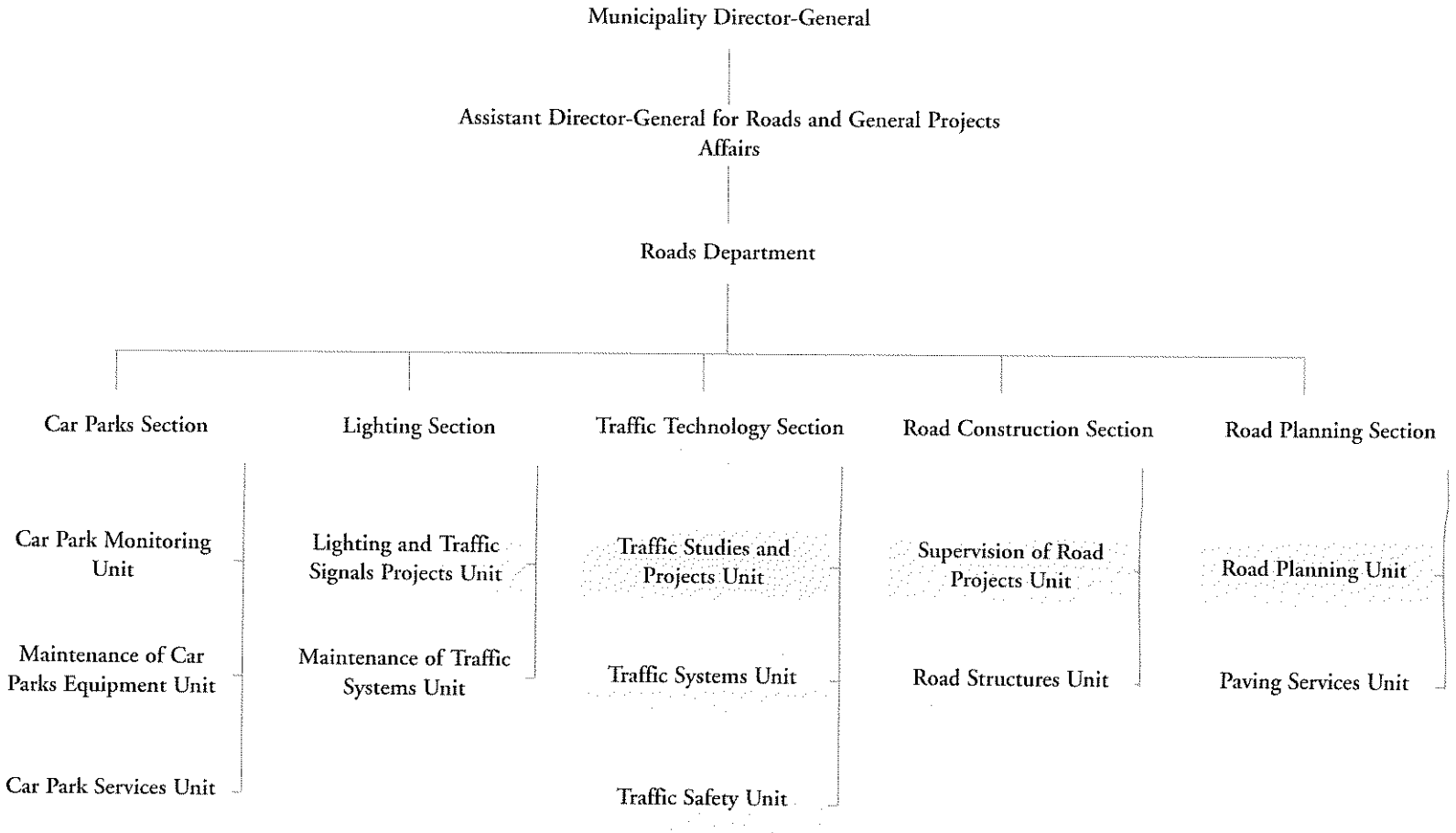


Chart No. 6
Organisation Chart for Roads Department 2002



Main Duties and Responsibilities of the Road Department & its Sections

In general terms, the main duties and responsibilities of the Department cover the proposing of the policy, systems and plans specific to public roads, entrances, both paved and unpaved, bridges, tunnels, public roadside parking, car parks, road lighting, traffic signals and any other subjects relating to the Department's work.

The work is carried out according to instructions issued from time to time in accordance with the Municipality's policy and legislation and in coordination with other concerned departments and sections within the Municipality as well as with the relevant external agencies and establishments concerned, whether local or federal.

Road Planning Section

1) This section implements the Municipality's policy, plans and budget in respect of all related studies and researches, roads design and planning works within an approved work schedule and timescale for all highways, bridges, tunnels, road exits, public car parks and pedestrian crossings.

2) It also organises and carries out the collection of statistical data on all types of vehicles and on pedestrian traffic, carries out analyses of traffic and any related planning, and

Infrastructure services on roadsides

also designs roads and traffic signals where these are related to the work of the section.

3) Another of its tasks is the obtaining of information on traffic accidents from the Public Traffic Department of Dubai Police to permit the data to be analysed so that the appropriate recommendations can be made with a view to reducing road accidents.

Road Construction Section

This section is in charge of carrying out the Municipality's duties with relation to roads, tunnels and bridges projects, as well as car parks. The work is undertaken in co-ordination with the Road Planning Section. It is also responsible for the operation and maintenance programme for the road network.

Traffic Technology Section

This section administers and operates the traffic control systems throughout the road network, by means of its Control Centre and the various traffic signs and signals.

It is also responsible for the safety of the public on the road network as well as for carrying out research designed to help in preparing a comprehensive strategic plan for traffic movement.

An example of Dubai's traffic control systems

Lighting Section

1) The Lighting section is responsible for implementing all aspects of Municipality work relating to lighting and traffic signals by the roadsides, in co-ordination with other sections in the department and elsewhere in the Municipality, in particular with the General Maintenance Department.

2) It prepares and implements daily and monthly preventative maintenance programmes.

Car Parks Section

1) This section is in charge of matters relating to the control of parking, whether on the roadside and in squares or in other designated locations.

2) This work includes regular inspections of areas with metered parking and maintaining the meters as well as preparing.

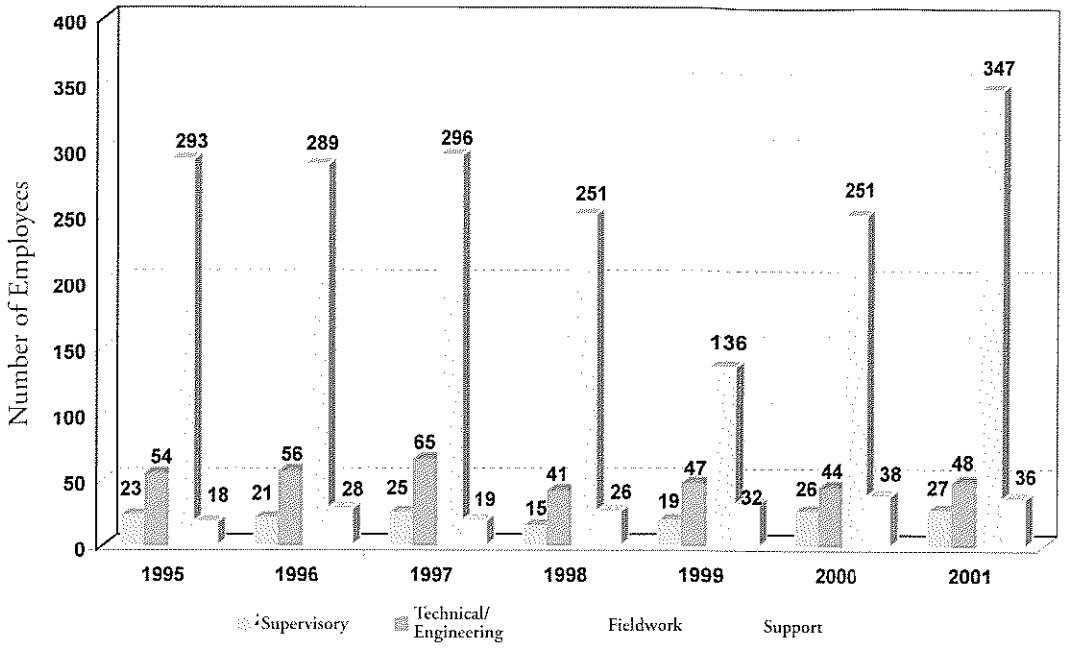
3) Carrying out of daily and weekly programmes of repairs and maintenance and a monthly preventative maintenance programme.

Car Parks in controlled areas in Deira

Posts in the Roads Department, 1995 – 2001

Job Type	1995	1996	1997	1998	1999	2000	2001
Supervisory	23	21	25	15	19	26	27
Technical/ Engineering	54	56	65	41	47	44	48
Fieldwork	293	289	296	251	136	251	347
Support	18	28	19	26	32	38	36

Graph No. 1. Posts in the Roads Department, 1995 – 2001



Number of employees in the Roads Department at the end of 2001

Nationality	Technician/ Engineer	Other Posts	Total
Emiratis	35	222	257
Expatriate	31	170	201
Total	66	392	458
Percentage of Emiratis	53.0 %	56.6 %	-
Percentage of Expatriates	47.0 %	43.4 %	-

Strategic Planning for the Road Network in Dubai

The road requirements for the Emirate of Dubai are determined as part of a comprehensive development strategy, this being drawn up following the carrying out of detailed studies of growth in land use and population and of the distribution and type of projected future traffic movement.

In 1991 and 1997, two detailed studies were carried out which helped in the laying down of plans for improving the transport and traffic system throughout the Emirate.

These studies first examined engineering solutions, such as the expansion of and improvement of present roads and the construction of new roads, and then looked at other elements within the scope of the Traffic Administration, proceeding to carry out a number of technical innovations which alleviated the problem of congestion and improved the efficiency of the existing road network. These included the introduction of the latest systems for the control of traffic signals.

Over the last quarter-century, there has been a huge increase in the volume of traffic in Dubai. In 1976, for example, around 4,500 vehicles an hour were using the three Creek crossings, while by 2002 this had risen to over 29,000 vehicles an hour, making use of nine lanes with a maximum capacity of 30,000 vehicles an hour. Unless capacity was increased, there would have been adverse impacts on the local economy.

To resolve this, a number of steps need to be taken. One key one will be a widening of the Garhoud Bridge to six lanes in each direction and its linking through interchanges to subsidiary roads at either end. It will also need linking, by other bridges and tunnels, to Al Maktoum Bridge on Sheikh Zayed Road, since this is the most used route. Initial plans for the expansion of Garhoud Bridge have been completed, while a number of associated improvements have been made.

As part of the programme to alleviate traffic congestion, the Emirates Road was built around the outskirts of the city, to provide links between various areas of Dubai, to provide an alternative route for traffic moving to and from Abu Dhabi and the northern emirates, and to lessen pressure on Sheikh Zayed Road and Al Ittihad Road.

The Roads in the Emirate of Dubai have been classified as follows:

Semi-circular Roads

As the name indicates, these roads are laid almost as parallel rings. They serve the major areas of Dubai. Examples are :

- Khalid ibn Al Waleed Street, Abu Bakr Al-Siddiq Street.
- Sheikh Rashid Street, this latter being an extension of Al Ittihad Road.

Radial Roads

These radial roads provide the links between the semi-circular roads, radiating out from central points such as the main commercial areas in Deira and Bur Dubai, They include:

- Al Maktoum Street, an extension of Airport Road and Al-Khawaneej Road
- Naif Street, an extension of Al-Rashid Street
- Al Mina Street, an extension of Al Wasl Street.

Functional Classification of Roads

The road network in Dubai is also classified according to size and type.

Freeways

These includes the roads with free and fast-moving traffic, without direct junctions, exit and entry being through interchanges which divide the traffic. Examples include the Dubai – Al-Ain Road, the Dubai – Sharjah Road, and the link between Sheikh Zayed Road and Emirates Road. They account for 16 per cent of the total road network.

Highways

These roads have central reservations and two or more lanes in each direction. Entry and exit is fully or partially controlled through interchanges, which may have associated service roads. Examples of this type include the Dubai – Hatta road and the Dubai – Al-Khawaneej road. They account for 18 per cent of the whole network.

Arterial Roads

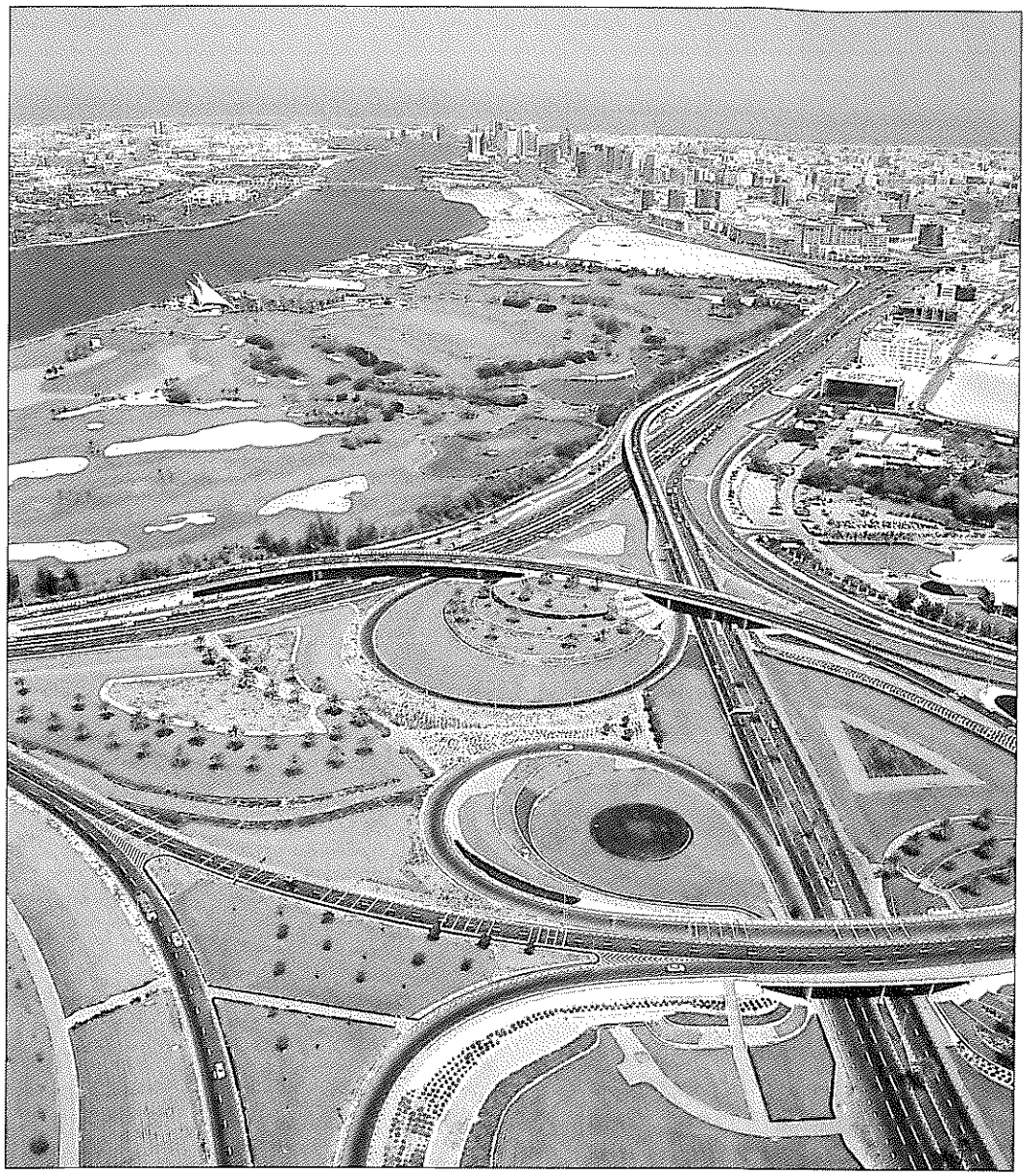
On these roads, there may be central reservations, although not in every case, while their engineering design is to a lower standard that that of the freeways and highways. Multi-level junctions are unusual, and traffic movement is controlled primarily by traffic lights. Among this type are the therefore the traffic movement is controlled through traffic lights. Examples of these roads include Al-Maktoum, Salahaddeen and Khaleej (Gulf) Roads. They account for 18.7 per cent of the entire network.

Junction Roads

These roads serve the purpose of permitting vehicles to move between the local roads network and the main roads, and are generally short. Traffic is controlled at the junctions through traffic lights, roundabouts and traffic signs. They have junctions or intersections with other Junction Roads, Main Roads or Local Roads. Examples are Hor Al-Anz Street, Al-Sabkha Street and Al-Musala Street. They account for 18.5 per cent of the entire network.

Local Roads

These roads serve traffic to and from shops, companies, buildings and so on which adjoin them. Traffic is controlled by means of traffic lights and roundabouts. Such roads are, of course, to be found throughout Dubai, and they account for around 28.5 per cent of the total roads network.



Garhoud area intersections

Expenditure on Roads Projects

Graph No. 2 illustrates the expenditure on Roads Projects between 1980 and 2002, during which period a total of around Dh 8.4 billion was spent. The top year was 2002, when Dh 890 million was spent, this being accounted for by major projects such as the Emirates Road as well as roads and parking around Dubai International Airport.

Chart No. 1. Geographical distribution of the road network in the Emirate of Dubai.

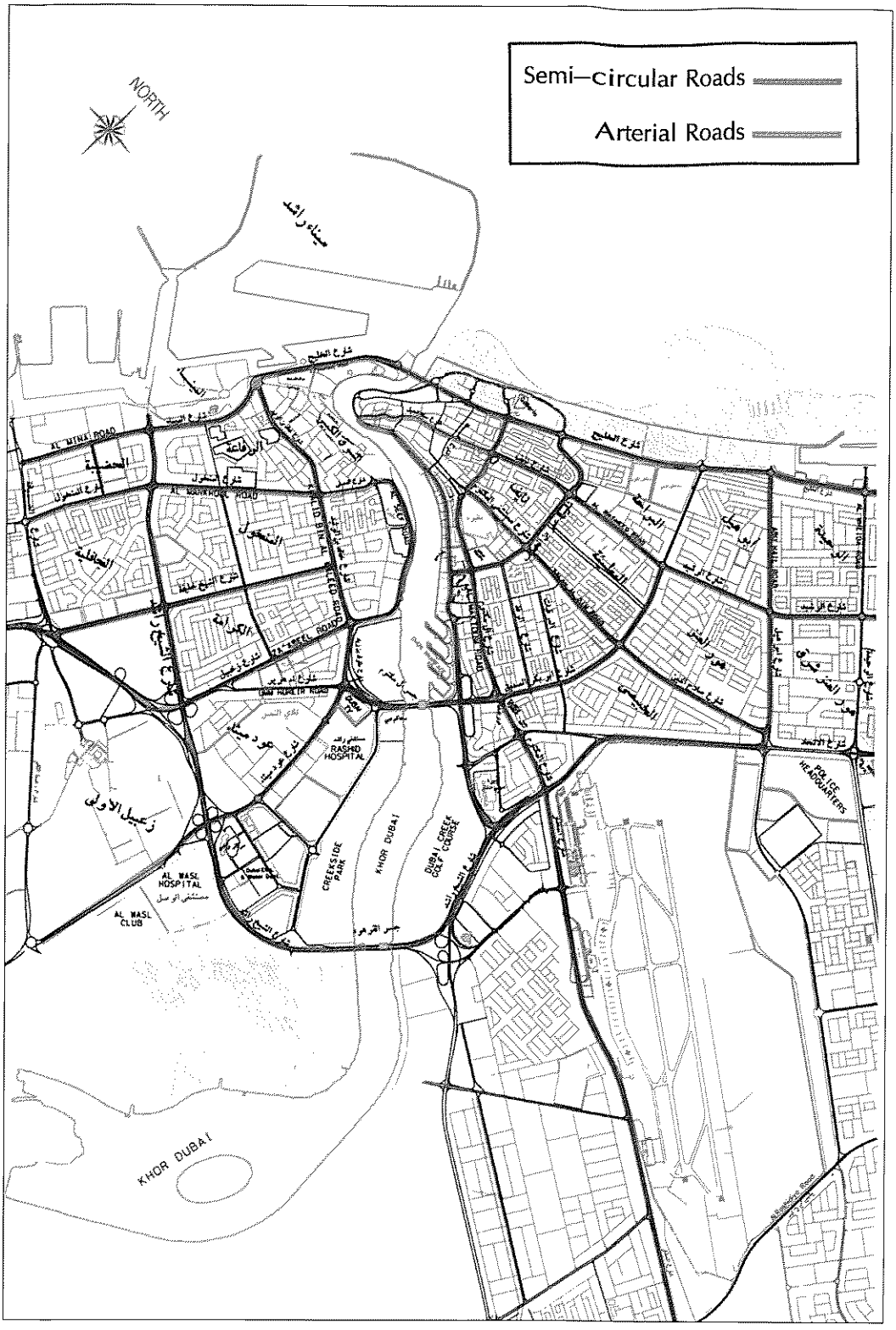


Chart No. 3 illustrates the growth in the road network between 1980 and 2002, by which time the Dubai roads network covered a distance of 7,358 lane/kilometres. The greatest growth in a single year was in 2000, when 949 lane/kilometres were built, as shown in Table No. 1 and Graph No. 4.

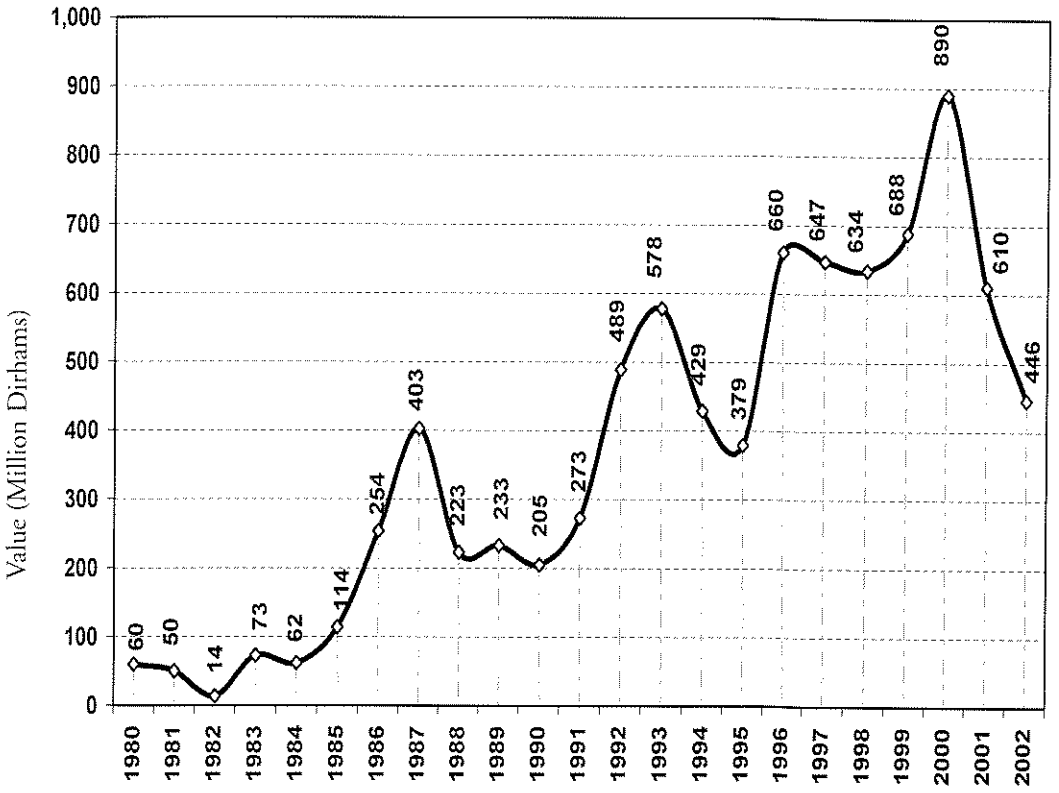
Expenditure on Road Projects, 1980 – 2002

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Value (Million Dirhams)	50	50	14	73	62	114	254	403	223	233	205	273

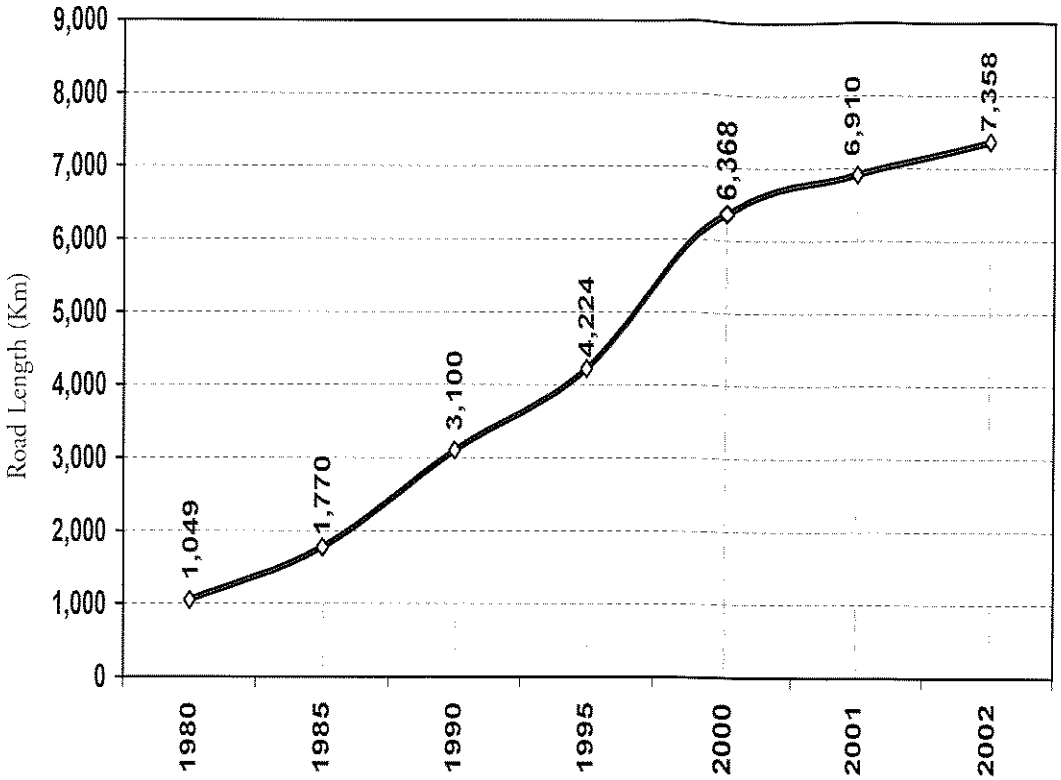
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Value (Million Dirhams)	489	578	429	379	660	647	634	688	890	610	446

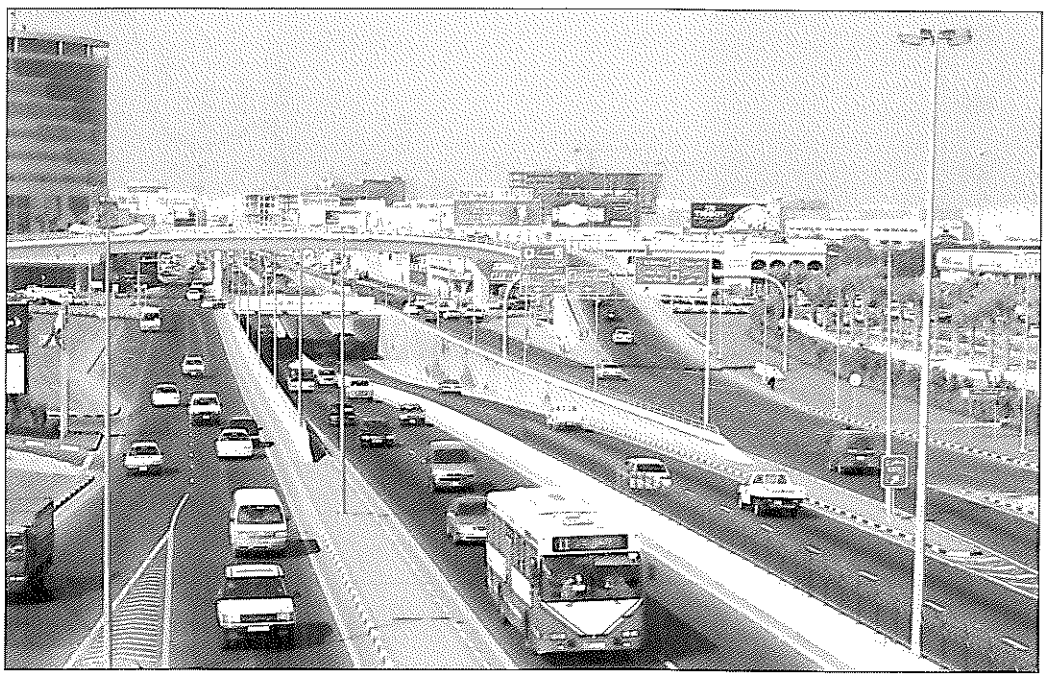
The total expenditure on Roads Projects between 1980 – 2002 was 8,414 million dirhams.

Graph No. 2. Expenditure on road projects, 1980 – 2002



Graph No. 3. Development of the Road Network, 1980 – 2002 Lane/Kilometres)





A local road network

Table No. 1. Length of roads (Lane/Kilometre), by type, 1980 – 2002

Type of Road	1980	1985	1990	1995	2000	2001	2002
Freeway	0	0	362.61	597.44	1,014	1,119	1,124.8
Highway	193.29	405.5	538.92	804.25	1,162	1,261	1,375.5
Arterial Roads	154.17	267.2	444.17	601.82	1,195	1,333	1,367.4
Junction Roads	242.02	371.28	516.08	757.52	1,176	1,272	1,334.6
Local Roads	459.84	730.31	1,238.11	1,462.97	1,821	1,925	2,155.5
Total	1,049.33	1,770.31	3,099.91	4,224.01	6,368	6,910	7,357.8

Increase in length of the road network (average – Lane/Km.), 1980 – 2002

Year	1985	1990	1995	2000	2001	2002
Length (Average Lane/ Km.)	698	1160	1476	2193	2434	3057

Graph No. 4. Increase in the Road Network, 1980 – 2002

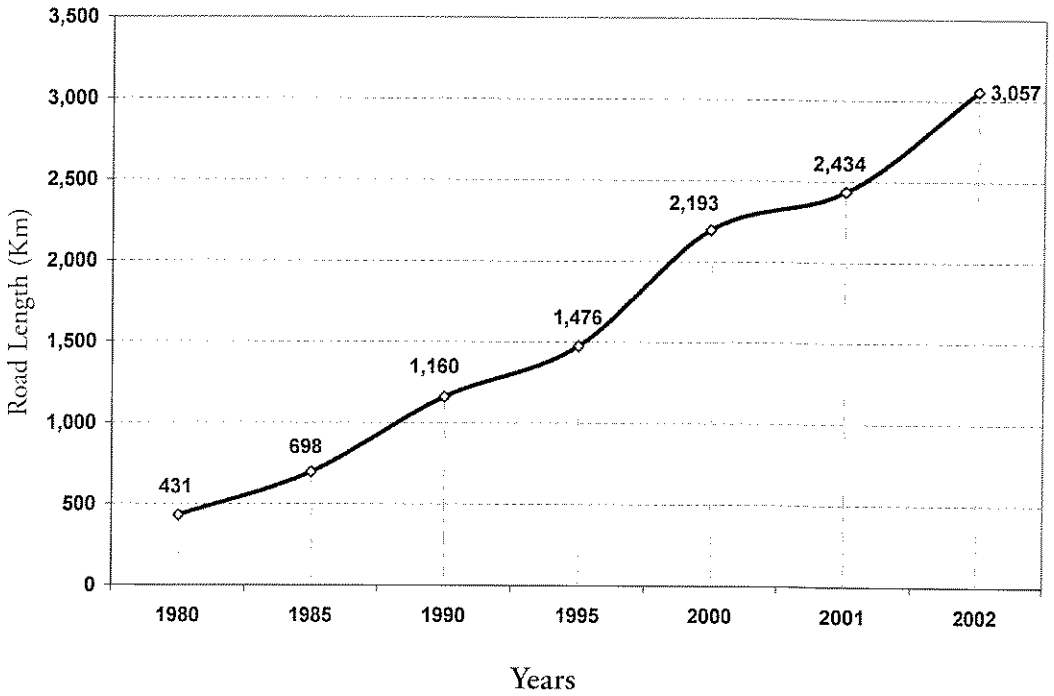
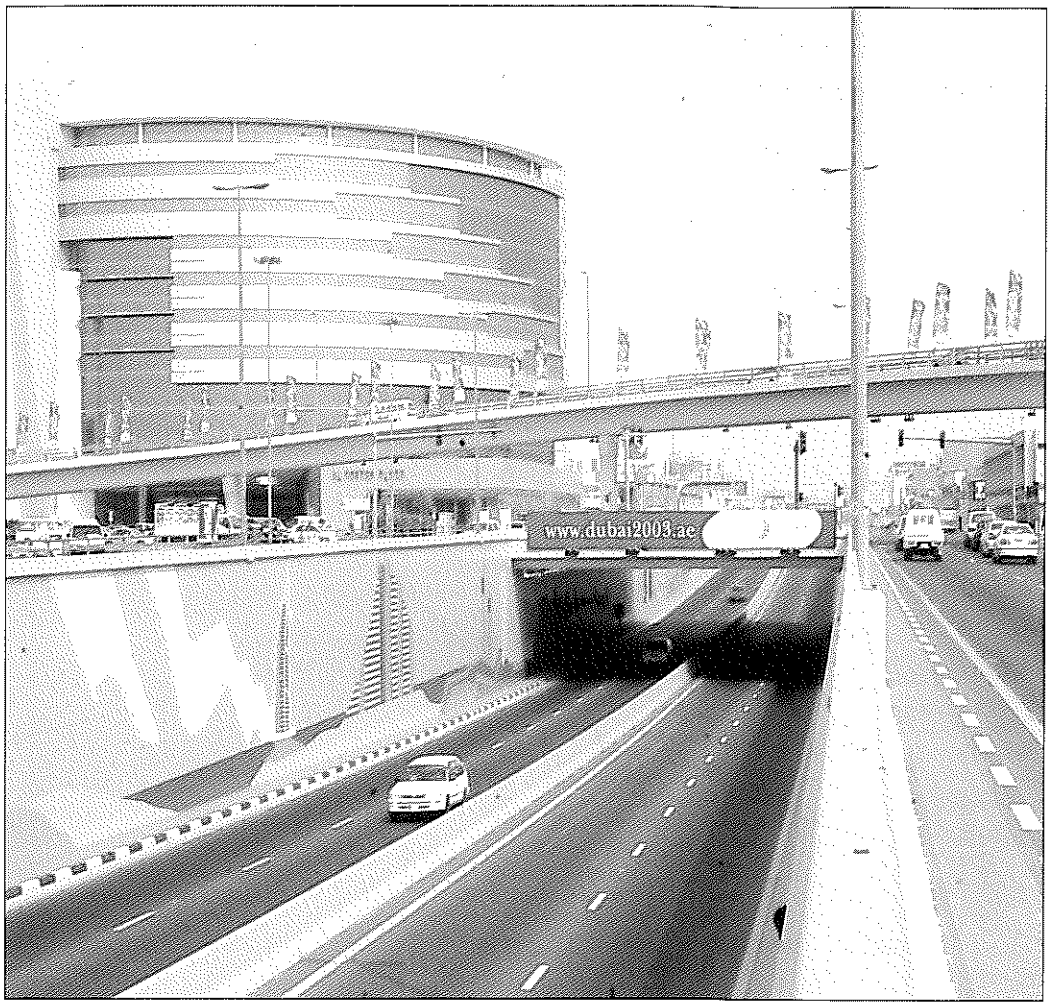


Table No.2. Main road tunnels built prior to 1985

Name	Length in Metres	Width in Metres	Date of Construction	Cost in Million Dhs.	Number of Lanes
Shindagha Tunnel	913	7.32	1975	60.0	2 + 2
Clock Roundabout Tunnel 1	314	9.6	1981	6.0	2
Clock Roundabout Tunnel 2	328	9.6	1981	7.0	2
Airport Road Tunnel	298	7.52	1981	8.0	2 + 2
Al-Qiyadah Tunnel	328	7.52	1981	10.0	2 + 2



Airport Road Tunnel

Projects carried out by the Department, by year

1982	
Psychiatric Hospital Road	Development of Abu Bakr Al-Saddiq Street
Al-Muraggabat – Riqqa Al-Bateen Road	Alterations to Al-Nahda Roundabout
Roads in Bur Dubai	
1983	
Car Parks at Al-Safa Park southern entrance	Connecting Road to Sheikh Maktoum's Palace
Roads in Deira	Roads and car parks in Rashid Hospital
Al-Aweer-Lihbab Road	Al-Mankhool Road
'U' turn on Khalid ibn Al Walid Street	Roads in Rashid Hospital ñ First Phase
Roads in Al-Khawaneej Village	Al-Rashid and Abu Bakr Al-Saddiq Road
1984	
Study and re-design of intersections on Abu Bakr Al-Saddiq Street	Roads in Deira
Alterations on Al-Dhiyafa Street from Al-Satwa roundabout to Zabeel Palace roundabout	Salahaddeen Road
Underpasses	Service Road on Al Ittihad Street
1985	
Expansion of Sharjah – Dubai Road	Roads in Jebel Ali Port
Service Road on Al-Maktoum Street	Roads in the labourers compound in Qusais
Paving work for the Civil Defence	Roads in the Central Market in Hamriyyah
Al-Quoz Graveyard Road	Road No. 88 in the Central Market in Hamriyyah
Signs bearing street names	Internal Roads in Al-Tawar – First Phase
Direction signs in Dubai	Interchange with Abu Dhabi Road
Roads in Nad El Sheba Residential area	Jebel Ali Port Road
Advanced works at Al-Nahda interchange	

1986	
Backfilling the Trade Centre roundabout	Roads in Al-Mateena area
Soil work and backfilling of second Zabeel Road	Al-Ain – Dubai Road – First Phase
Sabkha (non-asphalt) Road for the Labourers' Complex in Qusais	Intersection of Al-Wasl Al-Manara Road with Airport – Al-Romour Road, Road leading to Jebel Ali Hotel
Study of road planning	Main work done to Al-Nahda interchange
Roads in Al-Satwa – Second Phase	Road works for schools in Deira
Iraqi Consulate Road	Internal Roads in Al-Mankhool
Camel Race Course Road	Roads for Shabiyat Al-Qusais
Protection work for Defence Road	Roads in Al-Ra's
Schools Roads in Bur Dubai	Internal Roads in Al-Tawar
Roads in the Rashid Hospital area	
1987	
Al-Hamriyyah Market	Roads in Hor Al-Anz – Third Phase
Internal Roads in Al-Rashidiya	Roads in Al-Rashidiya
Asphalting works in Al-Maktoum Hospital	Roads in Al-Diwan area
Preservation of Umm Suqeim Beach and Sheikh Hamdan's Villa	Roads in Al-Lisaili
Soil work and backfilling in Al-Quoz	Al-Dhiyafa Street and Al-Wasl Street
Backfilling in Al-Wasl	Roads in Umm Suqeim
Soil works and backfilling in Al-Safa	Garhoud Bridge Road
Paving roads in the port and sabkha (non-asphalt) roads in Al-Mamzar	Fencing the Al-Khawaneej, Al-Rashidiya and Al-Amradi Roads
Roads in Al-Jafliya	Roads in Al-Karama
Dubai-Hatta Road	Temporary 'U'- turn at Al-Saqar Chemicals
Roads in the Exhibitions area in Garhoud	Roads in the Women's Prison & Clock Roundabout
Roads in Al-Satwa	Al-Qusais and Factory area road
Ground levelling in Al-Aweer Industrial area	

1988	
Expansion of Nad Al-Hamar Road	Roads in Hor Al-Anz – First Phase
Large Traffic Signs	Roads in Al-Hadheiba, Al-Asbeej, Al-Rola and Al-Hamriyyah
Paving of Al-Sikik (narrow roads) in Deira	Al-Aweer Roadside Fence
Nad Al-Sheba interchange	Ground levelling in Nad Al-Sheba (1)
Roads in Hor Al-Anz – Second Phase	Marine works on the Deira Corniche
Dubai-Al-Ain Road – Second Phase	Roads in the Hyatt Regency area
Survey of traffic control tools	Omer ibn Al-Khattab Road
Al-Nahda underpass project	Construction of Al-Nahda interchange on Etihad Road
1989	
Maintenance of Shindagha underpass	Road section in Al-Qusais/ Al Sharjah
Development of Garhoud Bridge	Protection for Umm Suqeim Beach
Containers in Jumeirah area	Protection for Jebel Ali Road
Works in Mina Seyahi	Pedestrian walkways
Works on Al-Maktoum and Garhoud Bridges	Service Road to the Trade Centre
Al-Ruwayyah interchange	Roads and car parks for the libraries in Bur Dubai
Al-Mamzar Project	Roads in the north of Al-Karama
Road between Al-Wasl & Jumeirah – Second Phase	Old Airport Road and New Airport Road
Civil engineering works for street lighting- (Al-Ain Road)	Nad El Sheba interchange – Second Phase
Road works in Al-Ittihad School	Roads in Deira Corniche – Market
Protection of interchanges on Al-Ain Road	Road works in Al-Hamriyyah Market
Oud Maitha Road	Masfut Bridge works
Fence and Protection on the Dubai – Abu Dhabi Road	Extension to Sharjah Road
Roads and car parks for libraries in Deira	Civil Engineering Works for street lighting and car parks
1990	
Roads in Hor Al-Anz – Fourth Phase	Roads between Al-Wasl and Jumeira Streets
Stations for monitoring heavy lorries	Road connecting Bu-Khadra roundabout and Zabeel roundabout

Emergency water drainage works	Roads in Al-Mamzar – First Phase
Soil works in Al-Mezher	Car parks in Deira and Dubai
Road connecting to Nad Al-Sheba residential area	Service Road on Al-Mankhool Street
Roads in Jumeirah	Extension of Sharjah Road – Second Phase
1991	
Roads and car parks in the Gold Market	Road works between the Al-Madam & Hatta roads
Road connecting to Al-Merqab residential area	Roads in Al-Aweer – First Phase
Road connecting to the freight area in the airport	Roads in Al-Aweer – Second Phase
Roads and car parks in Al-Karama	Pedestrian bridges on Al-Maktoum Street
Roads in Zabeel east	Car parks in Riqqa Al-Bateen
Expansion of Al-Khaleej Road	Development of Al-Saqar roundabout
Roads connecting Al-Wasl, Jumeirah & Al-Quoz	Roads in Al-Tawar – third Phase
Improvement of Al-Saif Street	Protection of verges on Al-Ain Road
Dubai - Hatta Road – Second Phase	Road planning in Al-Mankhool
1992	
Improvement of Naif Street	Rehabilitation of al-Qusais Street
Civil Engineering work for street lighting	Roads surrounding Sheikha Mouza's Palace
Backfilling and levelling works in Al-Wasl and Al-Quoz.	Car parks for the New World Building
Survey of backfill areas	Car parks and roads connecting to the Courts
Backfilling in Umm Al-Qaiwain	Roads in Al-Quoz Industrial area
Painting pavements in Dubai and Deira	Roads surrounding Sheikh Mana's Palace
Backfilling of residential areas in Dubai	Roads in Al-Sufouh
Backfilling & levelling works in Shabiyat Meshrif	Improvement of Al-Dhiyafa roundabout
Development of Al-Aweer Industrial area	Improvement of Al-Saif Street
Sidewalks on Al-Muraggabat Street	
1993	
Car parks in Al-Riqqa	Sheikh Zayed Road – Third Phase
Car parks	Completion of fence on Hatta Road

Backfilling and levelling in Jumeirah and Umm Suqeim	Trade Centre car parks
Improvement of roundabout in Nad El-Sheba	Roads in Nad El-Sheba – Second Phase
Road connecting to Al-Khawaneej	Improvement of Al-Riqqa Street
Soil works in Al-Qusais Industrial area	Civil Engineering works for street lighting
Service Road in Jumeirah	Various car parks in Dubai
Improvement of Al-Hamriyyah Vegetable Market	Pedestrian bridge on Oud Maitha Street Docks
Development of Al-Wasl roundabout and Garden Roundabout	Roads surrounding Sheikh Ahmed's Palace
Road in Al-Mezher – Second Phase	Clock Roundabout underpass.
Sheikh Zayed Road – Second Phase	
1994	
Service Road on Abu Bakr Al-Saddiq Street	Backfilling for colleges
Expansion of Al-Maktoum Bridge and the interchanges with Rashid Hospital and Idhafa (Broadcasting) Roundabout	Advanced works on the Trade Centre interchange
Roads in Al-Mezher	Lighting on Sheikh Zayed Street
Extension of Beni Yas Street	Roads in Al-Rashidiya
Works on the port and customs	Roads in Zabeel East
Car parks for the schools – First Phase	Mirdif interchange
Shekh Zayed Road – First Phase	Backfilling in Al-Quoz – First Phase
Backfilling in Al-Safa	Backfilling in Al-Quoz – Second Phase
Backfilling in Al-Manara	Backfilling in Al-Quoz – Third Phase
Backfilling in Al-Wasl	Backfilling in Al-Quoz – Fourth Phase
Backfillinf in Umm Suqeim	Various car parks in Dubai
Backfilling in Al-Rashidiya	Temporary services for Ports and Customs
Backfilling in Nad Al- Hamar	Roads in Abu Hail area
1995	
The Road from CMC interchange to Bu-Khadra roundabout	Roads in Al-Satwa, West of Sheikh Zayed Street
Service Road on Khalid Bin Al-Waleed Street	Lihbab – Al Ain Road Road
Improvement of Road 206.	Improvement of Al-Baraha Street

Roads in al-Rashidiya – Second Phase	Levelling land in Al-Qusais Area 2
Roads in Al-Ra's	Roads south of Al-Safa Park
Improvement of Jumeirah Road	Road connecting to the Diwan
Controlling car parks in Deira Centre	Road connecting to Al-Zabeel Palace
Road Planning in Dubai	Road to Hatta
Levelling land in Al-Mizher – First Phase	Passageway for Al-Mamzar Corniche
Levelling land in Al-Mizher – Second Phase	Car parks for the Mosque in Nad El-Sheba
1996	
Roads in Umm Hurair	Roads in al-Karama
Commercial Centre Interchange	Al-Mamzar Corniche
Car parks for schools	Roads in Al-Aweer Industrial area
Al-Qata'iat interchange – Zabeel	Pavements in Al-Baraha
Roads in Al-Quoz Industrial area	Roads south of Al-Amal Hospital
Various car parks in Dubai	Road connecting to the Government Garage
Improvement of Al-Wasl Street	Central Control of Traffic Signals Project
Roads in Al-Mankhool	Civil Engineering works for road lighting
Improvements to interchanges in Dubai	Paving in Al-Bastakiya
1997	
Roads in Rashid Port	Roads connecting to Jebel Ali
Expansion of Al-Rashidiya Road	Fence in Al-Aweer
Land levelling works in Al-Qusais	Fence near Lihbab roundabout
Garhoud and Al-Romoul interchange	Al-Qusais- Sharjah Road
Service Road in Al-Aweer	Roads in Ra's Al-Khor Industrial area
Improvements to Al-Riqqa Street	Improvement of Al-Romoul Road
Roads in Al-Mizher	Al-Jadaf Road
Improvements in Shindagha	Entrance to Chicago Beach Hotel
Improvements to Al-Saif Street	Oud Maitha interchange with Sheikh Rashid Street

1998

- Improvements in Al-Khawaneej Road
- Roads in Nad El-Hamar
- Roads for Al-Mamzar Park
- Improvements to Sheikh Zayed Street
- Improvements to Al-Dhiyafa Street
- Improvements to Al-Rashid Street
- Development of interchanges in Deira
- Paving the sikik (narrow roads) in Al-Ra's, Second Phase
- Roads in Nad Shebeeb
- Roads in Al-Hamriyyah
- Improvements to Al-Muraggabat Street
- Roads to Biocelene Centre
- Global Village for the Festival
- Roads in Al-Mizher
- Car parks for Al-Hamriyyah Market
- Twin Towers interchange
- Civil Engineering Works for road lighting
- Street planning project
- Multi-story car park in Naif
- Pedestrian Crossings
- Roads in Al-Qusais
- Various work relating to Dubai Airport
- Backfilling in Hatta residential area
- Aesthetic work in Al-Khor
- & improvements to Saif Street
- Various car parks in Dubai
- Beni Yas Street interchange with Garhoud Street
- Roads in Hor Al-Anz
- Construction of Sheikh Zayed Road from the Trade Centre interchange to Seih Sheib

1999

- Road across Dubai – First Phase
- Road connecting to the Majlis in Nad El-Sheba
- Internal Roads in Oud Maitha
- Rehabilitation of Margham Road
- Various car parks in Dubai
- Nad El-Hamar Road – Al-Rashidiya
- Improvements to Al-Saqar roundabout
- Al-Mateina Street improvements
- Expansion of Al-Qusais Road – Al-Rashidiya
- Road 204 & 211
- Levelling land in Al-Warqa – First Phase
- Levelling land in Al-Warqa – Second Phase
- Al-Wasl interchange with Al-Hadhayba
- Civil Engineering Work for street lighting
- Numbering Streets and Sections
- Controlling car parks – Second Phase
- Roads in Al-Hamriyyah
- Roads in Al-Qusais

2000

- Improvements to Al-Tawar Street
- Roads in Umm Suqeim
- Al-Ghabiba multi-story car park
- Pavements in Al-Mamzar

Roads in Jebel Ali Industrial area	Improvements to Al-Ittihad Street
Paving the sikik (narrow roads) in Bur Dubai	Circular Road / First Phase – Contract 1
Paving the sikik (narrow roads) in Al-Ra's	Circular Road / First Phase – Contract 2
Roads in Al-Barsha	Circular Road / First Phase – Contract 3
Connections to Sheikh Zayed Street	Circular Road / Second Phase
Expansion of Nad El-Hamar Road	Roads in Al-Warqa
Various car parks in Dubai	Roads and car parks in Dubai Int. Airport
Parking for small trucks	Al- Hadhayba interchange
2001	
Roads in Al-Zabeel area	Levelling works in Al-Warsan
Roads in Al-Rola area	Service Road on Al-Qusais – Sharjah Road
Expansion of Airport Road	Development of Al-Mamzar Corniche
Roads in Al-Qusais area	Entrances to Jebel Ali Free Zone, (JAFZA Bridge)
Dubai Circular Road – Phase 1	Entrances to the Fruit and Vegetable Market
Roads in Al-Quoz Industrial area	Various car parks in Dubai
Railways and passageways in Al-Ra's area	Roads and levelling land in Al-Khawaneej
Roads in Al-Warqa area	Dubai Circular Road – third Phase
Roads in Bur Saeed area	Al-Mamzar interchange
Passageways in Al-Satwa	
2002	
Roads in Al-Satwa area	Roads from Al-Safa to Umm Suqeim
Improvements in various locations in Dubai	Bu-Khadra interchanges
Improvement of Al-Safa interchange	Rehabilitation of Hatta road
Levelling works in Al-Warsan area	Ra's Al-Khor interchange
Roads in Hatta	Roads in Al-Mizher
Improvement of Al-Sufouh Street	Pavements in Al-Tawar area
Pavements in Al Hadhayba area	

H.H. Sheikh Mohammed bin Rashid Al-Maktoum reviewing one of the road projects

The most important projects completed between 1986 and 2002 were the following:

▪ Construction of Al-Nahda interchange with Al-Ittihad Road and Al-Nahda underpass:

Completed 1986 Cost Dh 46 million

This interchange is the northern gateway to Dubai. Work began in 1985 and entailed the construction of a two way, three lane underpass to provide free flowing access for traffic movement between Sharjah and Dubai. A three lane roundabout was built on top of this underpass to provide a link to the surrounding road network.

▪ Dubai – Al Ain Road:

Completed 1986 Cost Dh 231 million

Work began on this project in 1986. It begins at the Bu-Khadra roundabout on Al Wasl Road, and extends to the border of the Emirate, in the direction of Al Ain. Extending over a distance of 60 km., it is two way, with three lanes on either side of a central reservation, and with hard shoulders on each side. Bridges and side roads were built at the main junctions. Well-lit by street

lighting, these are between 17 and 25 metres in length. There are also eight underpasses for the use of camels and three for cars and pedestrians.

Creekside Project:

Completed 1988 **Cost Dh 59 million**

This is adjacent to Beni Yas Street, stretching from the Municipality building and the Intercontinental Hotel to Al-Ra's and is a 1.4 km, two way / two lane road with pedestrian side-walks and around 1450 car-parking places. A 1.3 km. protective wall was also built along the edge of the Creek.

Pedestrian Walkways across Al-Maktoum Street:

Completed 1991 **Cost Dh 8 million**

These two walkways were designed for pedestrians wishing to cross the street.

Expansion of Al-Khaleej Street:

Completed 1991 **Cost Dh 41 million**

This project involved the expansion of Al-Khaleej Street and provision for a 4.4 km, two-way, four lane 4.4 road between the Hyatt Regency interchange and Al-Waheeda Street roundabout, improvement and expansion of lanes on the existing roundabouts on this road and the construction of services roads on either side, so as to remove secondary traffic from the main flow. Additional car parks and lighting were also provided throughout the length of this road.

Clock Roundabout Underpass No. 3:

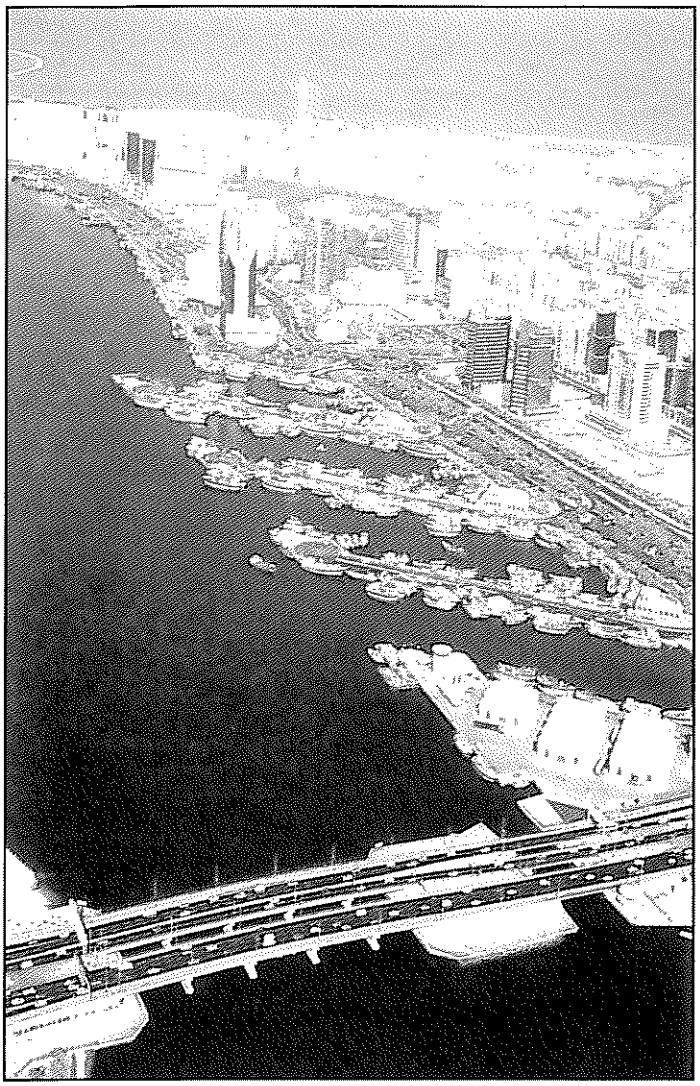
Completed 1993 **Cost Dh 17 million**

The Clock Roundabout Underpass No. 3, 305 metres long and 9.6 metres wide, has two lanes, running one way from Al-Maktoum Street to Al-Maktoum Bridge.

Wharfage on Beni Yas Street:

Completed 1993, Cost Dh 198 million

In 1991, it was decided that wharfage was needed along the Creek to accommodate the increasing number of traditional dhows requiring space, which could reach as many as 250 vessels. The project involved back-filling along a distance of around 7 km using around one million cubic metres of rock and sand, and the building of four docks for cargo handling, as well as



The Creek wharfage

Customs buildings, the necessary infrastructure for fuel and water supply and various decorative features.

Extension of Beni Yas Street (First Phase):

Completed 1994

Cost Dh 110 million

Work on this project began in 1992, prompted by the increase in pedestrian and vehicle traffic on Al-Maktoum Street. It involved the building of a new two-way, three lane road connecting Beni Yas Street from the Omar ibn Al-Khattab roundabout to Garhoud Street. It provided access to the Creek wharfage, and was divided from Tariq ibn Ziyad Street by an underpass leading towards Garhoud Street.

Extension of Al-Maktoum Bridge and both interchanges at Rashid Hospital and Idha'a (Broadcasting) Roundabout Project:

Completed 1994 Cost Dh 180 million

This involved the construction and improvement of roads and bridges near Al-Maktoum Bridge in addition to the expansion of the bridge itself, providing it with four lanes in each direction. Associated works included the construction of a 1.5 km., two-way, four lane road, two raised interchanges and a 9-metre high1.9 km. long supporting wall, as well as other facilities and landscaping.

Improvements to Jumeirah Road:

Completed 1995 Cost Dh 24 million

This involved the laying of new asphalt from on this road from Al-Dhiyafa Roundabout to the Chicago Beach Hotel, a distance of 11.4 km., as well as the construction of six junctions with traffic lights and nine pedestrian crossings.

First Phase of the car-parking control project:

Completed 1995 Cost Dh 9 million

Designed to deal with the problems caused by a lack of sufficient parking in central Deira, this involved the installation of pay and display parking meters on roads and car park barriers on Beni Yas Street facing the Creek.

Trade Centre and Sheikh Zayed Road Interchanges:

Completed 1996 Cost Dh 178 million

This project, on which work began in 1994, was designed to ease the flow of traffic between Sheikh Zayed, Sheikh Rashid and Al-Dhiyafa Roads. It involved the construction of three underpasses and four bridges.

Zabeel Street interchange with Sheikh Rashid Street:

Completed 1996 Cost Dh 158 million

This project, on which work began in 1994, segregated traffic flow at this interchange by constructing under-passes linking Sheikh Zayed Street and the Al-Maktoum and Garhoud bridges. Landscaping work was also involved.

Central Control of Traffic Signals:

Completed 1996 Cost Dh 26 million

This involved a replacing of all existing signals, including 97 sets of traffic lights and 27 sets controlling pedestrian crossings. These were replaced by an automatically-controlled network designed to reduce congestion and to smooth the flow of traffic.

Oud Maitha Road interchange with Sheikh Rashid Road:

Completed 1997 Cost Dh 75 million

The project involved the construction of a raised interchange to permit free movement between Sheikh Zayed Street and Garhoud Bridge, as well as associated landscaping.

Al-Romoul Interchanges:

Completed 1997 **Cost Dh 116.5 million**

This involved the construction of six bridges to link Garhoud Bridge to all major roads in the Garhoud, Al-Romoul and Al-Bustan areas, as well as associated landscaping.

Sheikh Zayed Road:

Completed 1998 **Cost Dh 684 million**

Sheikh Zayed Road was designed to be the first road of Highway standard, stretching from Dubai towards Abu Dhabi. It was carried out in three phases, and took into account the need for the highest possible level of safety for users. Street lighting, a central reservation, service roads and landscaping were part of the package. Details of the three phases follow.

Phase One: Trade Centre Roundabout to Defence Intersection:

Completed 1994 **Cost Dh 62.5 million**

Work began in 1993, with the widening of the existing road to four lanes in each direction

Sheikh Zayed Road

and the construction of an underpass to link the Trade Centre area to Sheikh Zayed Road. Two service roads, each 1.5 km. in length were built on either side, along with street lighting and rainwater drainage, as well as the laying of the necessary utilities infrastructure for water, electricity and telecommunications.

Phase Two: Defence Roundabout to Jebel Ali:

Completed 1994 **Cost Dh 424 million**

In this phase, Sheikh Zayed Road was widened to four lanes in each direction. The six main junctions, Defence Roundabout, the Al-Safa and Al-Manara interchanges and the roads to the Chicago Beach Hotel area (now the site of the Jumeirah Beach Hotel and Burj al-Arab), to Jebel Ali and to the Emirates Golf Course at Jebel Ali, were provided with bridges and access roads, to facilitate the smooth flow of traffic on the highway, as well as easy access to and departure from adjacent areas.

Three separate contracts were awarded for this work, one covering the 8 km. from the Jebel Ali roundabout to the Emirates Golf Course, for a value of Dh 136 million, the second the 12 km. from the Golf Club to Al-Manara, costing Dh 118 million, and the third from Al-Manara to Defence Roundabout, costing Dh 170 million.

Phase Three: Jebel Ali roundabout to Seih Sheib:

Completed 1998 **Cost Dh 198 million**

This phase, extending from the Jebel Ali roundabout to the border with the Emirate of Abu Dhabi, involved the widening of the highway to four lanes in each direction and the construction of bridges and access roads at junctions 7 and 8, to ensure the smooth flow of traffic.

Beni Yas Street Extension interchange with Garhoud Street (Phase 2):

Completed 1998 **Cost Dh 82 million**

This involved the construction of an underpass and two bridges to link Garhoud Street and Beni Yas Street, with associated landscaping work.

Aesthetic Projects in Al-Riqqa, Al-Dhiyafa, Al-Muraggabat, Al-Mateina:

This group of projects included Al-Riqqa Street (Completed 1997, Cost Dh 10.8 million), Al-Muraggabat Street (Completed 1998, Cost Dh 13.6 million), Al-Dhiyafa Street (Completed 1998, Cost Dh 18.2 million) and Al-Mateina Street (Completed 1999, Cost Dh 21.8 million).

The projects involved widening of the roads and the pavements, as well as the provision of

Al-Riqqa Street

open spaces in either side for recreational use. The much-wider pavements are used by adjacent restaurants and food outlets, and have proved popular during the annual Dubai Shopping Festivals.

Improvement of Al-Saif Street:

Completed 1998 Cost Dh 4.3 million

This involved the creation of pedestrian walkways along the side of the Creek, complete with seating and lighting, as well as safety barriers.

Rooftop and Multi-Storey Car Parks:

Completed 2000 Cost Dh 135 million

These projects were carried out to increase the amount of car-parking available in central areas.

Roads and Car Parks at Dubai International Airport:

Completed 2000 Cost Dh 142 million

This project involved the building of connecting roads and car-parking, with a capacity for 1,100 cars, as well as an underpass and bridge at the Al-Bustan interchange, seven other bridges, and two covered and air-conditioned raised pedestrian crossings with moving walk-ways.

Emirates Road Project (Dubai Ring Road):

Completed 2001 Cost Dh 813 million

The purpose of this project was to provide a link between Dubai and the rest of the Emirates and to reduce congestion on the main roads in the city. Work, which began in 1998, was divided into three phases.

The first two phases were completed on 6th January 2001, covering a distance of 50km., and including thirteen underpasses, to permit future development related to electricity, water and drainage, as well as five crossings for camels.

Phase One

This involved three sections, covering 22 km., and stretching from the junction with the Dubai – Al Ain road to the border with the Emirate of Sharjah. It included the building of 19 other stretches of ancillary and joining roads and eight interchanges, seven of which were raised and the other at ground level, as well as 34 bridges:

Section One, completed in 2000 at a cost of Dh 158 million, stretched from the border with Sharjah to the Al-Nahda interchange in the Al-Qusais area. Six km. long, has had two interchanges, with three bridges and a ground-level link.

The second section, 5 km. long and running from the Al-Khawanjeej road to Al-Romoul Street and also completed in 2000, had two raised interchanges with a total of eleven bridges.

The third section, completed in 2001, runs 11 km. from the road to Al-Aweer to the junction with the Dubai – Al Ain road, and has three raised interchanges with 20 bridges.

Phase Two

Completed in 2000, and costing Dh 214 million, this 28-km. section ran from the Dubai – Al Ain road to the junction with the Jebel Ali to Lihbab road and has four intervening junctions, providing links to the Jebel Ali Free Zone, Al-Barsha, the Al-Quoz Industrial Area and Dubai Investments City.

Phase Three

The third phase, also completed in 2001 and costing Dh 68 million, involved the building of a link to the 16 km. Jebel Ali – Lihbab road.

Entrances to the Fruit and Vegetable Market

Completed 2001 **Cost Dh 47 million**

This involved an expansion of and improvements to the road network in the Ra's al-Khor area, including entrances to and exits from the Central Fruit and Vegetable Market and the second-hand car market, as well as expansion of the facilities of the Dubai Ports Authority. Among the work undertaken was six kilometres of roads enlarged from single-lane to double-lane, a widening of the Al-Aweer road within the Ra's al-Khor area to three lanes in each direction, 2 kilometres of road widened from two to three lanes, the building of an interchange on the Al-Aweer road, linking of the Central Market with the adjacent city road network at the junction of the Nad al-Hamar road with Road 67 and the laying of main rainwater and drainage lines.

Al-Mamzar Interchange

Completed 2001 **Cost Dh 40 million**

This involved the construction of an interchange with four bridges and associated services for utilities half-way between the Al-Nahda roundabout in Dubai and the Al-Nahdha interchange in Sharjah. It was built to facilitate the movement of traffic between Al-Mamzar, Al-Qusais and Al-Ittihad Street.

Improvement work to main roads

Through the Roads Construction Section, the Department has engaged in a continuous programme of work designed to improve the main road network in Dubai. This work has involved an expenditure of around Dh 1.5 billion.

Building of local roads

Many local roads in residential, commercial and industrial areas have also been built, with the costs of these amounting to around Dh 650 million by 2001. Among such roads have been those at the City Centres in Bur Dubai and Deira and other roads in Umm Suqeim, Al-Barsha, Al-Mamzar, Al-Baraha, Al-Qusais, Al-Hamriyyah, Nad al-Hamar, Nad al-Sheba, Al-Mankhool, Al-Mizher, Hor al-Anz, Umm Hurair, Al-Karama, Al-Rashidiya, Satwa, Port Rashid and the industrial areas in Ra's al-Khor, Al-Quoz, Al-Aweer and Jebel Ali.

Development of Al-Safa Interchange

Completed 2002 **Cost Dh 68 million**

This involved the building of an interchange with three bridges, two circular ramps and associated links to and from Sheikh Zayed Road, as well as re-planning of car-parking facilities, land-

scaping, lighting and the relocation of and protection of the utilities infrastructure.

Bu-Khadra Interchange

Completed 2002 Cost Dh 112 million

This project linked the Bu-Khadra and Wimpey interchanges with Road 313 and the Dubai to Al Ain road, and also involved the construction of a new interchange linking the road from the Defence Interchange and Al-Khail Road, which runs parallel to Sheikh Zayed Road, to the Emirates Highway.

Ra's al-Khor Interchange

Completed 2002 Cost Dh 42 million

This involved the building of an interchange linking Nad al-Hamar Street with the Al-Aweer road, the widening of the Ra's al-Khor road from three to four lanes over a distance of four km., and building of a four-km. long link road from the main Al-Aweer road.

Dubai Cross Road Project (First Phase)

Completed 2002 Cost Dh 15 million

This involved the widening of Al-Amardi Street from a single lane to a two-lane, two-way road from the Al-Khawaneej road to Al-Aweer and the building of a 4.8 km. long double-lane dual carriageway to the Dubai-Hatta road, as well as an interchange and two camel-crossings.

Dubai Cross Road Project (Second Phase)

Completed 2003 Cost Dh 48 million

This second phase, covering a distance of 135 km., runs from the new roundabout on the Dubai to Al-Aweer road to the Ruwayyah bridge on the Dubai to Al Ain road. Dual carriageway, with two lanes, 7.5 metres wide, on each side, and with a 15 metre central reservation, the road has lighting, two camel-crossings and associated works.

Street lighting and operation of traffic systems

Street lighting and traffic signals are key elements of the road network, and have the objective of providing for road-users a safe network that can be used at the lowest possible cost, permitting travel as quickly as possible within the necessary constraints imposed by safety needs. The Municipality's policy of the provision of street lighting can be defined as follows:

Control of Traffic Systems

One of the main problems faced by cities worldwide is the control of traffic flow resulting from urban expansion. In Dubai, this problem has been exacerbated by the rapid growth of tourism and commerce. The solution adopted by the Dubai Municipality, following a detailed study, was the installation of a modern automated central traffic control system, capable of responding swiftly to changes in traffic flow and delays at traffic lights.

Table illustrates the Municipality's policy for the provision of lighting facilities.

Classification of Road	Lighting Policy
External Freeways	– Complete lighting of the roads if the traffic flow reaches 60% of the road's capacity or if there is a higher possibility of accidents occurring due to a lack of lighting.
External Highways	– Complete lighting of the roads if the traffic flow reaches 60% of the road's capacity or if there is a higher possibility of accidents occurring due to a lack of lighting.
Urban Highways	– Complete lighting of the roads
Arterial Roads	– Complete lighting of the roads
Roads in residential areas	– Complete lighting of double-lane roads. – Lighting of single lane roads in an area developed to 40% of its capacity. – Lighting of roads near public utilities such as mosques, schools, parks and commercial shops provided that the construction of the drainage network has been completed
Local streets in residential areas Streets in industrial areas	– Complete lighting of double-lane roads. – Lighting of roads in fully-developed areas – Lighting of double-lane roads if there are no obstructions.
Local streets in central commercial areas	– Complete lighting of the roads.

Lengths of streets provided with lighting, 1985 – 2002 (in kilometres)

Year	1985	1990	1995	2000	2001	2002
Total length of streets with lighting	138	484	681	1,196	1,290	1,655

Lengths of streets provided with lighting, by road classification, at the end of 2002 (in kilometres)

Road Classification	Total length of roads with lighting (km.)	Total length of roads (km.)	Percentage of roads with lighting
Freeways	149.6	149.6	100%
Highways	167.7	254.7	66%
Urban Highways	101	101	100%
Arterial Streets	498	498	100%
Collective Streets	466	946	49%
Local Streets	273	1,109	25%
Total	1,655	3,058	54%

Lengths of streets provided with lighting, by road lane classification, at the end of 2002

Item	Total length of roads with lighting (km.)	Total number of lamp-posts	Total number of lighting units	Total energy/ megawatts	Total cost of annual electric consumption in million Dirhams
Lanes E	418	6,523	13,361	8.4	7.36
Lanes D	498	10,310	22,845	10.17	9.06
Areas	739	20,555	26,110	7.5	6.56
Total	1,655	37,388	62,316	26.07	22.98

The Traffic Control Centre was opened in September 1996, staffed by five well-trained Emirati engineers.

The project cost a total of Dh 26 million, which covered both the necessary changeover of the traffic lights and pedestrian crossings themselves as well as the installation and programming of the control centre.

It began by covering 97 traffic lights and 27 pedestrian crossings, although by the time this report was compiled, there were a total of 166 traffic lights and 52 pedestrian crossings in operation.

In the six years since the system was first installed, the number of traffic lights and pedestrian crossings it controlled rose from 125 to 218, an increase of 75 per cent. The number of vehicles registered rose from 213,305 at the end of 1996 to 387,305 by the end of 2002, an increase of 81 per cent.

The graph below illustrates the increase in traffic movement during this period.

Number of Traffic Signals and Pedestrian crossings, 1985 – 2002

Item	1985	1990	1995	2000	2001	2002
Number of traffic light interchanges	50	60	101	147	156	166
Number of pedestrian crossing signals	-	16	26	41	53	52

Maintenance of Traffic Signals

Preventative Maintenance

Maintenance work	Implementation Policy	Maintenance work	Implementation Policy
Replacement of Traffic Signals	Once every 15 years	Cleaning Traffic Signal Units	Once a month
Cleaning & checking traffic signals	Annually	-	-
Replacement of bulbs in traffic signals:		Replacement of bulbs for pedestrian crossing signals:	
Red	Annually	Green	Once every 6 months
Yellow	Annually	Red	Once every 6 months
Green	Annually	-	-

Corrective Maintenance

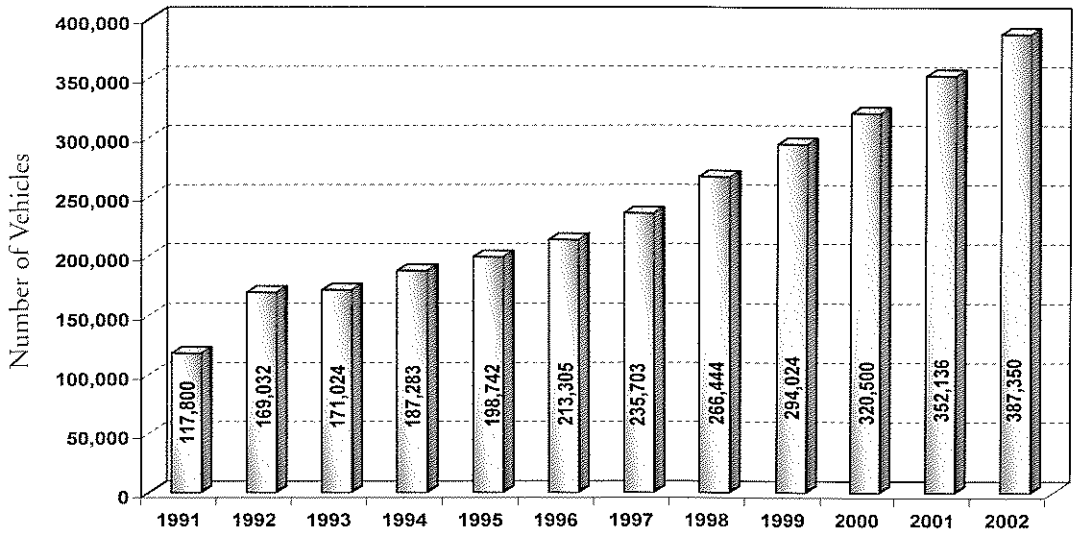
Maintenance Work	Implementation Policy
Repairing damage to traffic signal cables	Within 1 hour
Repairing damage to control equipment	Within 1 hour
Malfunctions resulting from accidents	Within 1 hour
Replacements of traffic signal parts damaged by accidents	Within 8 hours
Replacement of damaged light bulbs	50 per cent within 1 hour 25 per cent within 8 hours 25 per cent within 24 hours
Malfunction of sensory devices	25 per cent within 2 day 50 per cent within one week 25 per cent within one month

Traffic Signal System Control Room

Increase in vehicle movement, 1991 – 2002

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
No.	117,800	169,032	171,024	187,283	198,742	213,305	235,703	266,444	294,024	320,500	352,136	387,350

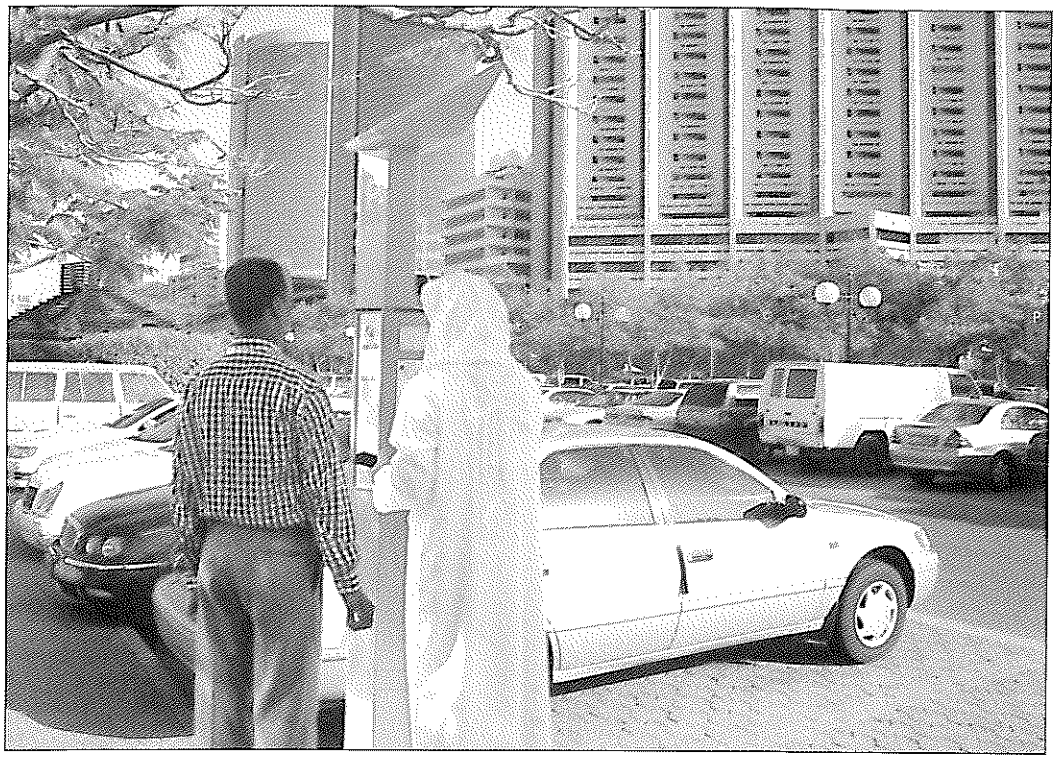
Increase in vehicle movement, 1991 – 2002



The Roads Department continues to carry out a variety of projects designed to develop and improve the roads network in Dubai. These include the improvement of road surfaces, carried out by the Road Paving Department, which has developed a manual and a computerised database on various types of surfacing, and research into an asphalt mix which is suitable for local weather conditions and for the level of traffic loads.

Roads are continually repaired, where this is required, while a review of the road signs in use has been carried out. A system for the numbering of small roads, streets, lanes and sections within Dubai has also been developed.

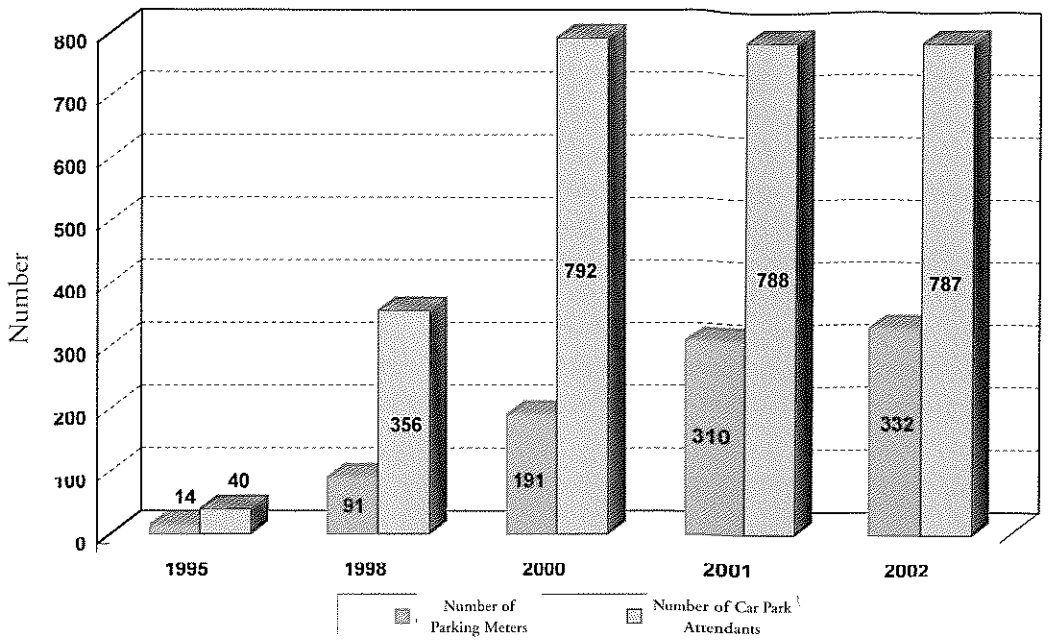
One important project developed by the Roads Department, as well as its other work, has been the development of car-parking controls. This has involved the installation of parking meters, linked to a computerised monitoring network. First tested in 1995, this system of paid on-street parking has now been extended to many areas of the city.



Car parking meters

Increase in number of car Park attendants and parking meters, 1995 - 2002

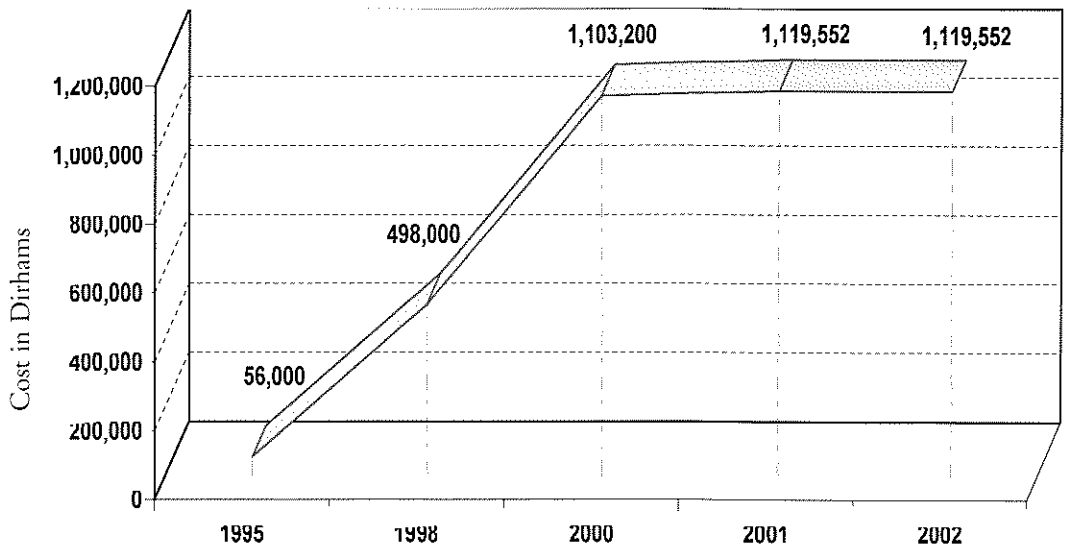
Year	1995	1998	2000	2001	2002
Number of Parking Attendants	14	91	191	310	332
Number of Parking Meters	40	356	792	788	787



Cost of maintaining parking meters (in Dirhams), 1995 – 2002

Year	1995	1998	2000	2001	2002
Cost	56,000	498,000	1,103,200	1,119,552	1,119,552

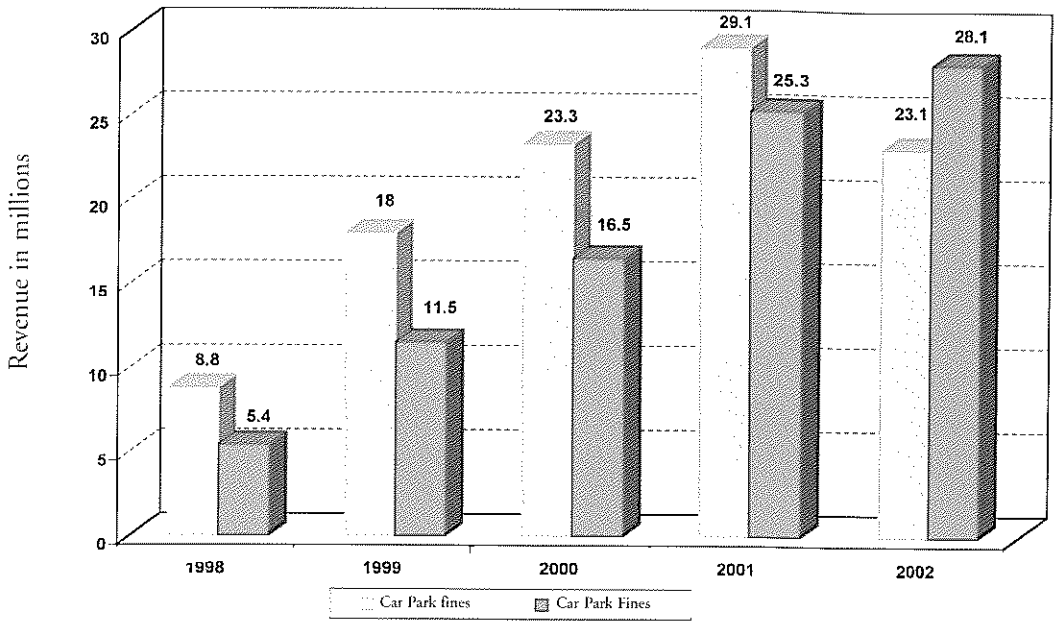
Cost of maintaining parking meters (in Dirhams), 1995 – 2002



Annual income for the Car Parks Section, 1998 – 2002 (in millions of dirhams)

Year	1998	1999	2000	2001	2002
Car Park Fees	8.8	18	23.3	29.1	23.1
Car Parking Fines	5.4	11.5	16.5	25.3	28.1

Annual income for Car Parks Section (in millions of Dhs.), 1998 – 2002



On 26th November 2002, the late H.H. Sheikh Maktoum bin Rashid al-Maktoum issued Law No. 7 regarding the organisation of the roads network in the Emirate of Dubai, laying down the role of the Municipality and the Roads Department in equipping and operating roads, car parks, the traffic control system and traffic signals.

Service Co-ordination Office

In April 1997, a Service Co-ordination Office was established in the Municipality to co-ordinate between utility providers such as the Dubai Water and Electricity Authority, DEWA, and Etisalat and the Municipality Drainage & Irrigation and Building Departments. The task of the Office is to simplify the procedures for the necessary cables and lines that these authorities lay under the roads. The Office also specifies the criteria and conditions relating to the No Objection Certificates issued to Consultants Offices and Contracting Companies and safety regulations related to excavations on the road network. It issues, electronically, No Objection Certificates (NOC) and Completion Certificates for

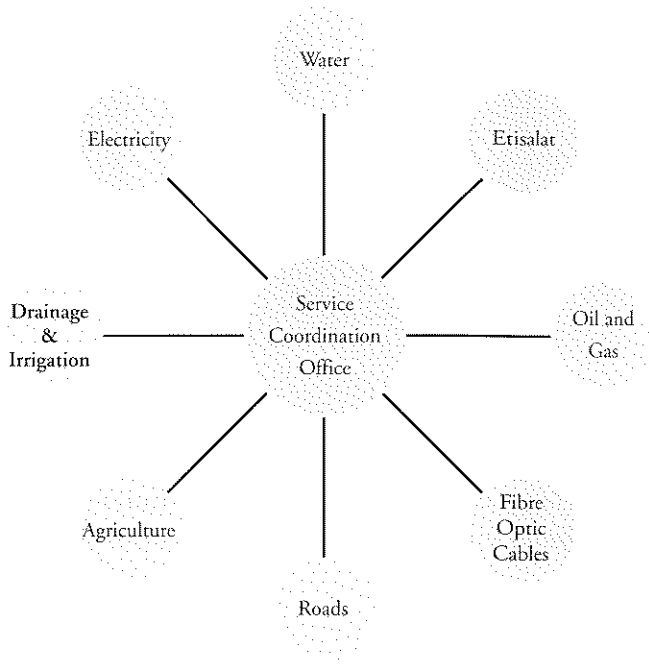
works and service projects related to Dubai's infrastructure that are carried out on the roads, these being provided to service authorities, contractors and consultants.

The Office also serves as a point of contact between contractors and consultants and the relevant parts of the Municipality, as well as other, related authorities for all matters related to the co-ordination of services and to the simplification of the procedures for issuing NOCs.

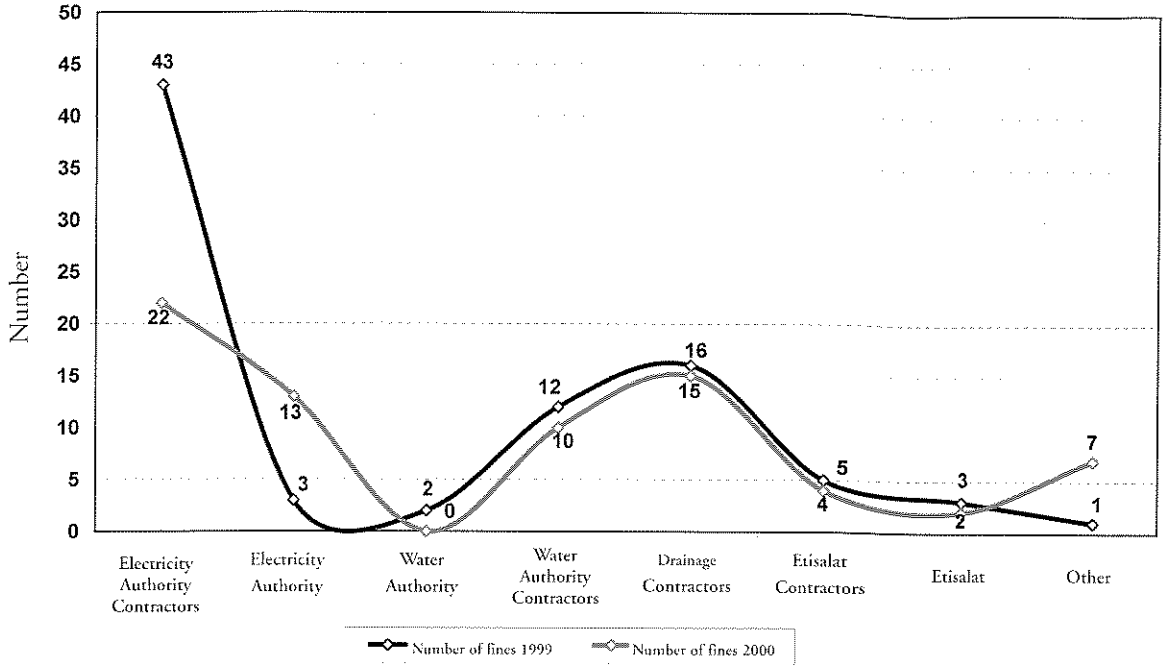
Another task is to co-ordinate with DEWA, Etisalat, Dubai Internet City and opther Government and private bodies on matters relating to the laying of services under or adjacent to roads.

In accordance with Administrative Decree No. 5, issued on 13 January 2002, the Service Co-ordination Office, formerly a part of the Roads Department, was made directly responsible to the office of the Assistant Director General of Roads and General Projects Affairs.

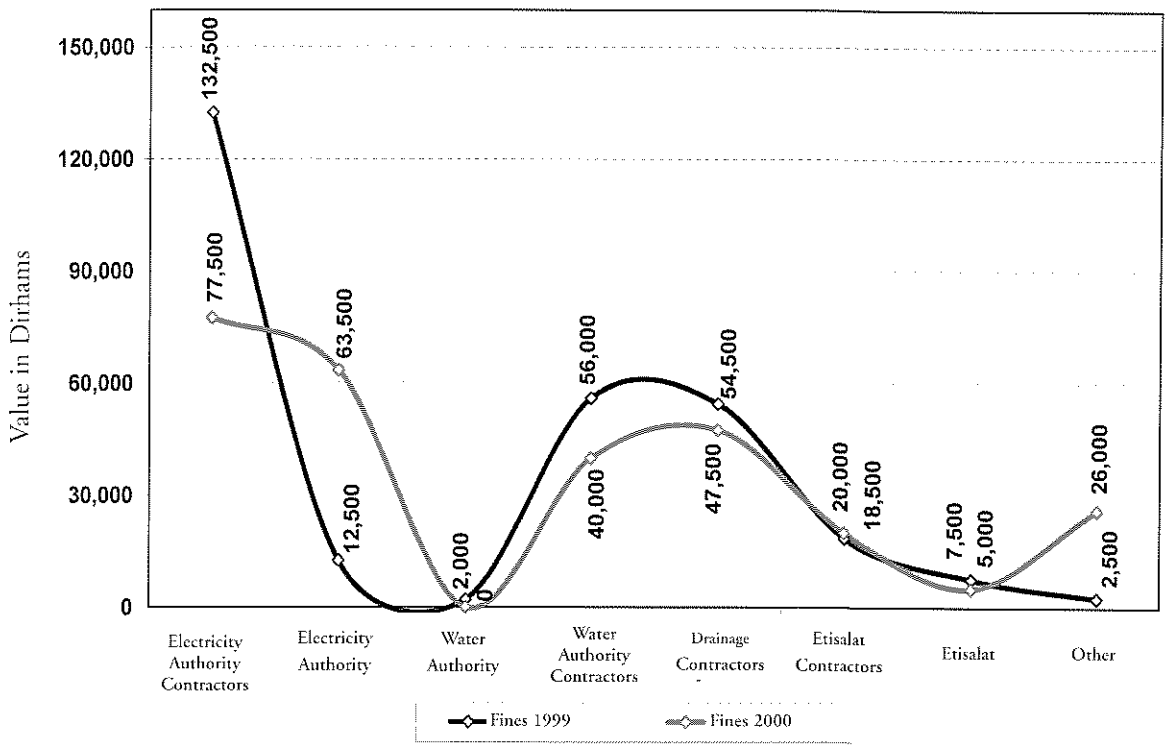
Diagram of the Service Coordination Office in 1997



Number of violation orders issued by the Service Coordination Office, 1999 – 2000



Value of fines related to violation orders issued by the Service Coordination Office, 1999 – 2000



Municipal Ordinances

Year	Number	Title
1961	1	To organise the parking of cars and other vehicles and places to tie riding animals
1961	3	Cleanliness and organising the use of public roads, bridges, streets, public squares and open spaces.
1967	18	Various Municipal Ordinances
1986	29	Laying service lines on public roads.
1991	60	Amendment of vehicle licence fees or their renewal, in accordance with the table attached to the Road Traffic Law issued in 1967.
1993	84	Amendment of articles in Municipal Ordinance No. 21/1981 regarding the laying of service lines on public roads in the Emirate of Dubai.
1995	92	Organising the use of public car parks within the Emirate of Dubai.
1997	109	Amendment of some articles pertaining to Municipal Ordinance No. 87/1991 regarding the specification of costs owed for repaving roads and repairs resulting from accidents.
1997	112	Works related to paving of roads, building exteriors and commercial shops within the Emirate of Dubai.
2000	7	Organising the rules for membership and reservation of public car parking spaces owned by Dubai Municipality.
2001	4	Amendment of some articles pertaining to Municipal Ordinance No. 9/2000 prohibiting the display of cars in public car parks within the Emirate of Dubai for the purposes of sale or rent.

Administrative Directives

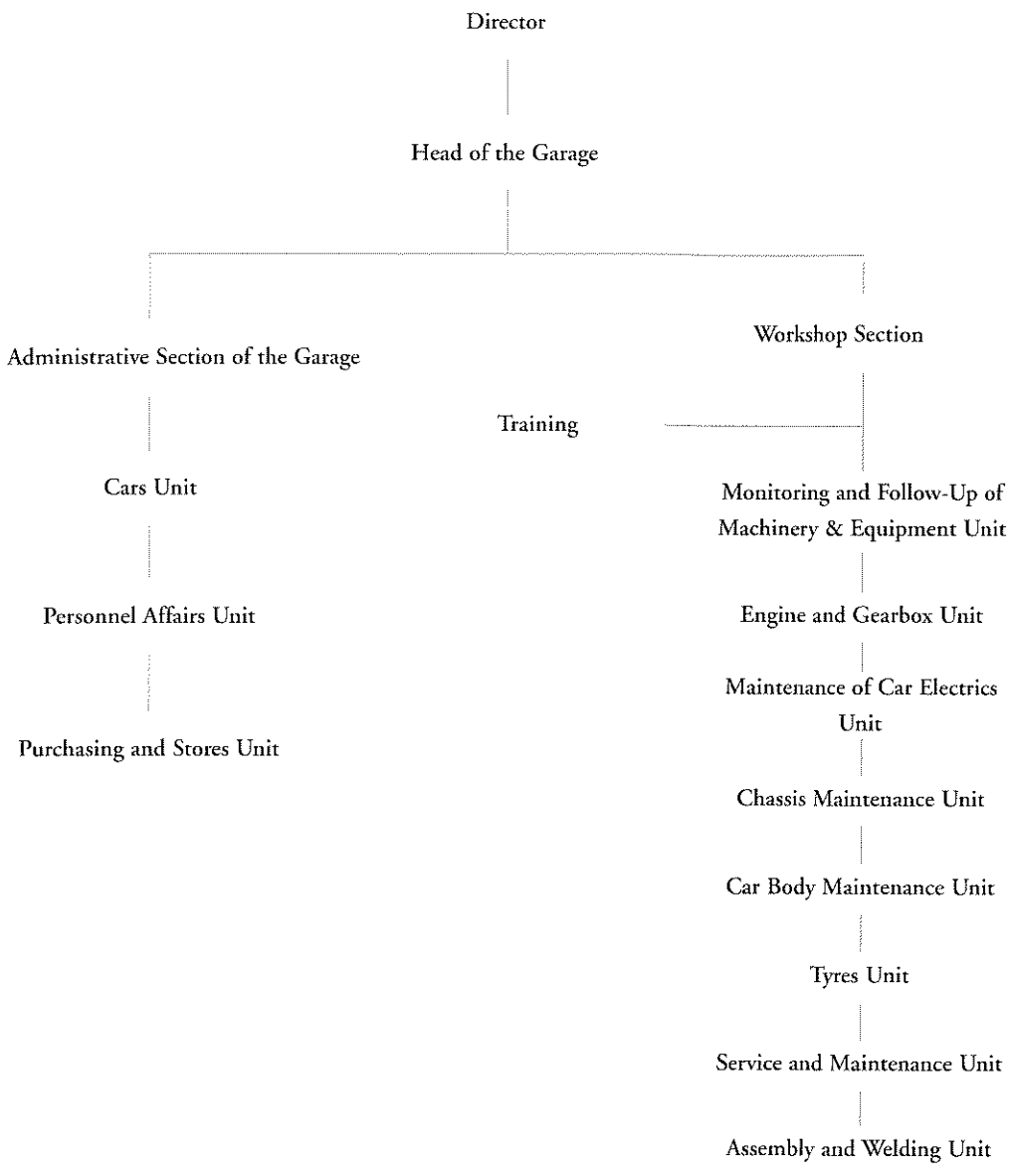
Year	Number	Title
1997	527	Formation of the Service Coordination Committee in the Emirate of Dubai
1997	1174	Rules organising works related to paving of roads, building exteriors and commercial shops within the Emirate of Dubai.
1998	298	Rules organising the placement of directional signs for some establishments within the Emirate of Dubai.
1997	118	Organisation chart and description of duties for the Road Department.
2000	36	Organisation of procedures relating to calculation, receipt and payment of all costs pertaining to works for improvement, development and transfer of service network lines.
2000	67	Amendment of fees for the use of some public car parks in the Emirate of Dubai.
2001	290	Amendment to the affiliation of the Service Coordination Office
2002	58	Creation of the Traffic Technical Section and amendment of the organisation chart for the Roads Department.
2002	162	Formation of the Technical Committee for the Dubai Train Project
2002	293	Formation of a committee to follow up the recommendations of the Transport Committee arising from the United Nations Economic and Social Commission for Western Asia ESCWA

Transport Department

Background

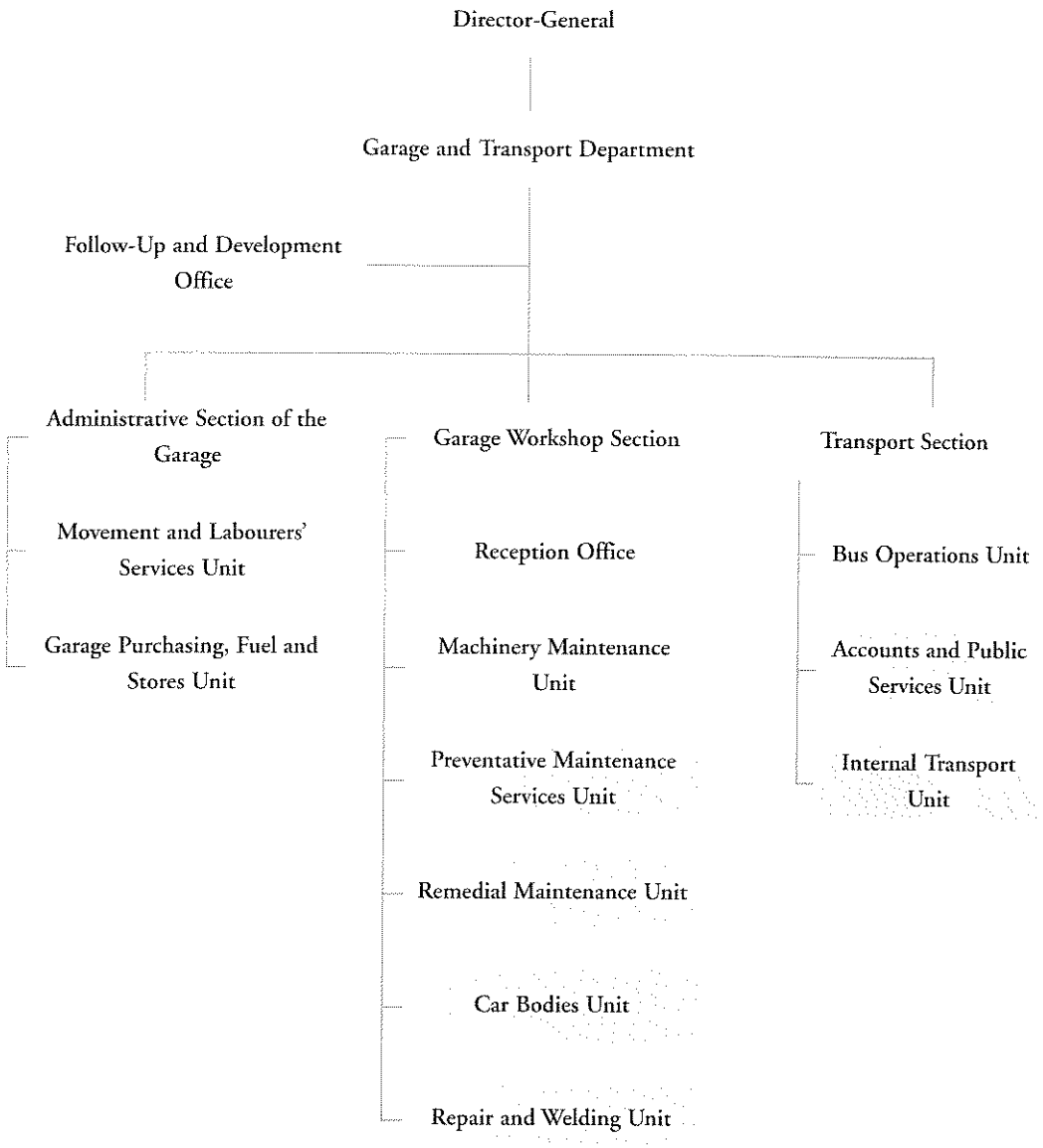
The origins of the Transport Department of today date back to the setting up of the Municipality Garage, in 1961. Then located in Al Maktoum Street, it was moved in 1980 to the Umm al-Ramool area, and was included in the Organisation Chart as the Garage Section, see Chart No. 1.

Chart No. 1. Organisation Chart for the Garage Section in 1980



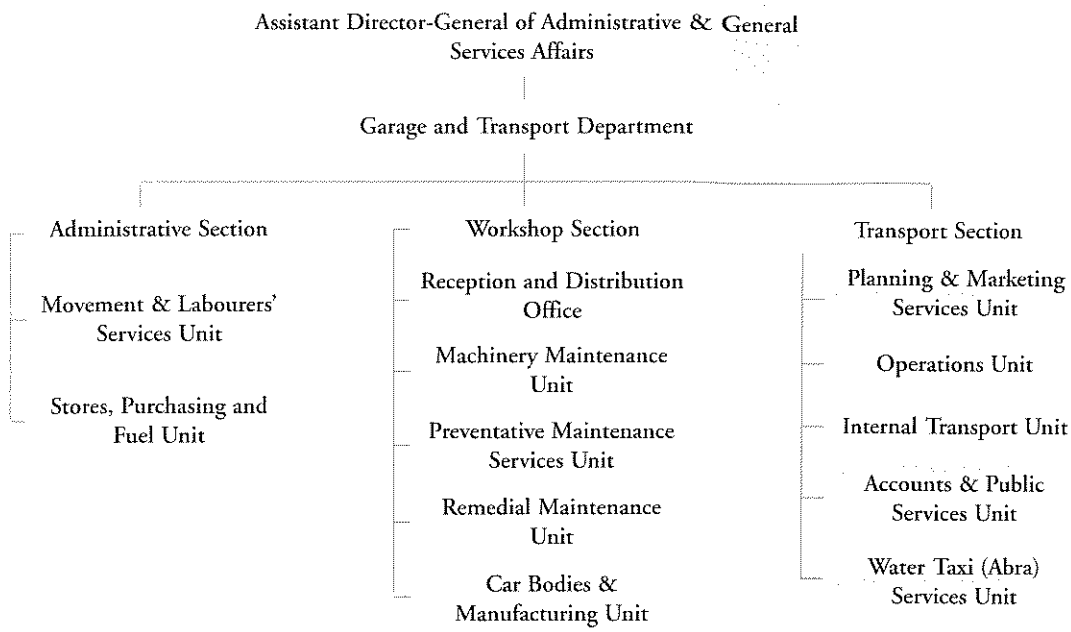
The Transport Section was established in 1968, when a number of buses were purchased by the Municipality, to permit it to introduce a public transport service. This was merged with the Garage Section to create the Garage and Transport Department in 1990 in accordance with the terms of Administrative Directive No. 311 for that year, issued on 10th February. Chart No.2 illustrates the revised structure.

Chart No. 2. Organisation Chart for the Garage and Transport Department in 1990



In 1995, to take account of the expansion of the Department's duties, new buildings were constructed, at a cost of 28 million dirhams. These included new administrative offices, a petrol and fuel station, a carpark with a capacity for 600 vehicles, stores for up to 20,000 types of spare parts and a workshop able to deal with 150 vehicles and other machines on a daily basis. At an administrative level, an Assistant Director-General post was created, also in 1995, with the amendment to the Organisation Chart shown in Chart No. 3.

Chart No. 3. Organisation Chart for the Garage and Transport Department in 1995



Al Shindagha Bus Station