

CHAPTER 4

ALTERNATIVES DEVELOPMENT AND EVALUATION

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4.1 SECTORIAL POLICY AND ALTERNATIVES

The present condition of the transport system in the Study Area shows that major transport issues and problems, that have also major concerns by the local in-charge authorities of CDR, MOPWT, Tripoli Municipality and other municipalities, can be grouped under the three transport sectors:

Based on the major transport issues and problems, that have major concerns by the local in-charge authorities of CDR, MOPWT, Tripoli Municipality and other municipalities, the following alternatives are established under three transport sectors:

- **Road Network Development:** Based on the present condition of the transport system, future land use planning and forecasted future transport demand, three alternatives regarding the road network are considered.
 - 1) No improvements will be done on the road network.
 - 2) Minor improvements will be done: Such improvements include the ongoing projects (detailed design stage) that are expected to be implemented in the near future.
 - 3) Major improvements will be done: Such improvements include all previously planned and expected projects to develop the whole road network.
- **Transport Demand Management:** As the Central Area in Tripoli contains the most congested streets and intersections, two alternatives are considered in regard to the transport demand management.
 - 1) No traffic demand management will be applied.
 - 2) Traffic demand management schemes will be applied to improve the traffic flow in the Central Area.
- **Public Transport System:** The existing public transport system that depends on taxi service is not efficient and will not meet the future public transport demand. The committed plan by MOPWT to introduce a bus transport system is included in all plan alternatives, as the most suitable public transport mode for the size and population of the Study Area.
 - 1) No introduction of City Bus Services.
 - 2) City Bus Service will be applied to introduce.

In generating sectorial alternatives, the present conditions mentioned above and objectives mentioned in the Master Plan policy are considered.

The overall procedure for the alternative plan development, selection and evaluation of the selected plan as economically, technically and environmentally feasible is presented in Figure 4.1-1.

4.2 MASTER PLAN ALTERNATIVES

Based on the above three major transport issues, the following five transport alternative plans were developed, with the bus transport service as a fixed component, in order to compare with the “Do Nothing” case and to select the optimum alternative that can be applied to develop the urban transport system in the Study Area. Table 4.2-1 presents the sectorial integration applied to form the alternatives, while Figure 4.2-1 shows the four alternatives schematically. The plans are:

Plan A – “Bus Service + Road Network with minor improvements:

To apply minor improvements and committed road projects on the existing road network without major expressway projects such as ring roads.

Plan B – Bus Service + Road Network with major improvements:

To apply all committed and proposed development projects of the road network including major expressways.

Plan C – Bus Service + Transport Management:

To apply traffic control measures and management schemes to improve traffic condition in central areas.

Plan D – Integrated Transport Plan:

To combine the major road projects, which gives better results than minor improvements, with transport management schemes and city bus service.

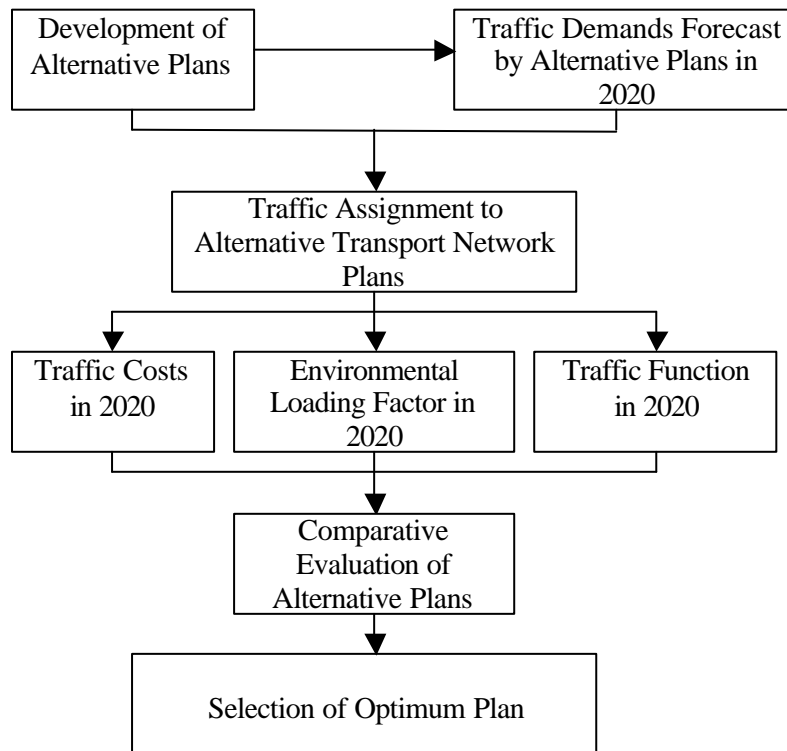


Figure 4.1-1 Selection of Optimum Plan

Table 4.2-1 Master Plan Alternative

Alternative Plan	Road Network			Demand Management		Public Transport	
	Without Improvement	With Minor Improvement	With Major Improvement	Without Management	With Management	Without City Bus Service	With City Bus Service
Do Nothing							
A							
B							
C							
D							

4.3 COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives are evaluated through a comparative analysis procedure to select the most appropriate transport plan for Greater Tripoli Metropolitan Area. The comparative analysis was conducted on the developed alternatives when compared with the “Do Nothing” case. In order to select the optimum plan, the following aspects are selected:

- 1) Traffic functional aspect
- 2) Benefit/cost aspect
- 3) Environmental loading aspect

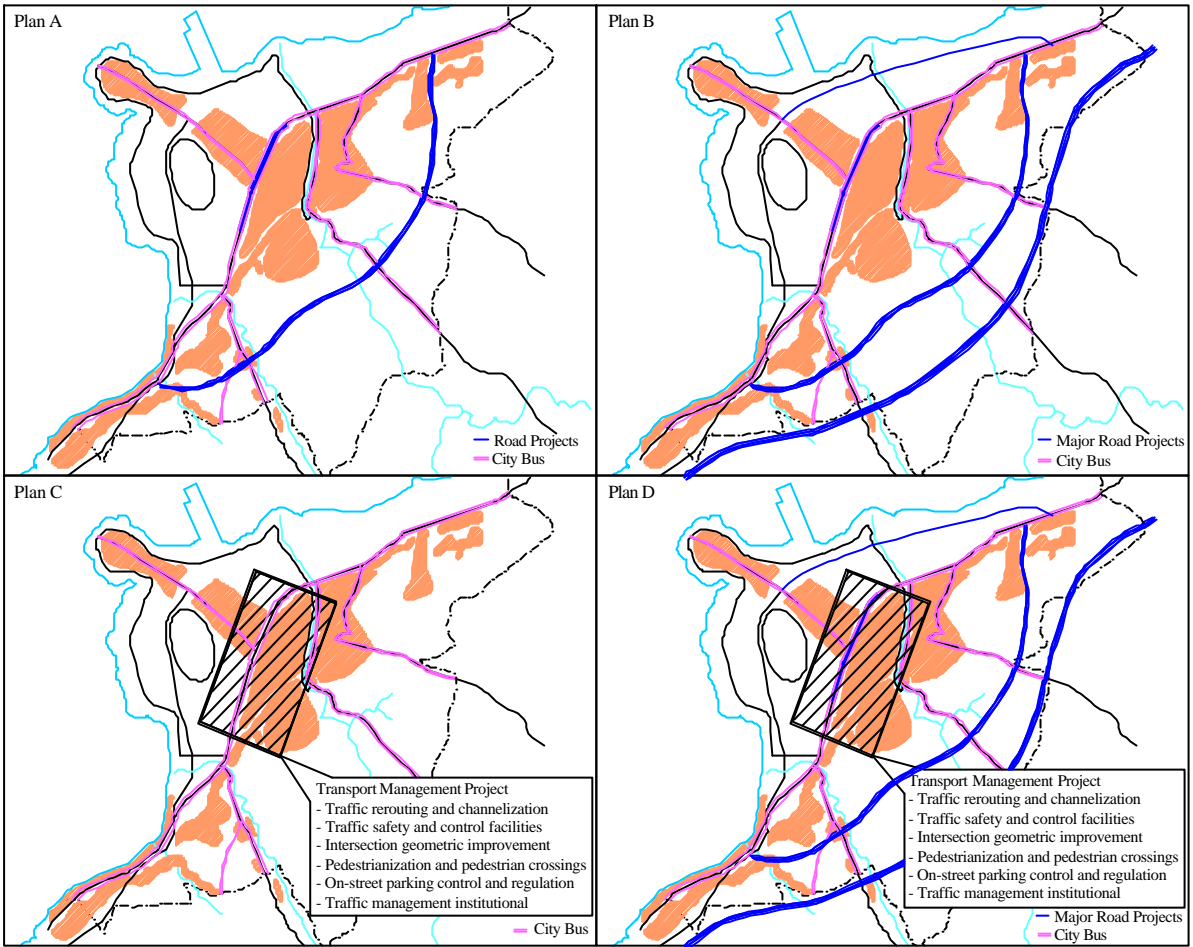


Figure 4.2-1 Schematic Master Plan Alternatives

4.3.1 Traffic Demand by Alternative Plans

All the developed alternative plans were subject to traffic demand forecast by applying the procedure presented in Volume 3. The total number of trips for each vehicle category is estimated as presented in Table 4.3-1.

Table 4.3-1 Traffic Demand Forecast - 2020

Vehicle Category	Plan A	Plan B	Plan C	Plan D
Internal Trip	270,732	270,732	236,289	236,289
Passenger Car	181,817	181,817	163,643	163,643
Taxi	44,283	44,283	22,932	22,932
Bus	11,204	11,204	16,286	16,286
Truck	33,428	33,428	33,428	33,428
External Trip	143,670	143,670	143,670	143,670
Passenger Car	110,812	110,812	110,812	110,812
Taxi	24,721	24,721	24,721	24,721
Bus	3,317	3,317	3,317	3,317
Truck	4,820	4,820	4,820	4,820
Total	428,233	428,233	393,790	393,790
Passenger Car	292,629	292,629	274,455	274,455
Taxi	69,004	69,004	47,653	47,653
Bus	14,521	14,521	19,603	19,603
Truck	52,079	52,079	52,079	52,079

4.3.2 Traffic Assignment by Alternative Plans

Forecasted trips for the alternative plans were converted to PCU and assigned on the road network by applying JICA STRADA models. Assignment results give the traffic indicators of pcu-km, pcu-hr and capacity-km that produce the average congestion degree in vehicle-capacity ratios as well as the average travel speed. Table 4.3-2 presents the traffic indicators for each alternative plan as well as the “Do Nothing” case in which no improvements are implemented on the transport network. The results show that Plan D has the lowest values of pcu-km and pcu-hr and produces the lowest congestion level with highest average speed on the network.

Table 4.3-3 gives the road length by traffic congestion degree for the four alternative plans. For C/V ratios over 1.0, plan D has the minimum congested lengths and followed by Plan B and Plan C while Plan A gives the longest congested lengths of roads on the network.

Table 4.3-2 Traffic Indicators by Alternative Plan - 2020

Plan	PCU-Km	PCU-Hour	Capacity-Km	VCR	Average Speed (Km/hr.)
Do-Nothing	2,788,483	74,557	3,582,567	0.778	37.4
Plan A	2,629,318	58,498	3,978,937	0.661	44.9
Plan B	2,561,699	48,755	4,982,902	0.514	52.5
Plan C	2,547,022	62,692	3,653,202	0.697	40.6
Plan D	2,348,516	42,838	5,057,002	0.464	54.8

Table 4.3-3 Road Length by Traffic Congestion Degree 2020 (Km)

Congestion Degree	Plan A	Plan B	Plan C	Plan D
>0.5	56.3	93.5	55.5	103.1
0.5-0.8	33.3	40.7	30.9	39.9
0.8-1.0	17.0	23.5	17.1	20.6
1.0-1.2	18.1	11.6	7.2	7.1
1.2-1.5	10.7	1.7	10.3	1
>=1.5	4.1	1.4	9.7	0.7
Total	139.5	172.4	130.9	172.4

Table 4.3-4 shows the average accessibility time to the Central Area by each alternative plan. As for the average accessibility to the Central Area, Plan D has the minimum accessible time and followed by Plan B, while Plan C gives the longest accessibility among the alternative plans.

Table 4.3-4 Population by Accessibility Time and Alternative Plans – 2000 and 2020

Accessibility (Min.)	2000	2020				
		Do-Nothing	Plan A	Plan B	Plan C	Plan D
0.0 - 5.0	18,850	3,600	3,600	3,473	13,600	23,473
5.0 - 10.0	159,202	112,640	112,640	108,604	122,640	108,604
10.0 - 15.0	77,564	142,266	142,266	258,104	122,266	238,104
15.0 – 20.0	43,248	74,667	74,667	62,154	74,667	62,154
More than 20.0	32,065	121,001	121,001	21,839	121,001	21,839
Total	330,930	454,174	454,174	454,174	454,174	454,174
Ave. Accessibility Time to Central Area (Min.)	13.08	19.7	17.2	14.7	19.0	14.1

4.3.3 Air Pollution by Alternative Plans

Air pollution components of HC, CO and NOx produced by each alternative transport plan are estimated as presented in Table 4.3-5. For comparison purposes, the differences between each alternative plan with the “Do Nothing” case show that Plan D has the highest differences with lowest values of produced air pollutants.

Table 4.3-5 Air Pollution by Alternative Plan (gm)

Plan	HC	Difference between Do-Nothing and Plan	CO	Difference between Do-Nothing and Plan	NOx	Difference between Do-Nothing and Plan
Do-Nothing	7,528,904	0	47,404,211	0	2,342,326	0
Plan A	7,099,159	-429,746	44,698,406	-2,705,805	2,208,627	-133,699
Plan B	6,916,587	-612,317	43,548,883	-3,855,328	2,151,827	-190,499
Plan C	6,876,959	-651,945	43,299,374	-4,104,837	2,139,498	-202,827
Plan D	6,340,993	-1,187,911	39,924,772	-7,479,439	1,972,753	-369,572

Note: Discharge rates are assumed as follows:
 HC 2.70 g/km
 CO 17.0 g/km
 NOx 0.84 g/km

4.4 ECONOMIC EVALUATION

4.4.1 Procedure

The total economic impact of the Master Plan projects is analyzed taking into account that each project element will be implemented as scheduled. The benefits generated by the Master Plan are calculated as savings in VOC (Vehicle Operating Cost) and TTC (Travel Time Cost) when analyzing the two cases of “Master Plan” case and “Do Nothing” case for each year of projects’ life span.

The unit traffic costs were established for the various cost items by updated values based on the “Economic Feasibility of The Coastal Motorway Tripoli-Syrian Border” and “Beirut Urban Transport Project Preparatory Study” that were carried out on 1999.

4.4.2 Economic Cost

The economic cost for road sector projects consists of the total of construction cost of road improvement works, engineering and maintenance cost. Public transport system cost consists of purchasing of buses, construction of bus/taxi terminal and other necessary facilities. Traffic management cost consists of traffic safety facilities, equipment of on street parking and construction of intersection improvement. The economic cost for each term in Plan is shown in Table 4.7-1.

Table 4.4-1 Economic Cost for Master Plan Projects (Million L.L.)

Sector	Short Term 2001-2005	Medium Term 2006 - 2010	Long Term 2011 - 2020	Total
Road Improvement/Great Separation				
Road Improvement	7,170	12,740	3,660	23,570
New Road Construction	28,200	20,810	119,900	168,910
Grade Separation/Underpass	27,020	7,680	5,120	39,820
Maintenance	0	1,109	18,805	19,914
Public Transport	17,490	0	8,510	26,000
Traffic Management	6,640	2,850	0	9,490
Total	86,520	45,189	155,995	287,704

4.4.3 Economic Benefit

1) Vehicle Operating Cost (VOC)

VOC is a main economic benefit that is generated by implementing the transport network development projects. The following sections present a description for the items of the savings in VOC in this study.

- Vehicle Cost and Relevant Taxes

Vehicles cost and related taxes are shown in Table 4.4-2. The most dominant types of vehicles used in the country are classified into four main categories, which are passenger car, taxi, bus and truck.

Table 4.4-2 Vehicle Cost (Million L.L.)

Vehicle Type	Fuel Type	Financial Cost	Tax	Economic Cost
Passenger Car	Gasoline	27,750	9,250	18,500
Taxi	Gasoline	27,750	9,250	18,500
Bus	Diesel	116,560	26,560	90,000
Truck	Diesel	119,000	11,829	107,171

- Fuel, Lubricant and Tier Cost

Prices of fuel lubricant and tire are shown in Table 4.4-3 and 4.4-4.

Table 4.4-3 Fuel Cost (L.L./LT)

Item	Gasoline	Diesel	Lubricant
Financial Cost	760	345	4,000
Tax	444	126	1,393
Economic Cost	316	219	2,607

Table 4.4-4 Tire Cost (1000 L.L./set)

Vehicle Category	No. of Tires	Financial Cost	Tax	Economic Cost
Passenger Car	4	243	33	210
Taxi	4	243	33	210
Bus	6	684	54	630
Truck	10	2,367	171	2,196

- Depreciation Cost

No established formula for depreciation of motor vehicles is available in Lebanon. In this Study, it was assumed that all vehicles are bought new, used for a certain amount of mileage and years, and that the residual value at the end of life span is 5%. Table 4.4.5 presents the estimated depreciation cost per vehicle category.

Table 4.4-5 Depreciation Cost

Item	Unit	Passenger Car	Taxi	Bus	Truck
Economic Vehicle Cost	1000 LL	18,500	18,500	90,000	107,171
Residual Value	1000 LL	925	925	4,500	5,358
Vehicle Life	Year	14	10	18	16
Depreciation Rate	% p.a	6.8	9.5	5.3	5.9
Depreciation Amount	1000 LL	1,255	1,758	4,750	6,364
Average Running p.a	km	16,000	26,000	35,000	45,000
Depreciation Cost	1000L.L/km	78	68	136	141

2) Saving in Travel Time Cost (TTC)

The travel time cost by vehicle type was estimated based on “Beirut Urban Transport Project Preparatory Study”, December 1999. These costs consist of business trips by 100% and other trips by 30% of the wage rate. The unit traffic cost by vehicle type is estimated as shown in Table 4.4-6.

Table 4.4-6 Unit Traffic Cost by Vehicle Type (LL)

Vehicle Type	Running Cost (50km/hr)	Fixed Cost	Travel Time Cost
Passenger Car	166	499	5,520
Taxi	159	637	4,200
Bus	292	2,066	3,465
Truck	295	2,648	4,860

(Prices at year 2000)

4.4.4 Economic Parameters

The economic parameters of benefit/cost ratio (B/C), economic rate of return (EIRR) and the net present value (NPV) were estimated by applying the estimated unit costs and benefits on the traffic parameters of the four plans. Table 4.4-7 presents economic parameter of the four alternative plans.

Table 4.4-7 Economic Parameters of Alternative Plans

Parameter	Alternatives			
	A	B	C	D
Benefit / Cost Ratio (B/C)	1.94	1.82	1.90	2.67
Economic Rate of Return (EIRR) %	18.13	20.59	17.77	27.58
Net Present Value (NPV) – LL Billion	56.88	93.64	43.84	187.09

4.5 SELECTION OF OPTIMUM PLAN

Applying a scoring analysis system based on the results of the comparative analysis between the alternative plans, as presented in Table 4.3-5, show that “Plan D”, which integrates and combine the three sectors of road development, transport management measures and city bus network, results in the most efficient transport system that can handle the future expected transport demand with less negative environmental impact when compared with other alternatives.

Table 4.5-1 Scoring of Optimum Plan

Alternatives	Traffic function				Environmental Loading Factor	Economic Benefit	Total
	VCR	Speed	Accessibility	Total			
Plan A	1	2	2	2	1	1	4
Plan B	3	3	3	3	2	2	7
Plan C	2	1	1	1	3	3	7
Plan D	4	4	4	4	4	4	12

Note: Scores: 4 = best, 3 = good, 2 = better and 1 = bad

CHAPTER 5

TRANSPORT SECTORIAL PLAN

CHAPTER 5

TRANSPORT SECTORIAL PLAN

5.1 ROAD NETWORK PLAN

5.1.1 Road Network Planning Concept

(1) Objectives

In line with the urban transport policy and scenario, objectives of road network development were established as follows:

- To strengthen the Greater Tripoli's standing as an international node and the regional capital.
- To guide the urban growth in the planned direction to achieve the spatial development.
- To alleviate traffic congestion in the existing urban area.
- To improve urban environment and amenity and to preserve historical and cultural heritage.

(2) Strategies

In order to realize the objectives, strategies are established as follows:

- To reinforce international and inter-regional road network in harmony with intra-urban network.
- To enlarge and reinforce the physical foundation of the transport infrastructure to cope with the requirements of the future urban economic growth.
- To provide high quality transport service between existing urban areas and the planned development area and among the planned development areas.
- To provide grade-separation facilities at congested intersections along the primary arterial streets.
- To maintain present road network in the existing urban area where traffic condition shall be improved by traffic management measures.

5.1.2 Road Network Development Concept

(1) Present Arterial Road Network Pattern

Present arterial network pattern is schematically shown in Figure 5.1-1. Characteristics of the present network are as follows:

- Most of arterial roads are connected with Tripoli Boulevard, which is functioning as a single backbone of the network in the Study Area.
- Inter-linkage of arterial roads is not achieved yet. Thus, the network is not flexible in terms of route selection from the side of the road users.
- Traffic capacity expansion of steep slope sections of inter-regional roads is practically impossible due to topographical constraint and roadside development.
- Present urban development is so concentrated at the limited areas that urban functions are being deteriorated. However, the present network is not formed to guide urban development in the new areas for development.

(2) Proposed Arterial Road Network Pattern

Proposed arterial road network pattern is shown in Figure 5.1-1, which can be compared with the present pattern. Basic concepts of the proposed network is as follows:

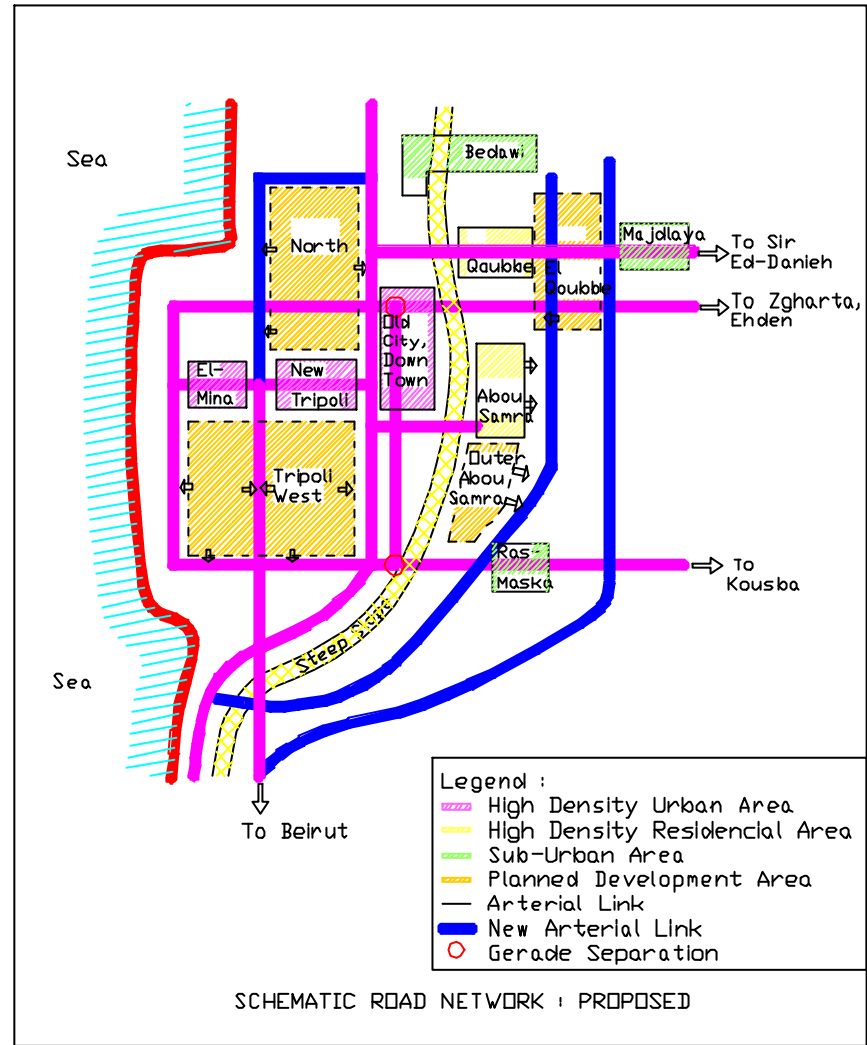
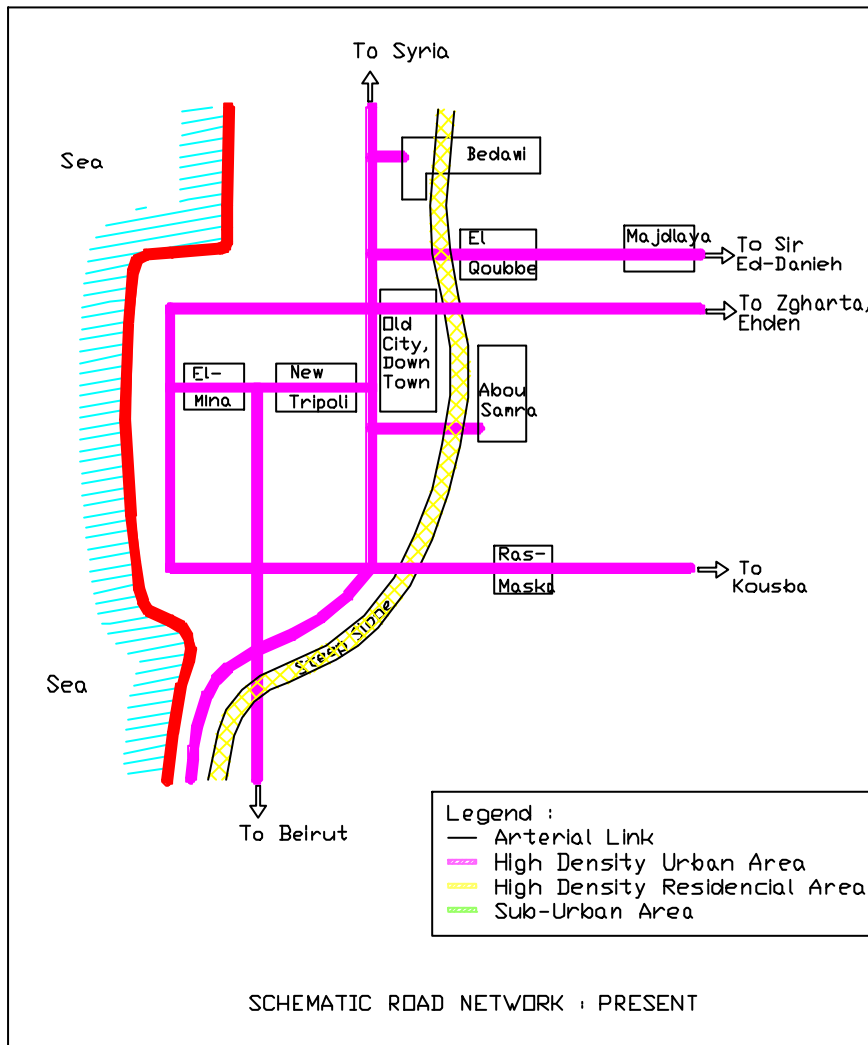


Figure 5.1-1 Present and Proposed Schematic Road Network

- Ring-and-Radial network pattern to guide the planned spatial urban development
 - East and West ring roads to be connected to form a strategic ring.
 - Inter-regional roads to function as radials
 - Tripoli Boulevard to be strengthen to function as a central backbone
- Full integration between urban development areas and road network through a ring road system connecting also planned development areas with each other.
- Ring roads to handle through traffic outside city center and to distribute traffic from outside the Study Area on radials.
- Strengthening international and regional linkage by a new motorway placed along the boundary of the Study Area that can accommodate the diverted through traffic.

Road length and density (km/sq.km) of the proposed road network development plan formulated based on the development objectives and concepts by functional road classification, are shown in Table 5.1-1.

Table 5.1-1 Road Length and Density

Function	2000		2020	
	Length (km)	Density (km/sq.km)	Length (km)	Density (km/sq.km)
Motorway	3.61	0.10	11.08	0.32
Primary Arterial	29.02	0.83	47.53	1.36
Secondary Arterial	29.15	0.83	36.10	1.03
Arterial Collector	26.62	0.76	44.64	2.27
Total	88.40	2.52	139.35	3.97

5.1.3 Road Network Development Projects

In line with road network development objectives and strategies, and present and future traffic demand, road projects were identified as shown in Table 5.1-2. Road projects are classified by type of work into: (A) Road Improvements and Widening, (B) New Road Construction, and (C) Grade Separation / Underpass. Location of road projects by type of work is shown in Figure 5.1-2.

- Improvement or widening of existing roads, mainly outside the built-up area, with a total length of 34.5 kilometers.
- Construction of new roads, with a total length of 32.1 kilometers.
- Five Grade-separation structures at congested intersections and as motorway interchanges.
- Tripoli Boulevard Underpass at the central area, with a covered length of about 0.6 kilometer.

Major features of the planned road network are as follows:

Arab Highway is planned as an international motorway with access-controlled standard, and is the extension of the existing Beirut – Tripoli Motorway. It has a road length of 11.1 km within the Study Area and is further extended to the border between Lebanon and Syria. The feasibility study was completed in 1998. It is planned to be a 6 – lane divided motorway with the design speed of 100 km/hour. Five interchanges are planned within the Study Area.

East Ring Road branches off from Beirut – Tripoli Motorway at Abou Halga Valley in the south, then traverses Ras-Maska, Abou Samra and El-Qoubbe Plateaus passing along the outer fringe of high density residential areas of Abou Samra and El-Qoubbe and ends at Tripoli Boulevard in the north. It should be extended up to Behsass Highway in the south and up to West Ring Road in the north. It has a total length of 8.5 km. This Ring Road will attract traffic generated in the existing high-density residential areas of Abou Samra and El-Qoubbe as well as the outer planned development areas, thus traffic generated from these areas is not required to pass through inter-regional roads, which have traffic capacity constraint at the slope section. It also links the currently disconnected sub-plateaus and inter-linkage among El-Qoubbe, Abou Samra and Ras-Maska will be established.

Table 5.1-2 Road Projects

Development Objectives	Development Strategy		Road Project			
			Code No.	Project Name	Type of Improvement	Scope of Work
1) To Strengthen the Greater Tripoli's Standing as an international node and the regional capital	a) To reinforce international and inter-regional road network in harmony with intra-urban network.		B03	Arab Highway	New Construction	L = 11.1 km, 5 I/C, Bridge = 630 m 6lane divided
			A01	Tripoli – Syria Road	Widening	L = 2.93 km, From 4-lane to 6- lane
			A02	Tripoli – Sir El Danie Road	Improvement	L = 5.4 km, 2 – lane
			A03	Qoubbe – Zgharta Road	Improvement	L = 4.2 km, 2 – lane
			A04	Abou Samra East Road	Improvement	L = 2.5 km, 2 – lane
			A05	Abou Samra West Road	Improvement	L = 2.5 km, 2 – lane
			A06	Ras Maska – Kousba Road	Widening	L = 5.0 km, From 2 – lane to 4 – lane
			A07	Ras Maska – Barsa Road	Improvement	L = 2.6 km
			A08	Ras Maska – Dedde Road	Improvement	L = 2.8 Km, 2 – lane
		A09	Bahasass (Old) Highway	Widening	L = 3.6, From 2 – lane to 4 – lane	
2) To guide the urban growth in the planned direction to achieve the spatial development	b) To enlarge and reinforce the physical foundation of the transport infrastructure to cope with the requirements of the future urban economic growth	c) To provide high quality transport service between the existing urban area and the planned development area and between the planned development areas	B01 (a)	East Ring Road	New Construction	L = 8.5 km, Bridges = 620 m 4lane divided
			B01 (b)	Related Roads of East Ring Road	New Construction	n = 3 roads, L = 4.8 km 2 ~ 4 lane
			B01 (c)	Grade Separation along East Ring Road	New Construction	n = 10
			B02 (a)	West Ring Road with 2 grade separation	New Construction	L = 6.4 km, 4 – lane divided, 2 Grade Separation
			B02 (b)	Related roads of West Ring Road	New Construction	n = 2 roads, L = 1.25 km
			B03 (c)	Grade Separation along West Ring Road	New Construction	n = 4
			C02 (b)	Grade Separation to provide linkage for divided communities	New Construction	n = 2 (along existing section of East Ring Road)
3) To alleviate traffic congestion in the existing urban area		d) To provide grade separation facilities at intersection along the primary arterial street	C01	Tripoli Boulevard Underpass	New Construction	L = 1.35 km
			C02 (a)	Grade Separation of critical intersections	New Construction	n = 3
4) To improve urban environment and amenity and to preserve historical and cultural heritage		e) To maintain present road network in the existing urban area where traffic condition shall be improved by traffic management measures		(Traffic Management Measures)		

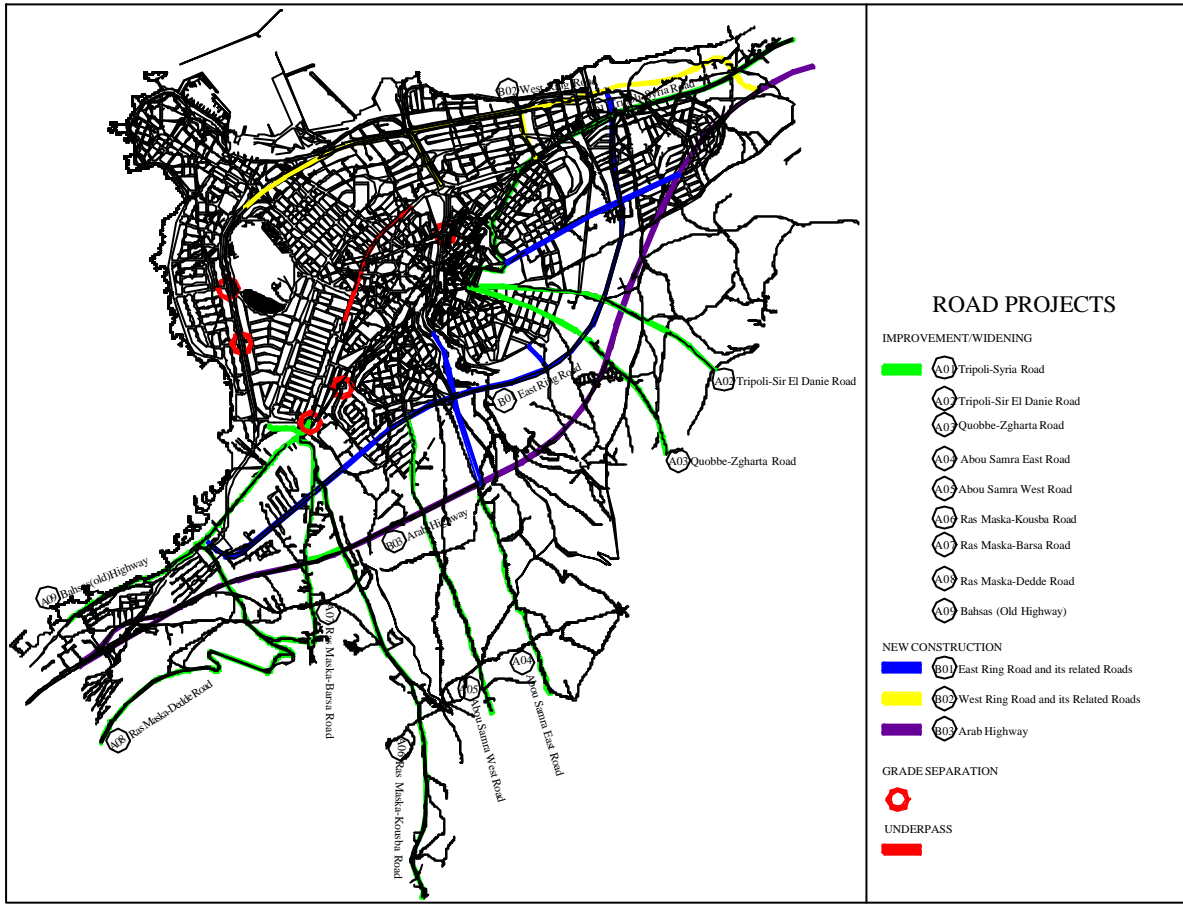


Figure 5.1-2 Road Network Projects

West Ring Road is partially completed from Behsass to El-Mina Street, which was constructed as an exit section of Beirut – Tripoli Motorway with access controlled standards. The existing section will be extended passing through the planned development area of Tripoli North and Connected with Tripoli Boulevard and Arab Highway in El-Bedaoui. Road right-of-way is 82.6 m. New section to be extended from the existing section is planned to be within the right-of-way of 80 m, which is reserved in the lately approved Land Readjustment Plan for Tripoli North Area.

5.1.4 Intersection Improvement Project

The Plan includes also projects to solve intersection problems in terms of geometry that can be summarized as follows:

- Roundabout type of intersection with small radius
- Multi – leg intersection, most of which are round about type
- Irregular –shaped intersection
- Intersection located at steep grade
- Lack of channelization

5.1.5 Preliminary Cost Estimation

Preliminary Cost estimate was carried out based on the prevailing unit prices and previous studies. Detailed design cost was estimated to be 4 % of construction cost and construction supervision cost as 8% of construction cost. Road right-of-way of major roads such as East and West Ring Roads and Arab Highway is acquired through the Land Readjustment Project, wherein landowners are required to donate 25 % of their land for public use. Thus, right-of-way is acquired free of charge by the

Government. When law authorizes the Land Readjustment Plan, land designated as the public land, development of reserved right-of-way is strictly controlled, and thus compensation cost is assumed as not required. The preliminary cost of road projects is summarized in Table 5.1-3, in which the economic cost is estimated to be 94.8 % of financial cost based on the results of previous studies.

5.1.6 Prioritization of Road Projects

A criteria was established for the prioritization of road projects, presented in Table 5.1-4, that was assessed from the view points of each of the items under the following four aspects:

1. Planning Aspect

- Compatibility with national/regional development Plans
- Impact on land development
- Impact on socioeconomic activities
- Maturity and Status for on-going and committed projects

2. Technical Aspect

- Urgency based on degree and scale of problems
- Improvement scale and the size of project
- Function and role in road network
- Technical difficulty and requirements for special structures or measures

3. Environmental Aspect

- Effect on health in terms of its high impact in mitigating air pollution
- Social impact with low need for land acquisition and resettlement schemes
- Physical impact with low negative effects on nature, flora and fauna
- Social acceptance from affected people and users' groups

4. Benefit Aspect

- Traffic demand to handle high traffic volumes with high level-of-service
- Cost scale with high priority for low cost projects
- Relative benefit scale that is assessed by the share of project's benefits to the total benefit.

Table 5.1-3 Estimated Preliminary Cost of Road Projects (Billion L.L. in 2001 prices)

Code No.	Project Name	Financial Cost			Economic Cost
		Engineering Cost	Construction Cost	Total	
A	Road Improvement and Widening				
A01	Tripoli – Syria Road	0.31	2.62	2.93	2.78
A02	Tripoli – Sir El-Danie Road	0.26	2.17	2.43	2.30
A03	Qoubbe – Zgharta Road	0.20	1.69	1.89	1.79
A04	Abou Samra East Road	0.17	1.41	1.58	1.50
A05	Abou Samra West Road	0.24	2.03	2.27	2.5
A06	Ras-Maska – Kousba Road	0.69	5.71	6.40	6.07
A07	Ras-Maska – Barsa Road	0.27	2.27	2.54	2.41
A08	Ras-Maska – Dedde Road	0.13	1.13	1.26	1.19
A09	Behsass (Old) Highway	0.38	3.13	3.51	3.33
Sub – total		2.65	22.16	24.81	23.52
B	New Ring Road				
B01 (a)	East Ring Road	3.04	25.29	28.33	26.86
B01 (b)	Related Roads	0.74	6.13	6.87	6.51
B01 (c)	Grade Separation	2.41	20.09	22.50	21.33
B01	B01 Total	6.19	51.51	57.50	54.70
B02 (a)	West Ring Road	1.61	13.45	15.06	14.28
B02 (b)	Related roads	0.16	1.34	1.50	1.42
B02 (c)	Grade Separation	0.95	8.05	9.00	8.53
B02	B02 Total	2.72	22.84	25.56	24.23
B03	Arab Highway	10.18	84.82	95.00	90.06
Sub-Total		19.09	159.17	178.26	168.99
C	Grade Separation / Underpass				
C01	Tripoli Boulevard Underpass	3.00	26.40	29.40	25.20
C02	Grade Separation	5.65	45.45	51.10	43.80
Sub-total		8.65	71.85	80.50	69.00
TOTAL		30.39	253.18	283.57	261.51

Table 5.1-4 Prioritization of Road Projects

Priority	Road Project	
First	A06 A09 B01 (a) C01	Ras-Maska – Kousba Road Behsass (old) Highway East Ring Road Tripoli Blvd. Underpass
Second	A01 A02 A03 A07 A08 B01 (b) B02 (a) B02 C02	Tripoli – Syria Road Tripoli – Sir El-Dannie Road Qoubbe – Zgharta Road Ras-Maska – Barsa Road Ras-Maska – Dedde Road Related Roads of East Ring Road West Ring Road Related Roads of West Ring Road Grade Separation - 2010
Third	A04 A05 B01 (c) B02 (c) B03	Abou Samra East Road Abou Samra West Road Grade Separation along East Ring Road Grade Separation along West Ring Road Arab Highway

5.2 PUBLIC TRANSPORT PLAN

5.2.1 Plan Concept

(1) Objectives

The objectives of the plan are:

- To introduce a modern and environmental friendly city bus system to meet the future socio-economic development in Tripoli and to decrease private car use dependency rate.
- To improve the shared-taxi service as supplement to city and inter-city bus in order to achieve an efficient public transport system.
- To improve the school bus service also as supplement to bus system to achieve an efficient and safe public transport system.

(2) Strategies

In order to achieve the objectives mentioned-above, the strategy prepared is as follows:

- Introduction of a modern city bus system
- Provision of optimum bus routes to meet public transport demand
- Provision of traffic demand control measures to prioritize public transport system among transport modes
- Integration between city bus network and inter-city one
- Providing bus terminals to promote integration with other modes
- Establishment of taxi terminals and stops to promote bus usage

5.2.2 Planning Alternatives

Five public transport-planning schemes have been investigated and evaluated to select the best alternative. Main characteristics of the selected scheme are based on the construction of new Central City Parking Terminal and two Intercity Terminals. Intercity bus loading/unloading and intercity taxi loading will be made at the new terminals. Intercity taxi unloading will be at passenger destinations. City taxi loading/unloading can be done at the central parking terminal. Figure 5.2-1 shows the planning alternatives including the Designated Terminal System (2) which is the planned public transport scheme.

5.2.3 City Bus

Recently, the share of public transport modes is about 36% that is divided between school buses (10%) and shared taxis (26%). The target share of public transport is based on the future modal share and estimated demand. The number of buses is estimated based on minibuses of 25 seats capacity. Table 5.2-1 presents the target ratios of public transport and Table 5.2-2 gives the estimated city bus demand.

Table 5.2-1 Target Ratios of Public Transport

Year	2001	2005	2010	2020
% of Public Transport to Total Trips	36	40	45	50
% of City Bus to Public Transport	0	45	60	70

	Present System	Improvement of Present System (Short Term Measure)	Designated Terminal System (1) (Medium Term Measure)	Designated Terminal System (2) (Medium Term Measure)	Taxi Area Service System (Medium Term Measures)
<p>Schematic Diagram</p> <p>LEGEND: — Inter City Bus — City Bus — Inter City Taxi — City Taxi ○ Loading/unloading ○ Unloading Designated terminal New Terminal</p>	<p>Not Specified Bus Terminal</p> <p>City Park Taxi Terminal</p>	<p>Designated Bus Terminal</p> <p>City Park Taxi Terminal (for inter city/ city taxi)</p> <p>Designated Bus Terminal</p>	<p>City Park Taxi Terminal (for inter city/ city taxi)</p> <p>New Terminal (for bus/taxi, inter city/city)</p>	<p>City Park Taxi Terminal (for city taxi only)</p> <p>New Terminal (for bus/taxi, inter city/city)</p>	<p>Designated City Area</p> <p>City Park Taxi Terminal (for city taxi only)</p> <p>New Terminal (for bus/taxi, inter city/city)</p> <p>No Exit</p> <p>No Entry</p>
<p>System</p>	<ul style="list-style-type: none"> - Intercity Bus: Loading and unloading at the city center, parking on a road. - City Bus: Are not yet in service. - Inter City Taxi: Unloading almost at passenger's final destination and loading almost at city center. - City Taxi: There is no classification between city and intercity taxi, that means city taxi can move from inside and outside the city boundary. 	<ul style="list-style-type: none"> - Intercity Bus: Loading and unloading at designated bus terminal. - City Bus: Connect the city center with the designated bus/taxi terminals and other city destinations. - Inter City Taxi: Unloading at passenger's destination and loading at city center terminal. - City Taxi: Loading from the city center, unloading at passenger's destination and also can go outside the city boundary. - Provision of designated bus terminal. 	<ul style="list-style-type: none"> - Intercity Bus: Loading and unloading at the new terminal. - City Bus: Connect the different city origins and destinations with the terminal locations. - Inter City Taxi: Unloading at passenger's destination and loading at the city park terminal. - City Taxi: Loading at the city park terminal and unloading at passenger's destination, connect the city park terminal with the new terminal and can also go outside the city boundary. - Construction of a new terminal. 	<ul style="list-style-type: none"> - Intercity Bus: Loading and unloading at the new terminal. - City Bus: Connect the different city origins and destinations with the terminal locations. - Inter City Taxi: Unloading at the passenger's destination and loading at the new terminal. - City Taxi: Loading and unloading can be at the city park terminal and also connect the city park terminal with the new terminal and also go outside the boundary of the city. - Construction of a new terminal. 	<ul style="list-style-type: none"> - Intercity Bus: Loading and unloading at the new terminal. - City Bus: Loading and unloading at origins and destinations and connect the city park terminal with the new terminal. - Inter City Taxi: Loading and unloading only at the new terminal and not allowed to enter the city boundary. - City Taxi: Move only within the city boundary and can make loading and unloading at the city park terminal and new terminal. - Construction of new terminal.
<p>Advantage</p>	<p>Very convenient and comfortable for the passengers, but hampering social activities and city environment.</p>	<ul style="list-style-type: none"> - Mitigate the congested traffic condition at the city center because of designated bus terminals. - Intercity bus will not enter to the city center that can improve the congested traffic condition at the city center. 	<ul style="list-style-type: none"> - Intercity bus will load / unload at a new terminal therefore, bus congestion at city center will be mitigated. 	<ul style="list-style-type: none"> - Congestion at the city park terminal will be minimized , because inter city taxi can not load at city park terminal. 	<ul style="list-style-type: none"> - Recognizable improvement in the reduction of traffic congestion at the city center.
<p>Disadvantage</p>	<ul style="list-style-type: none"> - There is no functional classification of the city intercity taxi/bus. - There is not enough parking space at the city center and city park terminal which are over congested. - Taxi waits for a long time since the number of passenger is few. (taxi service supply is greater than passenger demand). 	<ul style="list-style-type: none"> - Almost same as the current condition unless the following measures will be implemented: <ul style="list-style-type: none"> • Commencement of city bus services. • Enforcement of recommended traffic regulation. • Traffic flow improvement especially near the old city. • Intersection improvement including traffic flow and geometry. 	<ul style="list-style-type: none"> - Congestion at city park terminal may be almost remain as present system unless the recommended measures will be implemented. - Recommended measures same as " Improvement of present system. 	<ul style="list-style-type: none"> - City taxi shall be distinguished with city ID card to park at city park terminal. - Enforcement to prohibit intercity taxi from loading at the city park terminal. 	<ul style="list-style-type: none"> - Difficult to define the city boundary limits because administrative legislation on service area of taxi is required to be determined at national level. - Difficult to prohibit a city taxi to go out of, and an inter city taxi to go in the city boundary.
<p>Evaluation</p>	<p>Not acceptable in terms of hampered social activities and city environment.</p>	<p>Practical as short term measure with recommended measures.</p>	<p>Not acceptable as medium term measure because of congestion at city park terminal.</p>	<p>Practical.</p>	<p>Not implementable because of required legislation at national level.</p>

Figure 5.2-1 Public Transport Scheme

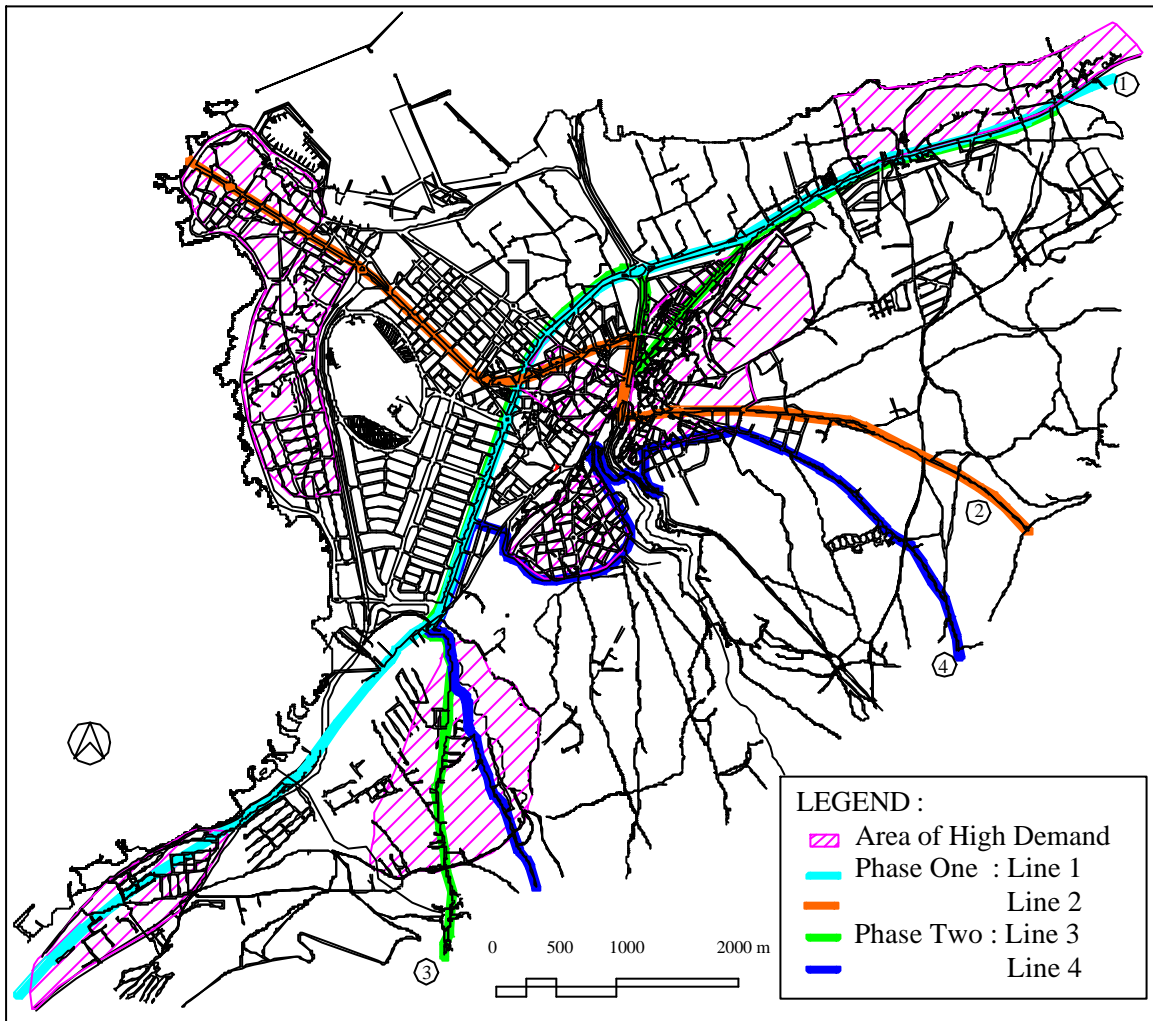


Figure 5.2-2 City Bus Routes

Table 5.2-2 City Bus Demand

Year	2005	2010	2020
Population	360,304	390,447	454,174
Trips/Day	699,000	795,000	1,017,000
Public Transport Trips/Day	280,000	358,000	508,000
Public Buses Trips/Day	60,000	110,000	200,000
Estimated No. of Buses	85	150	285

As the city center is characterized as a main destination with the highest density of trips, it is considered in all bus lines to achieve the highest occupancy rates. Other main areas are El-Beddawi, El-Mina, El-Qoubbe, Abu-Samra and Behsass. A city terminal will be implemented at Sahat El-Taal. The length of the four routes is presented in Table 5.2-3 while Figure 5.2-2 shows the planned bus routes. The capacity of proposed city bus terminal is presented in Table 5.2-4.

Table 5.2-3 City Bus Operation Length

Line No.	1	2	3	4
Length (km)	12.5	9.0	12.0	12.5

Table 5.2-4 City Bus Central Terminal

Year	2005	2010	2020
Number of Stalls	4	8	12

Measures to increase the bus users may include:

- Bus public experiment and campaign
- Bus exclusive, priority, exclusive right/left turn and reversible lanes
- Bus priority signal
- Short time interval among buses
- Reasonable walking distance
- Reasonable fare
- Comfort transfer system with other transport modes especially intercity buses

5.2.4 Intercity Bus

The plan includes two intercity terminals to prevent the intercity buses to enter the city center in order to lessen the severe traffic congestion. The first terminal with high priority is located in south of Tripoli at Behsass. This location is already under consideration by MOPWT. The second terminal will be in the north of the city at Beddawi. Table 5.2-5 gives the required capacity of the planned inter-city terminals.

5.2-5 Intercity Terminal Stalls

Year	2005	2010	2020
Southern Terminal			
Large Buses	24	15	17
Minibuses	140	90	95
Northern Terminal			
Large Buses	-	8	10
Minibuses	-	55	60

5.2.5 City and Intercity Taxi

By introducing the city bus service, a little decrease in the number of taxis is expected till the year 2005 then the required number will increase again. The estimated city taxi demand for the target years is presented in Table 5.2-6.

City taxis will have parking spaces in the central parking, southern and northern terminals. Taxi stands will be constructed at other main origins and destinations such as El-Mina, El-Qoubbe, El-Bedaoui and Ras-Maska. Table 5.2-7 gives the capacity of the required city bus terminals.

Table 5.2-6 City Taxi Demand

Year	2001	2005	2010	2020
Trips/day (1000)	600	699	795	1,017
Taxi Trips/day (1000)	194	192	212	257
No. of Taxis	4600	4334	5120	6000

Table 5.2-7 Capacity of City Taxi Terminals

Year	2005	2010	2020
Central	50	25	36
Southern	8	16	24
Northern	-	8	16

Intercity taxis will have parking spaces in the southern and northern terminals where loading will be only allowed at these terminals. Unloading will be allowed at passenger destinations. The capacity of the two intercity taxi terminal is presented in Table 5.2-8.

Table 5.2-8 Capacity of Intercity Taxi Terminals

Year	2005	2010	2020
Southern	106	87	94
Northern	-	28	30

Figure 5.2-3 shows the proposed locations for the bus and taxi terminals.

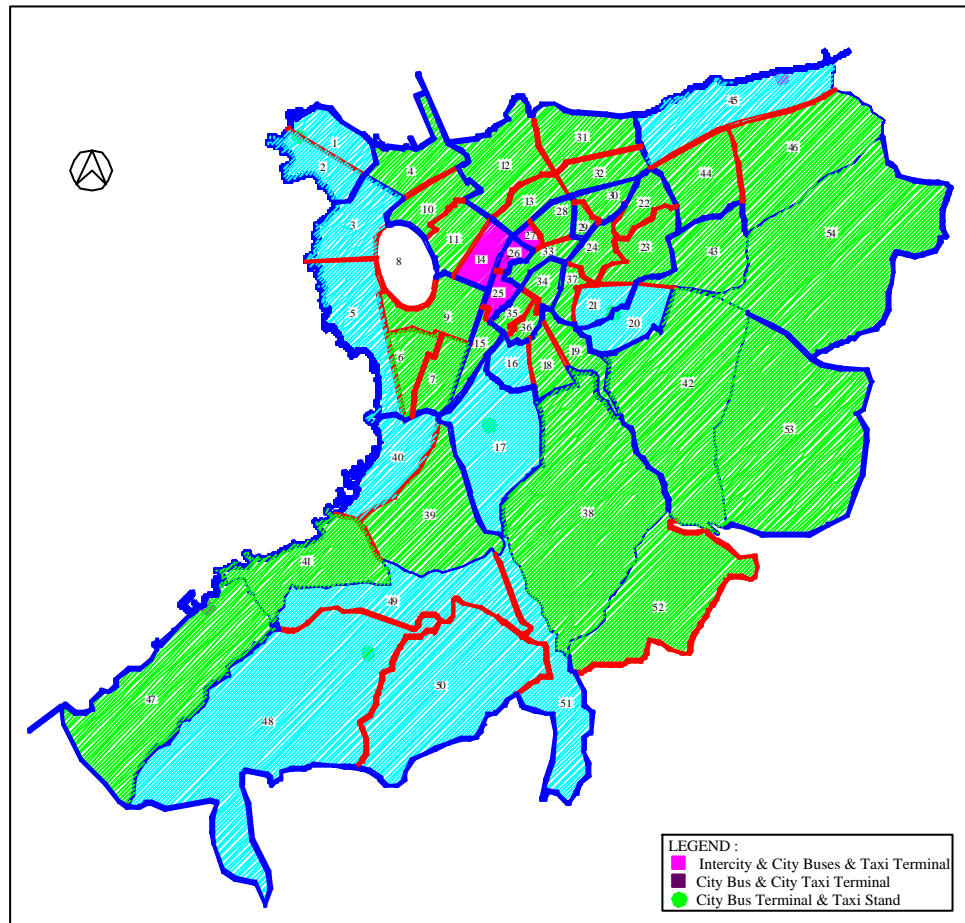


Figure 5.2-3 Terminal and Taxi Stands

5.2.6 School Transport

In general, the Master Plan policy is to increase the share of school bus trips in future, as buses are environmental friendly transport mode. In Tripoli however, school buses cause recognizable traffic jams during the morning and evening peaks since all the schools lack the reasonable off-street parking spaces. Furthermore, the survey analysis shows that shared taxis provide the same function of school buses with lower cost and shorter trip time. Through consultation with local authorities, it is concluded to keep the share of school bus within the current limit. The plan depends on mini-buses since they have higher operating speeds and more efficiently maneuvering performance rather than the large buses. Table 5.2-9 shows the results of the estimated required number of school buses. Alleviating the severe traffic congestion due to school buses is based on following techniques:

- Gradually replace large buses by the minibuses
- Create off street parking stalls
- Apply short time shift in the start and end times of the school day
- Built all of the new schools in new developing areas

Table 5.2-9 School Bus Demand

Year	2001	2005	2010	2020
Trips/day (10 ³)	600	699	795	1,017
School Buses Trips/day (10 ³)	22	28	36	51
No. of Buses	420	560	720	1020

5.2.7 Implementation Schedule

Table 5.2-10 shows the cost and the implementation plan for the public transport aspects. As can be noticed from the table the target of the Master Plan is to finalize all the public transport projects by the end of the middle-term plan.

Table 5.2-10 Implementation Plan

Plan	Year			Cost (BillionLL)
	01-15	06-10	11-20	
Public Bus	10.80	4.60	8.15	23.55
Bus Routes Nos. 1 and 2,	2.00		4.00	6.00
Bus Routes Nos. 3 and 4		2.00	4.00	6.00
City Bus Central Terminal	0.20			0.20
Behsass Transport Center*	8.00			8.00
El-Bedaoui Intercity Bus Terminal		2.50		2.50
El-Qoubbe City Bus Terminal	0.15			0.15
El-Mina City Bus Terminal	0.15			0.15
El-Bedaoui City Bus Terminal	0.15			0.15
Abou Samra City Bus Terminal	0.15			0.15
Developed Area City Bus Terminal		0.10	0.15	0.25
Taxi	1.15	0.20	0.15	1.50
Central Terminal	0.15			0.15
El-Mina Taxi Stand	0.25			0.225
El-Bedaoui Taxi Stand		0.10		0.10
El-Qoubbe Taxi Stand	0.15			0.15
Abou Samra Taxi Stand	0.15			0.15
Behsass (Ras-Maska) Taxi Stand*	0.15			0.15
Behsass Intercity Taxi Terminal*	0.15			0.15
Bedaoui Intercity Taxi Terminal	0.15			0.15
Developed Area Taxi Terminal		0.10	0.15	0.25
School Bus	0.55	0.20	0.20	0.95
School Bus Parking Stalls	0.15			0.15
Shard Taxi & Private Car Stalls	0.10			0.10
Large Buses Replacement	0.20	0.10	0.10	0.40
New Schools Parking Facilities	0.10	0.10	0.10	0.30
Cost (Billion LL)	12.50	5.00	8.50	26.00

* Components of Behsass Transport Center

5.3 TRAFFIC MANAGEMENT PLAN

Components of the plan are integrated with developments in road projects and public transport services.

5.3.1 Plan Concept

(1) Objectives

The objectives of the plan are:

- To prepare efficient traffic management plan in order to reduce traffic congestion in the Study Area.
- To prepare comfortable and safely transport system for road users in the Study Area.
- To improve the urban environment through reduction of traffic congestion at the Central Area.
- To provide an efficient, comfortable and safer transport system by integrating road improvement projects and public transport system.

(2) Strategies

To achieve the objectives, the strategy is formulated as follows:

- Strengthening traffic education
- Strengthening traffic enforcement
- Improvement of traffic signal system
- Improvement of traffic safety, control and management facilities
- Introduction of parking control

5.3.2 Education and Public Awareness

The education plan is basically designed to address the following four groups through educational activities, campaigns and safety programs.

- School children and students
- Car drivers
- General public
- Traffic management and enforcement personnel

5.3.3 Enforcement

Traffic policemen and enforcers will be qualified through training programs that include:

- Traffic laws, regulations, control and enforcement techniques
- Traffic management procedures
- Human, vehicle and road system mechanism
- Traffic flow characteristics
- Traffic signal operation and intersection control
- Traffic accidents investigation techniques

5.3.4 Traffic Signalization

In the time being there are no signals. However, there is an on-going project to provide 30 intersections with signals under a two-phase implementation plan. The intersections are selected based on judgment and field observations. Under this Master Plan, implementation priorities of intersections were assessed by a weight analysis based on the following criteria to establish a revised plan with technical database.

- Level of service

- Heavy traffic volumes
- Heavy pedestrians crossing
- High number of conflict points
- Link with other intersections

5.3.5 Pedestrian Facilities

Insufficient facilities such as sidewalk, marking, warning and speed limit signs, guardrail, pedestrian signals and over/underpass cause risks for pedestrian movements. The Master Plan includes all the necessary measures to provide the required facilities and to increase the pedestrian safety.

5.3.6 Traffic Control Facilities

The natural topographical condition needs to pay attention. Investigation shows that some locations lack the minimum control facilities even they are characterized with drastic alignment profiles. High traffic congestion is common at many roundabouts. Applied one-way system at some locations in central area is maze. Required control facilities such as signals, warning flusher and pedestrian signals, priority signs and channelization are clarified. Figure 5.3-1 shows the locations of planned traffic signals and control facilities.

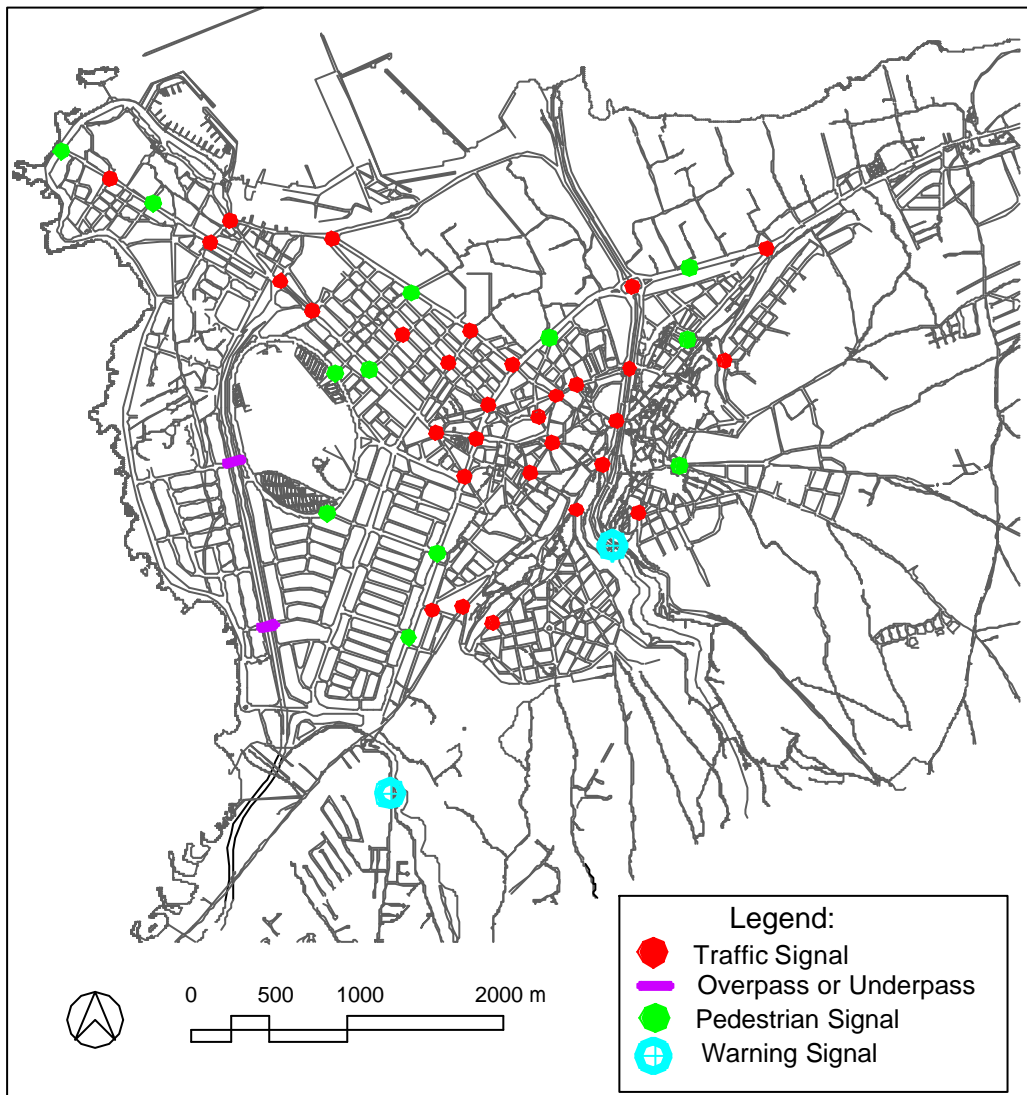


Figure 5.3-1 Traffic Signals and Control Facilities

5.3.7 Parking Control

(1) Parking Control Policy

Parking provision and control directly affect the volume of traffic, particularly where commuters and shoppers are heavily using streets for parking. Basic control approaches to deal with parking problem are bans, time limits, parking fee and off-street parking.

Except the central area, parking demand is within the reasonable measures. The following procedures are to solve the drastic parking problem in the central area.

- Prohibit on-street parking gradually as the substitute off-street spaces are provided.
- Prohibit on-street parking completely by the end of the Short-term Plane.
- Apply reasonable time limit-parking policy during the Short-term until the complete prohibition can be obtained.
- Utilize vacant lands as off-street parking areas.
- Provide an off-street parking area for tourist buses near to Tripoli castle and old city.
- Provide as soon as possible new designated terminals for intercity buses till the Behassas terminal is constructed.
- Control the taxi oversupply to reduce the number of parked taxis in the central area.
- Utilize the Central Park area for the parking of city taxi
- Provide the city with the required taxi terminals and stands.
- Mitigate congestion due to parking on front of the schools.
- Promote the parking stalls attached to large-scale buildings to be constructed in future.

At present, there is an on-going project to install about 500 parking meters on selected commercial corridors. Locations of parking meters are shown in Figure 5.3-2.

(2) Parking Demand

The parking demand is sub-divided into two (2); parking demand and garage demand. Each definition is described as:

- Parking demand : A space in which vehicles may be accommodated mainly at daytime.
- Garage demand : A space used for housing vehicles mainly at nighttime.

These parking and garage spaces are sometimes used in common with each other. In order to formulate the parking control plan, it is necessary to estimate both the parking and garage demands.

1) Parking Demand

The parking demands at Tripoli Center Area are estimated on the basis of number of vehicle-trips attracted to the same area. The result of estimation is shown in Table 4.2-7. According to this table, the peak hour parking demands in 2020 are estimated to be about 4,125 vehicles.

2) Garage Demand

The garage demand is largely in proportion to the number of vehicle ownership at Tripoli Center Area. So the number of vehicles at the same area is estimated as shown in Table 5.3-1.

According to this Table, it is estimated that the number of vehicles at this area is 4,350 vehicles in 2020.

Both parking and garage demands by the target years are estimated as shown in Table 5.3-2.

Table 5.3-1 Garage and Parking Demand in the Central Area

Parking Demand		
	2000	2020
No. of Trips	45,147	61,851
Garage Demand	14,655	27,600
Parking Demand in Central Zones	30,492	34,251
Parking Demand Rate (%)	10	12
Parking Demand in Central Area	3,000	4,125
Garage Demand		
	2000	2020
Population (persons)	330,900	454,200
Person per HH	4.5	4.5
No. of Households	73,533	100,933
No. of Vehicles	56,620	138,000
No. of Vehicles in Central Zones	14,655	27,600
No. of Vehicles in Central Area	3,150	4,350

Table 5.3-2 Parking and Garage Demands in the Central Area

	2000	2005	2010	2020
Parking Demand	3,000	3,250	3,500	4,125
Garage Demand	3,150	3,450	3,750	4,350

(3) Parking Management Plan

The parking problems in Tripoli is concentrated in the Central Area including the Old City. To provide a smooth and orderly traffic flow in the Central Area and to improve the environmental conditions, on-street parking must be prohibited and that coincides with the current traffic law. The survey results show that the parking demand in the Central Area is about 3,000 parking stalls, while the garage demand is about 3,150 parking stalls.

By prohibiting the on-street parking, the Central Area will need to have about 3,150 parking stalls at nighttime and 3,000 parking stalls at daytime in 2000. In 2005, the demand will increase to about 3,450 parking stalls at nighttime and 3,250 stalls at daytime.

Currently, there are about 850 off-street stalls, and on-going parking meters of 500 stalls are being installed. That makes a difference between the off-street demand and supply of about 2,020 stalls in 2000 and 1,900 stalls in 2005. Table 5.3-3 shows number of the parking stalls required in the Central Area, while Table 5.3-3 shows both required parking spaces and garage space.

Table 5.3-3 Parking Demands in the Central Area

	2000	2005	2010	2020
Parking Demand	3,000	3,250	3,500	4,125
Garage Demand	3,150	3,450	3,750	4,350
Parking Stalls to be required	3,105	3,250	3,500	4,125
Off-Street Parking	850	850	850	850
Parking Meters	0	500	500	500
Garage Stalls attached to Building	0	650	650	650
Parking Stalls to be required	0	1,250	1,500	2,125
On-Street Parking	2,020	0	0	0

Table 5.3-4 Parking Stalls required at the Central Area

	2000 ~ 2005	2006 ~ 2010	2011 ~ 2020
Parking Stalls to be required	1,250	250	625
Cumulative Parking Spaces to be required	1,250	1,500	2,125

The area required for the additional supply (2,125 spaces) is 43,500 m². The survey for vacant lands shows that there are enough lands that can be used by the Municipality under the rental concept.

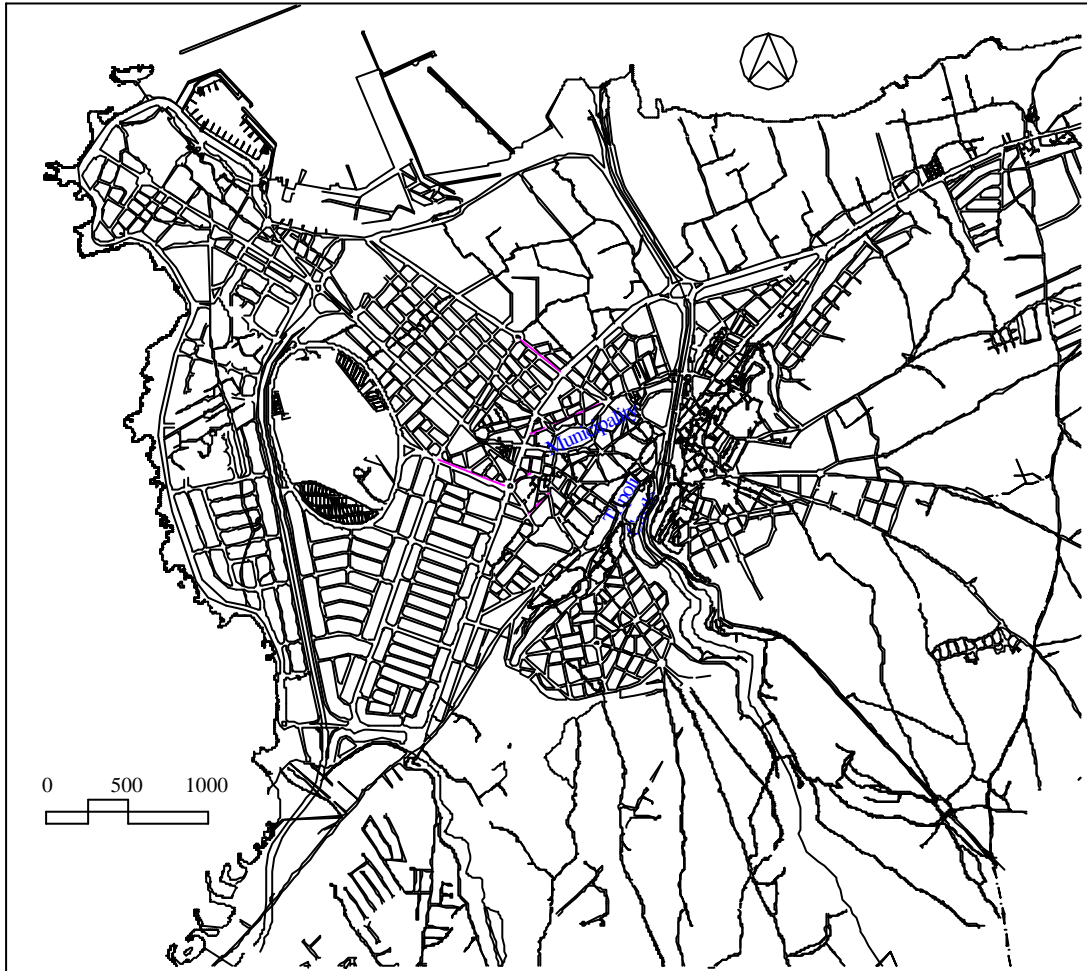


Figure 5.3-2 Location of On-Street Parking Meters

Prohibition of parking along the intersection approaches will highly improve the level of service. Figure 5.3-3 shows the capacities of intersection approaches while Figure 5.3-4 provides the off-street parking supply and prohibited on-street parking locations.

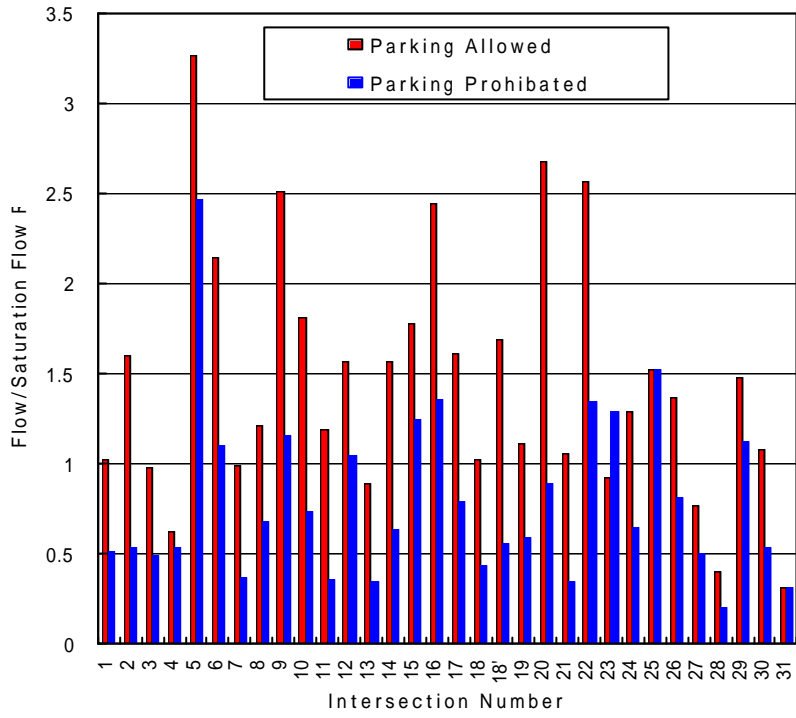


Figure 5.3-3 Intersection Approach Capacities

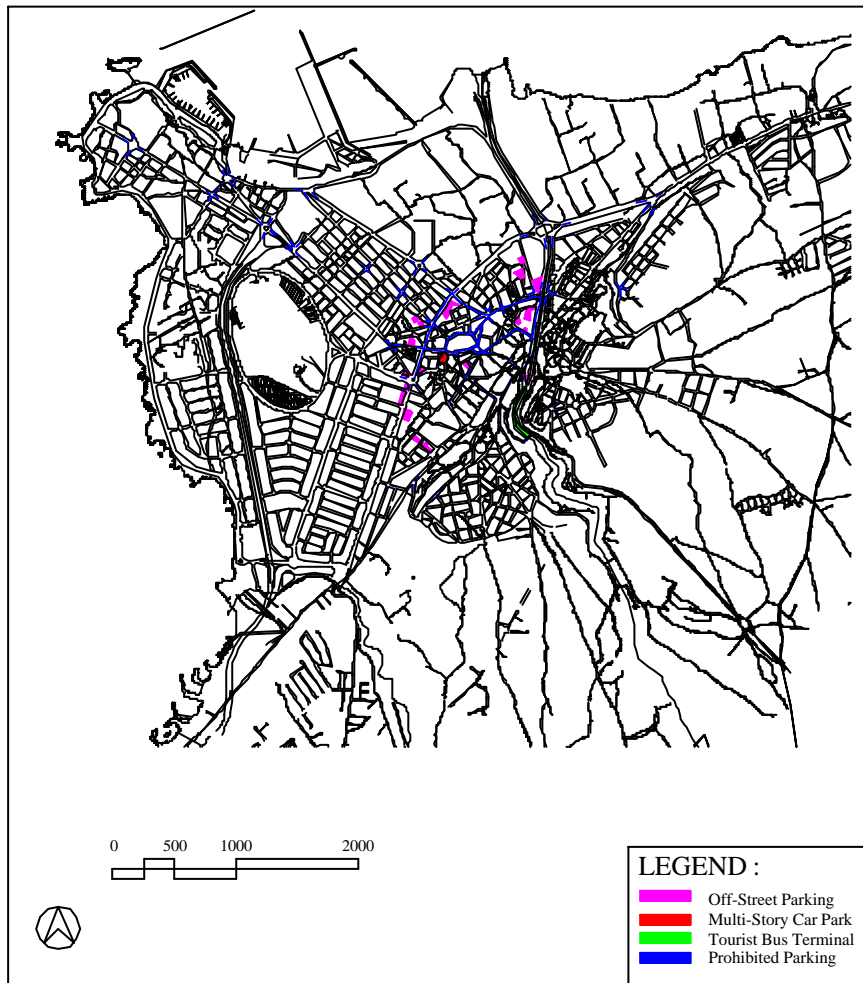


Figure 5.3-4 Off-Street Supply & Prohibited On-Street Locations

5.3.8 Traffic Safety Facilities

Comprehensive efforts and measures for safety components, which are: Education, Enforcement, Environment and Engineering are required. Engineering requirements are those related to geometric design and safety facilities. Major safety measures at intersections and locations with high potentiality for traffic accidents include:

- Appropriate geometric design
- Channelization with optimum safe lane widths.
- Marking of all traffic lanes and pedestrian crossing.
- Traffic signs for regulating, warning and guiding.
- Traffic signal
- Street lighting
- Guardrails
- Pedestrian over and under pass and sidewalk

5.3.9 Implementation Schedule

The proposed implementation plan for traffic control and management with the estimated cost are presented in Table 5.3-5.

Table 5.3-5 Implementation Plan

Plan	Short-Term 2001~2005	Medium-Term 2006~2010	Long-Term 2011~2020	Cost LL Billion
Signals	1.56	1.00		2.56
Traffic Signals of Main Intersections, Phase I	0.59			0.59
Traffic Signals of Main Intersections, Phase II	0.78			0.78
Traffic Signals of Secondary Intersections		1.00		1.00
Pedestrian Traffic Signals	0.11			0.11
Warning Traffic Signals	0.08			0.08
Signs	0.17	0.17		0.34
Warning Signs	0.04	0.04		0.08
Informatory Signs	0.02	0.02		0.04
Prohibitory Signs	0.11	0.11		0.22
Marking	0.24	0.12		0.36
Intersections	0.05			0.05
Major Corridors	0.19			0.19
Secondary Corridors		0.12		0.12
Overpass/Underpass	0.26			0.26
Major Corridors	0.26			0.26
Parking	1.08			1.08
Prohibition at Intersection	0.10			0.10
Partially Prohibition along Corridors	0.10			0.10
Major Roads Complete Prohibition	0.10			0.10
On-Street Paid Parking	0.30			0.30
Off-Street Paid Parking	0.40			0.40
Multistory Car Park	0.30			0.30
Truck Loading and Unloading	0.05			0.05
Education and Safety	3.00	1.00		4.00
Enforcement	0.42	0.71		1.13
Cost (Billion LL)	7.00	3.00		10.00

Note: The Master Plan strategy is to complete all projects by the end of the Medium-Term Plan.

5.4 INITIAL ENVIRONMENTAL EXAMINATION

The development of the urban transport infrastructure and facilities of Greater Tripoli is expected to produce various impacts on the environment, which are investigated and examined in order to simultaneously develop mitigating measures to minimize any possible negative impact.

5.4.1 Environmental Legislation

Lebanon has a large body of environmental laws with some dating back to the 1930s. However, these laws are characterized by obsolescence and the need for update, in addition to the lack of clarity regarding accountability and provisions of mechanism for implementation. There is also weakness of law enforcement due to lack of clarity in responsibilities and coordination.

The Ministry of Environment was established in May 1981 aiming at controlling all forms of pollution, the use of pesticides deforestation and forest fires, solid waste disposal, protection of fauna and flora and urbanization. In April 1993, the ministry issued the Law 216, marking a significant step forward in the management of environmental affairs. It has the power to:

- Formulate general environmental policy and propose measures for its implementation in coordination with other concerned agencies.
- Protect the natural and man-made environment in the interest of public health and welfare.
- Controls and prevent pollution irrespective of the source.

Moreover, the Ministry has suggested, in September 2000, an Environmental Impact Assessment outline, which is still a draft decree under revision by a committee composed of representatives from related ministries and agencies.

The main goal of this decree is to specify the obligatory requirements for public and private projects concerning the evaluation of its impact on the environment. The framework of the projects under this decree provides the following conditions:

- (1) It is not allowed to divide the project and offer it in stages so as to prevent the ability to precisely classify said project. In such a case, the initial environmental examination or the environmental impact assessment study is considered inadmissible.
- (2) The ruling of this decree is applicable to any changes, additions, expansions or rehabilitation to a project, already existing, or licensed if private project, or approved if public project, which may lead to important effects on the environment.

5.4.2 Environment Related Agencies

A number of other government organizations have responsibilities for environmental management, in particular the CDR, which is leading the recovery and reconstruction program. The key overlaps in responsibility on the national level are summarized as presented in Table 5.4-1.

Table 5.4-1 Environment Related Agencies

Item	Agency
Wastewater	MOE, CDR, Housing, Hydraulics and Electric resources, Health and public works
Solid/Hazard waste	MOE, CDR, Health, Urban Affairs, and public works
Water resources	MOE, CDR, Health, and public works
Land Use	MOE, CDR, Transport, Agriculture, Tourism, Housing and Health
Forest and Agriculture	MOE and Agriculture
Pollution	MOE, Transport, Industry and Petroleum
Cultural Heritage	MOE, Antiquities department

5.4.3 Initial Environmental Examination

The Initial Environmental Examination (IEE) was carried out for the urban transport master plan of Greater Tripoli in order to make a preliminary identification of negative and diverse environmental impacts. The master plan includes various types of transport improvement projects that comprise not only physical environment but also institutional improvement, especially parking control. The project types are as follows:

- Road Improvement and Construction
- Interchange Construction
- Intersection Improvement
- Bus System
- Signal Installation
- Parking Control and Facility Improvement

Environmental items under JICA Guidelines were investigated to carry out an initial environmental examination on the M/P projects. Its objectives are to identify the possibility of any negative impact that may result and to propose adequate mitigating measures. Master Plan projects are categorized into two main groups based on their expected negative environmental impact:

- 1: Projects with high potential negative impact
- 2: Projects with low potential negative impact

In order to determine the importance and potential of each environmental impact, the following factors are assessed:

- Number of people subject to the impact
- Extent of the impact
- Impact duration and intensity
- Components simultaneously affected
- Cumulative aspect of the impact
- Irreversibility impact
- Mitigating Measures

Screening and scoping were carried out using existing data and information in order to identify items that should be examined in more details in the coming stages of further environmental impact analysis.

5.4.4 Screening And Scoping

As a result of Screening, further environmental examination is required. Details of each factor are shown in Table 5.4-2. Based on examination of screening as presented and discussed in the table, a scoping procedure for further examination was carried out and the results are presented in Table 5.4-3. Under this process, the evaluation categories are as follows::

- A: Serious impact is predicted
- B: Some impact is predicted
- C: Extent of impact is unknown (Examination is needed. Impact may become clear as study progresses)
- D: No impact is predicted. EIA is not necessary

Table 5.4-2 Screening of Master Plan Projects

Item	Description	Evaluation	Notes
<i>SOCIAL ENVIRONMENT</i>			
Resettlement	Resettlement by occupancy of proposed land	Yes	Residence are living in project areas
Economic Activities	Loss of productive opportunity such as Land	Yes	Various economic activities exists
Traffic and Public Facilities	Influence of existing traffic such as congestion	Yes	Public facilities exist in the project area
Split of Communities	Split of Communities by obstruction of traffic	Yes	Some access controlled roads may create split
Cultural Property	Loss of cultural property and falling of values	No	Cultural heritage buildings do not exist in all areas.
Water Rights and Rights of Common	Obstruction of fishing rights, water rights, and common rights of forest	Unknown	Rivers and canals for agriculture exist
Public Health Condition	Deterioration of Waste dumps and solid waste	Yes	Large refuse amount will be produced
Waste	Occurrence of Waste dumps and solid waste	Yes	Some construction waste of dumps will be produced
Hazards (Risks)	Increase of possibility of danger of landslide and accident	No	Low possibility
<i>NATURAL ENVIRONMENT</i>			
Topography and Geology	Change of valuable topography and geology by excavation or filling works	Yes	Large scale structure or earth work
Soil Erosion	Surface soil erosion by rainwater after land development (vegetation removal)	Yes	Subjected area is not developed
Ground Water	Change of distribution of ground water by large scale excavation	Unknown	Main work is construction and filling
Hydrological Situation	Change of river discharge and riverbed condition due to landfill and drainage	No	No structure will be built on the rivers
Coastal Zone	Coastal erosion and sedimentation due to landfill or change in marine condition	No	Project area is on Land
Flora and Fauna	Obstruction of breeding and extinction of spices due to change of habitat condition	No	Urbanized and developed area
Meteorology	Change of temperature, precipitation, wind, etc., due to large-scaled development.	No	There are no large scale development
Landscape	Change of topography and vegetation by land development and harmonious obstruction by structural objects	Yes	Landscape will be changed
<i>POLLUTION</i>			
Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	Yes	Impact by exhaust gas from increasing traffic
Water Pollution	Pollution by inflow of silt, and effluent into rivers and ground water	Unknown	Less impact by road facilities
Soil Contamination	Contamination of soil by dust and chemicals	No	No chemical activities for soil
Noise and Vibration	Noise and vibration generated by vehicles	Yes	During construction and operation
Land Subsidence	Deformation of land and land subsidence due to the lowering of ground water	No	Sensitive land do not exist in the subject area
Offensive Odor	Generation of exhaust gas and offensive odor by facilities and operation	No	No Factor
Overall Evaluation	Environmental Impact Assessment (EIA) is required or not	From the results of the evaluation, EIA is required	

Table 5.4-3 Scoping of Master Plan

ENVIRONMENTAL ITEMS	EVALUATION OF ROAD BY NUMBER									
	ROAD NUMBER *	A01	A02	A03	A04	A05	A06	A07	A08	A09
<i>SOCIAL ENVIRONMENT</i>										
Resettlement	A	B	B	C	C	B	A	A	A	
Economic Activities	B	B	C	B	B	B	B	B	B	
Traffic and Public Facilities	B	B	C	B	B	B	B	B	B	
Split of Communities	C	D	C	D	D	D	D	C	C	
Cultural Property	D	D	D	D	D	D	D	C	C	
Water Rights and Rights of Common	C	C	C	D	D	D	D	C	C	
Public Health Condition	B	B	C	D	D	B	B	B	B	
Waste	A	A	A	B	B	A	A	B	B	
Hazards (Risks)	D	D	D	D	D	D	D	D	D	
<i>NATURAL ENVIRONMENT</i>										
Topography and Geology	B	B	C	D	D	D	B	B	B	
Soil Erosion	B	B	C	D	D	D	B	B	B	
Ground Water	D	D	D	D	D	D	D	C	C	
Hydrological Situation	C	C	C	D	D	D	B	C	C	
Coastal Zone	D	D	D	D	D	D	D	D	D	
Flora and Fauna	D	D	D	D	D	D	D	D	D	
Meteorology	D	D	D	D	D	D	D	D	D	
Landscape	B	B	B	D	D	D	B	B	B	
<i>POLLUTION</i>										
Air Pollution	B	B	B	D	D	B	B	B	B	
Water Pollution	D	D	D	D	D	D	D	D	D	
Soil Contamination	C	C	C	D	D	D	D	C	C	
Noise and Vibration	B	B	B	B	B	B	B	B	B	
Land Subsidence	C	C	C	D	D	D	D	C	C	
Offensive Odor	D	D	D	D	D	D	D	D	D	
Overall Evaluation	A	B	B	C	C	B	A	A	A	

* Evaluation categories are:

- A: Serious impact is predicted
- B: Some impact is predicted
- C: Extent of impact is unknown (Examination is needed. Impact may become clear as study progresses)
- D: No impact is predicted. EIA is not necessary

5.4.5 Items for EIA Study

Some projects, such as new construction of roads and facilities, may require an EIA study that includes further detailed environmental examination on items included in the following table. Other projects management and signalization do not require such detailed studies.

Table 5.4-4 Items Required for EIA

Environmental Items	Roads and Intersections	Public Transport	Parking Facility
<i>SOCIAL ENVIRONMENT</i>			
Resettlement	B	D	D
Economic Activities	B	D	C
Traffic Facilities	B	C	C
Split of Communities	C	D	D
Cultural Property	C	C	C
Water Rights of Common	C	C	C
Public Health Condition	B	D	D
Waste	B	C	C
Hazards (Risks)	D	D	D
<i>NATURAL ENVIRONMENT</i>			
Topography and Geology	B	D	D
Soil Erosion	C	D	D
Ground Water	D	D	D
Hydrological Situation	D	D	D
Coastal Zone	D	D	D
Flora and Fauna	D	D	D
Meteorology	D	D	D
Landscape	B	B	B
<i>POLLUTION</i>			
Air Pollution	B	C	C
Water Pollution	C	D	C
Soil Contamination	D	D	D
Noise and Vibration	B	C	C
Land Subsidence	D	D	D
Offensive Odor	D	D	D
Overall Evaluation	C	D	D

Evaluation Categories:

A: Serious impact is predicted

B: Some impact is predicted

C: Extent of impact is unknown

D: No impact is predicted. EIA is not necessary

5.4.6 Air Pollution Assessment

A field monitoring survey was conducted at a total of 10 stations representing different characteristics of the Study Area based mainly on the present traffic volumes. Results show that the CO concentrations exceed the WHO standard at most locations during daytime, when there is most of the traffic, and decrease significantly during night-time. It is also noticed that the highest daytime concentrations are measured on Mondays (at stations S3 and S7), when an increased traffic activity is usually occurred. SO₂ concentrations are significantly higher than the equivalent WHO standard, and do not vary much from site to site. TSP concentrations exceed WHO Standard (150 μg/m³) at most of the congested areas. In conclusion, air pollution is considered as a major environmental problem in the Study Area. (See Figure 5.4-1 (1) ~ (4))

Table 5.4-5 Environment Survey Stations

Traffic Volume	Stations
High	2, 3, 4, 5 and 6
Medium	1, 7 and 10
Low	8 and 9

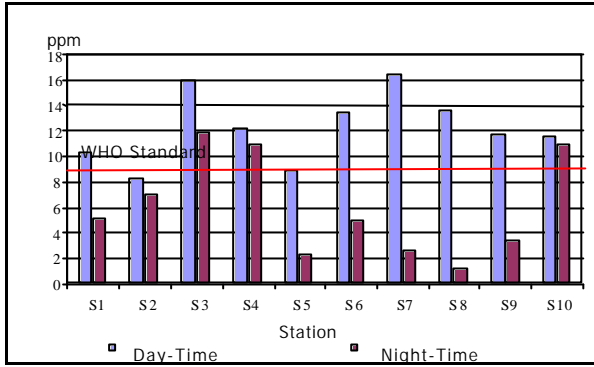


Figure 5.4-1 (1) Average Concentrations of CO (ppm)

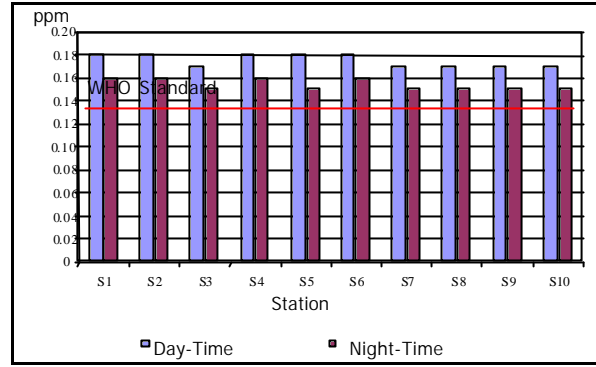


Figure 5.4-1 (2) Average Concentrations of SO₂ (ppm)

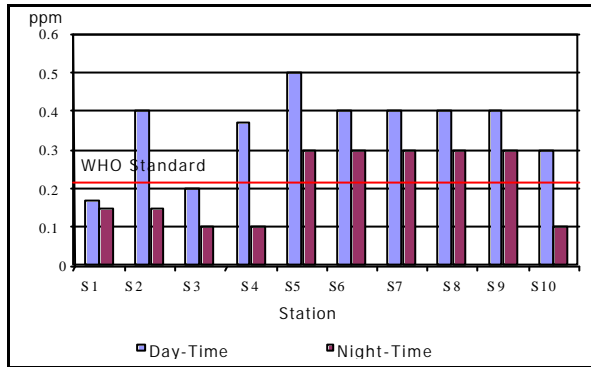


Figure 5.4-1 (3) Average Concentrations of NO₂ (ppm)

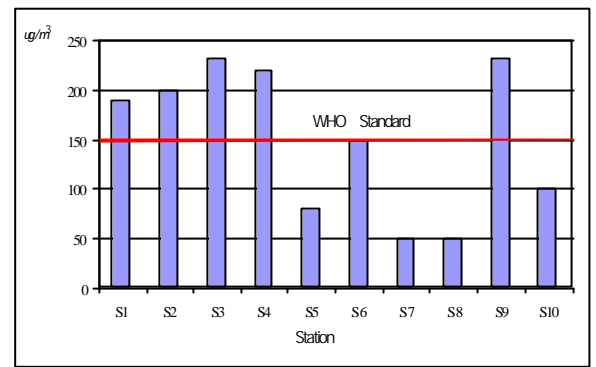


Figure 5.4-1 (4) Average Concentration of TSP

5.4.7 Evaluation and Mitigating Measures

As a result of screening and scoping examination for the master plan, major negative impacts are predicted. Resettlement may suffer major negative impact in pre-construction stage on roads and intersection projects. In addition waste may cause major negative impact in both construction and operation stages. Other minor negative impacts are on economic activities, traffic and public facilities, public health condition, topography and geology, soil erosion, landscape, air pollution and vibration in both construction and operation stages.

A resettlement plan is required for land acquisition of few road projects. Other negative social impact is not expected, as the Master Plan will promote living style and environment as well socioeconomic development, In addition, it will support tourism activities and increase traffic safety levels.

For the natural environment, air pollution is one of the main elements that are greatly affected by traffic congestion and transport modes; therefore, the impact of the Master Plan projects on air pollution reduction was investigated and predicted for the target years. When compared with the “Do Nothing” case, results show great reduction in emissions and air pollutions in the Study Area.

5.4.8 Master Plan Impact on Air Quality

Based on the traffic assignment results of the Master Plan, an estimation and forecast procedure was done to investigate the impact of the Master Plan project on the air quality of the Study Area. Figure 5.4-2 shows the comparative results for the two cases of “Do Nothing” and “Master Plan” for the target years with the existing situation.

In the year 2020, the “Do Nothing” case gives 1.72 times of pollution compared with 2001, while implementing the projects of the Master Plan will educe this value to only 1.21 times.

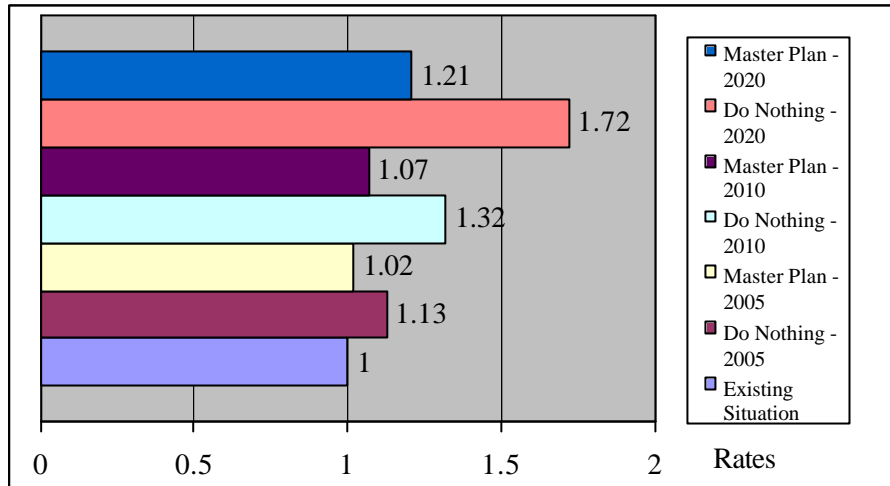


Figure 5.4-2 CO Emission Reduction of Master Plan

For more reference on introducing different modes in future planning., emission reduction alternatives are developed in Figure 5.4-3 based on calibrated results of an environmental study for Greater Cairo (JTCA-1998). As shown in the figure, the public transport modes and traffic management schemes reduce future emission, however, emission control techniques and regulations are the most effective alternative. That includes strict measures on strengthening of emission standards, vehicle registration and inspection, fuel improvement, promoting CNG (Consolidated Natural Gas) cars, and decreasing of modal shares of car use. A proper air quality management system is required to further improve the environment and to keep emission levels under international standard. Such system may include fuel improvement, vehicle inspection, emission regulation and the introduction of unleaded gas (ULG) and less emission vehicles (LEV) for taxis and buses.

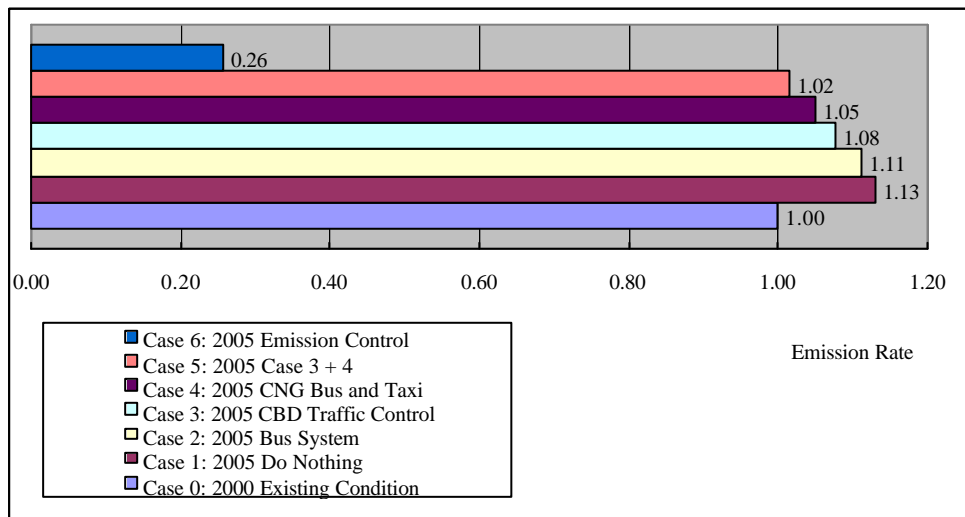


Figure 5.4-3 CO Emission Reduction of Public Transport

5.5 PROJECT MANAGEMENT AND FINANCING

This section summarizes the findings and recommendations based on the observation on the present system and practice on the project management and financing discussed in Main Report - 2.

5.51 Legislation

The legislation power is rested with the Member of the Parliament, and the administration power of the government relevant ministry and the Municipality to establish and change the laws and regulations is limited only through the member of the parliament elected.

Transport related laws and regulations are shown in Table 5.1-1. Transport related laws and regulations should be supplemented with the necessary sub-decrees, as follows:

1) Traffic Laws and Regulations

- The simplification of regulation should be practiced so that the driver and pedestrian can understand the rules easily. Because the self obedience is the principal in this country, the rule of the traffic regulation should be published and provided when driver's licenses are given or renewed.
- An appropriate time zone for heavy truck should be added to the regulations to avoid the traffic congestion in the central area of the Municipality of Tripoli.
- Illegal parking should be punished with higher fines applied for.

2) Vehicle Registration System

Registration system, registration plate's fees, and yearly registration fees for all types of motor vehicles and motor bicycles are stipulated in the article 275 of the Section 10, where low registration fee is applied.

At the time of first registration of the vehicle, an inspection by the specialized department is conducted, however, regular inspection is not compulsory in Lebanon.

In order to prohibit use of old vehicles, regular inspection shall be strictly conducted with higher registration fee.

3) Driver License System

The driving licenses system is well established with regard to international standard. Only thing Lebanese driver should keep in mind is self-obedience of the rule. Otherwise, it is of no use to strengthen the number of the traffic policemen in the Municipality of Tripoli. When driving licenses are renewed, education should be provided for the applicants. The education contains statistical information on accidents, its relation with the laws of regulations, techniques of driving and some information on traffic pollution.

4) Legislation Required for master Plan

- The transport related legislation in Lebanon seems to be well established when compared with international levels. However, drivers due to inappropriate enforcement under the scarce man power and budgetary constrains do not properly observe traffic laws and regulation.
- On transport related legislation, new legislation is not required, but strict enforcement on traffic regulation such as raising of fines against violations of traffic laws and regulations especially for illegal parking should be practiced.

Table 5.5-1 Laws and Regulations Relating to Transport in Lebanon

Category & Subject of Law	Applied Laws and Regulations	Responsible Organization/s
Road Traffic: (Overland Traffic control, Driver's Licenses, Automobile registration, etc)	Traffic Laws of Lebanon 67/77 (1968) (Revised and amended various times)	- Ministry of Interior - Internal Security Force - Ministry of Public Works and Transport - Police Force of Municipality of Tripoli
Transportation Business (Taxi services, bus services, Truck transportation services, etc)	Code of Commerce (Legislative Decree No. 304 dated 24 Dec. 1942)	- Ministry of Public Works and Transport - Commercial Court - Chamber of Commerce and Industry
Investment (BOT, Privatization of public transport entities)	Code of Commerce (Legislative Decree No. 304 dated 24 Dec. 1942)	- Ministry of Finance - Municipalities - Commercial Court - Chamber of Commerce and Industry
Insurance (Mandatory automobile liability insurance)	None. (Optional automobile insurance) Insurance Law: Decree 9812 (1968) (revised 1993 and 1999)	- Ministry of Economy and Trade
Road administration and management (Road administration, management, construction, and rehabilitation)	None (Toll on the Road is not applied for the Master Plan Projects as it is a Government Policy except BOT investment.)	- Ministry of Public Works and Transport - Ministry of Municipalities and Rural Affairs - Municipality in charge
Urban Planning (Land utilization, Building restrictions, Obligatory Parking Lot Construction)	Real Estate Property Code Building Laws and Regulations Real Estate Laws for Foreigners (1969)	- Ministry of Public Works and Transport - Ministry of Municipalities and Rural Affairs (MOMRA) - Ministry of Finance, - Urban Planning Office, Municipality of Tripoli
Environment (Noise, Vibration, Air pollution, Water pollution)	Environment Law	- Ministry of Environment - Municipality in charge

5.5.2 System and Organization

The administrative systems of Lebanese government is based on the management notion that the efficient and capable staffs assigned for the project manage and operate administrative matters on all steps starting from planning, drawing up contacts and supervising.

A manager can look after more than 10 projects with other division's support for documentation and payment. Actual works are contracted out and performed by the private contractor and consultants. The government and municipality have few work force under their organization.

This system has its demerits and sometimes causes friction with the financier of different culture or international practice. CDR has a funding coordinator to handle, to promote the procedure and what the borrower should do in accordance with the agreed terms and conditions.

(1) Ministry of Public Works and Transport (MOPWT)

The Ministry of Public Works and Transport (MOPWT) is in charge for policy formulation, planning, formulation and implementation of projects for the public works and transport sector. MPWT has the relevant departments and project management unit for implementation of sector projects. However, MOPWT has limited their implementation of projects only for small size projects such as rehabilitation of small roads and bridges and contract out with private company.

For maintenance of road and relevant facilities, MOPWT is worked for the national roads and highways, but the work itself is contracted out with private companies.

For the contracting out with private contractor, minimum staff and engineers are hired and kept in the Project Implementation Unit. MPWT does not have force account in their organization. Under the Team Leader of PIU, it was informed that a pavement design and quality control specialist, a system

analyst/road database specialist, a financial controller and an environmental specialist are working for many projects. They hire private consultants for study, preparation of Feasibility Study if needed, conducting tenders, concluding contracts and supervising contracts performance.

(2) Ministry of Interior (MOI) and International Security Force (ISF)

Law enforcement in Lebanon is performed by the MOI/ISF in the central government. Under the MOI/ISF, the Internal Security Force executes following major roles/functions all over the country.

- Establishing policy and security
- Accomplishing the mission of the judicial police
- Assisting the public authorities in accomplishing their duties.

Law enforcement system and organization is well developed in Lebanon. However, at the local level, enforcement officers and officials are very scarce, and it will encourage driver's attitude and behavior more bold in neglecting laws and regulations.

The Ministry of Interior and International Security Force should increase the enforcement officials and officers with increasing budgetary allocations. It is very difficult to estimate and recommend how many officials and officers should be additionally employed. In this connection, the Ministry, the Internal Security Force and the Municipality should also coordinate each other to increase officers and budget.

(3) Council for Development and Reconstruction (CDR)

The Government formed the Council for Development and Reconstruction (CDR) to implement bigger rehabilitation and reconstruction projects more efficiently hiring capable and experienced staff and engineers and with foreign and local funding but implementing projects contract out with private companies. It is confirmed by the Government that this system will continue since the efficiency of CDR has its reputation and the Government is forced to be small-sized Government.

The CDR is directly responsible for implementing a large part of the reconstruction program and acts in this capacity in coordination with the various institutions (consisting principally of the relevant ministries), which will ultimately use or operate the investments. The other parts of the reconstruction programs are implemented by various ministries and other governmental agencies, such as the Ministry of Hydraulic and Electric Resources, EDL, the Conseil Executif des Grands Projects and the Conseil Executif des Grands Projects de la Ville de Beyrouth. In such cases, the CDR remains involved whenever needed in the planning, design and monitoring phases and principally arranges for the sources of financing. The CDR has so many experiences in implementing projects. Many capable and experienced engineers and staffs can be appointed as a Project Manager of Project Management Team, but assistants such as an assistant engineers and an accountant are recommended.

(4) Tripoli Municipality

Tripoli Municipality has the issues of inadequacy of infrastructure, inadequate municipal finance, and limited institutional capacity. World Bank, EU and USAID have started their technical and financial assistance to the municipalities through the Ministry of Municipality and Rural Affaires (MOMRA), but the effects of these assistances will not be evaluated in a short time. With the coordination among donors concerned, technical assistance for building institutional capacity in the municipality of Tripoli should be programmed.

The major function on transport of the Municipality is enforcement of traffic regulation. However, enforcement of Road Traffic Law is under the jurisdiction of Internal Security Force (national police force), Ministry of Interior. The Internal Security Force dispatches at present sixteen policemen (16) to the Tripoli Group for that purpose.

There are fifteen (15) policemen (one officer and 14 soldiers) dispatched and belong to the Municipality Police Force (Police Department of the Municipality) for the purpose such as controlling of traffic control, robbery, smuggling and so on. The Municipal Police Force works only for the following traffic law enforcement.

- Registration of parking place for taxi (free of charge). Even through the taxi operation is allowed nationwide, taxi owner has to register the parking place to the municipal police.
- If a taxi parks on a sidewalk, it violates the traffic law and municipal police handle this case.

(5) System and Organization for Implementation of the Master Plan

- Administrative style of the Lebanese Government and Municipality is based on the notion of small government. For instance, CDR has only about 190 officials working for the 797 projects including technical assistance, averaging 4.2 projects per official in 1999. Ministries and the municipalities have the same situation.
- It is practical to hire professional staff or engineers as in-house adviser/staff/engineer inside the Government organization and to contract out with private contractor and consultant as required for the implementation of the projects.
- Projects and measures recommended in the Master Plan are composed of:
 - 1) Road improvement and widening,
 - 2) New road construction,
 - 3) Grade separation and underpass,
 - 4) Public transport
 - 5) Traffic management.
- The following implementation organization is recommended, particularly the large size construction project .
 - 1) Implementing Agency: CDR, Project Management Team (A project Manager/2-assistants) shall be organized.
 - 2) Engineering: Consultants
 - Right of way acquisition Consultants
 - Detailed Engineering Consultants
 - Construction Supervision Consultants
 - 3) Construction: Contractor
 - 4) Operation and Maintenance: MPWT
- For public transport system and traffic management the following system is recommended.
 - 1) Implementing Agency: MOPWT
 - 2) Consultants and Contractor: Same as above.
 - 3) Operation and Maintenance: A Transport Management Unit will be established under the Municipality. Municipality police force and Internal Security Force of Ministry of Interior should be integrated into such unit to perform traffic management and control tasks.

5.5.3 Financing

(1) Budgeting System of Central Government

Ministry of Finance drafts budget for the fiscal year and submits to the Council of Ministers. After decision in the Council, it is submitted to the parliament for discussion. The parliament decides the budget, and promulgates the law for the fiscal year's budget.

Budget and Performance for recent five years

Lebanon's national budget has always deficit for many years after 15 years of civil war. (See Table 5.5-2) This is because of reconstruction of the social and economic infrastructures damaged and

destroyed by the civil war. However, not only reconstruction makes the deficit huge but also the revitalization of the economy is another element for the deficit.

Table 5.5-2 Summary of Fiscal Performance (1996 to 2001)

Unit: Billion LL

Items	FY	1996	1997	1998	1999	2000	2001.1-7	2001(Budget)
Revenue		3536.0	3752.0	3979.4	4464.0	4091.4	2420.3	4900.0
Tax Revenue		3253.0	3430.0	3097.2	3321.1	2918.8	1692.5	3447.0
Non-tax Revenue		283.0	322.0	882.2	1142.9	1172.6	727.8	1453.0
Expenditures		7245.0	9161.0	6639.9	7200.3	8190.0	4201.5	9900.0
General Expenditures		4552.0	5781.0	3288.0	3575.5	3992.6	1696.5	5400.1
Debt Service		2693.0	3380.0	3351.9	3624.8	4197.4	2505.0	4499.9
Domestic Debt		2508.0	3225.0	3051.3	3214.4	3572.3	2000.2	n.a.
External Debt		185.0	215.0	300.6	410.4	625.1	504.8	n.a.
Budget Total Deficit (-)		-3709.0	-5409.0	-2660.6	-2736.3	-4098.6	-1781.2	-5000.0
As % of Total Budget Expenditures		-51.19	-59.04	-40.07	-38.00	-50.04	-42.39	-50.51
Treasury Deficit (-)		-561.0	-497.0	-796.6	-849.1	-1773.4	-358.5	n.a.
Total Budget & Treasury Expenditures		n.a.	n.a.	7906.5	8453.6	10424.5	4756.0	11102.3
Total Deficit (-) (Cash base)		-4270.0	-5906.0	-3457.1	-3585.4	-5872.0	-2139.7	n.a.
As % of Total Expenditures		n.a.	n.a.	-43.73	-42.41	-56.33	-44.99	n.a.

The government has to borrow money for financing the deficit. The public debt amounted to 136% of GDP at the end of year 2000. The debt is one of the most crucial problems for the government. Government has to borrow money in the domestic and international markets for lowering the borrowing cost.

Public Debt

As of June 30, 2001, net outstanding public debt of Lebanon was 37,579 billion LL (consisting of 25,365 billion LL of net domestic debt and 12,214 billion LL (8,102 million US\$) of public external debt)

The Table 5.5-3 shows the Republic's net public sector debt for the periods extending from the end of 1995 until June 2001.

Net public debt as a percentage of estimated GDP increased from 46 percent in 1992 to 79 percent in 1996, 96 percent in 1997, 105 percent in 1998 and 120 per cent in 1999 and 142% in 2000.

Table 5.5-3 Public Debts

(In billions of Lebanese Pounds)

	1995	1996	1997	1998	1999	2000	2001.6
Net Domestic Debt (1)	9,287	13,358	18,381	19,544	21,377	24,530	25,365
Public External Debt (2)(3)	2,127	2,922	3,673	6,282	8,351	9,510	12,214
(in Mil. of US\$)	1,332	1,883	2,402	4,166	5,538	6,992	8,102
Net Public Debt	11,414	16,280	22,054	25,826	29,728	35,071	37,579
Annual Increase (%)		42.6	35.5	17.1	15.1	18.0	-

Source Notes: Ministry of Finance /The Central Bank

- 1) Net domestic debt represents gross domestic debt less public sector deposits with central bank and commercial banks
- 2) Amounts translated into Lebanese Pounds at end of period rates, includes accrued interest
- 3) Public external debt figures in this Offering Circular differ from previously published figures due to continuing implementation of the Debt Management System.

(2) Infrastructure Investment

The Government has Five Year Development Plan (FYDP), which was prepared by CDR in April 2000. The Plan indicates the financial resources as shown Table 5.5-4 and Figure 5.5-1.

Table 5.5-4 Financial Resources for the Five-Year Development Plan (2000-2004)

(LL Billion)

Financial Resources	Total (1)	%	Transport Sector		
			Sector Total (2)	%	(2)/(1) %
Foreign Official Loan (a)	2,000	14.7	366	7.4	18.3
Foreign Official Grants	116	1.2	0	0.0	0.0
Independent Municipalities Fund (MOMRA)	787	5.8	0	0.0	0.0
General Budget (MOF) (b)	6,585	48.5	2,454	49.7	37.3
BOT (Foreign Private)	4,026	29.7	2,116	42.9	52.6
Total	13,564	100.0	5,027	100.0	36.4
Government Financial Burden (a)+(b)	8,585	63.3	2,820	57.1	32.8

Source: CDR – The Five Year Development Plan 2000 - 2004

Including foreign private investment (BOT) to the infrastructure project, total financial resources applied to the plan is 9.0 billion US\$, of which general budget is 48.5%, BOT is 29.7%, and available foreign loan and grants are 15.9%.

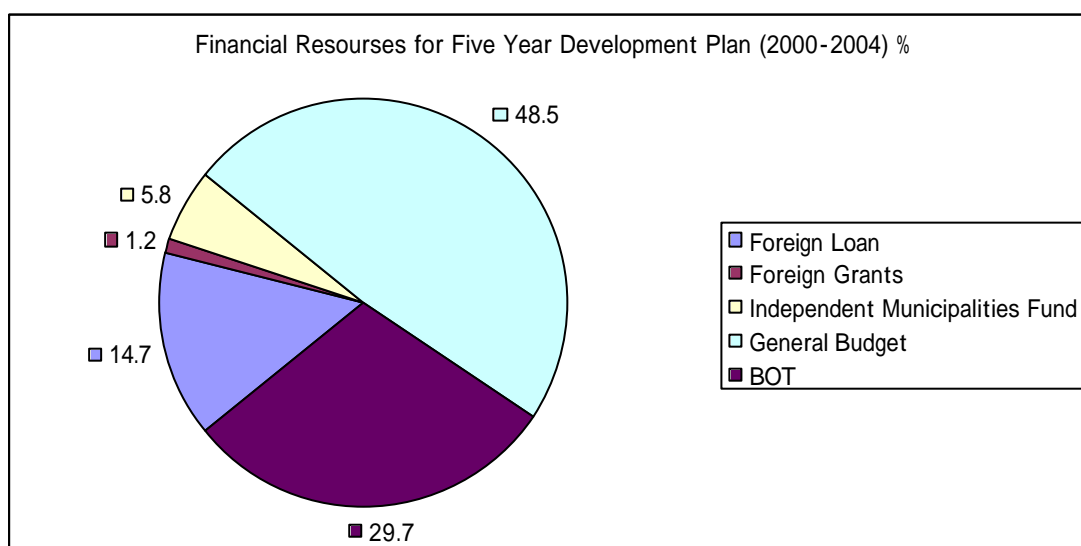


Figure 5.5-1 Financial Resources for Five-Year Development Plan (2000-2004)

(3) Budgeting System

1) Budget of Tripoli Municipality

Next Table 5.5-5 shows the budget for five years and comparison with budgets of national and MOPWT.

The expenditure size of the Tripoli Municipality is only 9.1% of that of MOPWT and 0.32% of that of the National Budget Expenditure.

Although the Municipality has been authorized to collect directly various fees such as house rent fee or building license fee, it shares only 27% of the revenue, whereas the indirect revenue such as port fees, 10% of phone calls and subscriptions, electricity and water consumptions through Ministry of finance is 59%. These items of income are now delayed more than two years.

Table 5.5-5 National, MOPWT and Tripoli Municipality Budget

Unit: Billion LL

Fiscal Year	Revenues			Expenditures				
	National Total	Tripoli Total	Share of Tripoli (%)	National Total	Tripoli Total	Share of Tripoli (%)	Min. of Public Works & Transport	Share of MPWT (%)
	(1)	(2)	(2)/(1)*100 = (3)	(4)	(5)	(5)/(4)*100 = (6)	(7)	(7)/(4)*100 = (8)
1995	3,280			5,630.0			275.0	4.9
1996	4,025	27.0	0.67	6,450.0	27.0	0.42	276.0	4.3
1997	4,100	31.0	0.76	6,370.0	31.0	0.49	248.0	3.9
1998	4,956	22.0	0.44	7,925.0	22.0	0.28	306.0	3.9
1999	4,990	20.0	0.40	8,395.0	20.0	0.24	231.0	2.8
2000	5,435	21.6	0.40	8,525.0	21.6	0.25	na	
Ave.	4,701.2	24.3	0.52	7,533.0	24.3	0.32	267.2	3.5

Since details of budget was not provided, road related revenue and expenditure could not estimated precisely. However, the study team estimated that the road related revenue is only 5 to 6% of the total revenue, but expenditure for road related facilities and maintenances is estimated more than 10% of the total expenditures.

This situation will make the municipality limit their activities on the municipal road and transport services for the citizens in Greater Tripoli area.

To sum up, the size of the Tripoli Municipality Budget is very small and means that funds on their hands cannot afford project local cost expenditure when transport project such as rehabilitation of municipal roads or public parking area construction is implemented. To solve this problem, Mayor intends to utilize private participation in the form of Build-Operate-Transfer as much as possible. Off-Street Parking project is underway to be implemented in near future.

2) Ministry of Municipal and Rural Affairs (MOMRA)

The Ministry of Municipal and Rural Affairs was established in 1993 and its responsibilities are to: (a) address the institutional and infrastructure needs of municipalities and rural communities, particularly those that cannot provide municipal services on their own, and (b) coordinate regional initiatives concerning municipal services. MOMRA manages "Independent Municipal Fund" to invest for the purposes. In 1995 – 96, MOMRA invested about US\$30 million to infrastructure needs of municipalities. In 1999, MOMRA distributed about US\$120 million to municipalities, representing 1997 transfers. In early 2000, a decree to distribute US\$300 million to municipalities was issued, which was representing 1998 and 1999 transfers.

In mid of 2000, World Bank has extended a project loan amounting to US\$80 million to the Lebanese Republic in order to (a) upgrade and rehabilitate backlog of essential municipal infrastructure, and (b) build/develop institutional capacity of MOMRA. In addition to this, the European Union (EU) indicated a technical assistance amounting to about 9 million Euros for the purpose of supporting municipal sector in Lebanon at both MOMRA in central level and municipalities and Unions of Municipalities in local level. Similarly, USAID has already started technical assistance program aimed at municipalities and villages, which covered already 80 municipalities.

World Bank summarized four main sector issues such as (a) inadequacy of infrastructure, (b) inadequate municipal finance, (c) The Independent Municipal Fund Arrears, and (d) Limited institutional capacity at central and local government levels.

Finance resources of the Municipality of Tripoli available for allocation to implementation of Master Plan projects are almost none and have to rely on the government support including CDR, foreign assistance and foreign private investment in the scheme of BOT if the investment climate is favorable to the private foreign investors.

Table 5.5-6 Financial Resources for the Master Plan Projects

Projects	Finance Sources			
	Municipality	Gov./CDR	BOT	ODA
Short term	Operation & Maintenance	Tripoli Blvd Underpass	None	Grant or Loan
Medium & Long term	Operation & Maintenance	Road Improvement & Widening, and New Road Construction if finance is available.	Road Improvement & Widening and New Road Construction if investment climate is favorable.	None

Remarks: When Tripoli Blvd Underpass is implemented by CDR using ODA finance, repayment is made through Independent Municipal Fund if loan is extended.

5.5.4 Estimation of Available Fund for Master Plan

According to the Government's Five Year Development Plan covering (2000-2004), total financial resources for the infrastructure investment is LL 13,560 Billion (US\$ 9.043 Billion), of which the Government general budget is 48%, private participation (BOT) 30%, foreign loans and grants 16% and municipality fund 6%, as shown in Table 5.5-4.

Fund availability for the Master Plan Projects is estimated based on the share of population and road network (km) of Greater Tripoli, to the national transport sector investment. Taking into consideration the fund requirement for the routine maintenance works for transport sector, the estimated fund availability is found to cover the implementation of the Master Plan projects as shown in Table 5.5-7.

Table 5.5-7 Required and Available Fund (LL Billion)

Items	Short-term (2001-2005)	Medium-term (2006-2010)	Long-term (2011-2020)
Master Plan Fund Requirement	84.27	56.49	178.85
Estimated Available Fund	85.0	86.0	215.0