11.9 Priority Setting in Public Transport Projects

1) Measures of Project Priority

The priority of projects should be studied based on the following measures;

(1) Cost performance of projects from the economic standpoint
(2) Fundamental element of public transport structures
(3) Convenience for public transport mode users
(4) Financially affordable to the executing body
(5) Contribution to the community
(6) Project consensus
(7) Project magnitude
(8) Ease of implementation
(9) Comprehensive ranking and Masterplan projects

The first step in the priority setting shall focus on the cost performance and benefit scale. Other evaluation will be done later in a synthesized manner.

2) Cost Benefit Analysis

(1) Annual Benefit of a Project

The benefit of public transport improvements is defined as the summation of savings in vehicle operating cost (VOC), and passengers' time (refer to Chapter 9 for details).

The decrease in vehicle operating costs and passengers' time in the complete Masterplan network compared to those of the Masterplan network without including project A, are considered to be the benefits of project A.

To compare the project benefits, the benefits by each project in the year 2000 are calculated so as to eliminate the influence by the variance of the year of implementation.

(2) Annual Cost of a Project

The construction and/or implementation costs of a project should be expressed on an annual base to calculate B/C of a project in the year 2000. The annual repayment is calculated at 0.1275 times the principal under the assumption of 25 years depreciation period with interest rate of 12% per annum and no residual value after 25 years.

The rolling stocks of rail systems are included in the rail operating cost, and are therefore not calculated in the annual cost.

(3) Grouping Based an B/C Ratio and B-C Value.

The scatter graph in Fig. 11.9.1 shows the relationship between B/C and B-C of the projects. The projects may be classified into four groups as follows;

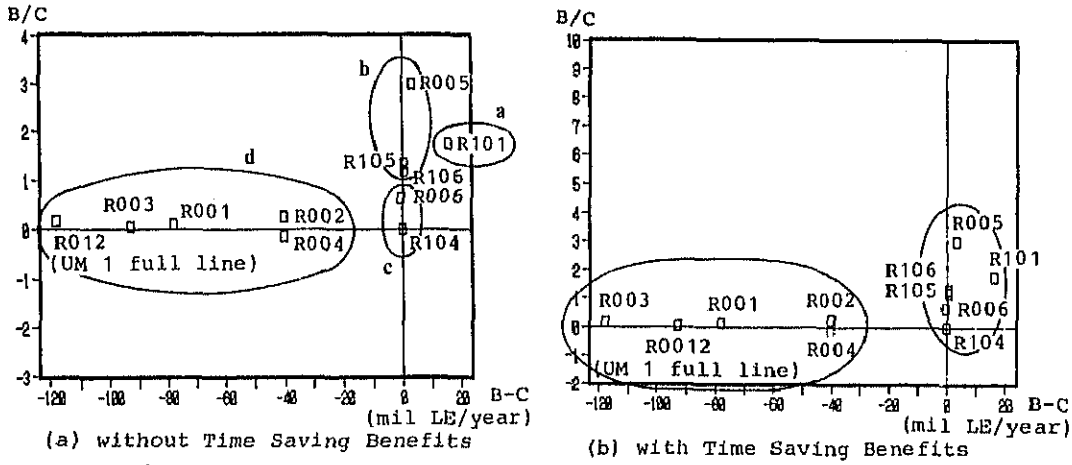


Fig. 11.9.1 Project Groups by Cost Performance

a. High B/C and B-C group
b. High B/C and small B-C group
c. Low B/C and small B-C group
d. Low B/C and negative B-C group

Group a:

The Heliopolis Metro Ramses - Nozha - section improvement project is in this group. From the standpoints of cost performance and large benefit, this project is highly recommended for implementation.

Group b:

Port Said line extension, Helwan line extension, and ENR commuter service (Cairo - Shubra Al Kheima section) projects are included in this group. These projects have in common very small scales of investment and of benefits. In spite of the small scale of benefit, projects belonging to this group show high cost performance, due to smaller scale of cost. From that point of view these projects are considered as small scale improvement projects with high cost performance.

Group c:

CTA - HCHD connection at Al Mataria sect., and ENR commuter service (Cairo - Giza section) are included in this group. The CTA - HCHD connection aims to form a northern ring rail and the ENR commuter service (Cairo - Giza section) a western ring rail. These two projects require a small scale of investment costs and produce a small scale of benefits. From the financial point of

view, however it is easy to commence these projects and although the calculated benefits are small, from the railway framework point of view, the early start of installing these projects is recommended.

Group d:

Urban Metro No. 1 (full line), Urban Metro No. 1 (Cairo side section), Urban Metro No. 1 (Giza side section), Regional Metro Giza branch and Urban Metro No. 2 projects are included in this group. These five projects require large investments, but cost performances are not good.

They are not recommended from the economic analyses point of view. However, they are fundamental countermeasures of the public transport system. Further discussion from the fundamental transportation element point of view shall be presented later.

3) Analysis on Fundamental Countermeasure Performance

Cross section analysis to determine fundamental countermeasure of public transportation in the preceding section shows the necessity of railway network. The result of passenger traffic assignment is shown in Fig. 11.9.2. and Table 11.9.1. Thirty percent of public transport passenger trips intersecting at cross section are transported by rail systems. At cross section A, 35% of passengers are transported by rail. The burdens shared by each of the Regional Metro and Heliopolis Metro are nearly equal. The CTA Port Said line also carries some of the burden. At cross section C, the Regional Metro transports 297 thousand trips and ENR (Giza - Cairo commuter service) transports 14 thousand. Both rail systems cover 32% of transport demand at that section. At cross section D, the Regional Metro Giza branch transports 95 thousand. The performance of Urban Metro No. 1 at cross section E is good, transporting 167 thousand. Adding 19 thousand passenger trips to be transported by the ENR commuter service (Cairo - Shubra Al Kheima) to the Urban Metro passengers, 32% of the demand is thus served by rail.

The fact that 32% of the demand is transported by rail; Regional Metro, Urban Metro No. 1 and improved Heliopolis Metro lines, shows that rail systems will become elements of the fundamental framework.

4) Bus Fleet

(1) Bus Fleet Reinforcement

Sixty percent of the public transport demand is served by bus. This figure shows that the bus transport system is an essential mode of the public transport system in GCMR.

The total cost to maintain a sufficient regular size bus fleet to serve 60% of the demand is estimated at 373.6 million LE in the decade up to the year 2000.

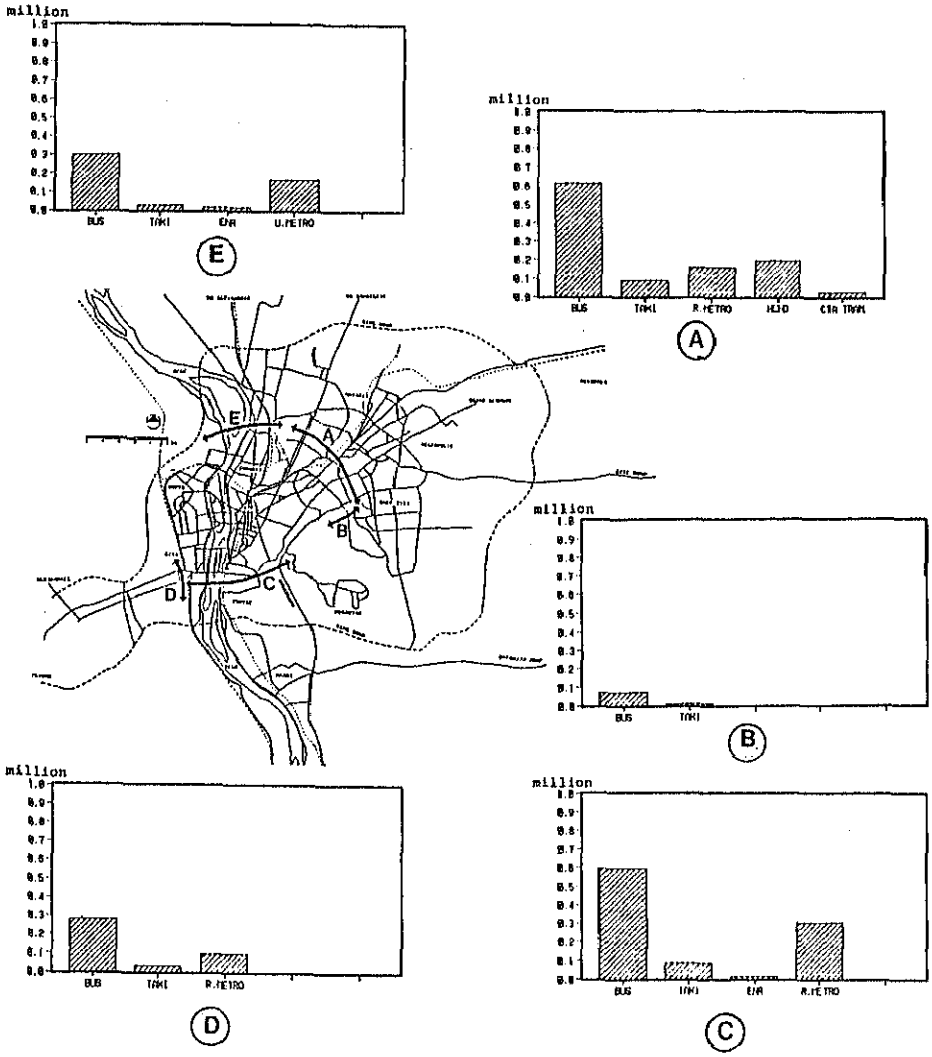


Fig. 11.9.2 Number of Passengers at Cross Sections

Table 11.9.1 Assigned Number of Passengers to each Transport Mode in the Masterplan Case

(unit: 1000 passengers)

	Total Demand	Traffic Assignment						
		BUS	TAXI	ENR	UM1	RM	HM	CTA
A	1,076	611	90	0	0	157	193	25
B	82	70	12	0	0	0	0	0
C	991	594	86	14	0	297	0	0
D	403	275	33	0	0	95	0	0
E	512	298	28	19	167	0	0	0

However, in the Masterplan, the financial cost of bus fleet reinforcement is limited to the purchasing cost of buses to be increased in number, from 1987 up to the year 2000, which is 115.8 million LE for 848 buses. The cost to maintain the present bus fleet is considered in the depreciation cost of the vehicle operating cost.

(2) Deluxe Bus Fleet

A fleet of 200 deluxe buses is introduced, with the purpose of stimulating modal change of private car user to public transport. Implementation cost is 56.0 million LE.

5) Comprehensive Evaluation

The measures outlined in section 1) are used to make a comprehensive evaluation of projects. These measures are briefly defined hereafter.

(1) Cost Performance

In the preceding section 2), projects were classified into four groups.

High B/C and B-C project group is given 5 points, high B/C and small B-C group; 3 points, low B/C with small B-C; 2 points, and low B/C with negative B-C; 1 point.

(2) Fundamental Element

Heavy rail systems, improved Heliopolis Metro tramway, and increase of bus fleet projects are considered as fundamental elements of the public transport structure as mentioned in the preceding sections 3) and 4). These projects are awarded 4 or 5 points. The ring rail concept, whose elements are the ENR commuter service (west ring rail), and connection of CTA Mataria line and Heliopolis Metro line at Al Mataria intersection, is given 3 points. Other projects are not considered as fundamental projects, therefore receive 1 point only.

(3) Convenience for Public Transport User

High speed, punctuality, high frequency service in dense traffic demand area, easy access/transfer and direct connection to the CBD are the points of evaluation.

(4) Financial Affordability

Projects are awarded the following points, in accordance with their financial investment cost;

- More than 400 million LE: 1 point
- 100 - 400 million LE: 2 points
- 50 - 100 million LE: 3 points
- 10 - 50 million LE: 4 points
- Less than 10 million LE: 5 points

In the case of the bus fleet reinforcement project, only cost of increasing bus fleet is considered, and not that of replacement.

(5) Contribution to the Community

Contributions to the establishment of a fundamental transportation network and to urban development are the points of evaluation.

(6) Project Consensus

Consensus among the government, governorates and executing bodies mainly concerned is the evaluation criteria. Minor attention is also paid to publicity to the citizens.

(7) Project Magnitude

The maximum traffic volume transported by section, by each project is listed in Table 11.9.2. Projects transporting more than 500 thousand passengers are given 5 points, 100 - 499 thousand; 4 points, 50 - 99 thousand; 3 points, 10 - 49 thousand; 2 points, and less then 10 thousand passengers; 1 point.

Table 11.9.2 Maximum Demand at Section
(unit: 1000 passenger)

Project	Demand
R001	217
R002	90
R003	140
R004	175
R005	54
R006	15
R101	157
R102	-
R103	41
R104	92
R105	7
R106	17
R107	-
R108	-
Bus Fleet	974

(8) Ease of Implementation

Under this measure, projects are evaluated from technical and social points of view only. Other factors such as financial affordability, maturity of a project, and consensus to a project although related to implementation ease are considered as separate measures.

(9) Comprehensive Evaluation Ranking and Masterplan Projects

The highest priority is given to the bus fleet increase project (B001). The second is the Heliopolis Metro Upgrading Project (R101). Small improvement projects of CTA and Heliopolis Metro tramways; R103, R104, R105, R107, and R108, are not easy to measure quantitatively but surely their effect regarding passenger convenience must not be overlooked. ENR commuter service project is one of the typical examples of making maximum use of existing facilities. Implementation of deluxe bus fleet project has high points due to the possibility it offers to encourage of modal transfer from private cars, which are the main cause of traffic congestion on the roads.

Needless to mention, construction projects of heavy rail system have a strong impact on the public transport structure. These projects are desirable from the transport structure points of view. The accumulated financial cost of all the projects which fell in the 4 and 5 point categories of the comprehensive ranking was 395 million LE. Considering the budget for public transport plan, set at 1,000 million LE as mentioned in Chapter 9, there is a surplus of 605 million LE. Therefore one heavy rail project can be introduced in the Masterplan. Considerable rail systems are the Urban Metro No. 1 (phase 1), Urban Metro No. 1 (phase 2), or Regional Metro Giza branch. Urban Metro No. 1 (phase 1) will serve the Shubra - CBD corridor, Urban Metro No. 2 (phase 2) the Dokki - Agouza - CBD corridor, and Regional Metro Giza branch the Giza - CBD corridor. Urban Metro No. 1 (phase 1) costs 887.5 million LE, phase 2 costs 537.3 million LE, and Regional Metro Giza branch costs 391.9 million LE. The three heavy rail systems are necessary in order to establish a modern, convenient and well qualified public transportation system to cope with traffic demand beyond the year 2000.

From the viewpoint of project maturity, Urban Metro No. 1 project, especially phase 1, is distinguished. Construction cost, however, largely depends on the method civil works are executed. Construction commencement, after widening of Shubra st. project is completed, can save a large amount of money because it would become possible to adopt cut and cover method. It is therefore recommended that Urban Metro No. 1 (phase 1) engineering study be started, but that construction should be delayed until the completion of the Shubra st. widening project. Accordingly, an amount of 71.2 million LE is appropriated for the engineering study in the first half of the Masterplan time period and the construction work is scheduled to start in the second half and to be completed in the year 2002.

Urban Metro No. 1, phase 2, compared to its phase 1 project, shows a slightly better B/C. Although the route was selected in the middle of the 1970's, after the selection many changes occurred, such as population distribution, persons movements, and urban and residential areas development. In particular, the rapid development of informal housing area has produced a large traffic

demand. It is therefore recommended to re-investigate the route location including extension along the Ahram st. Accordingly, a sum of 37.4 million LE is appropriated for feasibility study and engineering study.

The Regional Metro Giza branch plan calls for maximum use of the Regional Metro tunnel section by connecting the areas rapidly increasing in population in Giza with the Cairo CBD. The route runs along the Ring Road. The Ring Road project (Giza side) is scheduled to be completed during the Masterplan period (until the year 2000). Furthermore the area along the line shows a strong tendency to rapidly develop and become populated. From these points of view, costs for land acquisition and feasibility/engineering study for the Regional Metro Giza branch are appropriated during the first half of this Masterplan period.

As a conclusion of the above discussion, projects are classified by three grades in Table 11.9.3, as follows;

a. Grade 'A' projects are to be completed until the year 2000
b. Grade 'B' projects are to be commenced before the year 2000
c. Grade 'C' projects are to be considered for construction after the year 2000.

Consequently the total investments until the year 2000, are the summation of grade 'A' projects, and costs of engineering, land acquisition, and part of construction for the three heavy rail systems projects.

Table 11.9.3 Priority Project Ranking

Evaluation Criteria	Projects															
	R001	R002	R003	R004	R005	R006	R101	R102	R103	R104	R105	R106	R107	R108	B001	B002
Financial Cost (M.LE)	*887.5*	*537.3*	*897.7*	*361.9*	*13.9*	*13.7*	*163.2*	*284.1*	*7.7*	*0.5*	*1.6*	*3.1*	*21.2*	*29.0*	*115.8*	*56.0*
Cost Performance	1	1	1	1	3	2	5	X	X	2	3	3	X	X	x	x
Fundamental Element	5	5	4	5	3	3	5	1	1	3	1	1	3	3	5	1
Convenience	5	5	5	4	3	3	5	3	3	4	5	4	4	4	3	3
Financial Affordability	1	1	1	2	4	4	2	2	5	5	5	5	4	4	2	3
Contribution to Community	5	5	5	5	3	3	5	3	4	4	5	3	4	4	3	3
Consensus to a Project	4	4	3	1	2	2	4	2	3	3	4	4	4	4	5	3
Project Magnitude	4	3	4	4	3	2	4	2	X	3	1	2	X	X	5	3
Ease of Implementation	5	5	4	3	3	3	5	3	5	3	2	5	5	4	5	5
Comprehensive Ranking	3	3	2	3	3	3	5	2	4	4	4	3	4	4	5	4
Ranking in Masterplan	B	B	C	B	B	B	A	C	A	A	A	B	A	A	A	A

Note : X: Not Estimated
Source: Study Team

11.10 Impact of New Fare Setting

1) Introduction

The analysis of the cross sections to determine the fundamental countermeasures for public transportation, outlined in sect. 1 of this chapter, confirmed the necessity of railway network. The results of traffic assignment however, show that railway facilities are being insufficiently used. The major reasons for this are considered to be the comparatively high fare setting of railways, and additional cost for feeder transport (see Chapter 5 sect. 3 for details).

During the Regional Metro and competitive bus passengers interview survey, the major reasons given by the Regional Metro passengers and competitive bus line passengers for their mode selection, were the difference in transport time and difference in fare. The logit model formulated from the results of this survey shows that the average time value of Regional Metro passengers and of competitive bus line passengers is 0.41 LE/hr. However, the built-up area of Cairo has been developed within a 10 km radius range. Because of short trip length due to the shape of the city, only little time-shortening effect by subway systems could be expected. Therefore, only the fare change effects will be examined hereinafter.

2) Cases of Fare Setting

Two types of fare setting systems are chosen. One type modifies (by increase or decrease) the present fare rate. Fares are set at 1.4, 1.2, 1.0, 0.8, and 0.6 times the present fare. The second type adopts a discount fare system for transferring from rail systems to feeder buses and vice versa (bus-to-rail), at 50% discount fare (Table 11.10.1).

Table 11.10.1 Different Rail Fare Cases for Comparison

Feeder Discount	Rail Fare Increase Coefficient				
	1.4	1.2	1.0	0.8	0.6
No Discount	ND14	ND12	ND10	ND08	ND06
Discount	D14	D12	D10	D08	D06

3) Total Sales and Total Passengers

Total sales resulting from "discount for transfer passengers case" are generally higher when compared to sales from the "no discount case" for the same rail fare cases (Fig. 11.10.1). This fact strongly suggests that to provide better convenience for public might result in more sales. Fig. 11.10.2 clearly shows the increase of bus-to-rail passengers in the discount cases, for example from 1.7 million (No Discount-10 case) to 2.5 million

(Discount-10 case). On the contrary, bus passengers declined from 4.9 million (ND-10 case) to 4.0 million (D-10 case). This fits with the expectation that arises from the implementation policy of the subway system.

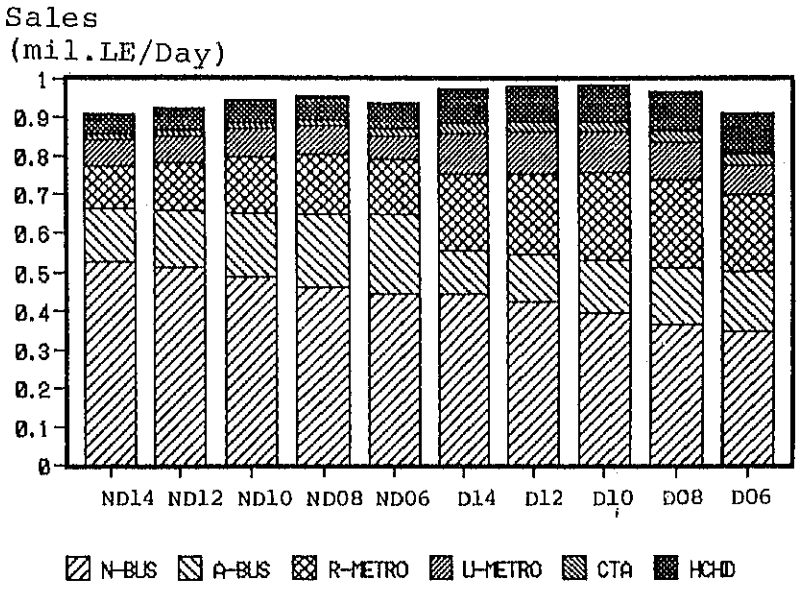


Fig. 11.10.1 Sales of Public Transport Modes

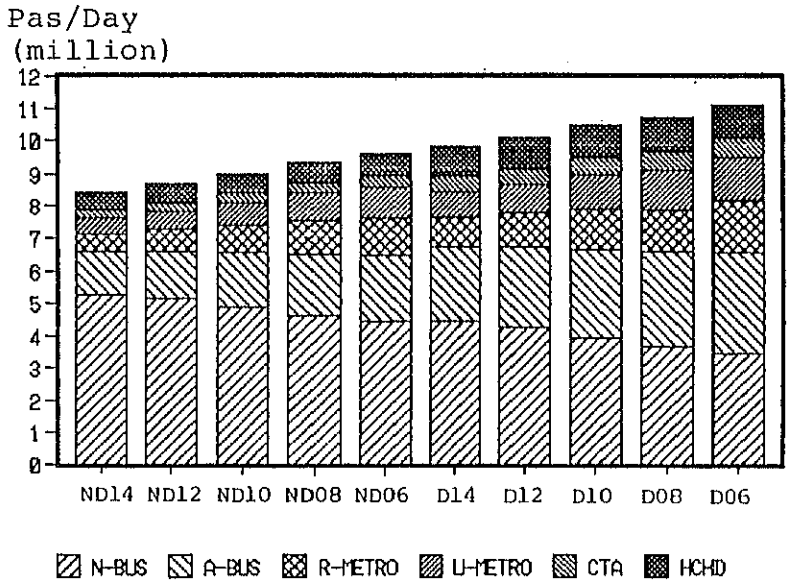


Fig. 11.10.2 Passengers of Public Transport Modes

As a result, the decrease in sales resulting from reduced bus passengers is compensated by the increase in sales from rail systems, not only heavy rail systems but also tramway systems.

From the overall public transport management point of view, the amount of total sales is one of the most important indicators. The highest amount of sales is recorded by the D-10 case; 985 thousand LE/day. D-10 case is, needless to say, the case of present fare setting with adoption of 5 pt discount for transferring passengers. D-12 case follows the D-10 case, and D-8 case ranks third. In the cases of without transfer discount, ND-8 case is the first, with ND-10 second. These results show that the present fare setting of the Regional Metro line (same fare system as Regional Metro line is assumed to apply to other subways) hits the mark, from the managerial point of view.

Share of bus, heavy rail and tramways, including improved Ramses-Nozha line is tabulated in Table 11.10.2. The standard case, ND-10, shows that share of buses is 73%. In spite of favorable consideration on reduced fare system, share of rail hardly covers 40%. Increase in number of passengers due to transfer discount is calculated to be around 15%. On the contrary, decrease of rail fare from 1.4 times the present fare up to 0.6 times, by step of 20%, results in an increment in each step in the range of 2-3% of passenger number. Figures of passenger.km for each case are illustrated in Fig. 11.10.3. Total passenger.km is almost flat against the expectation that increase of feeder-rail trips steps up the total passenger.km.

Table 11.10.2 Share of Passengers by Modes Corresponding to Different Fare System

Case	Mode		
	Bus	Subway	Tram
ND14	0.786	0.121	0.094
ND12	0.763	0.141	0.096
ND10	0.730	0.171	0.099
ND08	0.698	0.200	0.102
ND06	0.676	0.220	0.104
D14	0.686	0.175	0.139
D12	0.663	0.197	0.140
D10	0.632	0.225	0.143
D08	0.619	0.234	0.147
D06	0.590	0.265	0.145

4) Impact of Fare Setting to Rail Systems.

(1) General Impact

Fig. 11.10.4 shows passenger volume transported by rail systems under the following fare setting conditions; reduced fare 60%, and transferring ticket system with 50% discount, comparing with normal ticket system.

The tunnel sections of the Regional Metro show a flow of 650 thousand passengers, which is around double the number of passengers in the normal case. Comparing with the maximum transport capacity of 666 thousand passengers for these sections, it is understood that the proposed fare system works well. In the case

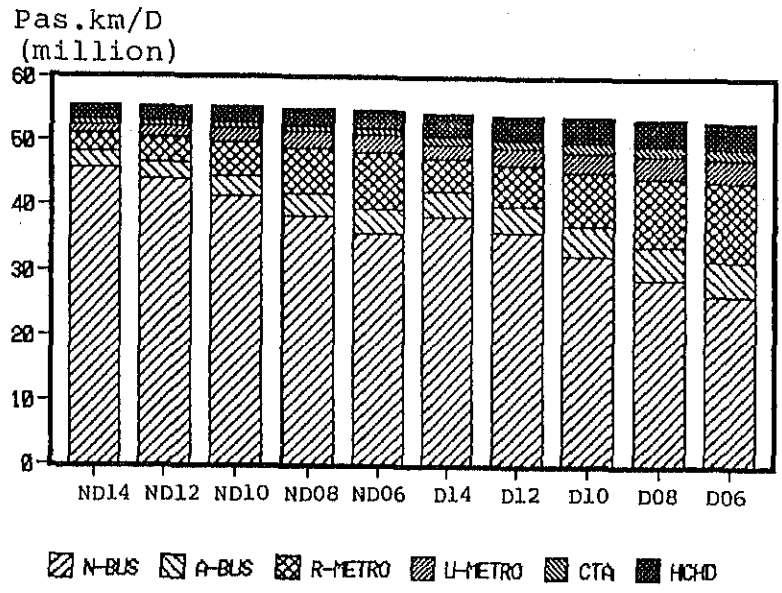


Fig. 11.10.3 Passenger.Km of Public Transport Modes

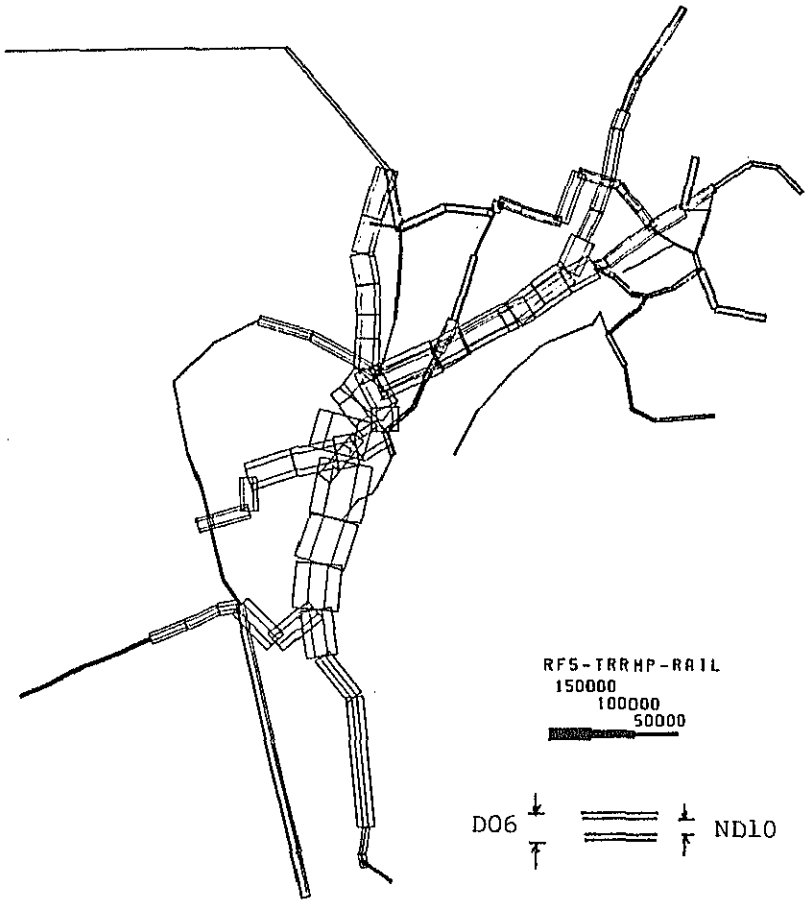


Fig. 11.10.4 Passengers Transported by Rail

of Heliopolis Metro tramway (upgraded section), 300 thousand passengers transported is 1.8 times the planned limit of 180 thousand.

Conclusively, reduced fare policy with discount transfer ticket system is to be proposed in order to attain more effective use of rail systems.

(2) Impact to Each Rail System

In this report, the benefit of a project is calculated as the difference of vehicle and rail operating costs between Masterplan case, and the case of the Masterplan excluding that project. However in this section an exception has been made and the difference in vehicle and rail operating costs of the Do-Nothing case and Do-Nothing case with that project is the benefit of that project. The reasons of this change of the method to measure benefits are:

a. At most it is possible to construct only one heavy rail project during the Masterplan study period due to the limit of budget, and

b. Impact of the project is clearly observed when comparing with Do-nothing case, because in case of comparison with the Masterplan which includes many projects, the effects of the projects interfere making is difficult to judge the impact of one particular project.

The result of calculation is shown in Fig. 11.10.5. Regional Metro Giza branch project shows high cost performance against the result in the Masterplan case. The reason why Giza branch shows such a high cost performance is mainly because the Ring Road does not exist in the Do-nothing case in the year 2000. In the Masterplan case, increased public transportation demand in the year 2000 is mainly handled by buses passing thru existing Ahram and King Faisal streets and newly constructed Ring Road. The demand expected on the Ring Road would be handled by the Giza branch, if the Ring Road does not exist.

One contradiction is that the construction of Giza branch is considered together with the construction of Ring Road. Because of this contradiction, high performance of Giza branch case can not be concluded without more detailed consideration and examination especially with closely related projects.

Urban Metro No. 1 line also shows an affirmative result due to the change in method, although phase 1 of this line produces poor results. The reason for this is that road along the line of Urban Metro No. 1 phase 1 is expected to become extremely congested, and although 276 thousand passengers shall transfer to the Urban Metro No. 1, this will have little effect on the improvement of the vehicle traffic. Actually, the simulation shows that the difference in average speed along Shubra st. in the Do-

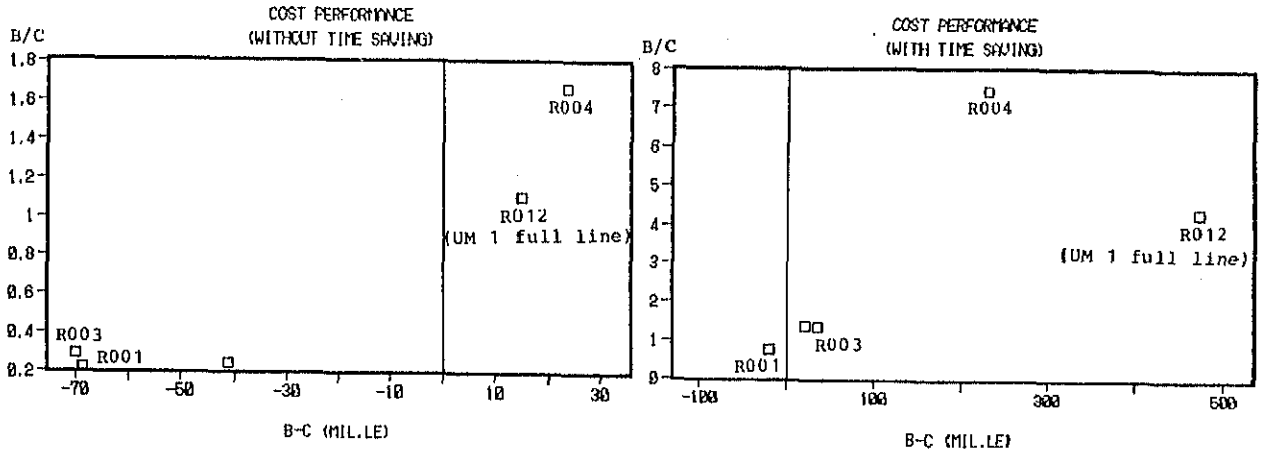


Fig. 11.10.5 Cost Performance of Heavy Rail Projects

nothing case and in the Do-nothing with Urban Metro No. 1 phase 1 project case, is negligible at 0.14 km/hr.

The lessons for Urban Metro No. 1 line from these results are:

a. The construction of the full length of the line is sustained from the cost performance point of view.

b. Road widening of Shubra st. with construction of phase 1 of this line might give some favorite results.

Urban Metro No. 2 still shows a poor result. Characteristics of each line are summarized in Table 11.10.3.

Table 11.10.3 Characteristic Figures of Proposed Subways

Line Name	Length (km)	Pax.km (1000 pax.km)	Pax/km (1000 pax/km)
Urban Metro No. 1 (Full Size)	17.7	4753.1	267
Urban Metro No. 1 (Phase 1)	10.2	2810.9	276
Urban Metro No. 2	7.7	1518.3	197
R.M. Giza Branch	11.7	1878.7	161

12. CORPS Plan

12.1 Introduction

CORPS is defined as the 7.8 km2 area, surrounded by the three arterials, Corniche st., Ramses st. and Port Said st.; it measures about 5 km from north to south and 2 km at its widest part from east to west. CORPS is the most important part of the Greater Cairo Region from the standpoint of economic and transportation activity; it encompasses the CBD, governmental building area and main transportation pivot points such as Ramses, Tahrir, Attaba and Sayedah Zeinab squares. Currently, CORPS attracts daily more than 150,000 passenger cars and 1,710,000 trips which will increase to 2,135,000 trips in the year 2000.

Fig. 12.1.1 shows the subjects which have been studied in CORPS. This chapter gives some guidelines on how to cope with the issues of each selected area. It should be noted, however, that the total recommendations in this chapter do not compose a masterplan for CORPS, since each study focused only on specific issues of certain areas, and did not comprehensively study the whole area with a unified theme. The target year also varies by recommended projects; some are urgent while others are to be implemented in the long term.

Section 2 of this chapter deals with the main transportation issues in CBD. Firstly, a short-term CBD traffic management plan is proposed, with a review of the CBD components in the Second Urban Transportation Development Plan based on the updated field survey data. It also includes new projects in CBD and its surroundings. Secondly, parking control policies and the introduction of a parking ticket system in CBD are recommended; and lastly, a traffic zone system is suggested from long-term perspectives, and adopting a pedestrian-and-bus only street system in the CBD.

In section 3, a long-term transportation complex plan for Azbakiah Park/Attaba sq. is discussed. The plan aims to beautify the area as well as mitigate the traffic congestion for the convenience of transferring passengers.

Finally in section 4, urban redevelopment plans for the eastern part of CORPS are explained in the context of the road construction and widening projects in the area. The urban redevelopment scheme in Japan will also be explained here.

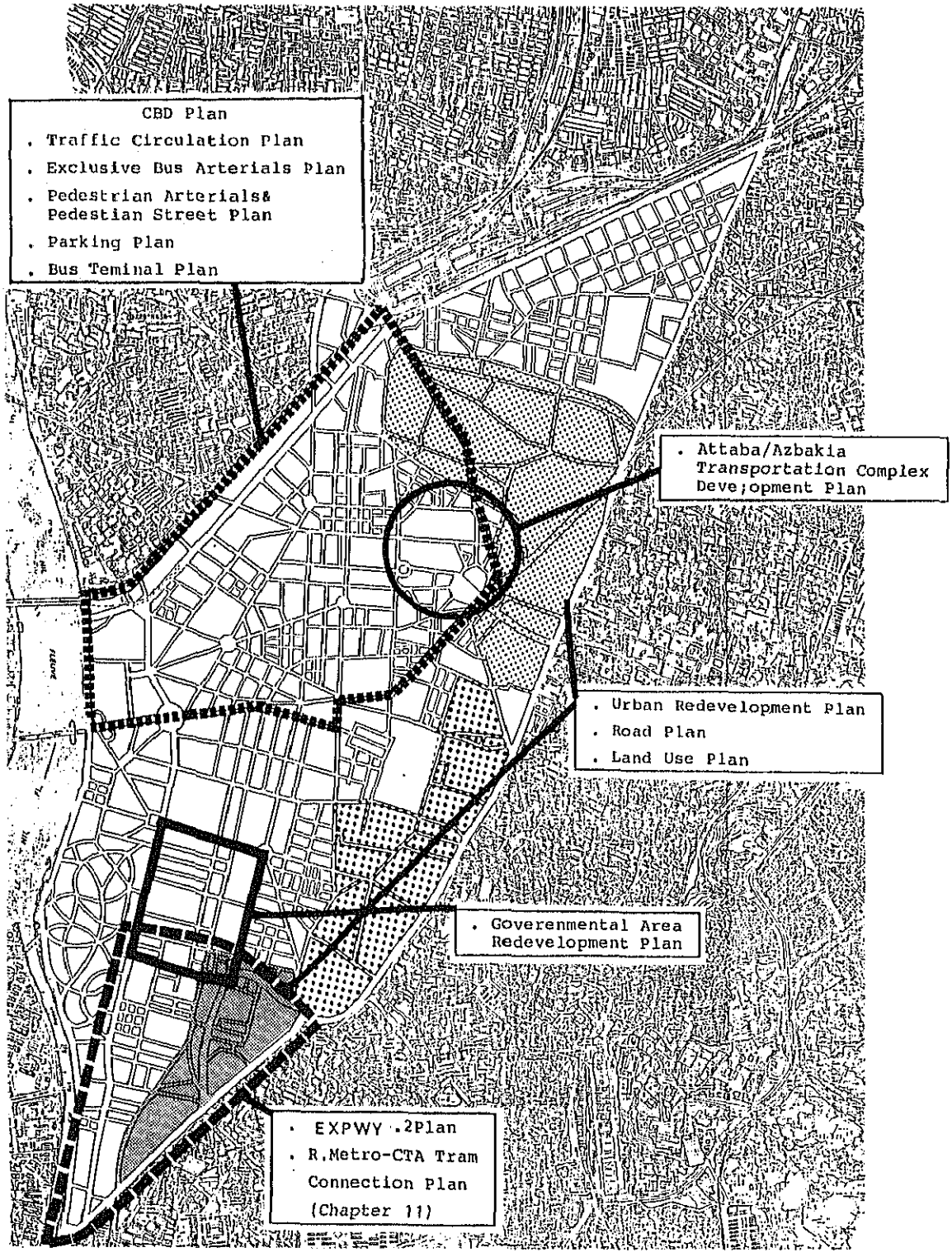


Fig. 12.1.1 Selection of Sites and Subjects for CORPS Plan

12.2 CBD Transport Plan

12.2.1 Urgent Project Proposal

1) Introduction

As previously pointed out in the analysis of the current situation (refer to Chapter 4), the problem of the existing traffic congestion is partially caused by the inadequate road capacity. The main cause, however, is the lack of well-developed traffic management facilities. Short-term countermeasure objectives are, therefore, listed as follows; and measures to improve the traffic management facilities and traffic control system are proposed below.

- To achieve a smooth flow of traffic
- To mitigate traffic congestion
- To reduce traffic accidents

An appropriate, systematic traffic management plan is essential for the safe, smooth flow of the increasing amount of motor traffic on the roads. Traffic management is particularly important to make the maximum use of the existing road facilities and to improve the current road capacities. Since a traffic management plan requires relatively low cost, except for those measures which improve facilities of a large size, and since it it is possible to carry out a trial-error method while observing the effects on the traffic flow and other factors, it is necessary to introduce improvement measures that respond to the changing requirements of different times.

With a view to achieving smooth traffic flow in important areas, the objective of the short-term plan is to mitigate traffic congestion at bottlenecks.

Thus, it is necessary to increase traffic capacity through the improvement of traffic management facilities. Measures to achieve this are listed in Fig. 12.2.1 and Table 12.2.1.

2) Inter-relationship with Current Projects

Current projects are given in Table 12.2.2. Some projects are already in progress, and the subject plan should be implemented in coordination with all these projects.

The subject plan has been developed in accordance with the following basic outline, taking into account the inter-relationship between the subject plan and the current projects (see Table 12.2.2). Fig. 12.2.2 gives the location map of current projects in CORPS.

- The countermeasures and policies of current projects are generally in agreement with each other.

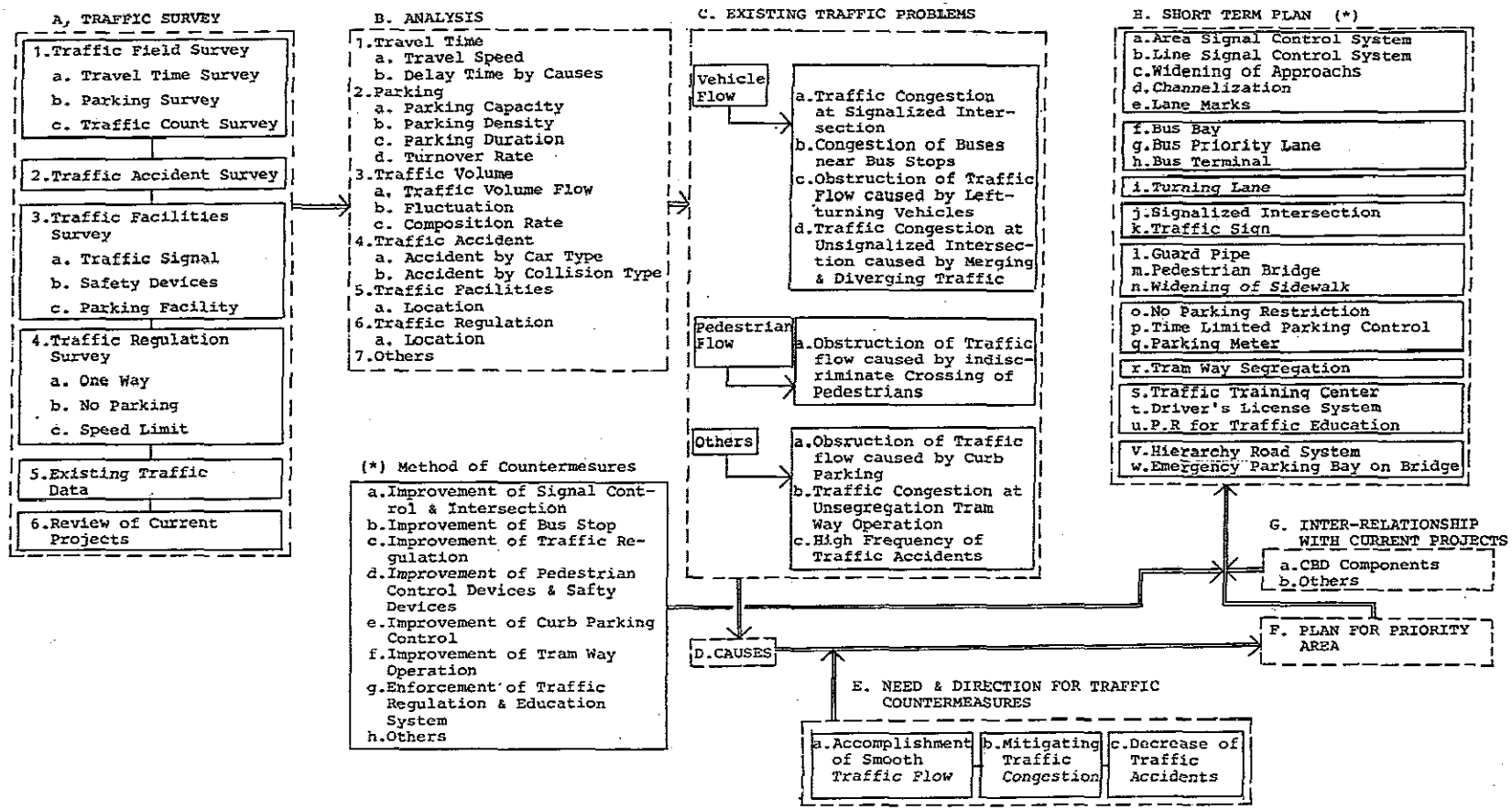


Fig. 12.2.1 Work Flow for Urban Projects Proposal

Table 12.2.1 Countermeasures for Mitigating Traffic Congestion

Problem	Countermeasure
a) Traffic congestion at signalized intersections	Improvement of signal control and intersection: - Area signal control system - Line signal control system - Channelization (widening of approaches)
b) Congestion of buses near bus stops (including priority service for public transport)	Improvement of bus stops and bus operation: - Bus bay - Bus terminal - Bus priority lane
c) Obstruction of traffic flow caused by left-turning vehicles	Improvement of intersection: - Turning lane
d) Traffic congestion at unsignalized intersections caused by merging and diverging traffic	Improvement of signal control and traffic regulation: - Signal light - Traffic sign
e) Obstruction of traffic flow caused by indiscriminate crossing of pedestrians	Improvement of curb parking control: - Guard fence - Pedestrian-only road - Pedestrian bridge - Widening of sidewalk
f) Obstruction of traffic flow caused by curb parking	Improvement of curb parking control: - No-parking restriction - Time limit control - Parking meter - Public garage building
g) Traffic congestion caused by unsegregated tramway operation	Improvement of tramway operation: - Tram priority way - Segregation of track
h) Traffic violation by drivers	Enforcement of traffic regulations and driver education: - Traffic training center - Drivers license system - Public relations

- A variety of countermeasures are involved in the current projects. Some of these have strong socioeconomic impact, while others are not fully appropriate to the situation at hand. Therefore, each countermeasure will be implemented on the basis of its relationship to the medium and long term plans.

- In view of the foregoing, plans for bus-road, bus priority lane, pedestrian-only road and tramway improvement have, in accordance with the policy of the medium and long term plans, low priority.

Table 12.2.2 Current Projects and Priority for Implementation

Existing Traffic Problems	Current Projects	Area & Location	Evaluation: Impact Positive	Evaluation: Impact Negative	Evaluation: Applicability	Priority
a) Traffic congestion at signalized intersection	Improvement of signal control intersection					
	- Area signal control system	CBD	●		●	A
	- Channelization	CBD	●		●	A
	- CBD circulation system	CBD	●		●	A
b) Bus congestion near bus stops	Improvement of bus stop & bus terminal					
	- Remodeling of bus terminal	Ramses, Attabd, Tahrir sqs.	●		●	A
	- Exclusive bus way	Ramses, Qasr Al Aini sts.		●	▲	B
	- Bus priority lane	CBD	●		●	A
	- Bus priority extension	Tahrir br., 26th July, Azhar sts.		●	▲	B
	- Bus & Pedestrian only network	Emad Al Dine, Talaat Harb, Tahrir Boustan, Abd Al Aziz, Adly sts.		●	●	B
c) Traffic flow obstruction caused by left-turning vehicles	Improvement of intersection					
	- Channelization	Ramses, Attaba, Tahrir sqs.	●		●	A
d) Traffic congestion at unsignalized intersection due to merging & diverging	Improvement of signal control & traffic regulation					
	- Area signal control system	CBD	●		●	A
	- Traffic sign standard	CBD	●		●	A
e) Traffic obstruction caused by indiscriminate crossing of pedestrians	Improvement of pedestrian control devices & safety devices					
	- CBD circulation system	CBD	●		●	A
	- Pedestrian road	Emad Al Dine, Talaat Harb, Tahrir Boustan, Abd Al Aziz, Adly sts.	●	▲	●	B
f) Traffic flow obstruction caused by curb parking	Improvement of curb parking control					
	- CBD circulation system & parking control	CBD		▲	●	A
	- Parking control unit	CBD	●		●	A
	- Multi-storey garage	CBD	●		●	A
g) Traffic congestion of unsegregated tramway operation	Improvement of tramway operation					
	- Shubra tramway	CORPS	●	▲	▲	B
	- Gueish tramway	CORPS	●	▲	▲	B
	- Port Said tramway	CORPS	●	▲	▲	B
	- Qalaa tramway	CORPS	●	▲	▲	B
h) Traffic violation of drivers	Enforcement of traffic regulation & education system					
	- Traffic regulation enforcement	--		▲	●	A

● : Strong ▲ : Weak

- As emergency measures to deal with the increased volume of traffic, the signal control plan, the intersection improvement plan (including channelization and lane marking), the bus bay plan, and the parking plan are considered to be the most effective and therefore these have the highest priority.

- Concerning countermeasures which have no immediate effects but are nevertheless important, i.e. those involving a traffic training center, driver's license system and PR for traffic education, it would be desirable to start preparations right away and implement them as soon as possible.

3) Plan Outline

The urgent projects proposal for the Study includes projects that have been proposed earlier. These projects in CORPS and its

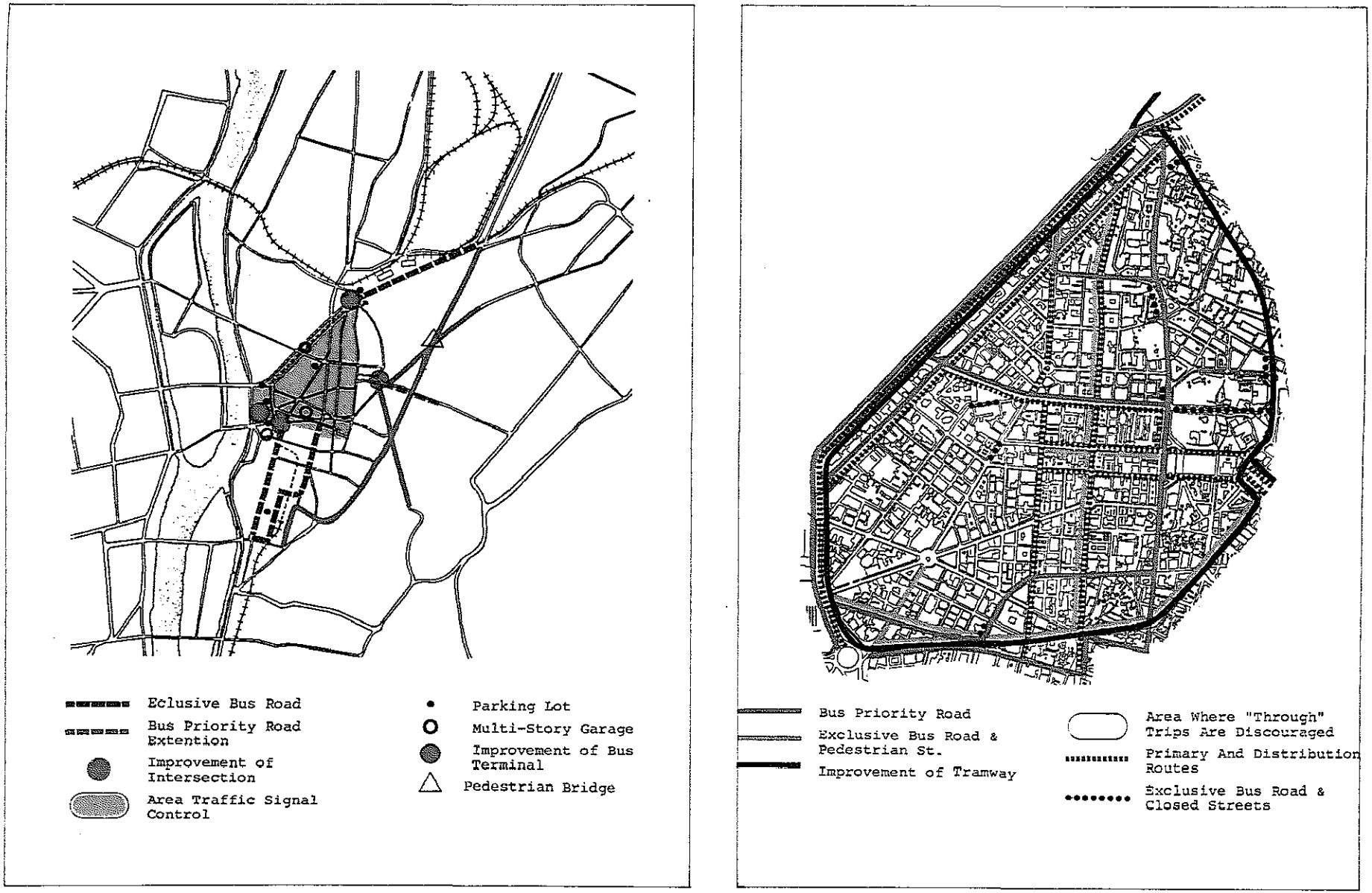


Fig. 12.2.2 Location of Current Projects

surroundings will be described. Fig. 12.2.3 gives the location map of the urgent projects proposed by the Study Team.

(1) Signal Control Plan

a. Inter-relationship with current projects

The area traffic signal control proposed for CBD is the same as that of the CBD Components, whereas the plan for coordinated traffic signal control and the plan for installation of traffic signals are newly proposed.

b. Plan Location

The signal plan will deal with both the signalized intersections, pinpointed as traffic bottlenecks through the analysis of the current situation, and the non-signalized intersections where the volume of merging and/or diverging traffic is large. In other words:

- Area traffic signal control: CBD (which is bordered by Ramses, Tahrir, Boustan and Clot Bey streets)

- Coordinated traffic signal control

Corniche st.	: Al Manial br. - Qasr Al Aini st. section
26th July st.	: Gezira st.- Gabalaya st. section (road below overpass) & Boulaq Al Gadid st. - Galaa st. section
Qasr Al Aini st.	: Tahrir sq. - Sayala br. section
Tahrir st.	: Dokki - Sudan section & Gezira - Al Nile st. section
Salah Salem st.	: Corniche st. - Abdel Aziz st.section & Youssef Abbas st. - Nabil Wadded st. section
Nile st., Giza st.	: Al Tahrir st. - Ahram st. section
Port Said st.	: Qalaa st. - Shaab st. section

- Installation of signal:

Tahrir st.	: 2 locations	Port Said st.	: 5 locations
Gueish st.	: 1 location	Galaa st.	: 2 locations
Qalaa st.	: 1 location	Shubra st.	: 1 location
Salah Salem st.	: 6 locations		

(2) Intersection Improvement Plan

a. Inter-relationship with current projects

Intersection improvement plans (including channelization and improvement of sidewalk) in CBD, and on Gueish and Ramses streets are the same as those of the CBD Components, whereas plans for areas outside CBD are newly proposed.

b. Plan Location

This plan will cover the signalized intersections at the locations which, based on the analysis of the current situation, are considered to be traffic bottlenecks.

The traffic capacity of each bottleneck will be calculated. At bottlenecks where the traffic volume is in excess of the calculated capacity, the signal phases will be improved and/or the approach will be widened. Traffic channelization will be introduced where it is deemed especially necessary and where the shape of the intersection will change due to the widening of the approach.

Based on the foregoing considerations, 21 new signals will be installed at the points listed above in the Signal Control Plan, including additional 4 on Tahrir st., 2 on Nile st., 2 on Ramses st., 1 on Shubra st., 1 on Port Said st., 1 on Gueish st. and 3 on Salah Salem st.

Based on the calculation of traffic volumes, either the improvement of signal phases or the widening of approaches will be selected. In those cases where these improvements are considered to be impracticable, then grade-separated intersections, etc. planned to be introduced in the medium and long-term plans, will be relied upon.

(3) Traffic Safety Facilities Plan

a. Inter-relationship with current projects

Pedestrian bridge plan, guard fence plan and road markings plan in CBD which are proposed in this Study are the same as those of the CBD Components, whereas those plans outside the CBD and emergency parking bay plan are newly proposed.

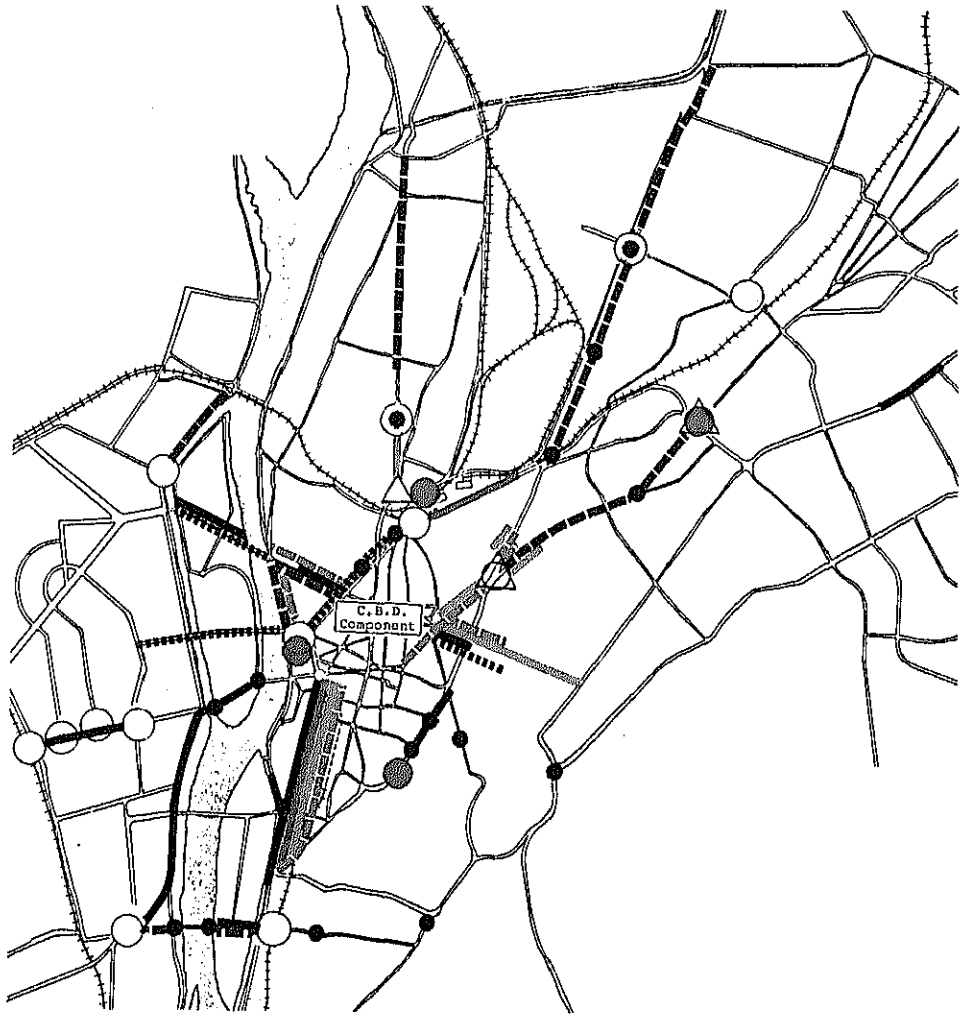
b. Plan Location

The subject of this plan will be the points where both motor and pedestrian traffic intermingle to a high degree, and where there is a need to achieve a smooth and safe flow of traffic.

c. Pedestrian Bridges

In determining the locations for the installation of pedestrian bridges, the following criteria are used:

- School and hospital locations with high pedestrian crossing and motor traffic volumes.
- Bus transfer locations with high pedestrian and motor traffic volumes.
- Commercial areas with large buildings and high pedestrian and motor traffic volumes.
- Areas with a high incidence of vehicle-pedestrian accidents.



- Line Signal Control
- Installation of Traffic Signal
- Bus Priority Lane
- Bus Way
- Bus Terminal
- Tram Time Limited Segregation
- No Parking Restriction
- Time Limited Parking Control
- Guard Pipe
- Pedstrian Bridge
- Widening of Approach Chanelization Marking Turning Lane
- Emergency Parking Bay

Fig. 12.2.3 Location Map of Urgent Projects Proposed

- Roads with more than two lanes going in one direction and without a sufficiently large median or safety zone to allow pedestrians to stand safely.

Based on the above criteria and on the results of the travel time survey, pedestrian bridges will be installed at the following three points: Abbasseya bus terminal, Shubra-Teraat Al Boulaqiya intersection, and Sayedah Zeinab sq. (pedestrian safety facilities are already being constructed in the Ramses station area in conjunction with the construction of a new subway station).

d. Guard Fences

As the indiscriminate crossing of streets by pedestrians obstructs the flow of traffic, thus causing traffic accidents, the objective of this plan is to prevent the disorderly crossing of streets by pedestrians, protect the pedestrians and maintain a smooth traffic flow by installing guard fences.

The following areas are considered to require guard fences:

- Sections near major signalized intersections of arterials
- Sections located on either side of pedestrian crossings
- Sections located on either side of pedestrian bridges
- Along the opposite side of the street facing bus stops

Based on the foregoing, guard fences will be provided on Qasr Al Aini, Al Azhar streets and, in the CBD, on Ramses, Galaa, Gomhouria, Boustan and Tahrir streets.

The length of guard fences to be installed at these points will be about 100 meters.

e. Road markings

Road markings will be provided at intersections, pedestrian crossings, center lines where there is no median and at places where there is a need to attract the attention of drivers. Roads with high incidence of traffic accidents will also be given top priority for road markings.

The plan will first be implemented on major roads in the CBD area, and will eventually be carried out on multilane arterials in the city.

f. Emergency parking bays

Stationary vehicles on elevated roads, resulting from accidents or breakdowns, can lead to traffic congestion and/or further accidents. To minimize traffic congestion and ensure a smooth flow of traffic in such situations, this plan provides for the construction of roadside emergency parking bays.

Emergency parking bays will be provided on elevated roads that do not have sufficient roadside space, in other words, the elevated sections on Ramses, 26th July, and Al Azhar streets. The standard configuration of the emergency parking bay is shown in Fig. 12.2.4.

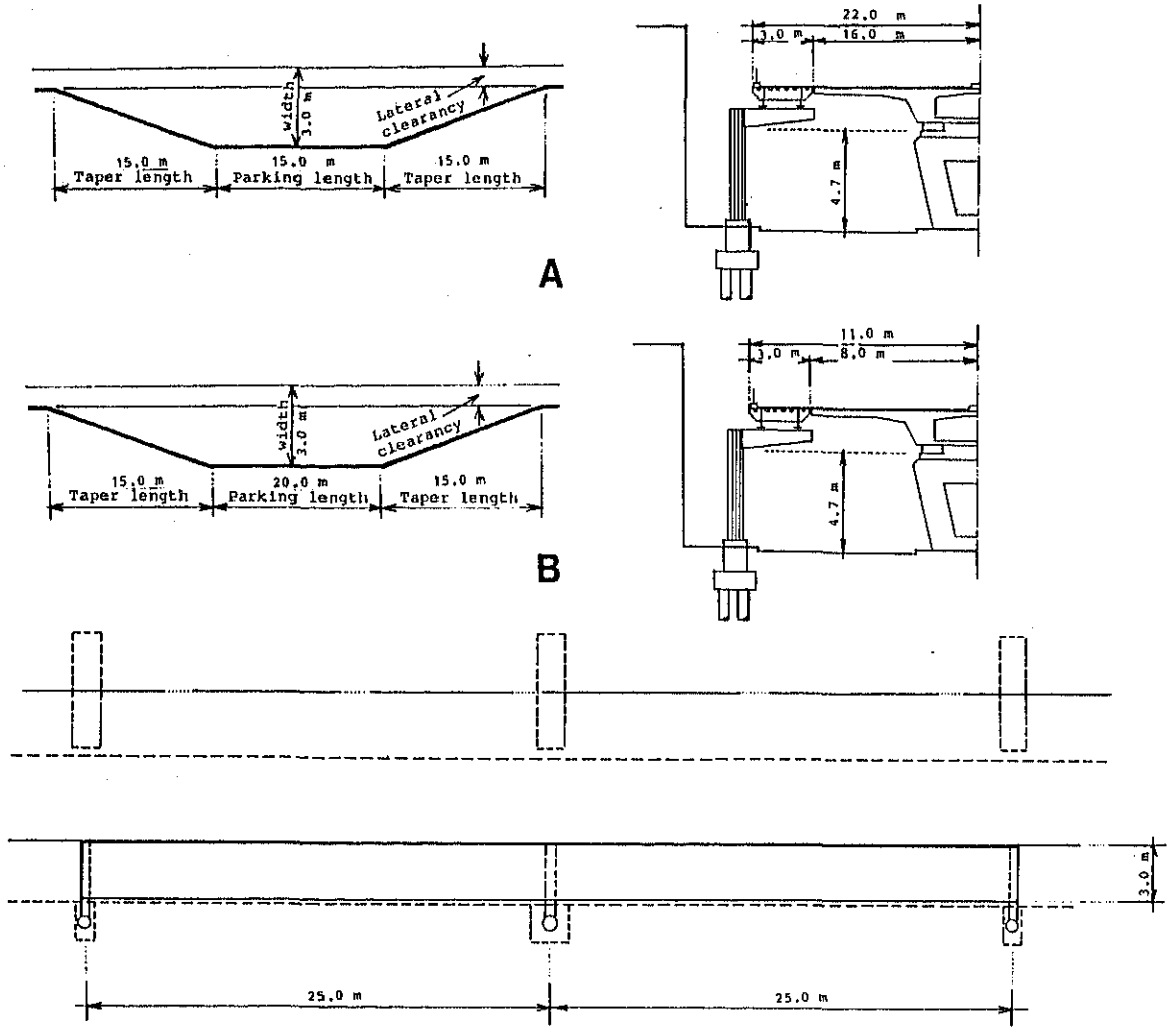


Fig. 12.2.4 Standard Structure of Emergency Parking Bay

(4) Bus Bay Plan

a. Inter-relationship with current projects

The bus bay plan is newly proposed.

b. Plan Location

The locations subject to this plan are those indicated by the travel time survey as bottleneck points caused by bus passen-

ger service. These are the two-way street section on Shubra st., the section to the north of Ghamra br. on Port Said st., the Port Said st. - Abbasseya section on Gueish st., the Corniche st. - Galaa st. section on 26th July st., the Embaba vicinity on Nile st., and the Giza br. vicinity on Salah Salem st.

12.2.2 New CBD Parking Plan

1) Basic Policy

On the main arterials in CORPS, especially in CBD, traffic congestion occurs persistently due to the concentration of the commercial and business activities, causing environmental damage and economic stagnancy as well as traffic jams and accidents. The traffic volume has been increasing year after year and on the other hand, it is almost impossible to continue to construct new roads to cope with this traffic increase.

In the long run, unrestricted car movement should be limited in CBD by means of restraint by traffic control and by promotion of modal conversion from private car use to public transportation use. However, it must be kept in mind that drastic change of policy tends to cause social problems.

The points of the recommendation are;

a. to ban parking on all arterials in CBD in order to enlarge the road capacity,
b. to control the parking duration on secondary streets in order to raise the turnover rate and absorb the parking demand excluded from the arterials,
c. to deter cars from long-term parking on the secondary streets by introducing parking charge system in addition to the parking duration control, and
d. to develop off-street parking facilities with the proceeds from the parking charge.

There are many car owners living in CBD having no off-street parking lots. Although they should arrange for parking spaces off the road in the long-term, it is necessary to provide some privileged treatment for them as long as the off-street parking capacity is not sufficient.

Fig. 12.2.5 shows the basic idea of the recommendations stated above.

2) Parking Control on Arterials

(1) Parking Restriction on Arterials

In principle, all the arterials in CBD are congested due to the on-street parked cars which should be controlled by no parking. The arterials, where parking should be restricted, were chosen according to the following procedure: Firstly, congested

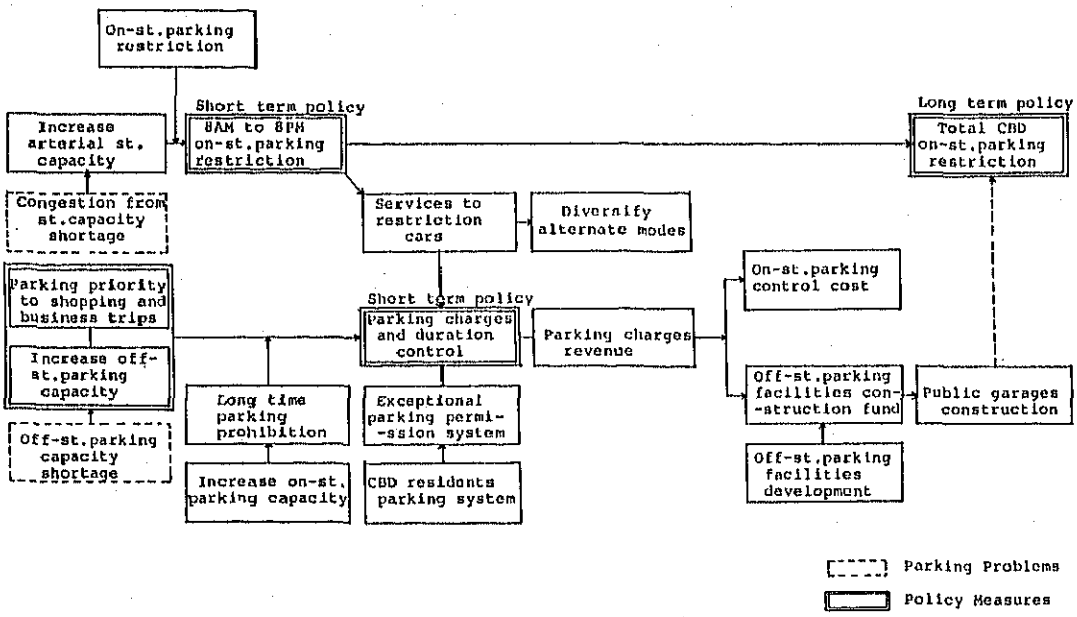


Fig. 12.2.5 Parking Problems and Policies Relationship

arterial sections with a travel speed of less than 10 km/hr were identified based on the results of the travel speed survey. Secondly, out of these, sections that had an on-street parking density of over 100% were chosen. Thirdly, the arterials which were designated as trunk roads by the CBD circulation system as recommended in the CBD Components, were also selected.

Arterials where parking is to be restricted are as follows:

A. Within CBD

a. Galaa st.
b. Ramses st.
c. Boustan st.
d. Tahrir st.
e. Abd Al Aziz st.
f. Roushdi st.
g. Talaat Harb st.
h. Sherif st.
i Orabi st.
j. Emad Al Dine st.
k. Gomhouria st.
l. 26th July st.
m. Adly st.
n. Abdel Khaleq Sarwat st.
o. Shari Abd st.

B. Within CORPS outside of CBD

p. Qasr Al Aini st.
q. Corniche st. (a part)
y. Gueish st. (a part)
s. Azhar st.
t. Port Said st. (a part)
u. 26th July st. (a part)

It is strongly recommended that on-street parking be prohibited from 8:00 AM to 8:00 PM on the arterials listed above. Almost 70 percent of the curb length of the said arterials in CBD are already controlled by no parking (Fig. 12.2.6). Traffic regulations must be strictly enforced to prohibit any illegal parking.

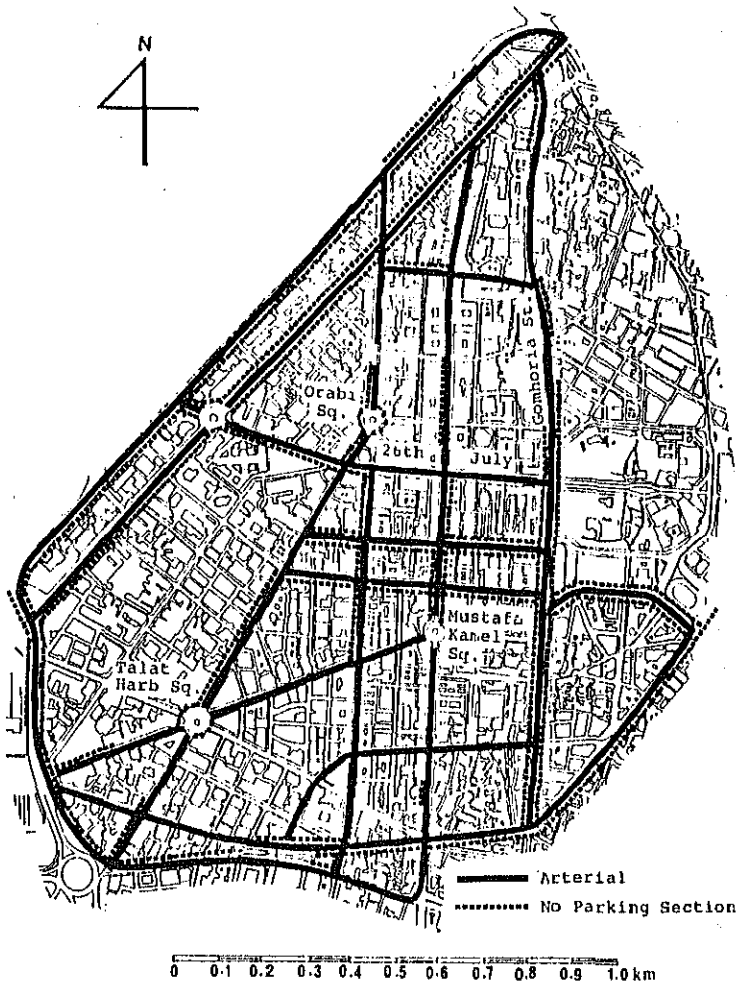


Fig. 12.2.6 Arterial Streets in CBD

Among the arterials listed for restricted parking, some sections could be exempt in sections where there was enough road capacity and a considerable parking demand such as in front of an important public building.

(2) *Impacts of the restriction*

Fig. 12.2.7 shows the maximum daily number of vehicles parking on the arterials by link. The total is 4659 vehicles. So, in order to enforce no-parking control completely from 8:00 AM to 8:00 PM, about 5000 additional parking spaces will be required. The number of vehicles affected by this enforcement is estimated at about 16000 vehicles/day, assuming the average turnover rate is 3.5 times for the no parking time period. (The average from 6:00 AM to 10:00 PM is about 4.5 times).

Those affected vehicles would have to seek their parking spaces either on nearby secondary road or off-street. (Some drivers would change their mode, giving up driving to CBD because

of the difficulty of finding vacant lots. But their number may not be so significant).

However, neither the secondary streets nor off-street parking can provide sufficient parking lots at present. Every effort should be made to increase the off-street parking capacity as well as to raise the turnover rate of parking vehicles on secondary streets.

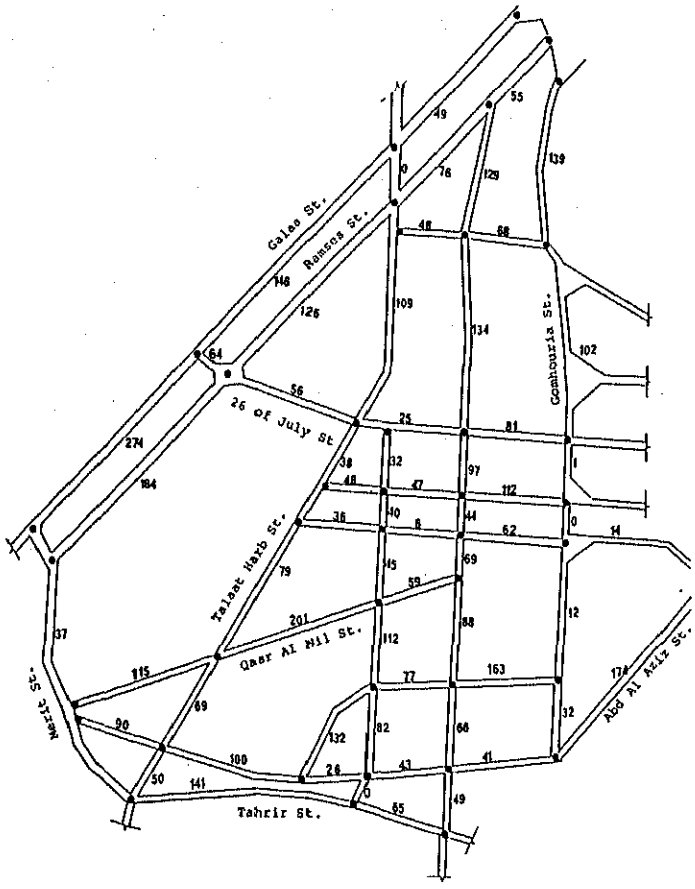


Fig. 12.2.7 Peak Number of Vehicles Parked on Arterial Links in CBD

3) Parking Control on Secondary Streets

For the secondary streets in CBD, two kinds of control measures may be recommendable; one is parking duration control and the other is to charge every parking vehicles. These two ought to be applied at the same time within one system.

Under the recommended system every vehicle parked on a designated street must pay a certain amount of parking charge and cannot park continuously longer than three hours at one time, even by paying more.

Main purposes of this control are:

a. to raise the turnover rate in order to increase the parking capacity in CBD as a whole;
b. to exclude long-stay vehicles, for example, vehicles that park throughout the working time, in order to provide more opportunities to vehicles to park with shopping or business purpose,
c. to promote the conversion from private mode to public mode and;
d. to raise funds to develop off-street parking facilities.

(1) Streets to be controlled

This control should be applied, as a rule, to all the secondary streets wider than five meters located within CBD and within 350 meters from its boundary (350 meters is considered as the maximum tolerable walking distance).

Fig. 12.2.8 shows the current no parking sections of the secondary street in CBD. Most of the designated sections are narrow streets where it is difficult to pass when a car is parked and of short sight distance. However, illegally parked cars are very often observed on such streets.

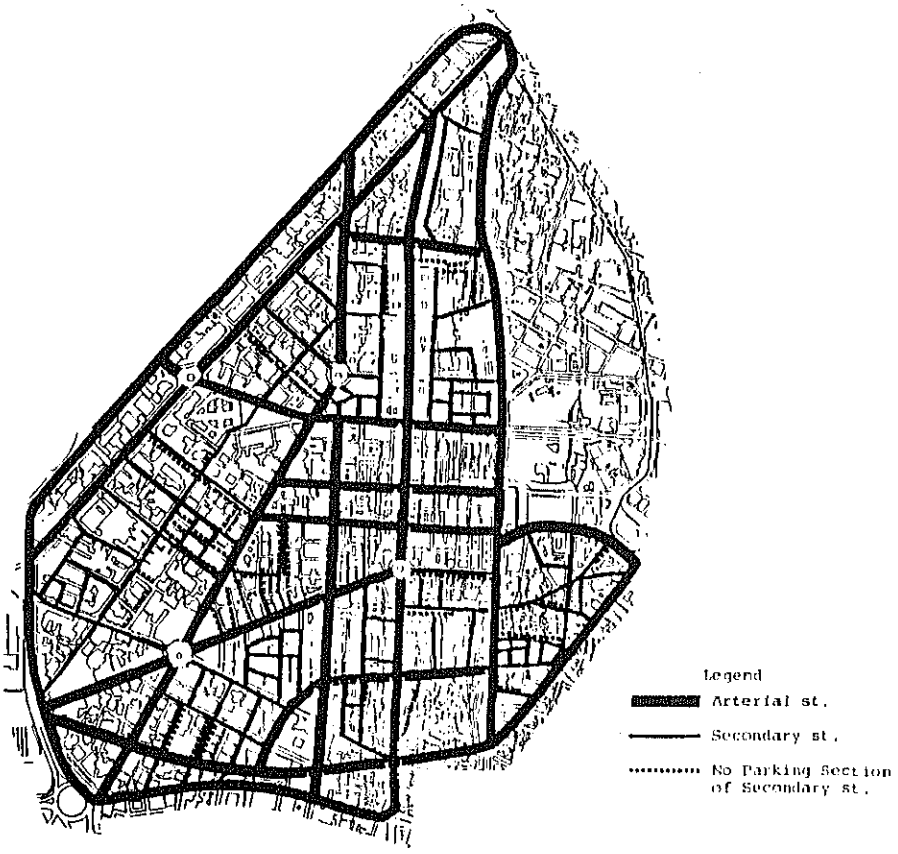


Fig. 12.2.8 Parking Restriction on Secondary Streets, as of Nov., 1987

(2) Control Method

Installation of parking meters is the most common way to enforce parking time control. However, it requires a considerable amount of initial cost and maintenance cost compared to the parking charge collected. In Cairo CBD parking meters were installed once along some arterial links, however, all of them have since broken down due to poor maintenance.

A park disk is used in a blue zone in European countries where only parking duration is controlled without charging.

It is suggested here to adopt parking ticket system which is an economical way without using any machine or instrument. The outline of the parking ticket system is as follows (Fig. 12.2.9):

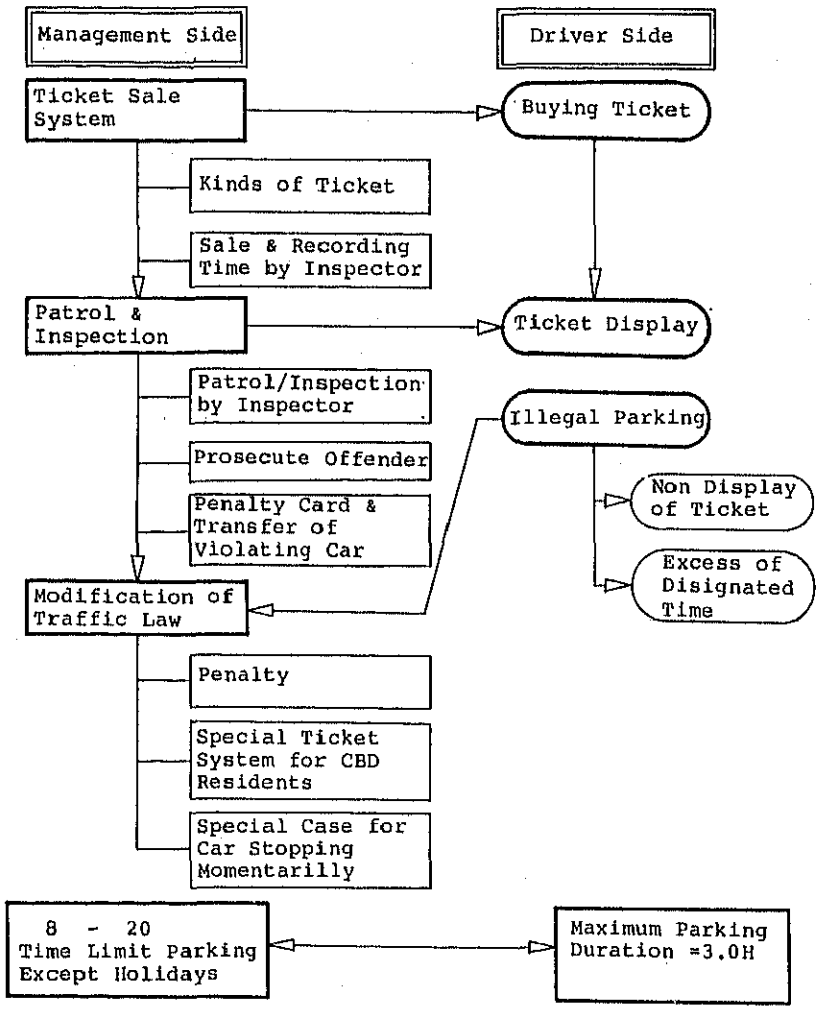


Fig. 12.2.9 Outline of Parking Ticket System

A driver needs to buy a ticket from an inspector. When parking on the designated street he has to put it on the dashboard where it can be seen from the outside.

An inspector shall be responsible for sale of tickets, and for patrolling to check for violators. When a violating car is discovered and the driver is not found, the inspector shall stick a traffic violation ticket on the car to inform the driver of his offense.

a. Parking Ticket

There are three kinds of tickets; one hour, two hour and three hour tickets. An example of a parking ticket is shown in Fig. 12.2.10. A driver should buy a ticket from an inspector directly on the street. An inspector shall record the date and parking duration and sign the ticket.

b. Parking Charge

If the parking charge is made too heavy a burden upon drivers, public opinion will be against the new system and a serious social problem may result. On the other hand, if the rate of parking charge is set at a very low level, the aforementioned purposes of the control system can not be attained.

The current rate of the public parking charge in CBD is 25 piasters per hour. Considering that car owners generally belong to the middle or higher class, this rate would be too low to avoid long time parking.

The fare by metered taxi may provide a hint for setting the rate of parking charge. It is worth considering what rate level would help someone decide whether to take a taxi to CBD or to drive his car then pay the parking charge. Using this, the rate can be set in the range of 0.5 to 1.0 LE per hour. A questionnaire survey will also be needed to estimate the amount to be charged.

c. Patrol and Inspection

An inspector, who is a policeman or a person assigned by the traffic police, shall patrol once every hour to check if there are violators. An inspector's sphere of activities will be between a 100 m section to 200 m section, on a daily two shift basis. The duties of an inspector are listed below:

- Ticket sale
- Patrol and inspection
- Enforcement of parking violation regulations
- Notice of penalty card
- Transfer of violating car by wrecking car

(Frontside)

No.

1 HOUR PARKING TICKET

Date

Inspector Sign.

HOUR

- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20

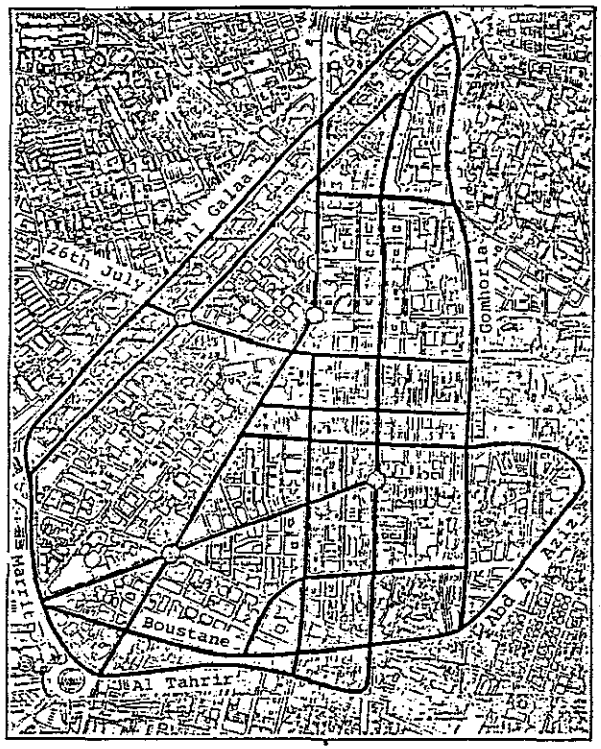
MINUTES

0 10 30 45

1. Place Ticket on dashboard visible to Governorate Inspector.
2. Use Ticket only once. Do not use Ticket Perviously Used.
3. Use 1 or 2 hour Ticket according to intended parking duration. Any number of tickets, sum of which equals intended parking duration, *may be used as long as* Ticket marking is correct.
4. Ticket must be used, even if somebody is waiting in parked car, or there is car problem.
5. Minimum parking duration is one hour. Parking duration less than one hour, use one hour.

Cairo Governorate

(Backside)



Streets where this Parking Ticket must be used when Parking :

Within area surrounded by
Galaa, Gomhouria, Azhar, Abd Al Aziz, Boustan,
Tahrir and Marriet Streets

Fig. 12.2.10 Sample Design of Parking Ticket

d. Regulation of Parking Violation

A driver violating the parking system will be punished in accordance with traffic bylaw regulations. After the inspector informs the driver of his offense, a series of procedures will be taken according to the traffic police office. There are two kinds of parking violation penalties; one is the payment of excess charge in the case of the parking time violation being less than 1.0 hour and the other is the transfer of violating car by wrecking car when time exceeds 1.0 hour. The process of parking violation regulation is shown in Fig. 12.2.11.

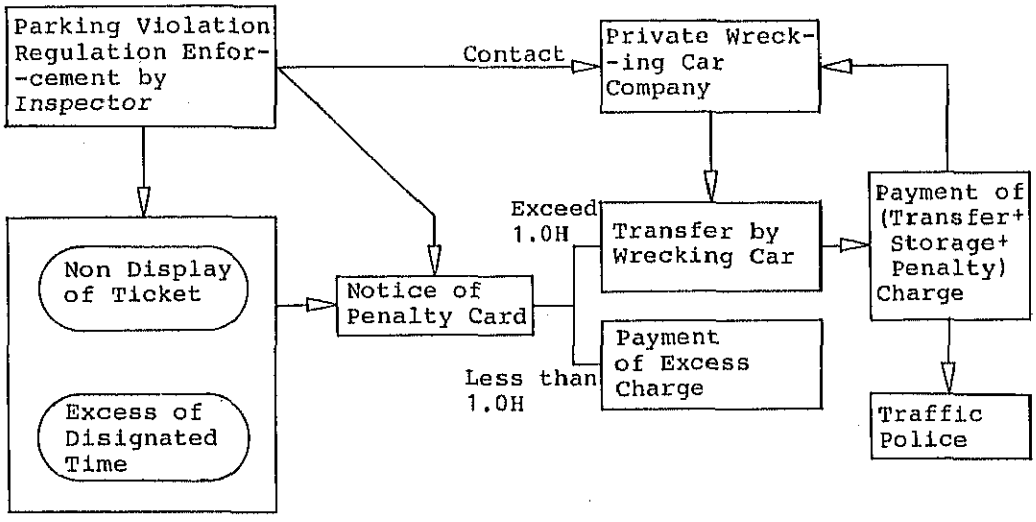


Fig. 12.2.11 Regulation of Parking Violation

e. Special Free Parking Ticket

Special free parking ticket should be issued to a resident living within the control area who parks his own car on the street in front of his dwelling.

f. Implemental Organization

It is necessary that the activities of planning and design of parking system should be studied in relation to the traffic countermeasures and their influence on business activities and drivers. It is desirable that the TMU be in charge of such planning matters, because it is responsible for the overall traffic management planning and policies. The operation of the parking ticket system will not be the TMU's responsibility due to its small staff and its nature as a planning body. Consequently, two ideas can be considered: a new organization responsible for operation will be formed, or the MPS shall be responsible for operation. The later idea will provide the advantage of making appropriate use of an existing organization such as MPS. The share of management activities is shown below (Fig. 12.2.12):

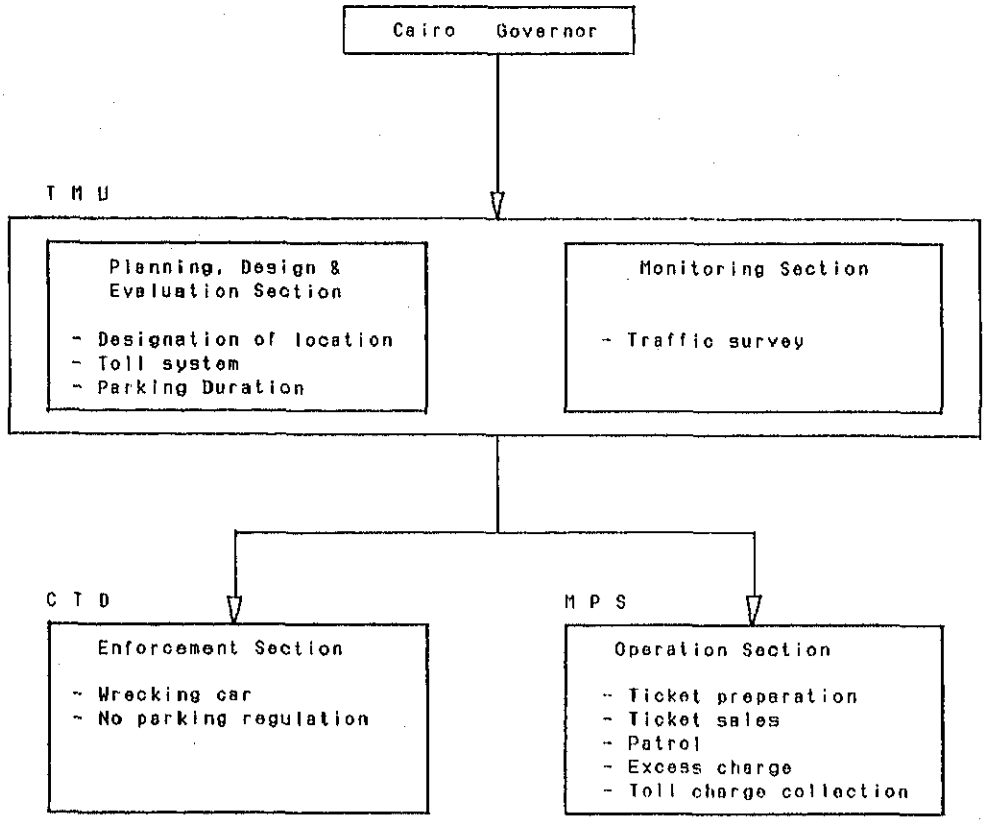


Fig. 12.2.12 Implementation Organization Proposed

- Final Decision -- Cairo Governor
- Planning, Design and Evaluation -- Traffic Management Unit
- Operation -- Management Parking System
- Enforcement -- Cairo Traffic Police

g. Preparation for Implementation

It is also recommended that at the start this new system be introduced in the most important areas as a pilot project, and its impact should be carefully monitored. As people become gradually accustomed to the new system it should be expanded to other areas, and any modifications necessary to make it more suitable to the Egyptian way of life should be implemented.

(3) Impact and Effect

Fig. 12.2.13 shows the parking capacity and the number of cars parked on the secondary streets in CBD; its hourly variation is shown in Table 12.2.3. The total capacity is 4791 lots, of which 1638 are now under no parking control, and 3153 lots are legal parking spaces. In comparison, 6414 cars were counted at peak time (11:00 AM - 1:00 PM).

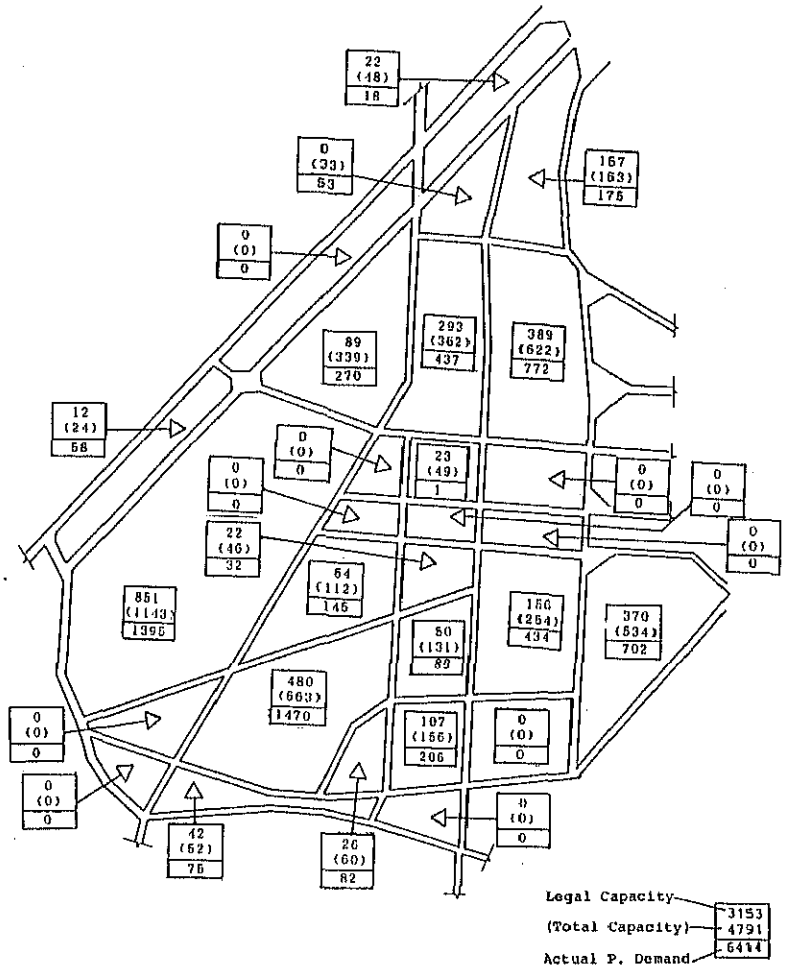


Fig. 12.2.13 Parking Capacity and Demand on Secondary Streets in CBD

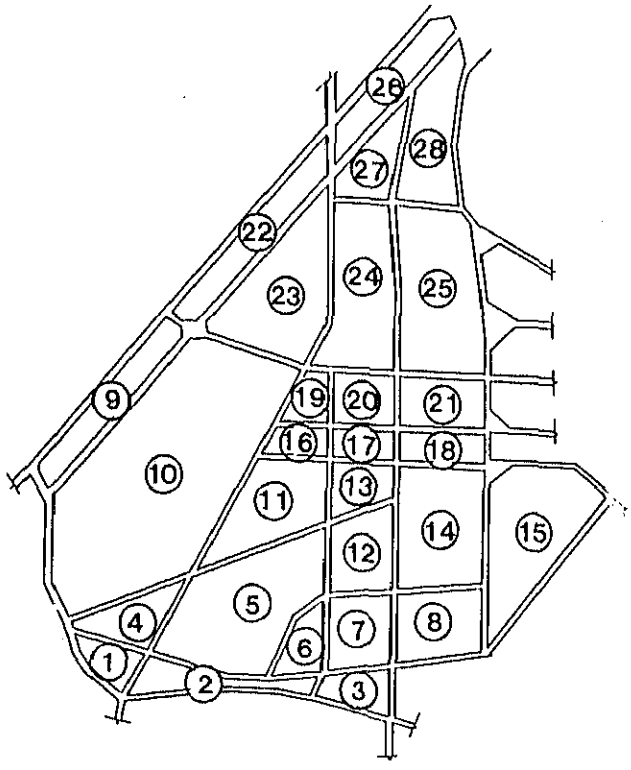
As shown in the previous section, the average turnover rate is 4.1 in the CORPS area. It is not foreseeable at this stage, to what extent the rate will be raised by the new control system. However, the following facts suggest that the control system would bring about a considerably higher turnover rate than now.

In CBD, long-stay cars parking for three hours or longer account for about 40% of the total. By prohibiting parking longer than three hours, the drivers of these long-stay cars would either shorten their parking time or change their mode. Accordingly the average parking time will shorten and the turnover rate will become higher.

Parking by the residents in CBD will not be affected by the new system. Referring to the parking density in the early morning, the number of cars parked by the residents is estimated at 20 to 30% of the total capacity. However, it is expected that most of the residents travel by their cars elsewhere during the daytime.

Table 12.2.3 Number of Cars Parking in CBD

Block No.	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	43	52	66	68	78	79	75	91	75	64	68	52	61	68	61	59
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	510	636	1234	1354	1419	1432	1470	1482	1072	1176	652	644	718	787	742	729
6	13	23	33	55	69	76	82	88	74	49	40	59	61	66	74	36
7	99	95	161	182	184	192	206	219	183	162	167	161	178	204	237	123
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	18	17	16	20	22	24	58	61	20	10	9	11	11	11	0	10
10	676	734	923	1247	1188	1314	1395	1348	1550	1097	961	933	1015	1063	910	873
11	33	51	114	144	145	151	145	141	115	103	97	102	107	115	80	74
12	11	23	87	122	123	126	89	129	109	90	48	32	54	80	68	37
13	13	31	39	38	49	37	32	46	50	46	37	40	36	42	29	27
14	126	167	393	450	414	424	434	414	456	372	239	226	241	262	270	225
15	348	306	446	589	672	685	702	661	623	538	489	499	545	557	454	458
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	2	2	2	1	1	1	1	1	2	11	11	11	8	6	4	6
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	72	93	154	220	211	229	270	270	268	213	189	206	193	194	148	151
24	195	212	297	399	443	437	437	437	381	312	247	258	297	318	266	249
25	160	225	603	752	788	834	772	760	701	567	364	310	357	360	351	267
26	10	14	16	16	15	16	18	15	15	14	12	15	14	13	9	9
27	4	7	25	48	56	57	53	48	39	29	26	29	23	23	20	13
28	114	120	149	154	166	174	175	181	168	169	171	152	174	146	136	93
Total	2447	2808	4758	5859	6043	6288	6414	6392	5901	5022	3827	3740	4093	4315	3859	3439



It is also expected that the parking duration of cars which at present park for a duration of three hours or less will tend to become shorter. Parking purposes of such cars are mostly considered to be for business or shopping. According to a parking time survey in Japan, the average parking time in case of on-street metered lots is 20 to 30 minutes.

In the central commercial area of Asuncion City, the capital of Paraguay, where the parking ticket system was adopted, the average turnover rate is as high as 6.0 to 8.0 times per day.

Assuming that the turnover rate be increased by 2.0 times from about 4.1 to 6.1 times per day, the parking capacity of the CBD secondary streets would consequently be increased by about 6300 parking opportunities. In addition, if the present parking density continues at the same 200% (6414/3153), the possible opportunity increase will reach 12600 (6300x2.4) parking times.

This increase is almost enough to absorb all the cars excluded from parking on the arterial streets by the no parking control from 8:00 AM to 8:00 PM. However, efforts should be continued to increase the off-street parking capacity as the present parking density is already intolerably high.

The revenue from the parking charges should be basically used for the development of off-street parking facilities. To make a rough estimation of this revenue, the following is assumed;

a.	Total parking capacity on the secondary streets	3000	cars
b.	Average parking density	1.5	times
c.	Control time period	12	hours
d.	Rate of charge per-hour	0.5	LE
e.	Days per month (excl. fridays)	25	days

Then, the total annual revenue will be:

3000 x 1.5 x 12 x 0.5 x 25 x 12 = 8.1 million LE

Even with some part of the amount used for operating costs of the control system, there would still be enough left to construct one multi-story garage with 1000 parking spaces every year.

4) Development of Off-Street Parking Facilities

(1) Urgent demand for off-street parking capacity

As described before, there is an urgent need to increase the off-street parking capacity in order to restrict on-street parking and to improve traffic problems in CBD. Without a doubt, the parking problem is and will continue to be one of the most essential subjects to be solved.

The distribution of currently existing off-street parking lots in CORPS is shown in Chapter 4, Fig. 4.3.3.

In order to make all the arterials in CBD no parking streets and at the same time avoid serious results, some 5000 additional parking lots will be required. If the turnover rate of the secondary streets is increased by 2.0 times by introducing the parking charge system and parking duration control, most of the excluded cars can be absorbed in the secondary street network, assuming the same parking density as present.

However, the present parking density on the secondary street is already extremely high exceeding 240% of the capacity in the peak hours. To lower this high density to a bearable level, for example, 150% of the capacity, about 1900 off-street parking lots must be additionally developed; (315 x (2.4 - 1.5) / 1.5).

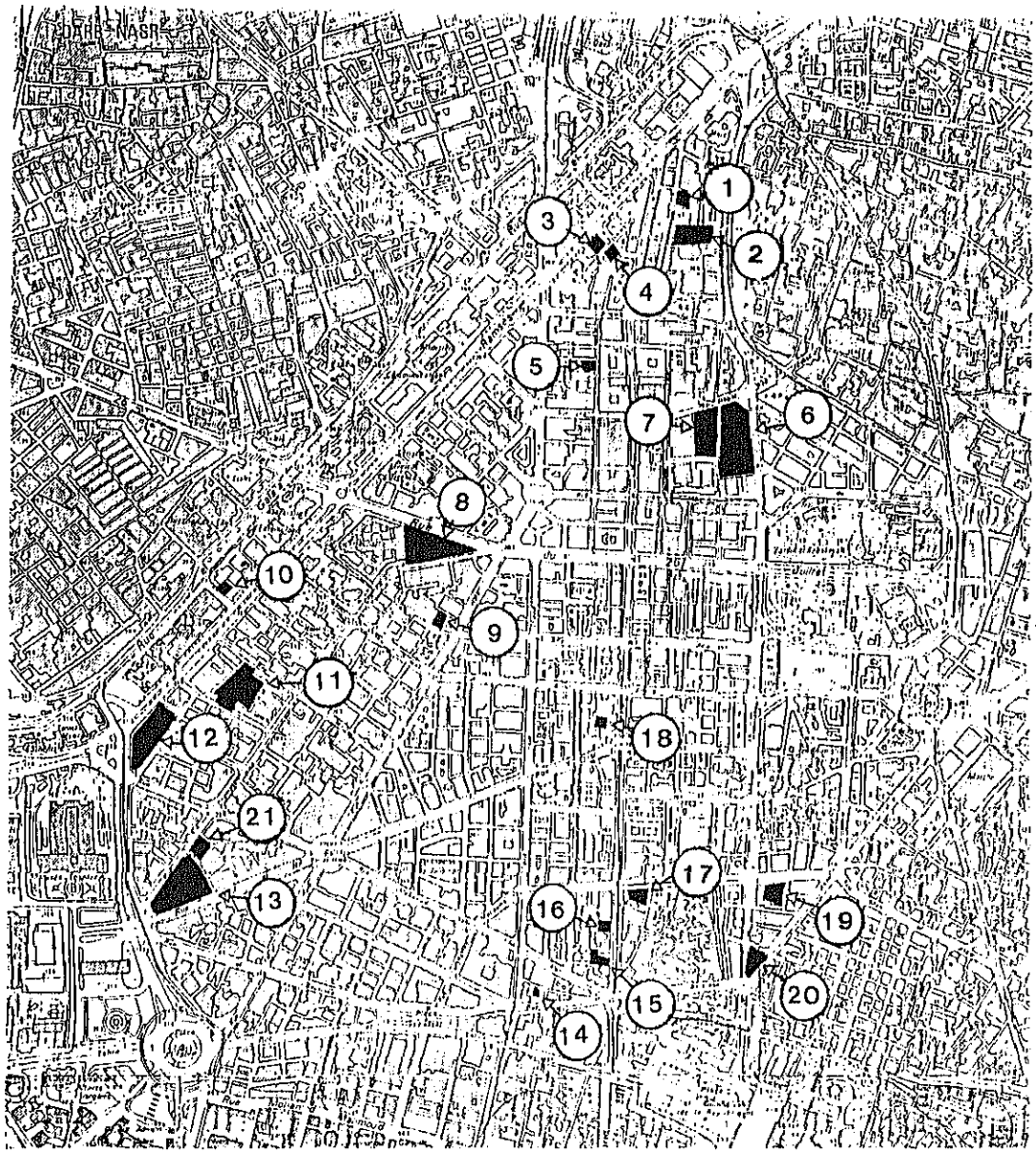
(2) Measures to Increase Off-Street Parking Capacity

While on-street parking control ought to be more strictly enforced, every effort should be taken to increase off-street parking. The following measures are suggested;

a. To strictly enforce Cairo Governor's decree No. 47/86.
The decree promulgated in 1986 obliges every new building owner to provide parking spaces wider than the area specified by the usage of the building. If the decree is strictly enforced, the off-street parking capacity will gradually increase with the renewal and development of CBD.

b. To develop more public garages.
Recently the Cairo Governorate has developed several multi-story garages in CBD. This type of facility should be increased to as many as possible. If the recommended parking charge system is introduced and the proceeds are allotted for public garage construction, the increase of the off-street parking capacity could be accelerated.

c. To encourage the private sector to use vacant lots for parking.
Fig. 12.2.14 shows the distribution of currently vacant lots in CBD. The total area is about 4.5 hectares which occupies 26% of total vacant lots area in CORPS. However most of the wider lots are already used as parking. The management of parking for public use is not a profitable business while the urban space in CBD has a high opportunity value, so it may be difficult to expect privately operated off-street parking to increase without taking any policy measures. In this sense, it is worthwhile to study such measures as tax exemption and subsidy system for parking business operated by the private sector.



1	Private Parking	11	Used for Parking
2	Some Shacks and Tents	12	Used for Parking
3	Private Parking	13	Not Used
4	Destroyed Building Remains	14	Not Used
5	Destroyed Building Remains	15	Not Used
6	Car Parking	16	Not Used
7	Garage Under Construction Up to 7th Floor	17	Not Used
8	Parking Area in Front of The Supreme Court	18	Private Car Parking
9	Private Car Parking	19	Private Car Parking
10	Not Used	20	Public Garden
		21	Not Used

Fig. 12.2.14 Vacant Plots in CBD as of January, 1988

12.2.3 Long-Term CBD Traffic Circulation Plan

The objective of the Traffic Circulation Plan for future traffic in CBD is to vitalize CBD by allowing it to function more effectively, promoting an attractive urban environment, and ensuring the smooth flow of traffic. This is the CBD Traffic Circulation Plan for the year 2000. It shall succeed the implementation of the CBD Circulation Plan, which is the implementation of the short term plan presented in the Second Urban Development Project - CBD Components (1985). The strategy of the plan calls for the control of the traffic flow in CBD by very strong traffic regulations, and the plan shall be implemented in such a way that the citizens gradually become accustomed to such regulations. The plan is based on the assumption that the eastern part of the tramway loop in CBD shall be abolished with the construction of the CBD urban metro, and the plan's effectiveness will be enhanced should the urban redevelopment plan in the area east of CBD be carried out. The basic policy entailed in the plan is described below.

1) Basic Policy

(1) Future Land Use

The CBD is a densely built-up area that functions as a center of commercial and business activities. All major roads in the area are chronically congested due to the high concentration of commercial and business traffic. The congestion is causing numerous problems, including the deterioration of the overall environment and commercial and business activities. The parking situation is particularly serious, and it is feared that any further worsening of the situation shall impede the area's proper functioning as a CBD and destroy its importance as a commercial center as well.

Meanwhile, the nighttime population of CBD is expected to decline year by year, causing space used for residential purposes to be gradually transferred to various other purposes. Thus, the business and commercial use of land in CBD will become more widespread and dense. The CBD will also expand spatially. In the process, it should become necessary to implement urban renewal projects in those areas where buildings have become old and space is not being used efficiently. It is also possible that the relocation of government buildings concentrated to the south of the CBD will be seriously considered.

The first objective of a traffic plan for CBD must be to maintain and support the commercial and business activities of the district at a healthy level. Therefore, in addition to ensuring the smooth flow of motor vehicle traffic, the plan must consider how to create an attractive urban environment that is amenable to pedestrians as well as to motorists.

(2) Future Trip Generation/Attraction

The volume of trip generation/attraction given in Chapter 8 (Transport Demand Forecast) is applied to the plan. Owing to the density of buildings in CBD, it will be difficult to meet the demands of an ever increasing volume of traffic with unlimited investment in new road construction. The time has come to start regulating the inflow of motor vehicle traffic by various traffic restrictions and the increased use of mass transit facilities. Taking this factor into account, the volume of trip generation/attraction is limited to the parking capacity of the area--about 180,000 vehicles per day in CORPS and about 100,000 vehicles per day in future CBD.

(3) Future Traffic System

The traffic system that takes into account the following issues, policies and measures is envisioned for CBD in the future. The traffic facility plan discussed below is based on this future traffic system.

(A) Issues

a. The increase in motor vehicle traffic will be dealt with by making appropriate use of existing traffic facilities in CBD.
b. Traffic that does not originate or end within CBD will be restricted to certain arterials.
c. The pedestrian environment will be improved in order to help ensure safety and enhance the commercial functions of the area.

(B) Policies

a. Public transportation facilities will be improved in order to induce travelers to shift from motor vehicles to public transportation.
b. Roads will be given separate functions, and through traffic will be segregated in order to improve the flow of traffic originating or ending in CBD.
c. Pedestrian space will be provided in order to improve the overall traffic environment in the urban area.

(C) Measures

a. The functions of public transportation facilities will be clarified, and the process of transportation will be improved by introducing exclusive bus way.
b. The area will be divided into several zones bordered by the circular road, and roads providing access to the circumferential road will be clearly distinguished.
c. Construction of parking facilities will be promoted in order to obtain the CBD parking capacity.
d. Pedestrian streets will be distributed within the overall traffic system.

2) Traffic Facility Plan

(1) Road Network Plan

In principle, the Road Network Plan relies on existing roads. However, the section of Champolion st. that comes in contact with 26th July st. and the southern section of Port Said st. will be improved. The road network subject to this plan is shown in Fig. 12.2.15, and the functions and classification of roads in CBD, on which the traffic circulation system is based, are listed in Table 12.2.4.

Table 12.2.4 Road Function and Regulation

Type	Function	Regulation
Arterial	- Arterial function for external and through traffic	Both ways
Semi-Arterial	- Connection with arterials and collectors	One way
Collector	- Access service for offices, shops and residences - Forming blocks	One way
Exclusive Bus Arterial (Including Pedestrian Arterial)	- High service for CBD bus transport - Pedestrian safety - Barrier for eliminating through traffic - Open space for pedestrians and street furniture (community space)	Both ways Buses & Pedestrians
Pedestrian Street	- Pedestrian service on collectors - Barrier for eliminating through traffic - Open space for pedestrians and street furniture (community space)	Pedestrians only

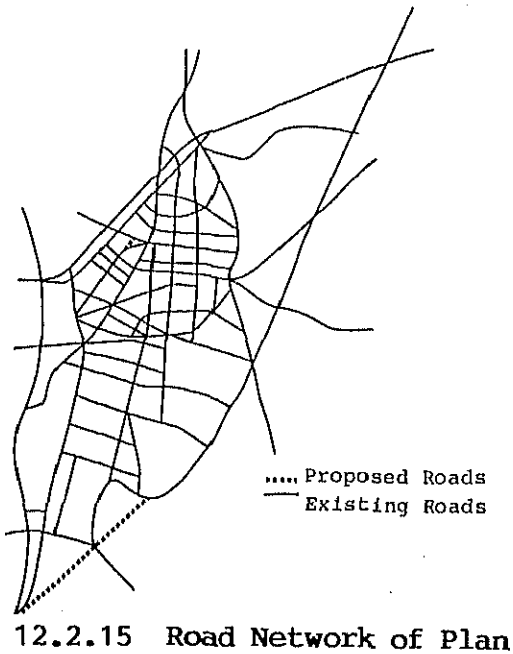


Fig. 12.2.15 Road Network of Plan

a. Arterials

Ramses, Galaa, Port Said, Qasr Al Aini, and Corniche streets which form the circumferential roads of CORPS are arterials. In addition, the arterials of Tahrir, Boustan, Gueish, Orabi, Sherif, Nobar, and Emad Al Dine, which are linked to the CORPS arterials, constitute the circumferential roads of CBD. Fig. 12.2.16 shows this arterial network.

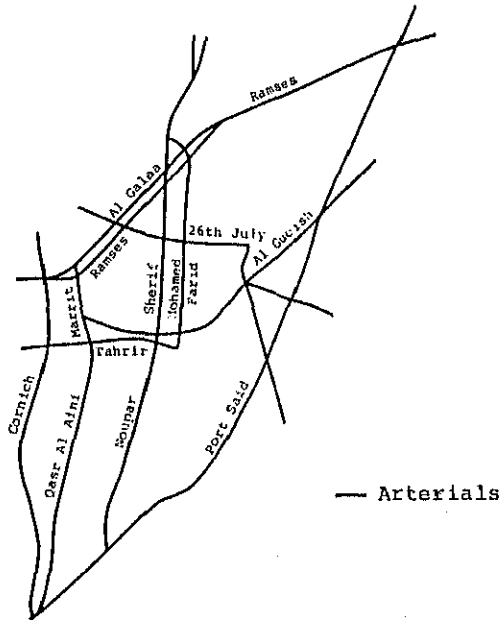


Fig. 12.2.16 Arterial Road Network

These arterial roads must have enough capacity to allow a concentrated volume of traffic to flow in and out of the zones bordered by the circular road. The traffic capacities of CORPS circumferential roads will be expanded as discussed in Chapter 10. The CBD circumferential roads will rely on traffic management measures such as parking restrictions, and turning control, owing to the difficulty of improving existing roads. The arterials in CBD will be extended by 11.3 km.

b. Exclusive Bus Arterials

The exclusive bus arterial will provide public transportation service within CBD while also acting as a barrier to through traffic. It will also serve as a pedestrian arterial, achieved by improving the sidewalks along the bus arterial.

The route of the bus arterial should be established so that it passes through as many of the following areas as possible: commercial or business centers with large pedestrian traffic, major inter-modal points, public transportation service area, roads that can serve as barriers to through traffic, etc.

As explained in Chapter 4 (Fig. 4.2.2), the flow of pedestrian traffic in CBD is heavy at present. Large pedestrian traffic in the CBD, at present is as follows:

- Qasr Al Nile st. : 6,800 person/h
- Sherif st. : 5,600 person/h
- Talaat Harb st. : 3,700 person/h
- 26th July st. : 3,800 person/h
- Emad Al Dine st. : 3,400 person/h

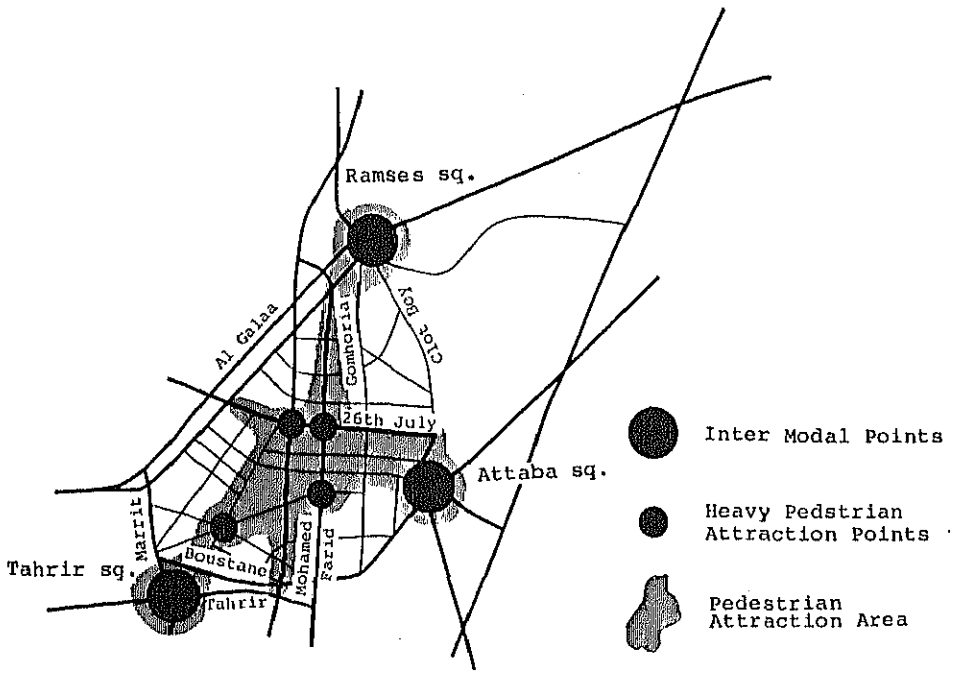


Fig. 12.2.17 Main Inter-Modal Points

The function of Ramses, Attaba, and Tahrir squares as major inter-modal points will be enhanced in the future, when mass transit facilities such as subway stations, major bus terminals, and tramway depots are established. Thus, these areas are important public transport centers for the CBD. Fig. 12.2.17 shows the locations of these major inter-modal points.

Taking walking distance into consideration, the bus service area is established as 200-250 m on one side. Through traffic in CBD on average accounts for 14% of traffic during the morning peak hours. The ratio is particularly high on Abdel Khaleq Sarwat st. (24%), Boustan st. (19%), Mahmoud Bassiuoni st. (19%), and Qasr Al Nile st. (15%). Most through traffic travels from east to west (from Attaba sq. towards Tahrir sq., and Marriet st.), so that a bus arterial along the north-south axis would be effective as a barrier to through traffic. Fig. 4.2.1 (Chapter 4), shows the flow of through traffic in CBD.

Based on the foregoing, three alternative routes were determined for the exclusive bus arterial, as shown in Fig. 12.2.18. The 26th July, Tahrir, and Boustan streets were excluded from the routes since they are important east-west access roads and part of the circumferential road as well. Under Alternative 1, Emad Al Dine, Qasr Al Nile, and Talaat Harb streets divide CBD into two sections, east and west. Alternative 2 is the same as Alternative 1 except that a route has been added to provide a link with Attaba sq.; the CBD is thus divided into three sections. Under Alternative 3, the Sherif-Nobar route has been added to Alternative 2 and, in consideration of zone size and intra-CBD accessibility, the Talaat Harb st. section has been omitted. The Sherif-Nobar route allows the bus arterial to service Sayedah Zeinab sq. The exclusive bus arterial, together with CBD circumferential roads and 26th July st., divides CBD into four zones under Alternative 1 and 2, and into five zones under Alternative 3.

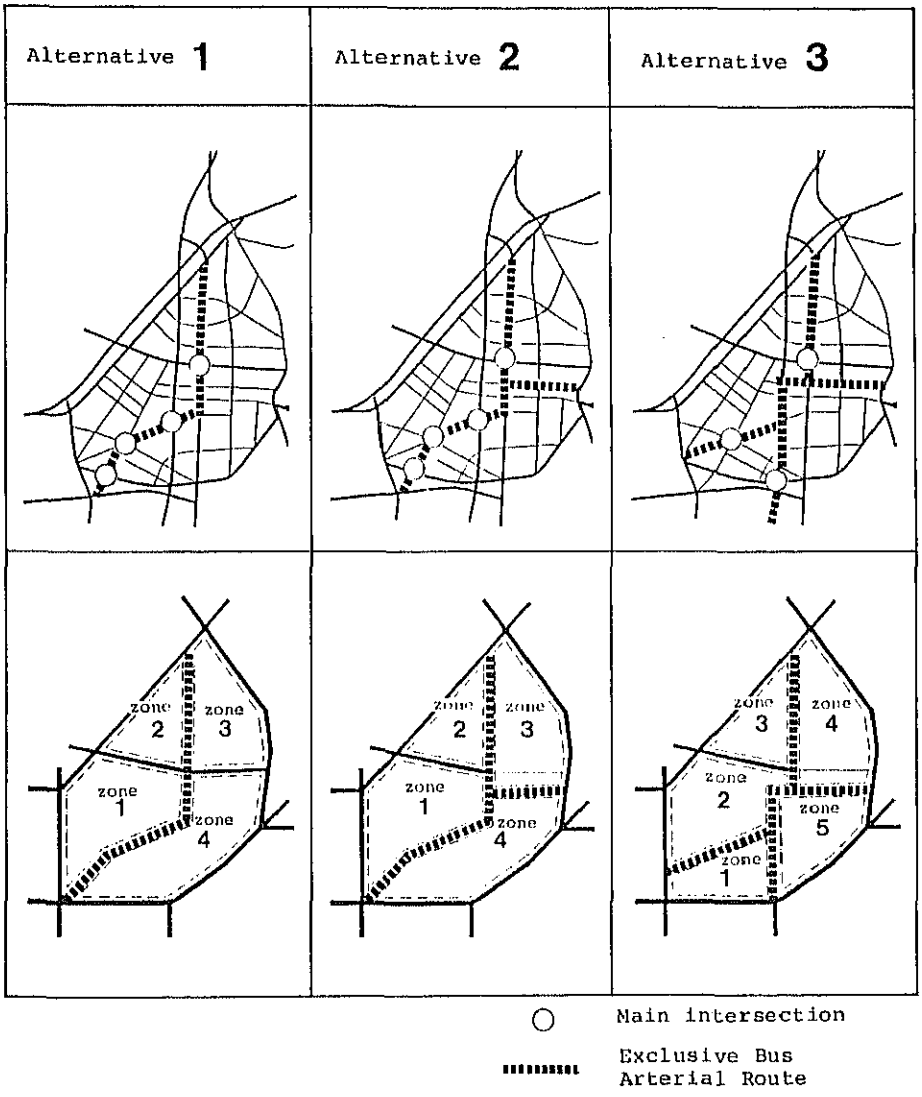


Fig. 12.2.18 Alternative Routes of Exclusive Bus Arterials

The alternatives were evaluated in terms of motor vehicle traffic, traffic facilities, and pedestrian traffic, as shown in Table 12.2.5. As a result of this evaluation, it was found that Alternative 3, which scored relatively well on all the evaluation items, is the most desirable. The semi-arterial plan and pedestrian street plan for traffic within the zones, therefore, are based on Alternative 3. Table 12.2.6 shows the evaluation results of each alternative. Under Alternative 3, the exclusive bus arterial will require an extension of 2.7 km.

Table 12.2.5 Method of Evaluation for Alternatives of Exclusive Bus Arterial Route

Evaluation Items		Method of Evaluation
From View of Motor Vehicles	a. Restricting through traffic	- Number of semi-arterials connected directly with arterials: Under 50% of maximum number: A 50 -70% of maximum number : B Above 70% of maximum number: C
	b. Convenience to Intra-CBD motor vehicle traffic	- Total length semi - arterials Above 70% of maximum length: A 70 -50% of maximum length : B Under 50% of maximum length: C
	c. Convenience to Intra-CBD public transport	- Walkable distance area from CBD Bus route Above 70% of maximum area: A 70 -50% of maximum area : B Under 50% of maximum area: C
From View of Traffic Facilities	a. Connection with major Inter-Modal points	- Number of connections with major Inter-Modal points 3 points: A 2 points: B 1 point : C
	b. Effective use of arterials roads	- Total length of arterials Above 70% of maximum length: A 70 -50% of maximum length : B Under 50% of maximum length: C
From View of Pedestrian Traffic	a. Safety of pedestrian traffic	- Intersection of pedestrian arterials by roads 1 point : A 2 points: B 3 points: C
	b. Convenience of pedestrian mall	- Total length of pedestrian arterials Above 70% of maximum length: A 70 -50% of maximum length : B Under 50% of maximum length: C

Note : 1) Major inter-modal points : Ramses sq. Attaba sq. Tahrir sq.
: 2) A : Excellent
B : Good
C : Fair

c. Semi-Arterial Roads

Semi-arterials serve as the main roads for motor vehicle traffic traveling within the zones surrounded by the arterials. They play an extremely important role in providing service to intra-CBD traffic, eliminating through traffic, and giving access to pedestrian streets.

Table 12.2.6 Evaluation for Alternatives of Exclusive Bus Arterial Route

Evaluation Items		Alternatives 1	2	3
From View of Motor Vehicles	a. Restricting through traffic	C	C	B
	b. Convenience to Intra-CBD motor vehicle traffic	A	A	A
	c. Convenience to Intra-CBD public transport	A	A	A
From View of Traffic Facilities	a. Connection with major Inter-Modal points	B	A	A
	b. Effective use of arterials	A	A	A
From View of Pedestrian Traffic	a. Safety of pedestrian traffic	B	C	A
	b. Convenience of pedestrian mall	B	A	A

Note : 1) A : Excellent
B : Good
C : Fair

From the standpoint of traffic control, the three basic road networks patterns can be envisioned (as shown in Fig. 12.2.19). Pattern 1 (loop pattern) is characterized by the fact that it attempts to eliminate through traffic entering the zones. Pattern 2 (grid pattern) is characterized by its emphasis on providing maximum convenience to intra-CBD motor vehicle traffic. Pattern 3 (linear pattern) aims at separating intra-CBD motor vehicle traffic from pedestrian traffic.

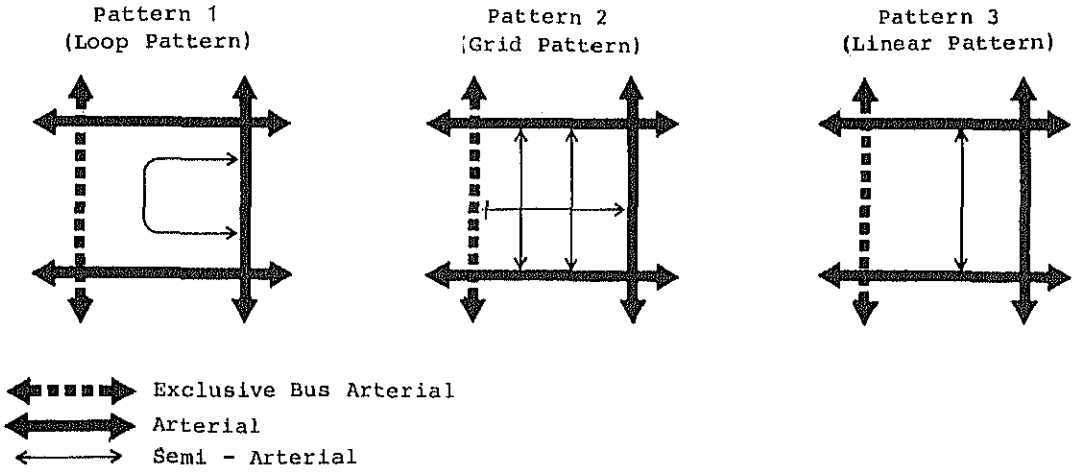


Fig. 12.2.19 Basic Patterns of Semi-Arterial Network

Furthermore, from the standpoints of land use and pedestrian traffic, the three patterns can be characterized as follows: In relation to land use, Pattern 2 (grid) gives the best accessibility to commercial/business areas, while Pattern 1 (loop) is

suited to the environment of residential areas. In terms of pedestrian flow, Patterns 1 (loop) and 3 (linear) are suitable for ensuring the safety of pedestrian traffic as they entail few points where the movement of pedestrians will be cut off.

The appropriate distribution of semi-arterials is in intervals of 100-300 m in commercial/business areas and 500 m in residential areas. CBD, bordered by the Ramses, Galaa, Tahrir, Boustan and Clot Bey streets, is divided into five zones, with a Semi-Arterials Plan drawn up for each zone. The zones are as follows:

Zone 1: Tahrir st. - Qasr Al Nile st. - Sherif st. - Boustan st. - Mohamed Farid st. -
Zone 2: Galaa st. - 26th July st. - Emad Al Dine st. - Adly st. - Sherif st. - Qasr Al Nile st.
Zone 3: Galaa st. - Emad Al Dine st. - 26th July st.
Zone 4: Galaa st. - Clot Bey st. - Adly st. - Emad Al Dine st.
Zone 5: Sherif st. - Adly st. - Boustan st.

Of the basic road network patterns discussed above, the most suitable pattern should be applied to a given zone by taking into account the kind of traffic service the zone requires. Fig. 12.2.19 shows the semi-arterial road network. In principle, Pattern 2 (grid), which offers high service efficiency to intra-CBD motor vehicle traffic, will be applied to all the zones in view of the need to ensure accessibility to business/commercial areas. Although the physical layout of the semi-arterials will be in a grid pattern, the loop or linear pattern may be effected in certain cases by enforcing one-way traffic movement. As with arterials, roadside parking on semi-arterials will be prohibited in order to obtain the necessary capacity. Extensions to the semi-arterials will be 0.68 km in Zone 1, 1.85 km in Zone 2, 0.7 km in Zone 3, 2.35 km in Zone 4, and 1.6 km in Zone 5.

d. Pedestrian Streets

Pedestrian streets are established along sections of semi-arterials and collectors where motor vehicle traffic will be unable to pass through due to the exclusive bus arterial. These sections will be turned into community space such as shopping malls, parks, and green space. Pedestrian streets will be provided along Emad Al Dine, Adly, Sherif, and Qasr Al Nile streets, and their total extension will be 1.6 km. Fig. 12.2.20 shows the pedestrian street network.

e. Collectors

Collectors provide access to roadside offices, stores, residences, and other establishments. A collector will be roughly 6.0 m wide and operated as a one-way. It will also be used as parking space, and a parking ticket system will be introduced for

this purpose. Extensions of 1.10 km in Zone 1, 1.30 km in Zone 2, 1.18 km in Zone 3, 2.79 km in Zone 4, and 2.61 km in Zone 5 are planned. Fig. 12.2.20 shows the collector street system.

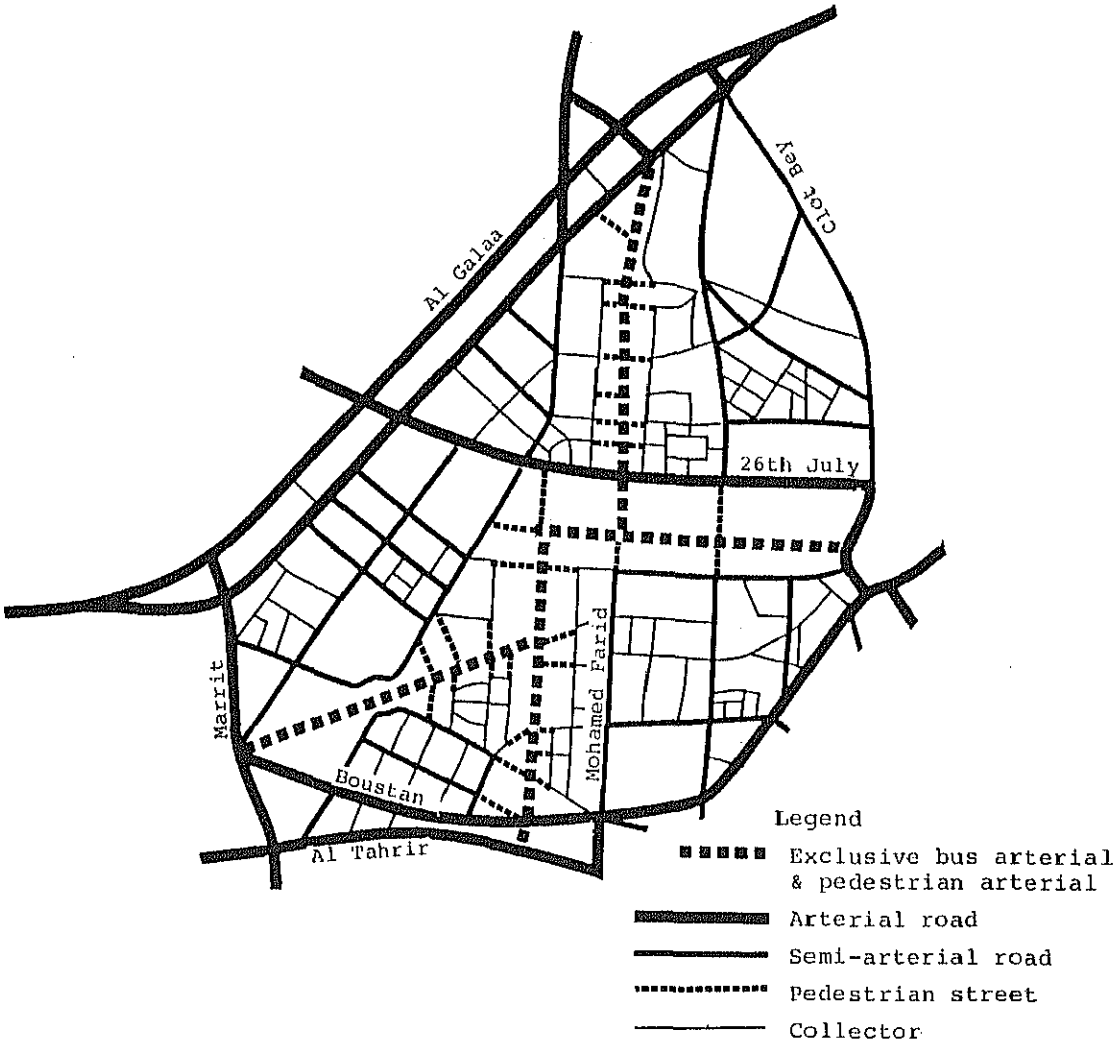


Fig. 12.2.20 CBD Road Network Proposal

(2) Standard Design of Road Cross Section

Based on the Road Network Plan in CBD stated in the previous section, standard cross-section elements are determined for each road classification. With the exception of the exclusive bus arterial and pedestrian streets, existing cross sections will be maintained on all roads (i.e., arterials, semi-arterials and collectors).

a. Arterials

The standard cross section of arterials will be as shown in Fig. 12.2.21. This cross section is the same as that of existing arterials.

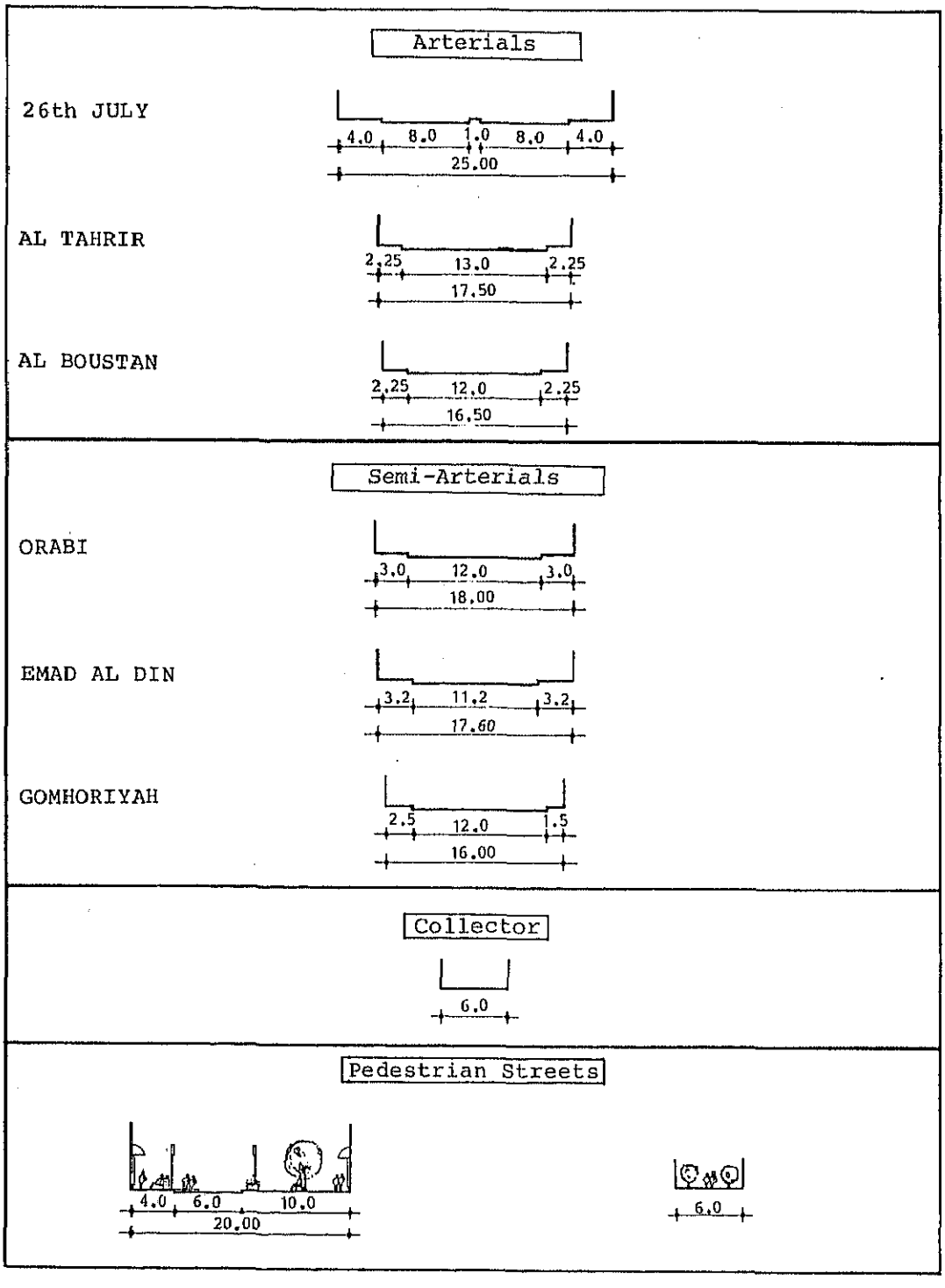


Fig. 12.2.21 Typical Cross Section by Road Type

b. Exclusive Bus Arterial

Since the exclusive bus arterial also functions as a pedestrian arterial, improved service to pedestrians must be considered as well. The carriageway will be 7 m wide and consist of two lanes and no median. The overall width of the road, including the pedestrian way, will be either 15 or 20 m, with 2 meter-wide bus bays provided along the latter. As an alternative, the horizontal alignment of the carriageway may follow an S-shaped pattern in order to create a variation in the appearance of the road. Fig. 12.2.22 shows the cross sections just discussed.

c. Semi-Arterials

The standard cross section of semi-arterials will be as shown in Fig. 12.2.21. This cross section is the same as that of existing semi-arterials.

d. Pedestrian Streets

As Fig. 12.2.21 shows, the standard width of pedestrian streets will be about 6 m. However, along Emad Al Dine, Sherif, Adly, Qasr Al Nile streets and other streets where the existing width is more than 6 m, the existing width will be maintained.

e. Collectors

As Fig. 12.2.21 shows, the standard width of collectors will be about 6 m.

(3) Parking Plan

Under the Parking Plan, the quantity of public parking space required in the year 2000 is estimated on the basis of CBD Road Network Plan; and the most feasible methods for securing the required quantity are studied.

At present, owing to the deficiency of off-street parking facilities in CBD, curb parking is at saturation level and illegal parking occurs frequently. It will, however, be difficult to obtain enough idle land in CBD in the future for use as public parking space. In view of this factor, the parking facility plan aims at operating on-street parking spaces as efficiently as possible and at the same time provides for off-street parking facilities.

In concrete, the on-street parking plan entails the introduction of a parking ticket system, while the off-street parking plan depends on the strict enforcement of regulations obligating new constructions to include space for parking, the renovation of existing surface parking facilities into multi-story garages, and the priority construction of public parking facilities whenever old buildings are to be torn down and replaced.

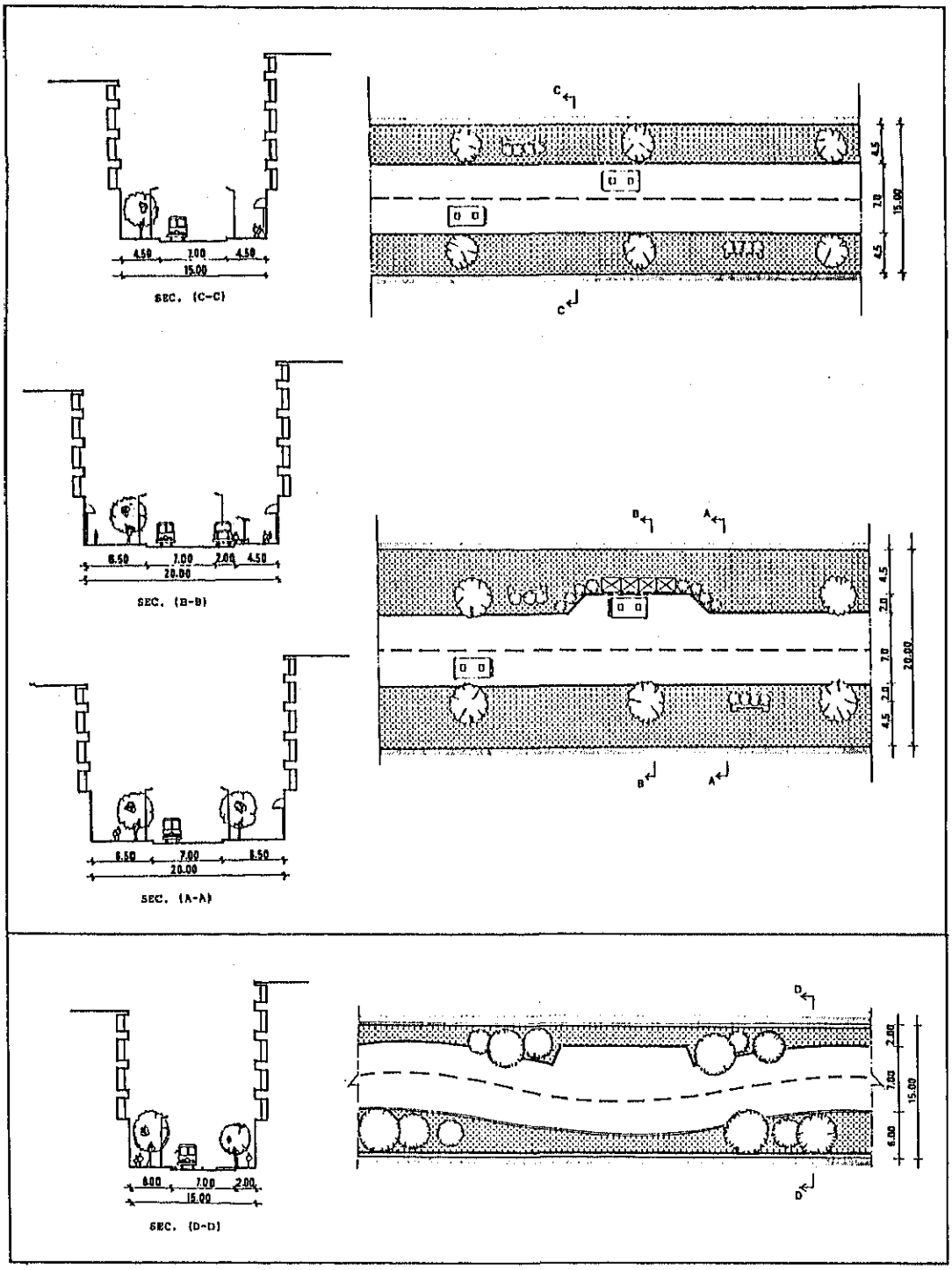


Fig. 12.2.22 Typical Cross Section of Exclusive Bus Arterial

a. Future Parking Demand

Parking demand in CBD for the year 2000 is estimated from the attraction volume of 100,000 vehicles, which is the level at which traffic is likely to be maintained in the future through restrictions on the flow of vehicles into the CBD, as discussed in Chapter 9. The total volume of vehicle attraction is broken down by trip purpose, and attraction by trip purpose is divided by the parking turnover for that trip purpose to arrive at the volume of parking demand. The calculation method is as follows:

$$\text{Parking demand space by zone (pcu.lot/day)} = \frac{\text{vehicle attraction by trip purpose}}{\text{parking turnover by trip purpose}}$$

By trip purpose, 40% of trips attracted to CBD in the year 2000 are expected to be for "commuting to work or business", 8% are forecast to be "commuting to school", 15% "shopping", and 37% "others". At the same time, average parking turnover indicated by the volume of future traffic demand is 2.5 times for work or business, 6.0 for shopping and others, and 2.0 for school. Only 10% of commuting-to-school trips is assumed to require parking. For the shopping and others category, the average parking turnover of 4.0 at present is assumed to increase by 50% to 6.0 in view of the increase in turnover to be created by the introduction of the parking ticket system. The parking demand by zone for the year 2000 is shown in Table 12.2.7. Total demand in CBD is forecast at 25,000 pcu.lot per day.

Table 12.2.7 Parking Demand in Year 2000

Items	Attraction (pcu)					Parking Demand
Zone	Work Business	School	Shopping	Others	Total	(pcu.lot)
1	6460	1290	2420	5980	16150	4000
2	13670	2740	5130	12650	34190	8600
3	3070	610	1150	2840	7670	1900
4	10040	2010	3760	9280	25090	6300
5	6760	1350	2540	6250	16900	4200
Total	40000	8000	15000	37000	100000	25000

Note : 1) Actual parking demand for school=10% of attraction
2) Average parking turnover; work, business=2.5 school=2.0 shopping & others=6.0
3) Share of trip purpose; work, business= 40% school= 8% shopping=15% others=37%

(Zone location shown in Alternative 3, of Fig. 12.2.18)

b. Parking Capacity by Service Zone

Parking capacity in CBD is calculated by combining the existing off-street parking capacity indicated by the parking facility survey and the curb parking capacity provided for by the CBD Traffic Circulation Plan.

Semi-arterials, which provide access to areas within the zones, must have enough width to allow vehicles to travel comfortably. However, because of the shortage of parking spaces in the CBD, curb parking will be allowed along either side of the semi-arterials, using the parking ticket system, as a temporary measure until off-street parking spaces are in adequate supply.

In addition, the collector is considered the same as the semi-arterial when obtaining access service for motor vehicles. Under such conditions, parking capacity is shown in Table 12.2.8. CBD total parking capacity is 15,140 pcu.lot, with existing off-street parking capacity at 11,000 pcu.lot; the planned on-street parking capacity in year 2000 is 4,140 pcu.lot.

Table 12.2.8 Parking Capacity in Year 2000

Items	Existing	On-street Capacity					CBD Parking
	Off-street	Semi-arterial		Collector		Total	Capacity
Zone	Capacity	L(km)	Capacity	L(km)	Capacity	(pcu.lot)	(pcu.lot)
1	1950	0.70	180	1.10	300	480	2430
2	3970	1.85	460	1.30	300	760	4730
3	1180	0.70	180	1.20	300	480	1660
4	1820	2.35	590	2.80	700	1290	3110
5	2080	1.70	430	2.60	700	1130	3210
Total	11000	7.30	1840	9.00	2300	4140	15140

Note : Parking capacity (pcu.lot)= Road Length/0.4 m
L : Length

c. New Parking Facility Plan

The estimated volumes of parking demand and capacity indicate that the supply of parking spaces in CBD will fall short of demand by about 9,860 pcu.lot in the year 2000. In terms of the total floor space of parking facilities required, this translates into 24.7 hectares. The supply deficiency by zone, as shown in Table 12.2.9, is 1,570 pcu.lot in Zone 1, 3,870 pcu.lot in Zone 2, 240 in Zone 3, 3,190 in Zone 4, and 990 in Zone 5. The shortage is especially acute in Zone 2 along Talaat Harb st. and in Zone 4 near Azbakiah sq.

At present a number of multi-story garages are being constructed in CBD, and several have already been completed. In addition, there are vacant lots and litter sites where it may be possible to build public parking facilities, as well as existing private parking lots that appear to be suitable for multi-story structures. The new parking facility plan calls for the construction of multi-story garages at these locations, which total 2.1 hectares. If the usual seven-story garage seen in Cairo is built, and if the required space per vehicle is assumed to be 25 square meters, about 5,810 pcu.lot of parking capacity can be obtained.

Table 12.2.9 Development Needs of Parking Spaces in Year 2000

Zone	Parking Demand (A)	Parking Capacity (B)	Development Needs of Parking Spaces pcu.lot (C)=(A)-(B)	Area (ha) (D)
1	4000	2430	1570	3.9
2	8600	4730	3870	9.7
3	1900	1660	240	0.6
4	6300	3110	3190	8.0
5	4200	3210	990	2.5
Total	25000	15140	9860	24.7

Note : 1 pcu.lot = 25 m2 (Including access and exit space)

Even with the above increase in parking capacity, supply will still be roughly 4,000 pcu.lot short of demand. It is thus necessary to promote the construction of multi-story garages wherever old buildings are to be torn down for replacement, until the deficiency is corrected.

d. Government Measures

In order to promote the development of new parking space as discussed above, it is necessary to obtain the cooperation of the government.

The possibility of implementing the following administrative measures should be considered:

- Subsidy and/or tax incentives (reduction/waiver of income and/or fixed property taxes) for commercial parking spaces operations.
- Easement of floor space rate requirement for private parking buildings.
- Impositions of heavier taxes on non-utilized land.
- Preferential development of public parking spaces.
- Strict enforcement of the regulation obligating new constructions to provide parking space.

3) Traffic Management Plan

The Traffic Management Plan consists of a bus route plan centering on the exclusive bus arterial road and a traffic control plan for eliminating through traffic.

(1) CBD Bus Route Plan

The CBD bus route plan establishes the bus route network for CBD and the method of service appropriate to the level of demand, on the basis of the exclusive bus arterial plan.

In CBD at present, there are no bus routes within the area surrounded by the 26th July, Ramses, Boustan, and Gomhouria streets. The major means of public transportation in this area are the CTA tramway and taxis.

As discussed in Chapter 11, the passenger occupancy rate of the CTA tramway, which covers the CBD and its periphery, has declined owing to the chronically congested state of the roads resulting from increased vehicular traffic. In order to ensure the proper operation of the tramway, it would be necessary to provide segregated tracks. This, however, is unfeasible considering the need to make the most of existing road space in CBD. In addition, it is necessary to increase the capacity of CBD circumferential roads if they are to provide service to through traffic as called for under the CBD Traffic Circulation Plan. Therefore, the bus route plan is based on the precondition that public transportation in the CBD will rely totally on buses and that the CTA Tramway lines on Boustan, Sherif, Roushdi, and Clot Bey streets will be removed.

a. CBD Bus Routes

CBD Bus routes are established on the basis of the exclusive bus arterial plan. If the maximum walking distance in commercial areas is given as about 250 m, the bus service area (walkable distance area) would be as shown in Fig. 12.2.23. As shown in the figure, the CBD bus service fails to cover certain sections along the CBD circumferential roads. This situation poses no problem as these sections are covered by the Regional Metro along Ramses st., non-CBD bus routes along the CBD boundary, and in future, Urban Metro No. 1.

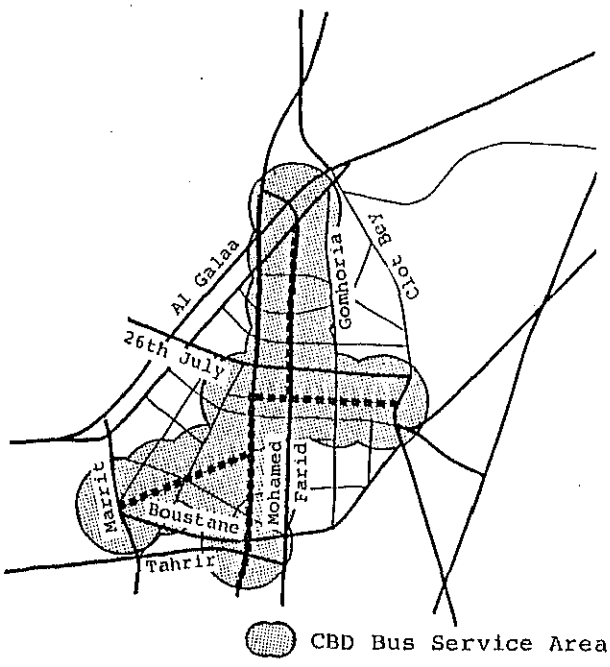


Fig. 12.2.23 CBD Bus Service Area on Routes

Accordingly, the new bus route network in CBD will consist of an east-west/north-south cross route on the exclusive bus arterial. The bus route on Sherif st. will be extended to provide a link with Sayedah Zeinab sq.

With the establishment of the new route, the existing bus routes in CBD, such as the one on 26th July st., will be eliminated. The new route will be used for traveling within the CBD and for traveling between the borders and the inner areas of CBD. In addition, all bus routes covering areas beyond the CBD borders (non-CBD bus routes) will terminate at one of the three bus terminals to be established at Ramses, Tahrir and Attaba squares. For this reason, a transfer system will be introduced to allow passengers to change buses from a non-CBD route to an intra-CBD route, or vice versa, at these terminals. Fig. 12.2.24 shows CBD bus routes, and Fig. 12.2.25 shows the relation between the CBD bus routes and non-CBD bus routes.

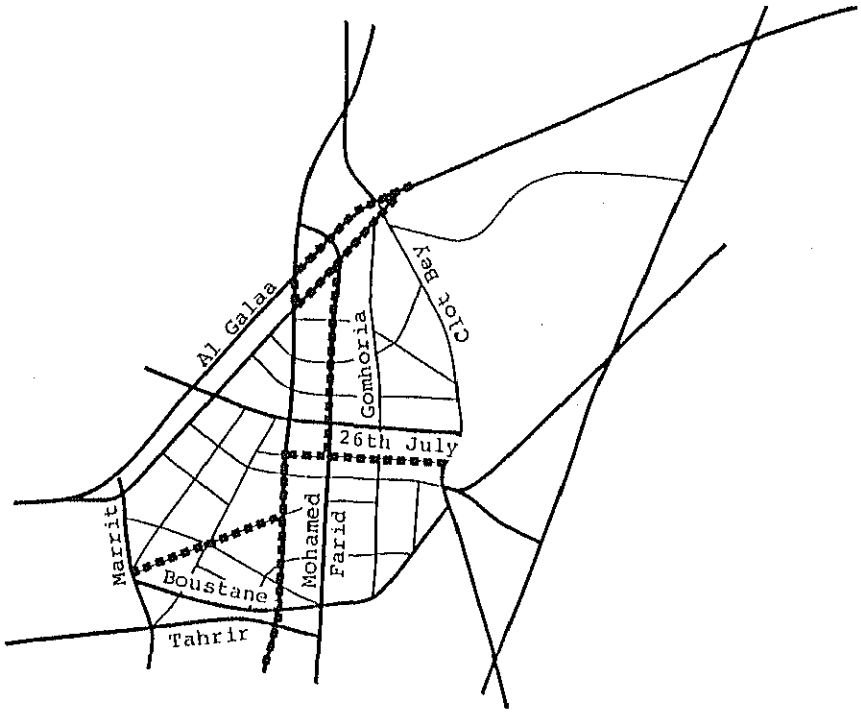


Fig. 12.2.24 CBD Bus Routes in Year 2000

b. Use of Small-Size buses

Small-size buses will be used on CBD bus routes for the following reasons: Since the exclusive bus arterial will also function as a pedestrian arterial and since the width of the arterial will be only about 20 m, the small-size bus, which is smaller than conventional buses, is desirable because it has less impact on the pedestrian environment. In addition, the use of such buses will provide added convenience to bus passengers by reducing the embarkation/disembarkation time.

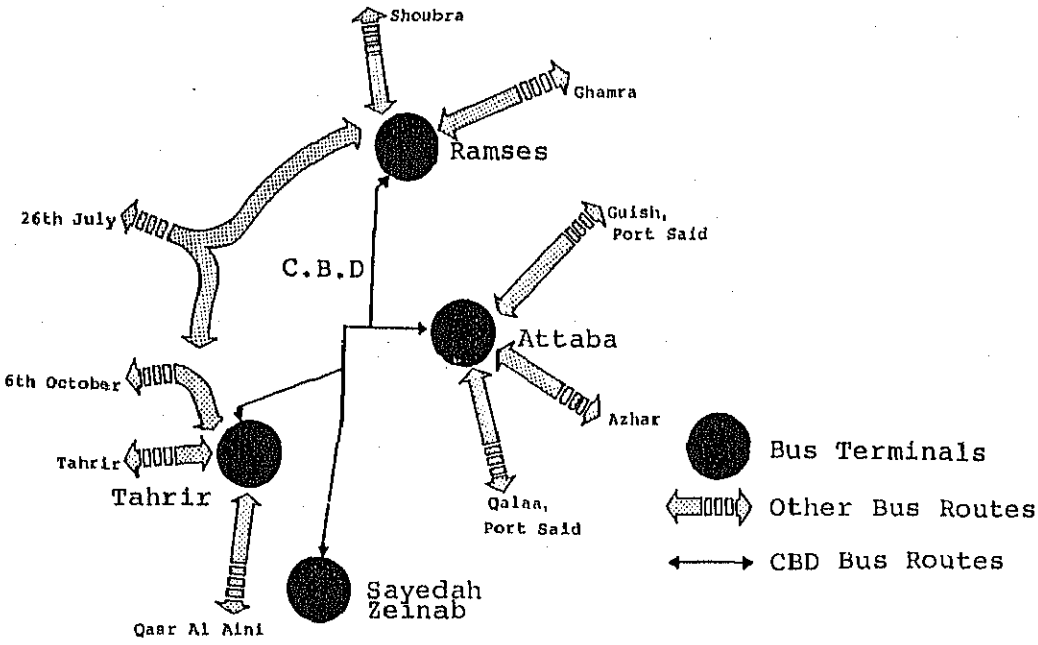


Fig. 12.2.25 Relation between CBD Bus Routes and Non CBD Bus Routes

c. CBD Bus Operation Plan

The introduction of the exclusive bus arterial plan and the new CBD bus routes will create a need for transferring to and from non-CBD bus routes. It is necessary to ensure that users do not feel reluctant to make such transfers owing to cost considerations.

From the standpoint of user convenience, the following conditions are desirable:

- Low fares
- Short distances between bus stops (200-250 meters or a free ride system
- Short waiting time (service frequency at 3 minute intervals or shorter)

d. Future CBD Bus Demand

Future CBD bus demand is forecast in Chapter 8. Bus attraction in the CBD in the year 2000 is forecast to be about 3,260 buses. CBD bus attraction by zone is given in Table 12.2.10.

CBD bus attraction by bus terminal for the year 2000 is as shown in Table 12.2.11. The Tahrir sq. terminal will cover the bus routes on 26th July, 6th October, Tahrir, and Qasr Al Aini streets; the Ramses sq. terminal will cover the 26th July, Shubra, and Ramses streets bus routes, and the Attaba sq. will cover Ramses, Gueish, Port Said, Azhar, and Qalaa streets.

Table 12.2.10 CBD Bus Attraction in Year 2000

Zone	Bus Attraction (small-size bus)
1	572
2	1274
3	229
4	652
5	536
Total	3263

Table 12.2.11 CBD Bus Attraction by Bus Terminal in Year 2000

Bus Terminal	Bus Attraction (small-size bus)
Tahrir	1329
Ramses	1231
Attaba	1141
Sayedah Zeinab	918
Total	4619

e. CBD Bus Terminal Plan

Along with the introduction of small-size bus service in CBD, bus terminals for transfer purposes will be established along the CBD border area (the route between Sayedah Zeinab sq. and CBD border will be served directly by small-size buses and will thus require no transfer at the border). The bus terminals will be established at the following four locations: Tahrir sq., Ramses sq., Attaba sq., and Sayedah Zeinab sq. The required number of bus berths and land area are shown in Table 12.2.12.

Table 12.2.12 Development Needs of CBD Bus Terminal in Year 2000

Bus Terminal	Peak Hour	Bus Berths	Area (m2)
Tahrir	130	4	770
Ramses	120	4	750
Attaba	110	4	720
Sayedah Zeinab	90	3	680
Total	450	15	2920

Note:
1) Area (m2)= (Nb/a+Nb/b)xc + (dxexNb/3600xIb + (Nb/bxf) + g
   where Nb = Peak hour arrival volume of CBD bus
   Ib = Average walking distance (80m)
   a = Embarkation time (60sec)
   b = Disembarkation time (30sec)
   c = Stopping space (30m2)
   d = Average distance of pedestrians (0.5m)
   e = Passenger capacity (25pax/bus)
   f = Passenger density x e (8m2/bus)
   g = Access and exit space (500m)
2) Peak hour volume rate = 10%

(2) Traffic Regulation Plan

In order to restrict through traffic in individual zones and guide the flow of traffic into and out of the zones, which are two of the major objectives of the CBD Traffic Circulation System, one-way movement will be enforced on semi-arterial roads and collector streets. In addition, parking restrictions will be enforced on arterial roads, which serve traffic moving between zones in the CBD, in order to raise the capacities of the arterials. Parking will also be restricted along one side of semi-arterials and collector streets, which serve intra-zonal traffic and where the parking ticket system is to be introduced.

a. One-Way Regulation

The basic concept behind one-way operation is characterized by the following points:

- In general, a zone's entrance or exit points will be the intersections between semi-arterials and arterial roads. Trips attracted to a zone will be made to enter from a semi-arterial, but trips generated in a zone are not particularly controlled as to their exit roads.

- Traffic flow will be controlled so that no through traffic enters a zone. In addition, directional control at intersections will be generally implemented as follows:

- No directional control will be enforced at intersections between arterials and semi-arterials.

- At intersections between arterials and collector streets, entry from an arterial road to a collector street will be prohibited, while entry from a collector street to an arterial road will be allowed for right-turning vehicles only.

Based on the foregoing, a one-way regulation plan is proposed as shown in Fig. 12.2.26.

b. Parking Restrictions

Parking will be restricted on the CBD arterial roads established under the CBD Road Network Plan. On semi-arterials and collector streets, where the parking ticket system is to be introduced, parking will be restricted on the other side of the curb-parking space (Fig. 12.2.27).

(3) Future Flow of Vehicular Traffic Based on CBD

Traffic Circulation System

The future volume of vehicular traffic that can be expected in the year 2000 with the introduction of the CBD Traffic Circulation System is forecast separately for cars and buses in order

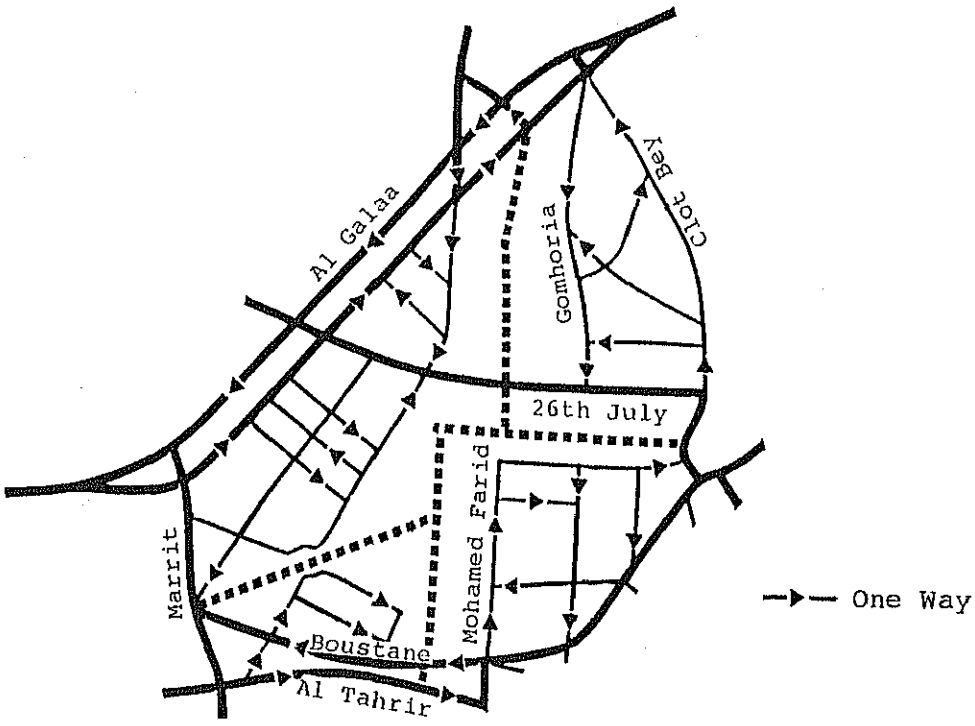


Fig. 12.2.26 One Way Regulation in Year 2000

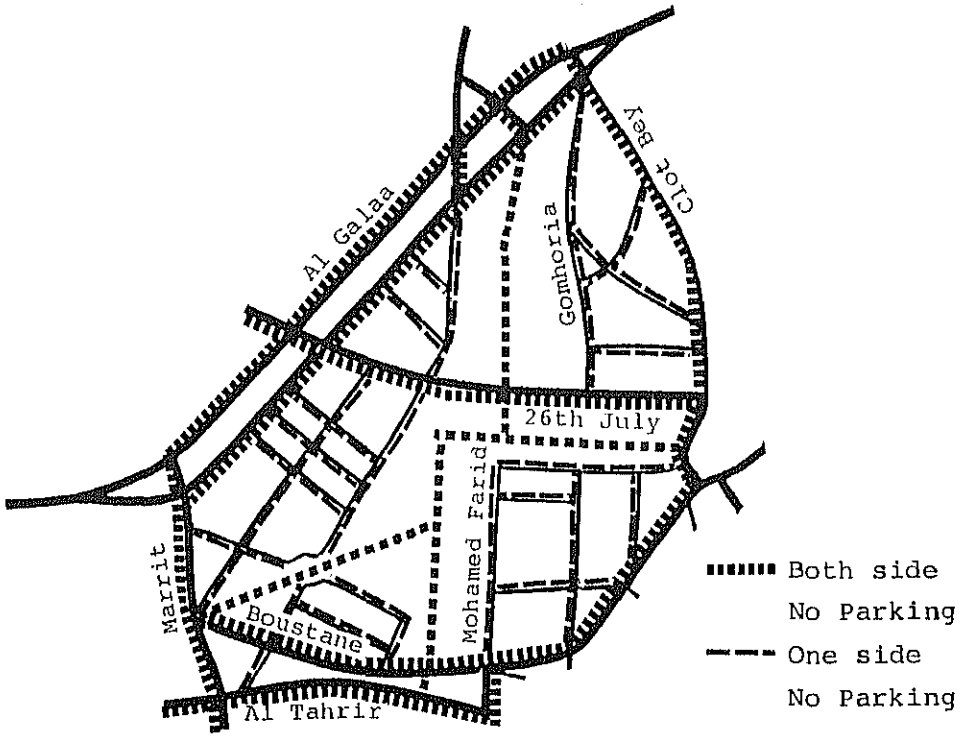


Fig. 12.2.27 No Parking Regulation in Year 2000

to determine the future flow of vehicular traffic in the CBD. The future volume of vehicular traffic is calculated by preparing a future OD table for the CBD (with the CBD divided into 18 zones and the non-CBD area divided into nine zones) based on the future OD table given in Chapter 8, and assigning the OD trips in accordance with the CBD Road Network Plan, the CBD Bus Route Plan, and the CBD Traffic Regulation Plan. The resulting trip assignment is divided as follows:

- Car traffic assignment (Fig. 12.2.28)
- Bus traffic assignment (Fig. 12.2.29)

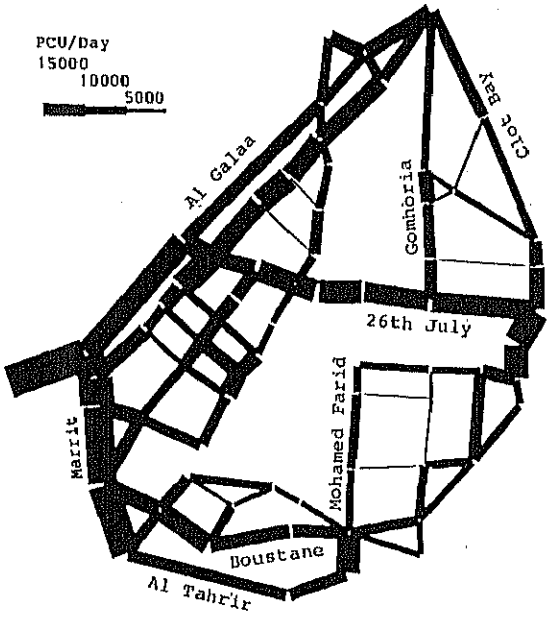


Fig. 12.2.28 CBD Car Traffic Assignment in Year 2000

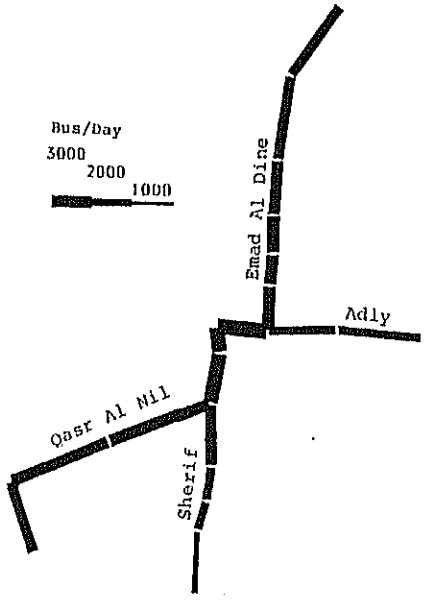


Fig. 12.2.29 CBD Bus Traffic Assignment in Year 2000

a. Future Volume of Car Traffic

The future flow of car traffic in the CBD is expected to show the following tendencies:

- Traffic on arterial roads, which form the circumferential (circular) roads of the CBD zones, will be heavy, as would be expected. Daily traffic volumes are expected to range from 15,000 to 43,000 vehicles (in both directions). This is because through traffic in individual zones will be diverted to the CBD circumferential roads as a result of reserving Emad Al Dine, Sherif, and Qasr Al Nile streets for exclusive bus use and exclusive pedestrian use. Daily traffic volumes on major arterial roads are forecast as shown in Table 12.2.13. Traffic demand will remain below capacity on all arterials.

Table 12.2.13 Daily Traffic Volume on Arterials in Year 2000

(unit: pcu/day two directions)

Road	Car Traffic Volume
Marriet	36000 - 43000
26th July	20000 - 29000
Ramses	14000 - 31000
Galaa	14000 - 29000
Boustan	9000 - 25000
Tahrir	16000

- Daily traffic volumes on semi-arterials are predicted to range from 10,000 to 20,000 vehicles (in both directions). In particular, traffic on all semi-arterials in Zone 2 will tend to be heavier than in the rest of the zones owing to the large number of trips generated from and attracted to the zone. However, traffic demand will remain below capacity on all semi-arterials. In addition, owing to the barrier that will be created by the establishment of the exclusive bus arterial, through traffic in each zone will show a marked decline. Daily traffic volumes on major semi-arterials are forecast as shown in Table 12.2.14.

Table 12.2.14 Daily Traffic Volume on Semi-Arterials in Year 2000

(unit: pcu/day two directions)

Road	Car Traffic Volume
Talaat Harb	9000 - 20000
Mahmoud Bassiuoni	14000 - 20000
Champolion	12000 - 18000
Gomhouria	1000 - 18000
Abd Al Khaleq Sarwat	10000 - 18000
Clot Bey	10000 - 14000
Emad Al Dine	10000 - 12000

From the foregoing, it can be seen that, while the introduction of the zone system will restrict through traffic in a given zone and improve the pedestrian environment, there will be a dramatic increase in car traffic on the CBD circumferential roads. Therefore, it is necessary to implement appropriate traffic control at intersections (channelization, signalization) and to strengthen the enforcement of no-parking regulations on arterial roads in order to allow the roads to fulfill their proper functions as arterials.

b. Future Volume of Bus Traffic

Bus traffic in the CBD will be heavy on Emad Al Dine, Sherif, and Qasr Al Nile streets, which will serve as the main axis linking together the Ramses and Tahrir bus terminals. Daily traffic volumes on these streets are expected to range between 2,700 and 4,100 buses (in both directions). Additionally, 2,300

buses per day are expected on Adly st., which will provide access to the Attaba bus terminal, and 2,400 buses per day on Nobar st., which will provide access to the Sayedah Zeinab bus terminal. Bus traffic in all sections will be within capacity.

4) Implementation Plan

The CBD Traffic Circulation Plan calls for the alteration of the current flow of traffic in the CBD through the introduction of powerful measures. It is therefore necessary to implement the plan in several phases in order to prevent confusion and allow the road users to gradually grow accustomed to the new system in gradual stages. The following phases are thus recommended (Fig. 12.2.30):

Phase 1	Implementation of the CBD Circulation Plan proposed in the Second Urban Development Project CBD Components.
Phase 2	Implementation of the CBD Traffic Circulation Plan proposed in this Study introducing the east-west exclusive bus arterial/pedestrian arterial, and allowing vehicle crossing at intersections.
Phase 3	Implementation of the CBD Traffic Circulation Plan proposed in this Study introducing the east-west and north-south exclusive bus arterial/pedestrian arterial, and allowing vehicle crossing at intersections.
Phase 4	Full implementation of the CBD Traffic Circulation Plan proposed in this Study.

5) Cost Estimation for CBD Traffic Circulation Plan

The financial cost for CBD Traffic Circulation Plan is shown in Table 12.2.15. The financial cost of the main projects are: Exclusive Bus Road (Project No. 101) 13.6 million LE, Bus Terminal (Project No. 103) 5.4 million LE, and Multi Story Garage 40.1 million LE.

Table 12.2.15 Cost Estimation for CBD Traffic Circulation Plan

Project No.	Project Name	Financial Cost Foreign (MUS$)	Financial Cost Local (MLE)	Financial Cost Total (MLE)	Economic Cost Foreign (MUS$)	Economic Cost Local (MLE)	Economic Cost Total (MLE)
C101	Exclusive Bus Road	1.8	9.5	13.6	1.8	12.4	16.5
C102	CBD Bus Rerouting			0.0			0.0
C103	Bus Terminal	0.7	3.8	5.4	0.7	5.0	6.6
C104	Pedestrian Arterials	0.2	1.1	1.6	0.2	1.5	2.0
C105	Pedestrian Streets	0.0	0.2	0.2	0.0	0.3	0.3
C106	On-Street Parking	0.0	0.3	0.3	0.0	0.3	0.3
C107	Multi-Storey Garage	7.0	24.0	40.1	7.0	38.4	54.5
C108	Traffic Regulation	0.1	0.3	0.5	0.1	0.4	0.6
Total		9.8	39.2	61.7	9.8	58.3	80.8

Note: 1 US$ = 2.3 LE

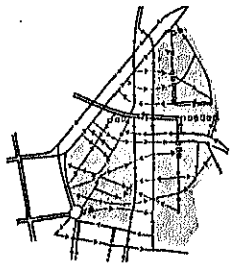
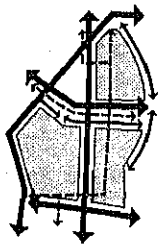
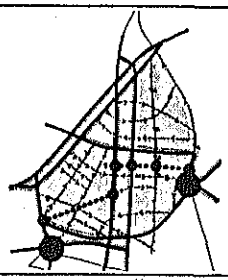
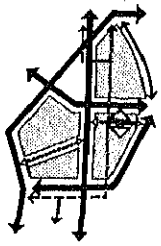
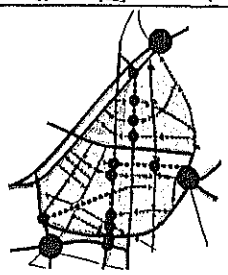
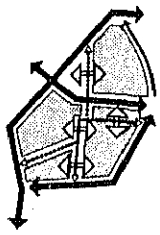
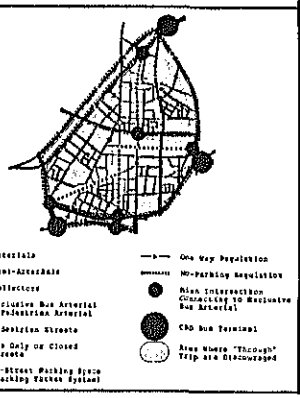
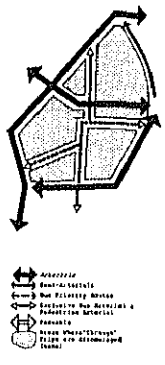
Phase	Main Objectives	Plan Phases	Road Functions & Modification of Traffic Control
1	a. Through traffic restriction by one-way system in CBD b. Classiffication of road function c. Public transport service by Bus Priority Road d. Enhance north-south arterial e. Three areas where through traffic are dicouraged f. CTA Tramway lines will be removed		
2	a. Through traffic restriction by one-way system in CBD b. Classiffication of road function c. Introduce east-west Exclusive Bus Arterial and Pedestrian Arterial, allowing vehicle crossing at intersections d. Two CBD Bus terminals e. Enhance north-south arterials f. Four areas where through traffic are dicouragede		
3	a. Through traffic restriction by one-wa system in CBD b. Classiffication of road function c. Introduce east-west and north-south Exclusive Bus Arterial and Pedestrian Arterial, allowing vehicle crossing at intersections d. Three CBD Bus terminals e. Five areas where through traffic are dicouragede		
4	a. Through traffic restriction by Exclusive Bus and Pedestrian Arterials, with no vehicle crossing b. Classiffication of road function c. Public transport service by CBD Bus route d. Three CBD Bus terminals e. Pedestrian street introduction f. Five areas where through traffic are dicouragede		

Fig. 12.2.30 Phases for Implementation of Traffic Circulation Plan