CHAPTER 8: TARGET AREAS TRANSPORT MANAGEMENT

8.1 EXISTING ISSUES, OPPORTUNITIES AND CONSTRAINTS

In summary, the following problems and issues have been identified from a traffic-engineering point of view in the Study Area. The problems and issues are identified from data based on several investigations of traffic volume flow, vehicular travel time, parking conditions and traffic control facilities.

8.1.1 Problems and Issues of Traffic Flow and Control

(1) Excessive Vehicular Traffic Volume to/from the Central Area

Chronic traffic congestion in the Cairo CBD area and the Central Giza area becomes very severe during the peak period when major signalized intersections reach near-saturated level. *This indicates that there are significant gaps between road space supply and vehicular traffic demand for commuting*.

(2) Low Average Travel Speed and Area of Congestion

In the morning peak period, the area surrounded by the 6th October, 26th July, Cornish El Neel and Port Said roads (covering approximately 15 sq km) was identified as a heavily congested area, in terms of travel speeds of 10km/h or less. However, in the midday period, the congested area increases to about 30 sq. km. In the evening peak hour, the congested area was more or less the same as the area in the midday peak period.

These figures show that the congested area covers almost the same area of the Cairo CBD and Giza Central Area, where the supply of road space is very difficult because of its characteristics of land use. *Thus, the question should be how to divert the excessive traffic demand made by private vehicles to other forms of traffic flows.*

(3) Main Causes of Traffic Congestion

The main causes of traffic congestion, characterized by travel speed of 10 km/h or less during the peak hour, are categorized into 8 types, in the context of traffic engineering and based on the travel time survey, as described below.

- Waiting for traffic lights to change
- Pedestrians crossing
- Congestion of buses/shared taxies near bus stops
- Traffic congestion caused by traffic spill-back from upstream
- Merging and diverging from/to side roads without a traffic signal light
- On-street parking
- Conflict of vehicles at U-turn points
- Vehicles stopping due to engine trouble

In addition, the following problems were seen from visual observation and other information.

- Bad driving habits such as zig-zag driving
- Unsuitable geometric condition of certain roads
- Traffic friction with informal roadside use activities

It is, therefore, highly recommended that effective countermeasures should be considered, to mitigate traffic congestion at "BOTTLENECKS", through a traffic control and management plan.

(4) Traffic Education of Drivers and Pedestrians is Weak

Egyptian drivers, considered collectively, have been described as undisciplined through actions such as suddenly changing lanes without notice, jumping queues and blocking intersections. Such driving behavior leads to lower traffic capacity and the occurrence of traffic accidents. *Therefore, effective traffic education programs and campaigns should be promoted to improve driver's compliance with traffic laws and regulations*.

The behavior of pedestrian's is also rather bad i.e. they cross streets at the middle sections of roads (jay-walking), and they walk along vehicle lanes to shortcut their journey. In addition to this, pedestrians and passengers overflow onto vehicle lanes at bus stops because of the small capacity of the area. *Appropriate pedestrian education programs are, therefore, required to improve pedestrian discipline as well as the capacity improvement of pedestrian facilities.*

In addition, the quality of instruction given to student drivers is quite insufficient, although more detailed investigation may be required in this area. More practice and classroom teaching by driving schools should be provided. *As a consequence of insufficient instruction, proper attitudes or ideas toward driving and law*

enforcement, that are necessary for self-discipline and social responsibility, are not adequately stressed.

(5) High Occupancy of On-street Parking

The Cairo CBD, bordered by Ramsees, Clot Bay, El Azhar, Port Said, Mohammed Bey Fareed, and Mohamed Kareem roads, has a high parking occupancy, where the parking occupancy in the business hour exceeds 100%. Particularly in the area boarded by Ramsees, 26th July, El Gumhouriya and El Raeess Abdel Salam roads, the parking occupancy was in the range of 150% to 200%. *The present level of on-street parking capacity is far from sufficient to meet parking demand. It is, therefore, highly recommended that the number of parking spaces should be developed or regulated by various traffic restrictions.*

8.1.2 Problems and Issues of Traffic Control and Management Facilities

(1) Unsuitable Traffic Signal Control System

At the present time, February 2002, there are over 227 signalized intersections in the study area. The maintained traffic signals are mostly vertical-type signal heads, traffic lights were not visible because of low poles. Some traffic lights are not working properly. The signal light for pedestrians was not installed sufficiently.

During peak periods, most major signalized intersections were manually controlled by traffic policemen. This is because the current traffic congestion in the Cairo may be difficult to control with the existing system due to near or over-saturation conditions. However, this manual control makes signal synchronization difficult to keep and leads to a long cycle time. Many long cycle times of more than 3 min were observed during the field survey.

(2) Key Bottlenecks

The current traffic congestion is mainly caused by spill-back due to near or over-saturated bottlenecks. The signal control system can only be effectively operated when the traffic shows a stable fluctuation pattern. *Thus, the technical improvement of the signal control system to manage near or over-saturated conditions will be necessary instead of manual operation by traffic police. Notwithstanding this, it is necessary that widening plans for approaches to intersections should be considered.*

Traffic to and from side roads without traffic lights disturbs main traffic flows. *These no-signalized intersections will be considered for the installation of signals including channelization, in order to control both motor vehicles and pedestrian traffic.*

The conflict of vehicles at U-turn points was seen on wide roads. *Such U-turn points will be considered for the installation of new signals, or such type of intersection will be improved with adequate design.*

(3) Shortage of Traffic Safety Facilities

Pedestrian crossings are not sufficient in number. *In order to reduce traffic accidents involving pedestrians, more pedestrian crossings are needed along arterial roads within the central area.*

The traffic signs are not sufficient in number and, in addition, some of the regulation signs are attached on low poles, giving poor visibility. *The improvement of traffic signs is necessary from the viewpoint of visibility as well as in terms of numbers.*

(4) Insufficient Vehicles Inspection System

Congested sections caused by vehicles stopping due to engine trouble/puncture were observed on elevated roads. Stationary vehicles on elevated roads, resulting from engine trouble, can lead to traffic congestion and/or further accidents. *A technical improvement of the vehicle inspection system is highly recommended.*

8.2 APPROACH AND METHODOLOGY

As previously pointed out in the analysis of the current urban transport status (refer to Chapter 9 of Progress (2) Vol. I Report), the problem of the existing traffic congestion is caused by inadequate road capacity including the lack of a well-developed traffic management system.

An appropriate, systematic traffic management plan is essential for the safe, smooth flow of the increasing motor traffic on roads. Traffic management is particularly important to make the maximum use of the existing road facilities and to improve current road capacities. Since traffic management plans are a relatively low cost, except for those measures which improve large size facilities, and since it is possible to carry out a trial and 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 at different times.

The traffic management plan is composed of a Short-Term Plan, and a Middle and Long-Term Plan. The short-term plan is an immediate action plan focused on issues in the selected traffic congested area, and does not comprehensively result from a study of the whole area on a unified theme, whilst the middle and long term plans are focused only on specific issues in certain areas. The approach of each plan is described below:

8.3 SHORT-TERM PLAN FOR IMMEDIATE ACTIONS

8.3.1 Objectives

The traffic management plan is generally part of the short-term plan because it makes maximum use of the existing road facilities. Immediate action plan objectives for promoting the quality of the urban environment are, therefore, listed as follows directly below; and measures to improve the bus priority system, traffic control

system, road/traffic management facilities and parking facilities are proposed thereafter.

- To promote the service level of bus transport system;
- To achieve a smooth traffic flow;
- To reduce traffic accidents; and
- To create "pedestrian-friendly" facilities.

The immediate action plan is proposed as a series of short-term measures for the next five years. It shall be followed by the implementation of the middle-term plan in the Master Plan. With a view to achieving smooth traffic flow in the Cairo CBD and Central Giza area, the goal of this plan is to induce commuters to shift from private vehicles to public transportation, and to mitigate traffic congestion at bottlenecks. Thus, it is necessary to increase road traffic capacity through the improvement of traffic management facilities. Measures to achieve this are listed in Table 8.3.1 and these are based on current problems and issues.

Table 8.3.1 Countermeasures for the Immediate Action Plan

Current Problems	Issues	Countermeasures	Warrants
1. Traffic congestion at signalized intersections (Key bottlenecks).	1. Technical improvement of signal control system to manage near/over-saturated conditions will be necessary.	1. Improvement of traffic signal control system. 1) Traffic response system on near/over-saturated condition. 2) Synchronized system of traffic signal. 2. Improvement at intersections 1) Widening plan at approach of intersection.	1. Driver obeys traffic signal control and regulation. 2. Strengthening traffic regulation enforcement. 3. Updating control parameters at different time.
2. Traffic conflict between vehicles and crossing of pedestrians	1. Appropriate pedestrian safety education programs are required. 2. A capacity improvement of pedestrian facilities is required.	1. Improvement of traffic safety facilities. 1) Plan of pedestrian crossing with traffic lights. 2) Plan of scramble pedestrian crossing. 3) Plan of pedestrian bridge. 2. Improvement of traffic safety education system 1) Plan of pedestrian's safety education program.	1. Pedestrian obeys traffic signal control and regulation. 2. Strengthening traffic regulation enforcement. 1. Executing sustainable traffic safety education.
3. Traffic congestion of buses and shared taxies near bus stops.	1. It is highly recommended that effective traffic education programs should be promoted to improve driver's behavior in accordance with traffic laws and regulations. 2. Safe bus stops facilities for passengers should be considered. 3. Bus priority system for promoting the service level of bus transportation system should be	1. Improvement of bus facilities. 1) Plan of bus stop with bus bay. 2) Plan of bus priority lane system. 2. Improvement of traffic safety education system 1) Plan of driver's safety education program.	1. Driver obeys traffic signal control and regulation. 2. Strengthening traffic regulation enforcement. 1. Executing sustainable traffic safety education.

	considered.		
4. Traffic congestion caused by traffic spill-back from upstream.	1. Technical improvement to manage the traffic volume should be considered. 2. It is necessary to increase the capacity at bottlenecks.	1. Improvement of traffic signal control system. 1) Traffic response system on near/over-saturated condition. 2) Synchronized system for traffic signals. 2. Improvement of intersection 1) Widening plan at approach of intersection. 2) Plan of channelization system.	1. Driver obeys traffic signal control and regulation. 2. Strengthening traffic regulation enforcement. 3. Updating control parameters at different time.
5. Traffic congestion at no-signalized intersection or roundabout.	1. Installation of signals including channelization, in order to control both motor vehicles and pedestrian traffic.	1. Improvement of traffic signal control system 1) Installation plan of traffic signal lights at non-signalized intersections and roundabouts. 2) Plan of channelization system.	1. Driver obeys traffic signal control and regulation. 2. Strengthening traffic regulation enforcement. 3. Updating control parameters at different time.
6. Traffic congestion caused by parking on street.	1. Parking spaces should be developed or regulated by various traffic restrictions.	1. Improvement of parking systems 1) Plan of toll parking system on street by introducing a parking ticket system. 2) Plan of tolled off-street parking facilities.	1. Strengthening on-street parking enforcement.
7. Traffic conflict of vehicles at U-turn points.	1. U-turn points will be considered for the installation of signal light control.	1. Improvement of traffic signal control system. 1) Installation plan of traffic signal lights at U-turn point.	1. Driver obeys traffic signal control and regulation. 2. Strengthening traffic regulation enforcement. 3. Updating control parameters at different time.
8. Traffic congestion caused by vehicles stopping due to engine trouble.	1. A technical improvement of the vehicle inspection system is highly recommended. 2. Emergency space on the elevated road should be considered.	1. Improvement of traffic safety facilities 1) Plan of emergency space on elevated road. 2. Improvement of vehicle inspection system 2) Improvement of vehicle inspection system.	1. Strengthening traffic regulation enforcement.
9. Traffic accidents caused by bad driving habits such as sudden change lanes by vehicles (e.g. zigzag driving), and sudden stopping without	1. Effective traffic education programs should be promoted to improve driver's behavior in accordance with traffic laws and regulations.	1. Improvement of traffic safety education system. 1) Plan of driver's safety education program.	1. Strengthening traffic regulation enforcement. 2. Executing sustainable traffic safety education.

notice leading to traffic accidents.			
10. Traffic accidents caused by unsuitable geometric conditions on street.	1. It is necessary to decrease traffic accidents through the improvement of traffic management design, and to achieve a smooth traffic flow.	1. Improvement of intersection 1) Plan of channelization system 2) Plan for improvement of intersection by introducing a dynamic simulation model.	1. Executing periodic analysis of traffic accident data.
11. Traffic friction with informal side land use activities.	1. It is necessary to increase traffic capacity through traffic enforcement.	1. Improvement of traffic enforcement 1) Plan of traffic enforcement on street.	1. Strengthening traffic regulation enforcement. 2. Executing periodic road patrol system.

Source: JICA Study Team 2002

In order to success the implementation of the given countermeasures in the GCR traffic conditions, the warrants should be executed carefully. Especially, it is necessary that ***drivers/pedestrians obey traffic signals and regulation*** if the benefits of traffic management measures are to accrue. The conflicts between vehicular traffic and pedestrians, which reduce the efficiency of the urban street network, can be minimized by improving the road/traffic facilities and implementing traffic safety measures including effective drivers/pedestrian education programs. Such measures and programs, if successfully implemented, will not only improve traffic flows but will also improve the safety, convenience, and comfort of both pedestrians and drivers.

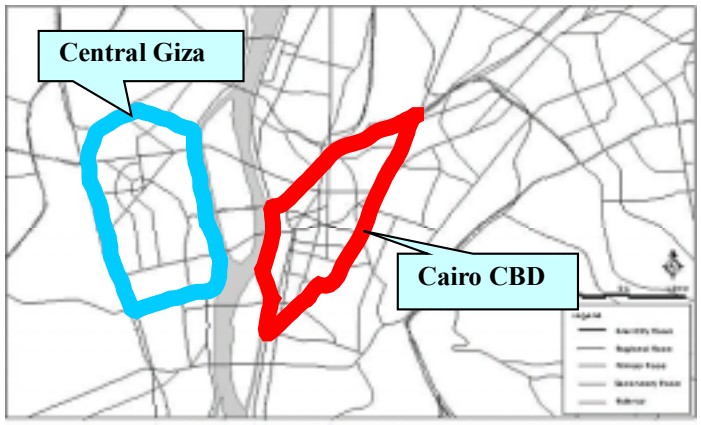
Besides, from a psychological point of view, unless the ***traffic enforcement*** is also promoted, the general public will not pay much attention to their behavior or attitudes. Traffic police should be mobile in keeping with progressive traffic enforcement and modern supervisory techniques. In additions, a more stringent licensing system as well as effective enforcement is urgently required to compel drivers to observe traffic rules. CREATS proposed a "*penalty-point system"* for the improvement of driving license system on Chapter 10, section 10.6 Supporting Measures, in order to implement more stringent licensing system. Frequent traffic offenders should be penalized by suspension of their license, and/or by making it compulsory for them to attend reeducation programs. A penalty-point system can be organized in such a way that serious offenders have a higher penalty than less serious offenders.

Regarding to the warrant for the traffic signal control system, in order to response the traffic flow conditions at different years, it is necessary that ***the traffic control parameters of signal light should be updated*** periodically.

8.3.2 Study Area

The study area for the immediate action plan, as shown in Figure 8.3.1, covers the area of seriously congested traffic in the Cairo CBD and Central Giza area (hereafter referred to as the "action plan area"), bordered by the Ramsees, Port Said and El Neel Cornish roads, and bordered by the Gamal Abd El Nasser, El Sudan and Abd El

Salam Aref roads. Chronic traffic congestion in the area becomes very severe during peak periods, where average travel speeds are less than 10km/h due to multiple causes such as traffic spill-back from over-saturated bottlenecks, signalized intersections with long cycle times, congestion of buses/shared taxies near bus stops, pedestrians crossing and merging and diverging from/to side roads without signal lights. Based on the foregoing, the Study Area for the immediate action plan has been defined by a traffic congestion area with low speeds of less than 10 km/h based on an analysis of the travel time survey.



Source: JICA Study Team 2002

Figure 8.3.1 Study Area for the Immediate Action Plan

8.3.3 Plan Description

(1) Improvement of the Traffic Signal Control System

Based on the results of the travel time survey, the current problems and issues related to existing traffic light controls are as follows:

- In the case of traffic congestion caused by spill-back due to near or over-saturated signalized intersections (bottlenecks), a technical improvement of the traffic signal light control to manage the traffic volume should be considered.
- In the case of traffic congestion at no-signalized intersections or roundabouts, installation of signal lights including channelization should be considered, in order to control both motor vehicles and pedestrian traffic.
- In the case of traffic congestion of vehicles at U-turn points, the installation of traffic signal light control should be considered, in order to distribute conflicts between vehicles.

Based on the forgoing issues, therefore, the four (4) plans listed below were proposed for mitigating traffic congestion

- Traffic response system for near or over-saturated conditions.
- Synchronized system of traffic signal lights.
- Installation plan of traffic signal lights at non-signalized intersections and roundabouts.
- Installation plan of traffic signal lights at U-turn points.

1) Traffic Response System for Near or Over-saturated Conditions

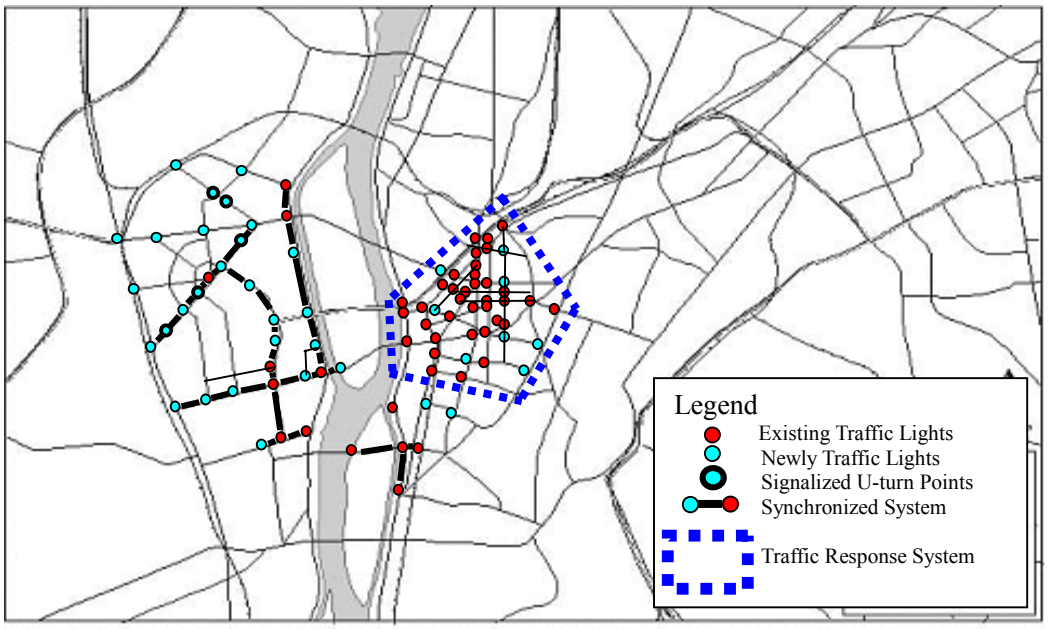
In order to alleviate traffic congestion where there are near or over-saturated conditions, it is recommended to introduce one type of traffic response system. It is applicable for all traffic conditions, from under-saturation to over-saturation. As part of the advanced traffic control system of the Tokyo Metropolitan Police Department, this new signal control system* was developed. The concept of control, system configuration and the effects of application are detailed below.
**Source: Advanced traffic control system of Tokyo Metropolitan Police Department.*

a) Plan Locations

As shown in Figure 8.3.2, this plan will deal with the principal road network of signalized intersections, linked to key bottlenecks with near or over-saturated conditions following the analysis of the travel time survey. In determining the locations for the installation of traffic signal lights for the traffic response system, the following criteria was used:

***Criteria for determining locations for installation of signal lights*:**

- Traffic congestion sections indicating less than 10km/h of average travel speed, due to long periods of waiting for traffic signal lights to change;
- High ratio of total stopping time to total travel time: ratio above 50%.
- Key bottlenecks bring about spill-back condition to downstream; and
- Locations are located in the high principal road network in the action plan area.



Source: JICA Study Team 2002

Figure 8.3.2 Plan Location for Signal Control System

The target intersections controlled by manual operation by the traffic police will be considered to be signalized intersections. Based on the foregoing consideration, the plan of the traffic response system covers the area bordered by Ramsees, Clot Bey, Port Said, Magless El Shaab and Cornish El Neel roads. The target total number of signalized intersections is 44 locations including 8 new signals.

b) Concept of Real-time Control System

The concept of control is explained below.

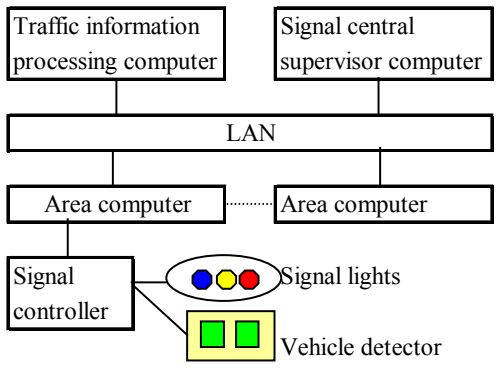
- When traffic demand is under-saturated, the aims of the system are not only to reduce delay and stops but also to make the traffic flow safe by moderating the speed of vehicles. It therefore uses a tool to set up an offset which corresponds to the cycle length and uses a pattern selection method for real-time offset control.

- When traffic demand is nearly saturated, this system curbs congestion by improving the efficiency of green time at critical intersections and maximizing the traffic capacity. It is provided with a critical intersection control method (Congestion alleviation control) for achieving this. The congestion alleviation control directly calculates the split and cycle length every 2.5 minutes based on the queue and the traffic volumes calculated from vehicle detector information. This system also incorporates right turn vehicle actuation, which is run every second by a signal controller at each critical intersection.

- When traffic demand is over-saturated, this system runs priority control for competing traffic flows at critical intersections. If congestion has exceeded a certain limit within a specific area such as the city center, this system controls inflow to that area. Priority control is made possible by the congestion alleviation control function, and inflow control is provided by Intentional Priority Control.

c) System Configuration and Summary of Functions

The system consists of sub-systems which are connected by means of an optical LAN and which share functions. As shown in Figure 8.3.3, the system consists of several Area Computers, a Traffic Information Processing Computer and a Signal Control Supervisor Computer.



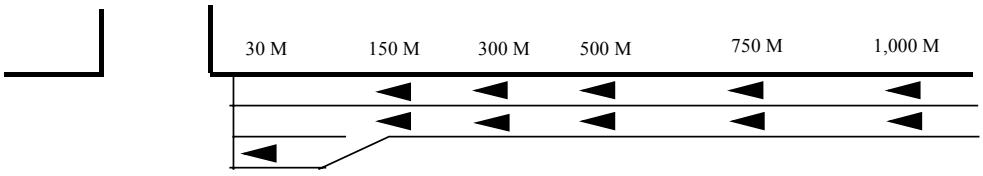
Source: *Advanced traffic control system* ***of Tokyo Metropolitan Police Department***

Figure 8.3.3 System Configuration

d) Traffic Information Processing

- Arrangement of vehicle detectors

Figure 8.3.4 shows a standard arrangement of vehicle detectors on an approach to a critical intersection (key intersection).

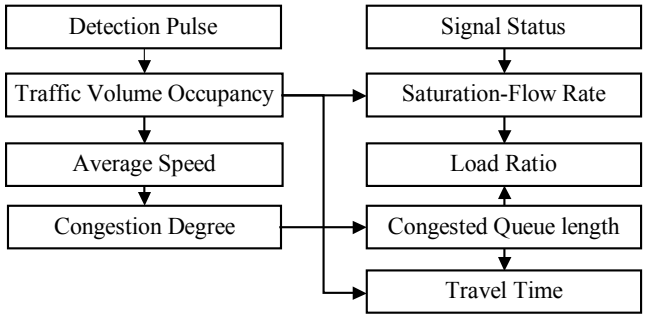


Source: Advanced traffic control system of the Tokyo Metropolitan Police Department

Figure 8.3.4 Arrangement of Vehicle Detectors

- Traffic Information Process

Figure 8.3.5 shows the flow of information, and the method used for processing each type of information is described below.



Source: Advanced traffic control system of the Tokyo Metropolitan Police Department

Figure 8.3.5 Traffic Information Process

- Signal Control Method

The system consists of a macro control function, which operates every 2.5 minutes, and a micro control function which operates every second. The macro control function is run by the Signal Control Supervisor and determines the signal parameters based on detector information and congestion information. The micro control function runs on the signal controllers and finely adjusts the green time based on detector information from nearby intersections. Its main functions are left-run vehicle actuation and flow rate maximization control.

e) Effects of Application of Traffic Response System

The effects of the application of traffic response system may be estimated that total travel time fell by 9%, total delay fell by 23% and congestion length-time fell by 28%, according to the result of Tokyo System.

2) Synchronized System for Traffic Signal Lights

Most major signalized intersections are manually controlled by traffic policemen and this manual control is not enough to keep traffic signal lights synchronized. In order to achieve a smooth traffic flow for major directions on seriously congested roads, it is highly recommended that the computerized synchronized system of traffic signal lights during peak hours is improved. Figure 8.3.2 shows the plan locations for the synchronized system, which covers target routes including the key bottlenecks with near or over-saturated conditions. In determining the locations for installation of traffic signal lights by the synchronized system, the following criteria was used:

***Criteria for determining the locations of the synchronized system*:**

- Traffic congestion sections indicating less than 10km/h of average travel speed, due to long waiting times for the traffic light to change;
- High ratio of total stopping time to total travel time: ratio above 50%, and
- Major route to be a priority except for within the planned area for the traffic response system.

Based on the foregoing the consideration, target routes of the synchronized system are eight (8) routes outside of the traffic response system: Cornish El Neel, El Saray roads in Cairo CBD, Abdel Nasser, Gami'at-Duwa El Arabiya, Doqy, Abdel Salam Aref, and Tahreer roads in Central Giza.

3) Installation Plan of Traffic Signal Lights at Non-signalized Intersections and Roundabouts

The plan for the installation of traffic signal lights will deal with both the non-signalized intersections, highlighted as subject intersections for the traffic response system and the synchronized system, and the non-signalized intersections or roundabouts where the volume of merging and/or diverging traffic was large. These were also highlighted as traffic bottlenecks through an analysis of the current situation which was based on the travel time survey. The plan includes the channelization system. Figure 8.3.2 shows the plan locations for the installation of traffic signal lights. In determining the locations for the installation of traffic signal lights, the following criteria was used:

***Criteria for determining the locations of traffic lights*:**

- Traffic congestion sections indicating less than 10km/h of average travel speed due to long waiting times for the traffic light to change, and
- Locations with traffic congestion due to merging and/or diverging traffic.

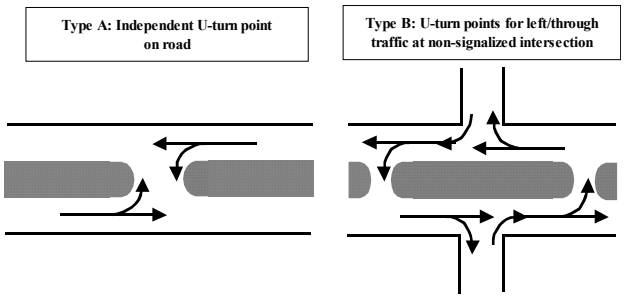
Based on these criteria, the targeted new signalized intersections are: 10 intersections in Cairo CBD, 23 intersections in Central Giza.

f) Channelization System

Based on the installation of traffic signal lights at non-signalized intersections or roundabouts mentioned above, the traffic channelization plan will be mainly executed.

4) Installation plan of traffic signal light at U-turn points

Traffic congestion at U-turn points is caused by conflicts between through traffic and entering traffic. It is, therefore, highly recommended that the installation of new traffic signal lights at U-turn points should be considered, in order to control both main traffic flow and entering traffic flow. The plan proposes a standard design by type of U-turn point. The current U-turn points are classified into two types i.e. A) independent U-turn point on road and B) U-turn points for left-turn/through traffic at non-signalized intersections (see Figure 8.3.6).



Source: JICA Study Team 2002

Figure 8.3.6 Type of Current U-Turn Points

a) Comparison With/Without System of Traffic Signal Lights

- Type A: Independent U-turn Point on Road

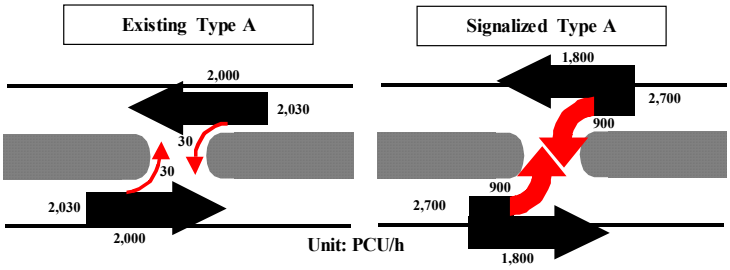
Table 8.3.2 shows the comparison of design capacity between existing type A and signalized type A. The figure indicates that the capacity of entering traffic from a U-turn lane will decrease rapidly when the traffic demand on major road nears capacity, the capacity of entering traffic from 1-lane U-turn point is only about 30 PCU/h when the through traffic on a major road is high i.e. above 2,000 PCU/h. As the result, the through traffic on the major road will be blocked by a long queue of entering traffic from the U-turn point. On the other hand, the proposed signalized U-turn point can serve about 900 PCU/h of entering traffic even if the demand of through traffic is high, through the distribution of signal phases (see Figure 8.3.7).

The capacity of entering traffic at a U-turn point was calculated based on the sum of the following two traffic volumes:

- General traffic volumes on the major or priority road and,

- Maximum traffic volume on the minor or non-priority road that, at the same time, can possibly pass through the U-turn point after stopping once.

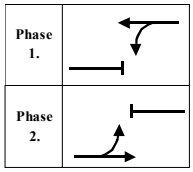
Accordingly, the usage of headways in priority traffic flow by vehicles of non-priority traffic flow is generally treated under the "gap-acceptance". The simple model equation is given by the Poisson distribution.



Source: JICA Study Team 2002

Figure 8.3.7 Comparison With/Without System of Traffic Signal Lights

The proposed signalized U-turn point was assumed based on the design conditions in Figure 8.3.8.



Proposed signal step. (cycle length = 100 sec)

Phase No.	Time (sec)			
	50			100
1	G(46)	Y	R(50)	
2	R(50)		G(46)	Y

Note: G = Green, R = Red, Y = Yellow (4 sec),
Each loss time = 1 sec

Source: JICA Study Team 2002

Figure 8.3.8 Assumption of Signal Phasing and Step

Table 8.3.2 Comparison of Design Capacity Between Existing Type A and Signalized Type A

4-lanes two-way, major road traffic (PCU/h)	Design Capacity			
	Existing A type		Signalized A type	
	4-lanes two-way, major road traffic (PCU/h)	1-lane one-way, entering traffic from U-turn lane (PCU/h)	4-lanes two-way, major road traffic (PCU/h)	1-lane one-way, entering traffic from U-turn lane (PCU/h)
600	4,000	550	1,800	900
1,000	4,000	330	1,800	900
1,500	4,000	160	1,800	900
2,000	4,000	**30**	1,800	900

Source: JICA Study Team 2002

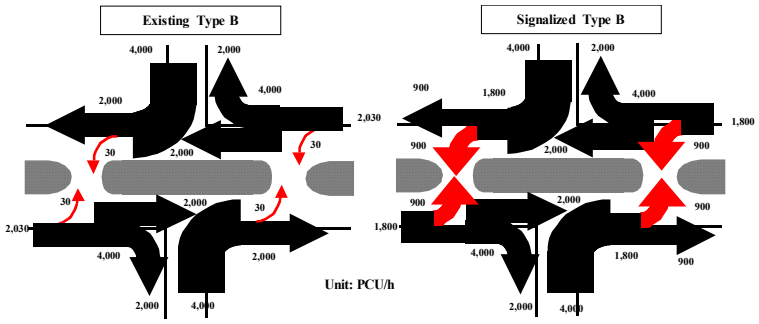
- Type B: U-turn Points for Left-turn/through Traffic at Non-signalized Intersection

Table 8.3.3 shows the comparison of design capacity between existing type B and signalized type B. The type B seems similar to a type of roundabout. However, the

circular traffic on the roundabout is priority traffic, whilst incoming traffic is non-priority traffic. Therefore, the existing type B should be considered as separated intersections linked to two U-turn points. The existing type B has two locations where there are headways in priority traffic flow by vehicles of non-priority traffic flow. The figure indicates that the capacity of entering traffic from U-turn lanes will decrease the same as the abovementioned existing type A. The proposed signalized intersection can also serve both directions at about 1,800 PCU/h through the distribution of signal phases (see Figure 8.3.9). The signal control system can work effectively when the traffic shows a stable fluctuation pattern in different directions.

The signalized Type B should be designed based on the following conditions:

- The signal system should be designed together as two U-turn points.
- The signal split adopts a synchronized system by using the abovementioned U-turn point signal steps.
- The each U-turn points will be controlled by offset parameters.



Source: JICA Study Team 2002

Figure 8.3.9 Comparison With/without System of Traffic Signal Lights

Table 8.3.3 Comparison of Design Capacity Between Existing Type B and Signalized Type B

4-lanes two-way, major road traffic (PCU/h)	Design Traffic Capacity											
	Existing B type						Signalized B type					
	4-lanes two-way, major road traffic (PCU/h)			4-lanes two-way, minor road traffic (PCU/h)			4-lanes two-way, major road traffic (PCU/h)			4-lanes two-way, minor road traffic (PCU/h)		
	Through and left-turn traffic	Right-turn traffic	Total	Through and left-turn traffic	Right-turn traffic	Total	Through and left-turn traffic	Right-turn traffic	Total	Through and left-turn traffic	Right-turn traffic	Total
600	2,000	2,000	4,000	550	2,000	2,550	900	900	1,800	900	900	1,800
1,000	2,000	2,000	4,000	330	2,000	2,330	900	900	1,800	900	900	1,800
1,500	2,000	2,000	4,000	160	2,000	2,160	900	900	1,800	900	900	1,800
2,000	2,000	2,000	4,000	**30**	2,000	2,030	900	900	1,800	900	900	1,800

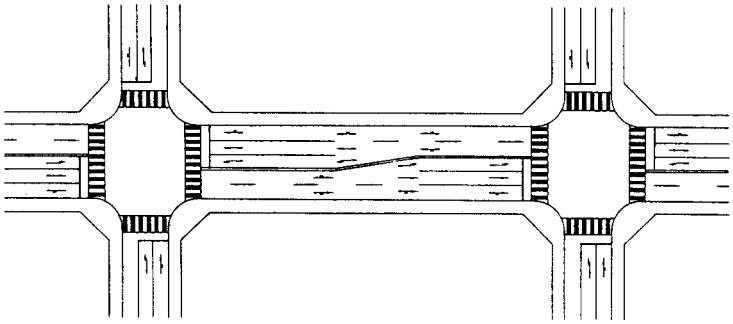
Source: JICA Study Team 2002

(2) Improvement of Intersection

Since there is no space in the built-up area of the plan area, for the short term, it is very difficult to widen existing and new roads. Accordingly, based on the major problem of current traffic spill-back associated with bottlenecks caused by lack of traffic capacity, it is necessary to increase road traffic capacity through the maximum use of the existing road facilities. The measure should take into account the need to decrease delay time and long queue during peak hours. Therefore, an improvement of an intersection by introducing a widening plan at the approach of the intersection with channerization is necessary, in addition to the abovementioned signal control system, for mitigating traffic congestion.

1) Widening Plan at Approach of Intersection

This plan covers the signalized intersections at the locations which, based on the analysis of the travel time and distance diagram in the travel time survey, were considered to be traffic bottlenecks. In this analysis, the bottleneck point in the context of traffic engineering is defined as follows: travel speed of less than 10km/h, and ratio of total stopping time to total travel time indicating a ratio of above 50%. At bottlenecks where such parameters are exceeded, the approach will be widened and/or traffic lights system will be improved as the abovementioned. In this section, the widening plan will be introduced. As an example, improvement plans are shown in Figure 8.3.10. The left lane of the widening plan is improved by shifting to the centerline or median, and the improvement of channeling is also required. In determining the locations for the widening plan at the approach of intersection, the criteria used was the same as for the improvement of the traffic control system, the location to be improved is also the same as for bottlenecks.



Source: JICA Study Team 2002

Figure 8.3.10 A Sample of a Widening Plan At the Approach of an Intersection

2) Plan for Improvement of an Intersection by Introducing A Dynamic Simulation Model

This section discusses the assessment for the improvement of bottlenecks by introducing a Dynamic Simulation Model. The target bottleneck for assessment is Abdel Moniem Ryad Square, pinpointed as a traffic bottleneck through the analysis of the travel time survey. In order to ensure a smooth traffic flow, the traffic circulation plan is formulated by introducing a synchronized system of traffic lights,

a pedestrian-friendly scramble crossing system and a ramp control system for the 6th October Bridge.

a) Alternative

Each Alternative is shown in Figure 8.3.11 (1)(2)(3)(4). Alternatives for improvement are classified into four (4) types as follows:

- Alternative A: Traffic circulation system by synchronized signal light

Alternative A adopts fully adequate synchronized traffic lights at crossing points on the principal roads, in order to achieve a smooth traffic circulation. Because, these intersections are manually controlling by traffic policemen, this manual control is difficult to effectively work when the traffic shows an unstable fluctuation pattern. Additionally, there is inadequate signal phasing at the major signalized intersections, for instance, at Galaa-Cornish El Neel intersection, and the traffic from Galaa St. at the 2nd phasing of the traffic lights is always blocked by the through traffic from Cornish St. Consequently, spill-back conditions occur downstream. When two intersections interfere with each other because the distance between them is too short, these intersections should be consider as one signal control system. Signal phasing at Galaa-Mariette Pasha St. intersection has also a conflict between buses from/to the bus street under 6th October Bridge and traffic on Mariette Pasha St. Furthermore, this phasing is not coordinated with traffic from Galaa St., and then, drivers jump queues and block intersections. There are three serious cross points caused by short distance weaving behavior. The most serious weaving point is the section between Galaa-Mariette Pasha St. intersection, and the on-ramp to 6th October Bridge and the left-turn to Tahreer Sq. Traffic congestion becomes very severe due to the conflict between this three directional traffic. Other points are sections between Galaa-Mariette Pasha St. intersection and Ramsees- Mariette Pasha St., caused by traffic going to Ramsees St., on-ramp to 6th October Bridge and Galaa St.. Based on the foregoing conditions, a traffic circulation system will be introduced with synchronized traffic lights.

- Alternative B: Pedestrian-friendly by scramble pedestrian crossing

Alternative B is the same as adopting fully synchronized traffic lights, in addition to a pedestrian-friendly scramble crossing.

- Alternative C-1: 6th October Bridge ramp control by closing on-ramps

Alternative C-1 is traffic enforcement for entering to 6th October Bridge by closing the on-ramp during peak hours.

- Alternative C-2: 6th October Bridge ramp control by partial closing

Alternative C-2 is stronger traffic enforcement than Alternative C-1, with the partial closing of on/off ramps.

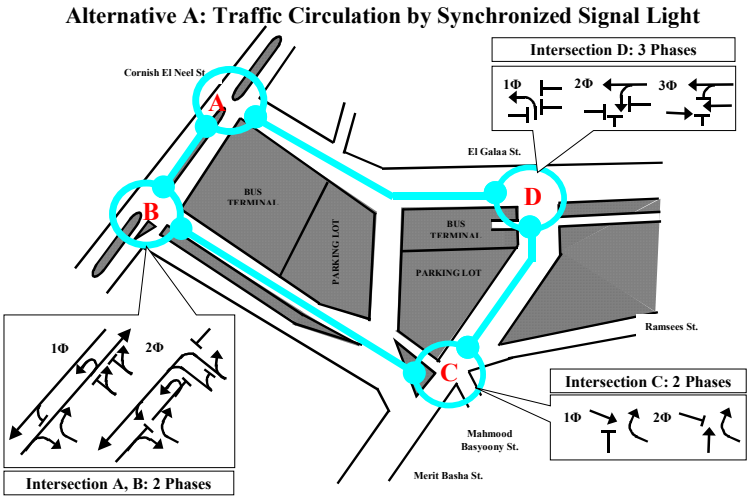


Figure 8.3.11 (1) Alternative A: Traffic Circulation System by Synchronized Signal Light

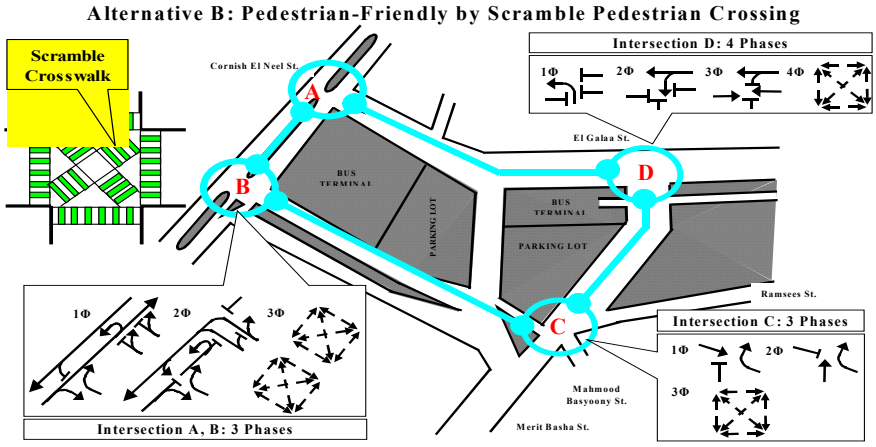


Figure 8.3.11 (2) Alternative B: Pedestrian-Friendly Scramble Crossing

Alternative C-1: 6th October Bridge Ramp Control by On-Ramps

(A.M. peak hours and P.M. peak

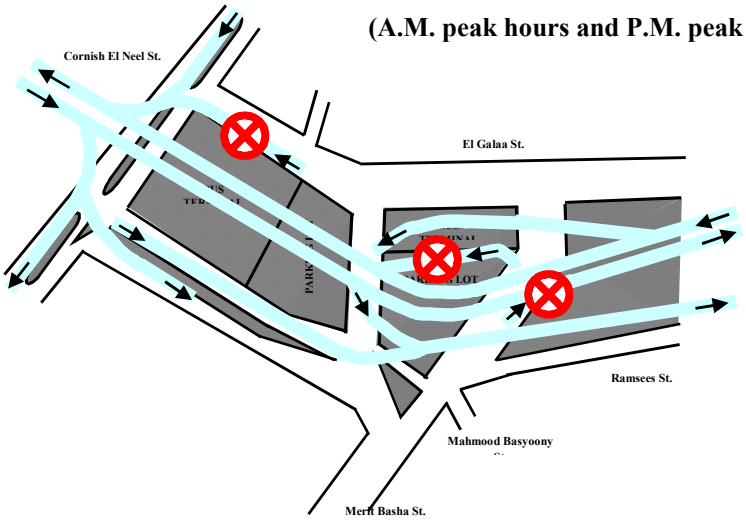


Figure 8.3.11 (3) Alternative C-1: 6th October Bridge Ramp Control by Closing On-Ramps

Alternative C-1: 6th October Bridge Ramp Control by Partial

(A.M. peak hours and P.M. peak

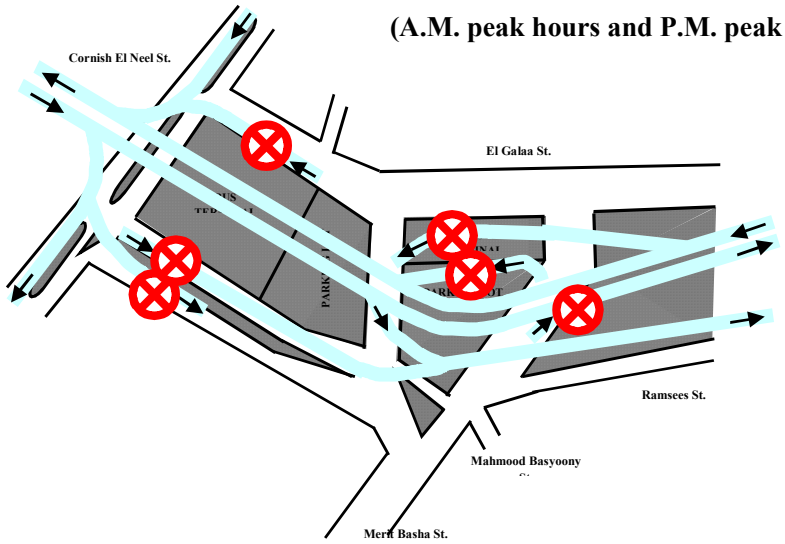


Figure 8.3.11 (4) Alternative C-2: 6th October Bridge Ramp Control by Partial Closing

The calculation of the saturation flow rate and the saturation degree of the intersection in Alternative A and B is shown in Table 8.3.4. Figure 8.3.12 shows the plan of signal cycle time and splits.

Table 8.3.4 Calculation of Saturation Flow Rate and Saturation Degree of Intersection

Intersection A.

Approach		N-S			S-N			E			-		
		R	S	L	R	S	L	R	S	L	R	S	L
1) No. of lanes		0	3	0	0	4	0	3	0	2	-	-	-
2) Basic value of saturation flow rate		-	2,000	-	-	2,000	-	2,000	-	2,000	-	-	-
3) Adjustment factor lane width		-	1.000	-	-	1.000	-	1.000	-	1.000	-	-	-
4) Adjustment factor for heavy vehicles		-	0.97	-	-	0.8	-	0.97	-	0.97	-	-	-
5) Adjustment factor for left		-	1	-	-	1	-	1	-	1	-	-	-
6) Saturation flow rate		-	5,820	-	-	6,400	-	5,820	-	3,880	-	-	-
7) Traffic volume		-	3,236	-	-	2,113	-	1,239	-	637	-	-	-
8) Flow rate		-	0.556	-	-	0.330	-	0.213	-	0.164	-	-	-
9) Necessary phase ratio	1Φ	-	0.556	-	-	0.330	-	0.000	-		-	-	-
	2Φ	-	-	-	-	-	-	0.000	-	0.164	-	-	-
	3Φ	-	-	-	-	-	-	-	-		-	-	-
	4Φ	-	-	-	-	-	-	-	-		-	-	-
10) Ratio of heavy		-	5%	-	-	33%	-	2%	-	3%	-	-	-

Note: R=Right-turn, S=Straight, L= Left-turn, S.D=Saturation Degree

Intersection B

Approach		N-S			S-N			E			-		
		R	S	L	R	S	L	R	S	L	R	S	L
1) No. of lanes		-	4	3	2	4	-	2	-	-	-	-	-
2) Basic value of saturation flow rate		-	2,000	2,000	2,000	2,000	-	2,000	-	-	-	-	-
3) Adjustment factor lane width		-	1.000	1.000	1.000	1.000	-	1.000	-	-	-	-	-
4) Adjustment factor for heavy vehicles		-	0.970	0.910	0.970	0.970	-	0.940	-	-	-	-	-
5) Adjustment factor for left		-	1.000	1.000	1.000	1.000	-	1.000	-	-	-	-	-
6) Saturation flow rate		-	7,760	5,460	3,880	7,760	-	3,760	-	-	-	-	-
7) Traffic volume		-	2,137	1,826	1,996	1,456	-	663	-	-	-	-	-
8) Flow rate		-	0.275	0.334	0.514	0.188	-	0.176	-	-	-	-	-
9) Necessary phase ratio	1Φ	-	0.275		0.000	0.188	-	0.176	-	-	-	-	-
	2Φ	-	0.275	0.334	0.000	-	-	0.176	-	-	-	-	-
	3Φ	-	-	-	-	-	-	-	-	-	-	-	-
	4Φ	-	-	-	-	-	-	-	-	-	-	-	-
10) Ratio of heavy vehicles		-	4%	6%	4%	2%	0	8%	-	-	-	-	-

Note: R=Right-turn, S=Straight, L= Left-turn, S.D=Saturation Degree

Source: JICA Study Team 2002

Table 8.3.4 Calculation of Saturation Flow Rate and Saturation Degree of Intersection (Contd.)

Intersection C

Approach		N-S			S-N			W-E			E-W				
		R	S	L	R	S	L	R	S	L	R	S	L		
1) No. of lanes		-	-	-	4	-	-	-	-	3	1	-	-		
2) Basic value of saturation flow rate		-	-	-	2,000	-	-	-	-	2,000	2,000	-	-		
3) Adjustment factor lane width		-	-	-	1.000	-	-	-	-	1.000	1.000	-	-		
4) Adjustment factor for heavy vehicles		-	-	-	0.970	-	-	-	-	0.970	0.970	-	-		
5) Adjustment factor for left		-	-	-	1.000	-	-	-	-	1.000	1.000	-	-		
6) Saturation flow rate		-	-	-	7,760	-	-	-	-	5,820	1,940	-	-	S.D of phase	Total S.D
7) Traffic volume		-	-	-	4,924	-	-	-	-	970	1,834	-	-		
8) Flow rate		-	-	-	0.635	-	-	-	-	0.167	0.945	-	-		
9) Necessary phase ratio	1Φ	-	-	-		-	-	-	-	0.167	0.000	-	-	0.167	0.801
	2Φ	-	-	-	0.635	-	-	-	-		0.000	-	-	0.635	
	3Φ	-	-	-	-	-	-	-	-	-	-	-	-		
	4Φ	-	-	-	-	-	-	-	-	-	-	-	-		
10) Ratio of heavy vehicles		-	-	-	3%	-	-	-	-	1%	-	-	-	-	-

Note: R=Right-turn, S=Straight, L= Left-turn, S.D=Saturation Degree

Intersection D

Approach		S-N			E-W(Gala St.)			W (from Bus termin		-W (to Bus termina					
		R	S	L	R	S	L	R	S	L	R	S	L		
1) No. of lanes		-	-	3	-	5	-	-	1	-	-	1	-		
2) Basic value of saturation flow rate		-	-	2,000	-	2,000	-	-	2,000	-	-	2,000	-		
3) Adjustment factor lane width		-	-	1.000	-	1.000	-	-	1.000	-	-	1.000	-		
4) Adjustment factor for heavy vehicles		-	-	0.970	-	0.940	-	-	1.000	-	-	1.000	-		
5) Adjustment factor for left		-	-	1.000	-	1.000	-	-	1.000	-	-	1.000	-		
6) Saturation flow rate		-	-	5,820	-	9,400	-	-	2,000	-	-	2,000	-	S.D of phase	Total S.D
7) Traffic volume		-	-	1,282	-	4,232	-	-	200	-	-	200	-		
8) Flow rate		-	-	0.220	-	0.450	-	-	0.100	-	-	0.100	-		
9) Necessary phase ratio	1Φ	-	-	0.220	-	-	-	-	-	-	-	-	-	0.220	0.770
	2Φ	-	-	-	-	0.450	-	-	-	-	-	-	-	0.450	
	3Φ	-	-	-	-	-	-	-	0.100	-	-	0.100	-	0.100	
	4Φ	-	-	-	-	-	-	-		-	-	-	-		
10) Ratio of heavy vehicles		-	-	4%	-	7%	-	-	100%	-	-	-	-	-	-

Note: R=Right-turn, S=Straight, L= Left-turn, S.D=Saturation Degree

Source: JICA Study Team 2002

Figure 8.3.12 Plan of Signal Cycle Time and Splits.

Alternative A: Intersection A
Proposed Signal Step: Cycle Length = 100 sec

Phase	Time (sec)		
1Φ	G (70)	Y	R (25)
2Φ	R (75)	G	Y

Note: Yellow time = 5 sec

Alternative A: Intersection B
Proposed Signal Step: Cycle Length = 100 sec

Phase	Time (sec)		
1Φ	G (41)	Y	R (54)
2Φ	R (46)	G (49)	Y

Note: Yellow time = 5 sec

Alternative A: Intersection C
Proposed Signal Step: Cycle Length = 100 sec

Phase	Time (sec)		
1Φ	G	Y	R (76)
2Φ	R (24)	G (71)	Y

Note: Yellow time = 5 sec

Alternative A: Intersection D
Proposed Signal Step: Cycle Length = 100 sec

Phase	Time (sec)				
1Φ	G (23)	Y	R (72)		
2Φ	R (28)	G (50)	Y	R(17)	
3Φ	R (83)		(12)	G	Y

Note: Yellow time = 5 sec

Alternative B: Intersection A
Proposed Signal Step: Cycle Length = 150 sec

Phase	Time (sec)				
1Φ	G (77)	Y	R(68)		
2Φ	R(82)	G (28)	Y	R(35)	
3Φ	R(115)	G (30)	Y		

Note: Yellow time = 5 sec

Alternative B: Intersection B
Proposed Signal Step: Cycle Length = 150 sec

Phase	Time (sec)			
1Φ	G (52)	Y	R(93)	
2Φ	R(57)	G (53)	Y	R(35)
3Φ	R(115)	G (30)	Y	

Note: Yellow time = 5 sec

Alternative B: Intersection C
Proposed Signal Step: Cycle Length = 150 sec

Phase	Time (sec)			
1Φ	G (25)	Y	R(120)	
2Φ	R(30)	G (90)	Y	R(25)
3Φ	R(125)	G	Y	

Note: Yellow time = 5 sec

Alternative B: Intersection D
Proposed Signal Step: Cycle Length = 150 sec

Phase	Time (sec)			
1Φ	G (32)	Y	R(114)	
2Φ	R(36)	G (63)	Y	R(47)
3Φ	R(103)	G (15)	Y	R(28)
4Φ	R(122)	G (24)	Y	

Note: Yellow time = 4 sec

Source: JICA Study Team 2002

b) Microscopic Dynamic Traffic Simulation Program

The Microscopic Dynamic Traffic Simulation Program is a software application which has been designed for the analysis of traffic flows in a road network. This program creates vehicles, each of which follows the vehicle ahead and determines its behavior based on the surrounding conditions at every time point until it reaches the destination. Each generated vehicle has its own desired speed, vehicular acceleration/deceleration performance, final destination, and route to the destination, and a variety of vehicle characteristics create irregular, frictional traffic flows, thus reproducing traffic congestion in the computer.

To be more precise, the Dynamic Simulation Program can reproduce the following phenomena in some form:

- Traffic disorder caused by the co-existence of slower vehicles;
- Traffic flow at signalized intersections;
- Merging and weaving traffic; and
- Traffic behavior depending on the road structure

The program then gives computed outputs such as traffic capacity of all or part of the network, average speed and stopping delay of vehicles by sections, etc. Therefore, it is envisaged that the application of this program is very effective, particularly when several alternative plans of road network are worked out and it is necessary to give some kind of quantitative approach for the comparison of the efficiency of each plan.

c) Distinctive Alternatives for Comparison

Average vehicle speed between intersections can be calculated as a division of the section length by the travel time to pass the whole section. The travel time includes the time when a vehicle stops at a traffic signal or in a congested area. Therefore, it should be noted that the actual running speed may be higher than this average vehicle speed value.

Based on the forecast results shown in from Figure 8.3.11(1) through Figure 8.3.11(4), four (4) alternative plans have been compared with the present case or each other. Below are some findings from this comparative analysis.

- Present case; the average speeds are in the range of 5km/h to 23km/h during peak periods (9:00-10:00). Especially, the average speed in sections of 3-4 (7km/h), 4-5 (6km/h), 5-6 (5km/h) and 6-1 (7km/h) show less than 10km/h.

- In Alternative A, compared with the present case, there is a significant increase in average speed on the each section; 3-4 at 12km/h, 4-5 at 21km/h, 5-6 at 12km/h and 6-1 at 13km/h.

- In Alternative B, compared with the present case, generally there is no so much change in speed values. The average speeds are in the range of 7km/h to 22km/h

during peak periods. The average speeds in sections of 2-4 (9km/h), 3-4 (9km/h) and 5-6 (7km/h) show less than 10km/h.

- In the Alternative C-1, compared with the present case, there is no so much change in speed values. The average speeds are in the range of 4km/h to 34km/h during peak periods. The average speeds in sections of 5-6 (6km/h) and 6-1 (4km/h) show less than 10km/h.

- In the Alternative C-2, compared with the present case, there is a significant increase in average speed on the each section; 3-4 at 12km/h, 4-5 at 26km/h and 5-6 at 14km/h.

d) Overall Evaluation

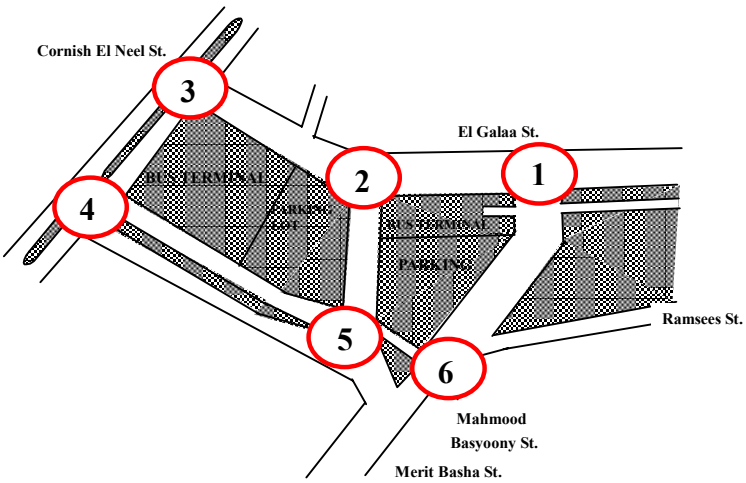
The comparative analysis conducted in terms of average vehicle speed show that all these four (4) alternative plans will most likely improve the current traffic flow in the Abdel Moniem Ryad Square. Above all, Alternative A has proved to make the highest score with respect to total numerical values. In this respect, the quantitative analysis finally concludes that, of all, Alternative A is the most recommendable action plan.

Table 8.3.5 Dynamic Simulation Forecast: Total Stopping Delay

(Morning Peak)

From/To	Travel Speed Forecasted by Dynamic Simulation (km/h)				
	Present	Alternative A	Alternative B	Alternative C-1	Alternative C-2
1 → 2	6	20	14	10	26
2 → 3	11	15	9	15	12
3 → 4	7	12	9	10	12
4 → 5	6	21	16	10	26
5 → 6	5	12	7	6	14
6 → 1	7	13	10	4	8
2 → 5	20	25	17	16	35
4 → 3	23	32	22	34	34
Evaluation	**-**	**Good**	**Fair**	**Fair**	**Good**

Source: CREATS, JICA Study Team



(3) Improvement of Parking System

1) Introduction

The Study Area for the immediate action plan, in Cairo CBD and Central Giza, is a densely built-up area that functions as a center of commercial and business activities. In the rush hour, all major roads in the area are congested due to the high concentration of commuters, and commercial and business activities. This congestion causes numerous problems, including the deterioration of the overall environment and commercial and business activities. Owing to the density of buildings in the area of the immediate action plan, it will be difficult to improve the road capacity to meet the demands of an ever increasing traffic volume of traffic despite unlimited investment in new road construction.

Therefore, it is necessary start regulating the inflow of private vehicles by various traffic restrictions and increasing the use of public transport facilities. Unrestricted vehicle movement should be limited in the Cairo CBD and the Central Giza by means of restraint by traffic control and by promotion of modal conversion from private vehicles use to public transportation use. It is, therefore, highly recommended that the parking system should be improved by introducing policy zoning for parking management. The main points of the recommendation are:

- To ban on-street parking by zonal parking control in order to make more effective use of road capacity;
- To management parking duration on-street in order to increase the turnover rate;
- To deter vehicles from long-term parking on-street by introducing a parking charge system in addition to the parking duration control; and
- To develop off-street parking facilities with the proceeds from the parking charges.

In addition, the Japanese standards that building owners should provide parking spaces that are applicable for building use and by total floor area will be introduced in the plan.

2) Locations for Parking Management System

Figure 8.3.13 shows the plan area for the parking management system. Figure 8.3.14 shows the distribution of current high parking occupancy. With regard to on-street parking, Cairo CBD and Central Giza have high parking demand, where on-street total parking occupancy during midday peak hours exceeds 100%. However, parking occupancy in the Shiakha zone was different, in the range of 50% to 230%, due to the differing share of parking demand from building use. The parking purpose during the peak period is different i.e. parking purpose in the midday peak hours are mostly considered to be for commuting or business & shopping. Such parking share will be different in proportion to the share of parking demand from building use. Figure 8.3.15 shows the building use in the area of the immediate action plan. With regard to the zonal share of building use, on-street

parking management ought to be more strictly enforced for the area with high parking occupancy and every effort should be taken to increase off-street parking.

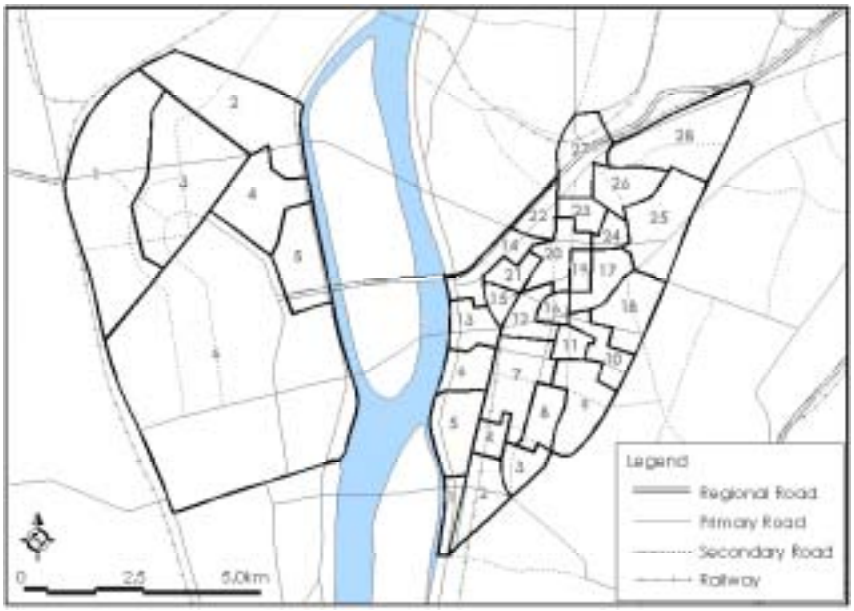
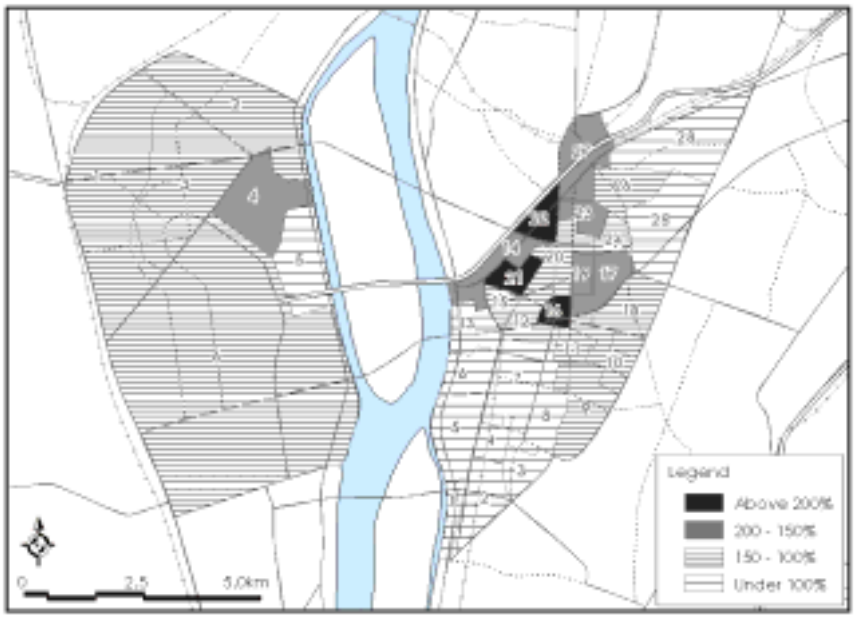
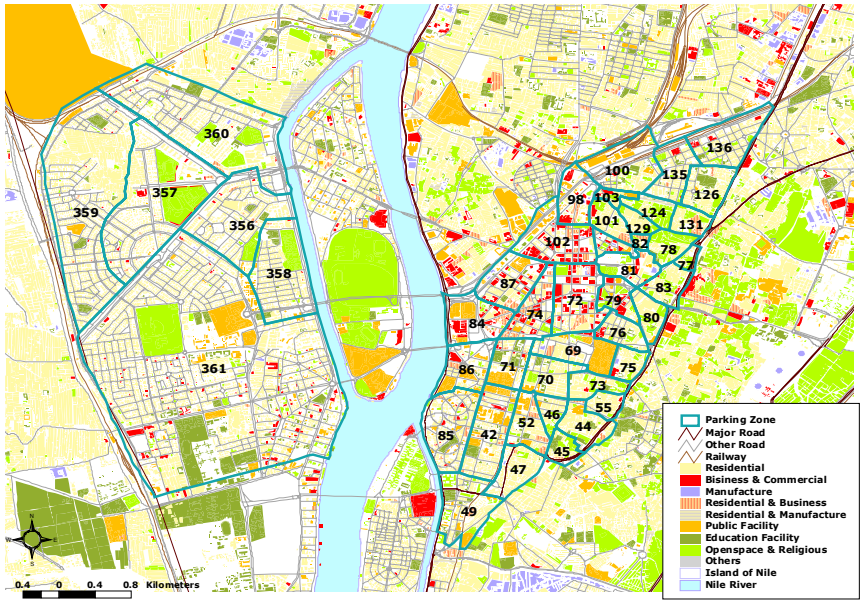


Figure 8.3.13 Plan Area for Parking Management



Source: JICA Study Team 2002

Figure 8.3.14 Distribution of Current High Parking Occupancy



Source: JICA Study Team 2002

Figure 8.3.15 Building Use in Immediate Action Plan Area

e) Area for Policy Zoning for Parking Management

The strictness of zonal parking management on street should be identified, based on the conditions of building use in the plan area. The policy zoning for parking management is effective for the traffic demand of commuting or business & shopping.

Table 8.3.6 shows the share of total building floor area by use and by sub-divided zone. The total building floor area is classified into four (4) categories of building use; 1) Residential, 2) Business & commercial, manufacture, public facility and education facility, 3) Mixed area residential & business, mixed area residential area & manufacture, and 4) open-space & religious and others. The generated and attracted traffic demand from/to building use of category 2) (Business & commercial, manufacture, public facility and education facility) are mostly considered to be for commuting or business & shopping. Figure 8.3.16 shows the distribution by the share of the total building floor area of category 2). The area bordered by Ramsees, Clot Bey, Abdel Azeez, El Sheikh and Cornish El Neel roads, has a high share of total building floor area for category 2), where the share is in the range of 50% to 70%. Particularly in the sub-divided zones 13, 14, 15, 16, 19, 21, 22 and 23, the shares of total building floor area are in the range of 61% to 70%. While, in most of the sub-divided zone in the Central Giza, the share of total building floor area for category 2) is less than 40%.

f) Criteria for Policy Zoning of Parking Management

Based on the foregoing situation, the policy zoning for parking management will be adopted at each zone listed below. In determining the area of the policy zoning for parking management, the following criteria are used.

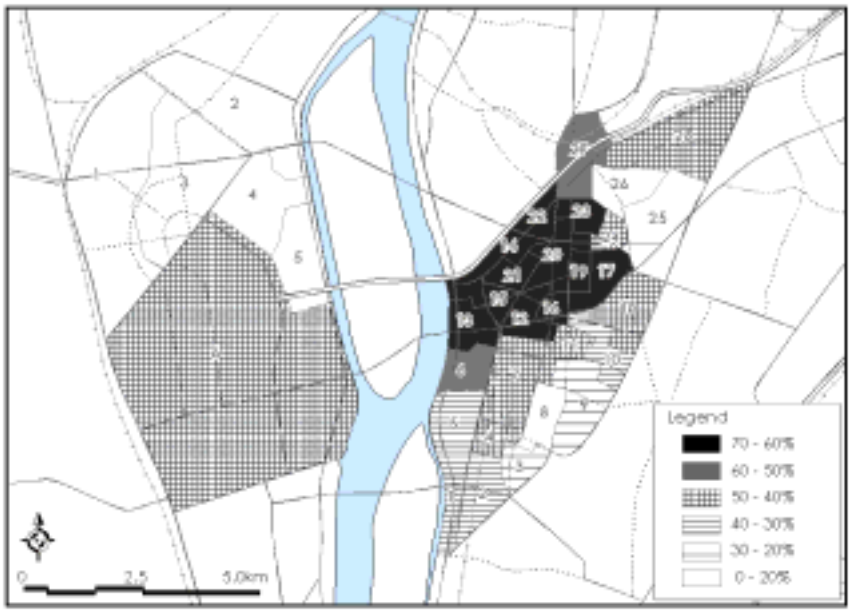
The areas of the policy zoning for parking management are defined as follows: Cairo CBD is bordered by Ramsees, Clot Bey, Port Said, Magless El Shaab, and Cornish El Neel roads, Central Giza is bordered by Gami'at-Duwa El Arabiya, Sudan, Abdel Salam Aref, and Gamal Abdel Nasser roads. Figure 8.3.17 shows the area of the policy zoning for parking management.

Criteria for Determining the Area of the Policy Zoning for Parking Management
1. Current high parking occupancy above 100% in midday peak hours.
2. Share of total building floor area of category 2); Business & commercial, manufacture, public facility and education facility above 30%.

Table 8.3.6 Share of Total Building Floor Area by Use by Sub-Divided Zone

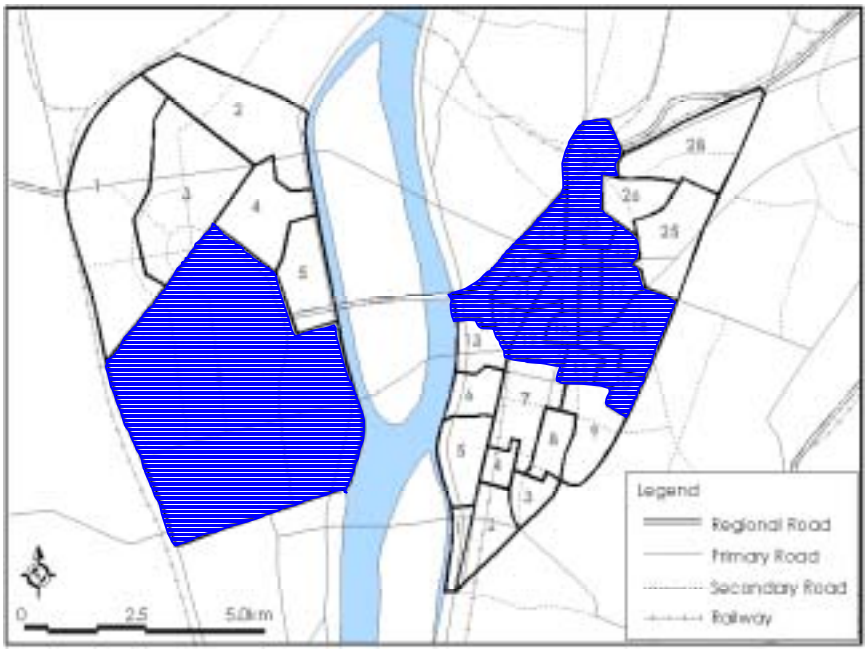
Zone No.	Zone Area	Building Area (ha)									
		Total Building Area		Residential		Business & Commercial + Manufacture + Public Facility + Education Facility		Mix Area Residential & Business + Mix Area Residential & Manufacture		Openspace & Religious + Others	
Total	**1807.63**	**3706.58**	**100.0%**	**2051.82**	**55.4%**	**1263.58**	**34.1%**	**265.36**	**7.2%**	**125.82**	**3.4%**
Cairo CBD	**770.62**	**1867.45**	**100.0%**	**794.31**	**42.5%**	**782.22**	**41.9%**	**239.06**	**12.8%**	**51.86**	**2.8%**
1	11.66	19.74	100.0%	10.30	52.2%	7.30	37.0%	1.14	5.8%	1.00	5.1%
2	32.30	58.29	100.0%	29.23	50.1%	23.00	39.5%	3.65	6.3%	2.40	4.1%
3	11.78	27.74	100.0%	19.81	71.4%	6.22	22.4%	1.42	5.1%	0.28	1.0%
4	12.71	30.58	100.0%	13.02	42.6%	14.90	48.7%	2.51	8.2%	0.15	0.5%
5	37.08	69.35	100.0%	41.48	59.8%	20.95	30.2%	6.50	9.4%	0.43	0.6%
6	26.25	48.67	100.0%	15.52	31.9%	27.32	56.1%	5.41	11.1%	0.42	0.9%
7	34.40	83.78	100.0%	36.56	43.6%	41.08	49.0%	5.42	6.5%	0.73	0.9%
8	38.54	101.53	100.0%	57.37	56.5%	20.19	19.9%	22.05	21.7%	1.92	1.9%
9	38.54	95.57	100.0%	58.63	61.3%	20.56	21.5%	11.80	12.3%	4.58	4.8%
10	32.26	84.13	100.0%	51.46	61.2%	25.29	30.1%	4.20	5.0%	3.18	3.8%
11	14.10	39.31	100.0%	17.66	44.9%	17.74	45.1%	3.25	8.3%	0.66	1.7%
12	24.12	73.85	100.0%	15.13	20.5%	39.86	54.0%	18.42	24.9%	0.44	0.6%
13	18.49	40.42	100.0%	5.18	12.8%	27.32	67.6%	7.61	18.8%	0.30	0.8%
14	25.89	63.91	100.0%	14.61	22.9%	38.96	61.0%	10.04	15.7%	0.30	0.5%
15	10.04	24.80	100.0%	1.67	6.7%	17.19	69.3%	5.79	23.3%	0.16	0.6%
16	11.77	50.45	100.0%	7.99	15.8%	31.51	62.5%	10.60	21.0%	0.35	0.7%
17	24.15	71.92	100.0%	18.28	25.4%	46.14	64.2%	5.45	7.6%	2.05	2.8%
18	33.53	91.93	100.0%	41.55	45.2%	43.90	47.8%	3.73	4.1%	2.74	3.0%
19	10.15	30.09	100.0%	7.84	26.1%	18.42	61.2%	3.29	10.9%	0.54	1.8%
20	31.22	99.72	100.0%	20.43	20.5%	61.42	61.6%	16.75	16.8%	1.12	1.1%
21	15.85	43.46	100.0%	12.95	29.8%	26.12	60.1%	4.26	9.8%	0.14	0.3%
22	20.62	56.67	100.0%	9.37	16.5%	39.63	69.9%	7.07	12.5%	0.61	1.1%
23	15.25	41.14	100.0%	6.98	17.0%	27.25	66.2%	6.48	15.8%	0.43	1.0%
24	10.71	22.79	100.0%	5.80	25.5%	10.73	47.1%	5.27	23.1%	0.98	4.3%
25	65.57	149.19	100.0%	87.02	58.3%	16.74	11.2%	30.24	20.3%	15.19	10.2%
26	23.41	71.52	100.0%	37.04	51.8%	17.81	24.9%	12.60	17.6%	4.07	5.7%
27	43.04	97.09	100.0%	20.77	21.4%	56.57	58.3%	18.44	19.0%	1.32	1.4%
28	97.16	190.33	100.0%	130.67	68.7%	48.61	25.5%	5.67	3.0%	5.38	2.8%
Giza CBD	**1037.01**	**1839.13**	**100.0%**	**1257.51**	**68.4%**	**481.36**	**26.2%**	**26.30**	**1.4%**	**73.96**	**4.0%**
1	158.80	350.41	100.0%	308.59	88.1%	38.81	11.1%	2.08	0.6%	0.92	0.3%
2	127.61	208.21	100.0%	162.13	77.9%	27.22	13.1%	7.78	3.7%	11.08	5.3%
3	115.72	160.37	100.0%	111.11	69.3%	23.53	14.7%	5.21	3.2%	20.53	12.8%
4	67.15	105.88	100.0%	87.29	82.4%	9.25	8.7%	5.05	4.8%	4.29	4.0%
5	58.00	98.81	100.0%	73.25	74.1%	15.78	16.0%	2.27	2.3%	7.51	7.6%
6	509.73	915.46	100.0%	515.14	56.3%	366.77	40.1%	3.92	0.4%	29.63	3.2%

Source: JICA Study Team 2002



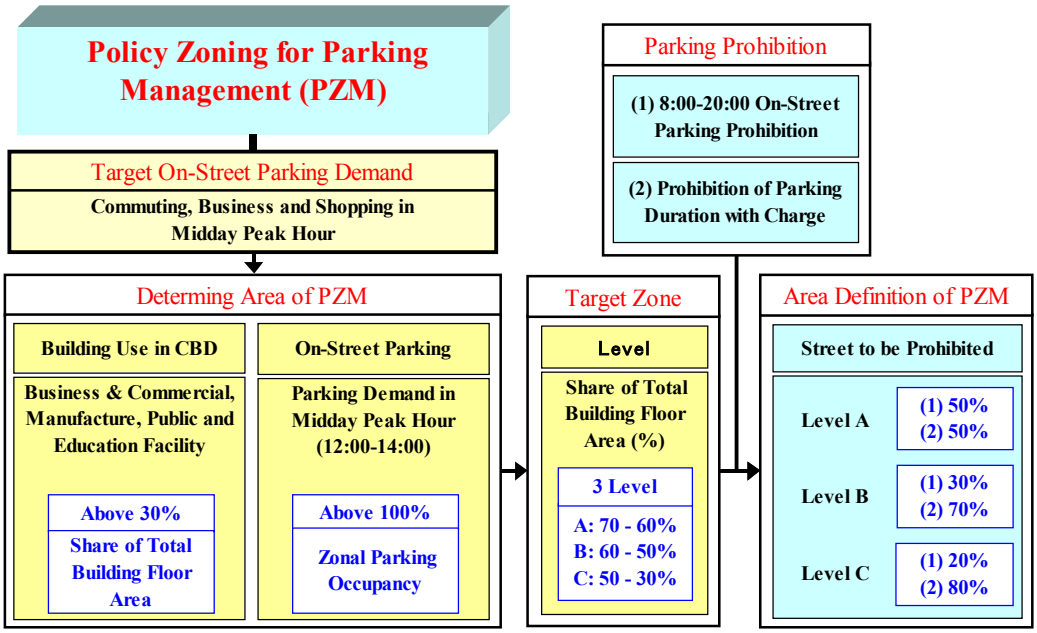
Source: JICA Study Team 2002

Figure 8.3.16 Distribution for Share of Total Building Floor Area of Category 2); Business & commercial, manufacture, public facility and education facility



Source: JICA Study Team 2002

Figure 8.3.17 Area of Policy Zoning for Parking Management



Source: JICA Study Team 2002

Figure 8.3.18 Policy Zoning System for Parking Management

3) Measure of Parking Management

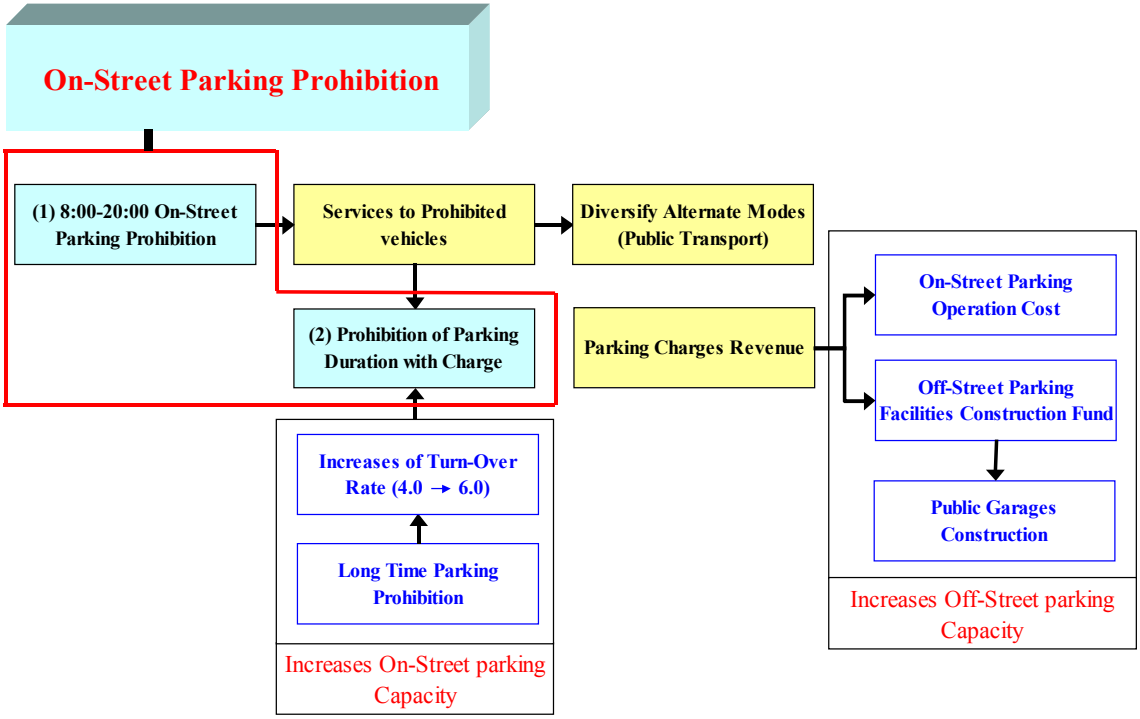
The strictness of zonal parking management on-street was identified as being based on the category levels of the share of the total building floor area and the degree of parking occupancy. Such strictness of category levels was defined by two (2) types of parking management. Two kinds of prohibition measures may be recommended; one is the prohibition of on-street parking during 8:00-20:00 and the other is to charge all vehicles. These two ought to be applied at the same time within one system.

- Prohibition of on-street parking during 8:00-20:00; and
- Prohibition of on-street parking duration by introducing a parking charge 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 (3) hours at one time, even by paying more.

The main purposes of this are:

- To raise the turnover rate in order to increase the parking capacity in the planned area;
- To exclude long-stay vehicles, for instance vehicles that park throughout working time, in order to provide more opportunities to vehicles to park for shopping or business;
- To promote the conversion from private mode to public mode; and
- To increase funds to develop off-street parking facilities.



Source: JICA Study Team 2002

Figure 8.3.19 Policy of Parking Prohibition

4) Area Definition of Zonal Parking Management by Strictness of Categories

Based on the foregoing, the area of the policy zoning for parking management and the two kinds of prohibition measures, a definition of zonal parking management by strictness, classified into three (3) category levels, may be recommended as shown in Table 8.3.7.

Table 8.3.7 Area Definition of Zonal Parking Management

Level	Criteria		Management	
	Zonal Share of Total Floor Area for Category 2)* (%)	Zonal Parking Occupancy (%)	Kinds of Prohibition	Of Total Streets, Street Share to be Prohibited (%)
A	70-60	Above 100%	1. Prohibition during 8:00-20:00.	50%
			2. Prohibition of parking duration with charge.	50%
B	60-50	Above 100%	1. Prohibition during 8:00-20:00.	30%
			2. Prohibition of parking duration with charge.	70%
C	50-30	Above 100%	1. Prohibition during 8:00-20:00.	20%
			2. Prohibition of parking duration with charge.	80%

Notes: * Business & commercial, manufacture, public facility and education facility

Source: JICA Study Team 2002

Level A is the strongest prohibition of on-street parking, the target area was identified based on the total floor area of category 2) indicating a high share of 60% to 70%. 50% of the streets will have no parking during 8:00-20:00, and the other 50% of streets have a parking charge system. Level B was identified based on the total floor area of category 2) indicating a share of 50% to 60%. 30% of the streets will have no parking during 8:00-20:00, and the other 70% of the streets have a parking charge system. Level C was identified based on the total floor area of category 2) indicating a share of 30% to 50%. 20% of the streets will have no parking during 8:00-20:00, and the other 80% of the streets have a parking charge system.

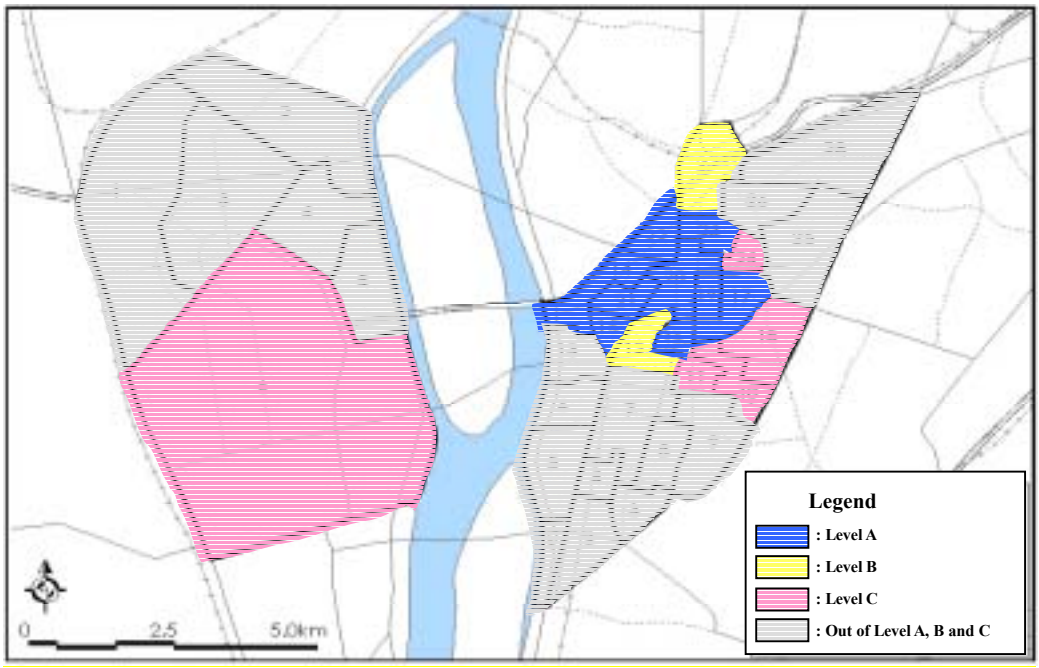
5) Area of Policy Zoning for Parking Management

Taking the area definition of zonal parking management into consideration, the area for parking management was established as shown in Figure 8.3.20 and Table 8.3.8. Zones where parking is to be prohibited are as follows:

Table 8.3.8 Zones Where Parking Is To Be Prohibited

Level	Cairo CBD	Central Giza
A	Zone No.14, 15, 16, 17, 19, 20, 21, 22 and 23	None
B	Zone No.12 and 27	None
C	Zone No.10, 11, 18 and 24	Zone No.6.

Source: JICA Study Team 2002



Source: JICA Study Team 2002

Figure 8.3.20 Definition of Area of Zonal Parking Management

6) Development Needs of Parking Spaces with Zonal Parking Management

Based on the plan of policy zoning for parking management, Table 8.3.9 shows the development needs of parking spaces by prohibited zones in Cairo CBD and Central Giza. The total is about 13,200 vehicles and 23,800 respectively. In order to enforce no-parking prohibition completely from 8:00 to 20:00, about 7,600 and 8,400 additional parking spaces will be required respectively. The number of vehicles affected by this prohibition is estimated to be about 25,000 and 37,000 vehicles/day respectively, assuming the average turnover rate is 3.3 and 4.4 times for the no parking time period respectively. (The average turnover from 6:00 to 22:00 based on the on-street parking survey is about 4.3 and 5.7 times). Those affected vehicles would have to seek other parking spaces. Therefore, in terms of the total floor space of parking facilities required, this translates into 19.0 and 21 hectares*. The supply deficiency by levels in Cairo CBD is, 5,400 lots in Level A zones, 1,300 lots in Level B zones, and 900 lots in Level C zones, the shortage by each zone is in the range of 130 to 960 lots. In Central Giza, the shortage in Level C zone is 8,400 lots. * *The required space for one car parking is 25 m^2 including pass way.*

Table 8.3.9 Development Needs of Parking Spaces by Zone for No-parking During 8:00-20:00 Time Periods

Zone No.	Level Category	Cairo CBD				Central Giza			
		* No. of Existing Parking Demand	No. of Existing Parking Capacity	Prohibition during 8:00-20:00	Prohibition of parking Duration with Charge	* No. of Existing Parking Demand	No. of Existing Parking Capacity	Prohibition during 8:00-20:00	Prohibition of parking Duration with Charge
				Development Needs of Off-street Parking Spaces (Lot)	Development Needs of On-street Parking Spaces (Lot)			Needs of Off-street Parking Facility (Lot)	Needs of On-street Parking Facility (Lot)
6	C	-	-	-	-	23,762	19,237	8,372	15,390
Sub total		-	-	-	-	23,762	19,237	8,372	15,390
14	A	818	540	548	270	-	-	-	-
15	A	340	236	222	118	-	-	-	-
16	A	840	376	652	188	-	-	-	-
17	A	828	429	614	215	-	-	-	-
19	A	306	202	205	101	-	-	-	-
20	A	1,209	1,001	709	501	-	-	-	-
21	A	1,194	533	928	267	-	-	-	-
22	A	1,234	543	963	272	-	-	-	-
23	A	813	535	546	268	-	-	-	-
Sub total		7,582	4,395	5,385	2,198	-	-	-	-
12	B	1,726	1,547	643	1,083	-	-	-	-
27	B	1,229	782	682	547	-	-	-	-
Sub total		2,955	2,329	1,325	1,630	-	-	-	-
10	C	718	589	247	471	-	-	-	-
11	C	668	509	261	407	-	-	-	-
18	C	954	918	220	734	-	-	-	-
24	C	302	220	126	176	-	-	-	-
Sub total		2,642	2,236	853	1,789	-	-	-	-
Total		13,179	8,960	7,562	5,617	23,762	19,237	8,372	15,390

Notes: * Based on result of on- street parking survey in 2001.

Source: JICA Study Team 2002

7) Prohibition of On-street Parking Duration by Introducing A Parking Charge System (Parking Ticket System)

a) Control Method

Installation of automatic parking ticket vending machine is the most common way to enforce parking time control. It, however, requires a considerable amount of initial cost and maintenance cost compared to the parking charge collected.

Figure 8.3.21 shows an automatic parking ticket vending machine on-street in Japan. In an area where these machines are installed, the parking lot is marked on the roadside in the same way as a common on-street parking lot. Parking at these lots is charged from 8:00 in the morning until 20:00 in the night. A driver may buy a ticket from the machine, he/she puts it on the vehicle dashboard.

It is, however, recommended here to adopt parking ticket system which is economic and does not use a machine or instrument. A driver needs to buy a ticket from an inspector. When parking on the designated street, he/she has to put it on the dashboard where it can be seen from the outside.

Figure 8.3.21 Parking Ticket Machine

An inspector shall be responsible for the sale of tickets, and for patrolling to check for violators, the inspector shall stick a traffic violation ticket on the car to inform the driver of his/her offence. The outline of the parking ticket system is shown in Figure 8.3.22.

- Parking Ticket

There are three (3) kinds of tickets: one (1) hour, two (2) hours and three (3) hours tickets. An example of a parking ticket is shown in Figure 8.3.23. A driver should buy a ticket directly from an inspector who is patrolling on the road. The inspector shall record the date and parking duration and sign the ticket.

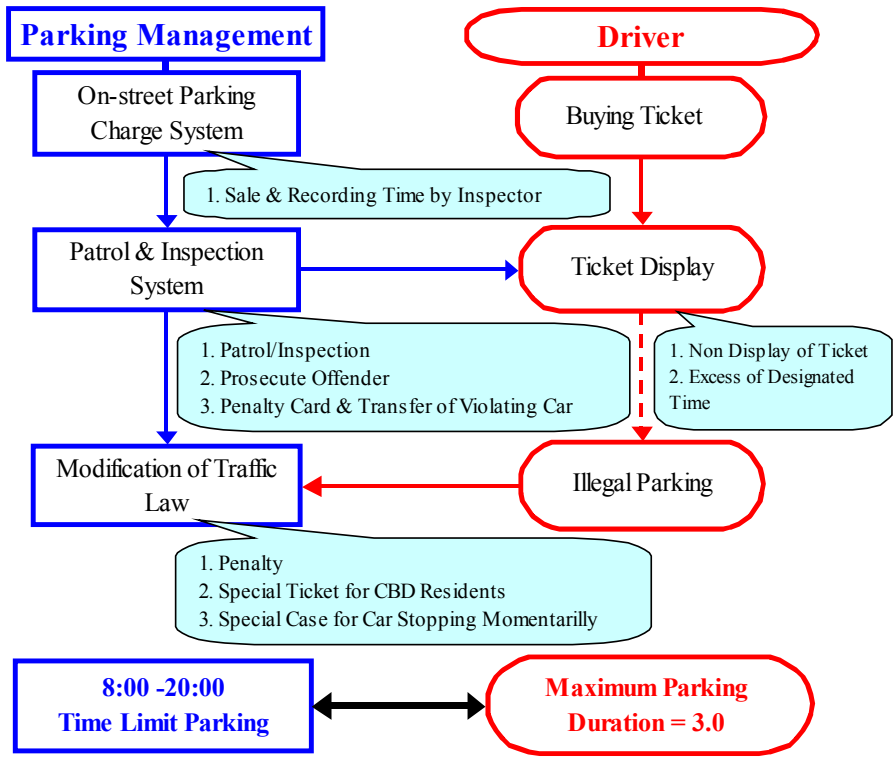
- Parking Charge

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 abovementioned purposes of the management system cannot be attained. For setting the rate of parking charge, an investigation by questionnaire will be needed to estimate the amount to be

charged. The following items may provide a hint for setting the rate of parking charge.

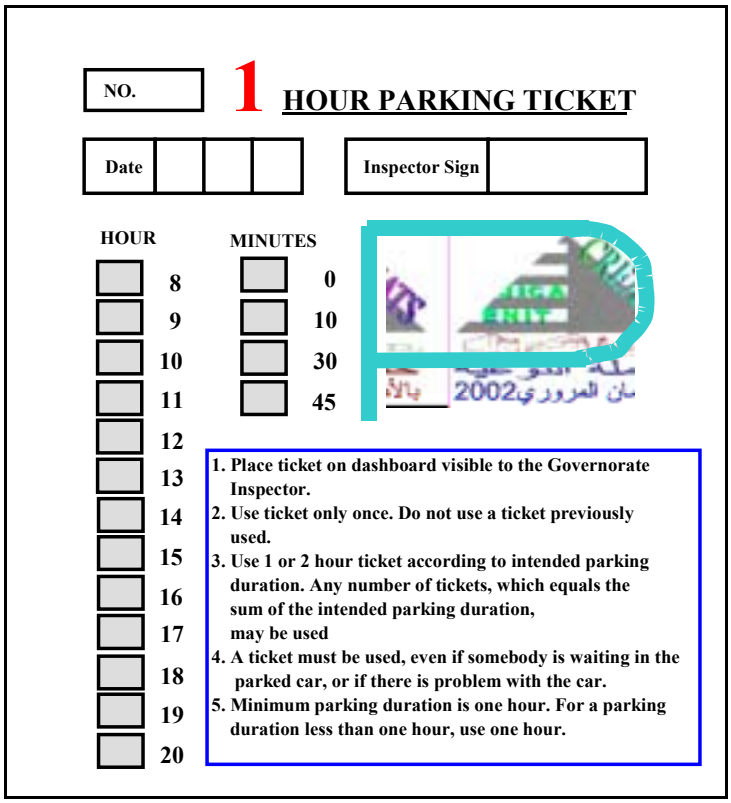
- Car owners generally belong to the middle or higher classes;
- The rate must be suitable to avoid long-term parking;
- Consideration of the current rate of public parking charge; and
- What rate would help someone to decide whether to take a taxi to the CBD area or to drive his car and then pay the parking charge.

Based on the foregoing, the rate of parking charge may be assumed to be between 1.0 and 1.5 L.E per hour.



Source: JICA Study Team 2002

Figure 8.3.22 Outline of Parking Ticket System



Source: JICA Study Team 2002

Figure 8.3.23 Sample Design of Parking Ticket

- Patrol and Inspection

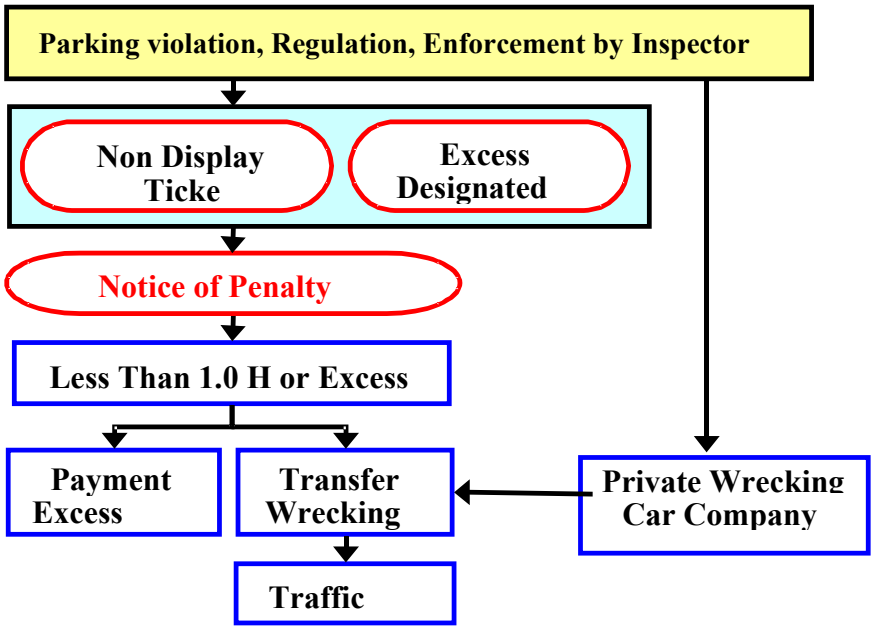
An inspector, who is a person assigned by the traffic police or Cairo Governorate, shall patrol once every hour to check if there are violators. An inspector's sphere of activities will be between a 100 m section to a 200 m section, on a daily shift basis. The duties of an inspector are listed below:

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

- Regulation of Parking Violation

A diver violating the parking system will be punished in accordance with traffic bylaw regulations. After the inspector informs the driver of his/her offence, 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 an 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 Figure 8.3.24.



Source: JICA Study Team 2002

Figure 8.3.24 Regulation of Parking Violation

- Special Free Parking Ticket

A special free parking ticket should be issued to a resident living within the management area who parks his/her own car on the street in front of his/her dwelling.

- Implementation organization

It is necessary that the activities of planning and design of the parking ticket system should be studied in relation to the transport measures and their influence on business activities and drivers. It is desirable that the Cairo Traffic Engineering Bureau (CTEB) be in charge of such planning matters, because it is responsible for overall traffic management planning and policies. Regarding the operation of the parking ticket system, two ideas can be considered: a new organization responsible for operation will be formed, or the CTEB shall be responsible for operation. However, staff of the CTEB should be recruited due to its small staff and its nature as a planning body. The share of management activities is described as below:

- Final Decision: Cairo Governorate and Giza Governorate;
- Planning, design and Evaluation: CTEB;
- Operation: CTEB or new organization; and
- Enforcement: Traffic Police

- 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 for the Egyptian way of life should be implemented.

b) Impact and Effect

- Turnover and Parking Duration

As shown in the previous section, the average turnover is about 4.3 and 5.7 times in the Cairo CBD and Central Giza respectively. It is not foreseeable, at this stage, to what extent the turnover rate will be raised by the parking ticket system. However, the following facts suggest that the parking ticket system would bring about a considerably higher turnover.

- In Cairo CBD and Central Giza, long-stay vehicles parking for three hours or longer account for about 37% and 27% of the total respectively.
- By prohibiting parking longer than three hours, the drivers of these long-stay vehicles would either shorten their parking time or change their mode.
- Accordingly the average parking duration will shorten and the turnover rate will become higher.

It is also expected that the parking duration of vehicles, which presently park for a duration of three hours or less, will tend to become shorter. The parking purpose of such vehicles is mostly considered to be for business or shopping.

- Increase of Possible Parking Capacity

In the CBD area of the Santa Fe Bogotá City, the capital of Colombia, where the parking ticket system was adopted, the average turnover rate is as high as about 6.0 times per day (Parking charge per one hour is 550 Pesos, as stated previously, US$ 1.00= 2,130 Pesos= 4.6 LE (March, 2002), thus, at the present rates of exchange, a 550 Pesos charge is the equivalent of roughly 1.2 Egyptian Pound).

In Cairo CBD, assuming that the turnover rate be increased by about 1.7 times from about 4.3 to 6.0 times per day, the possible parking capacity of the Cairo CBD streets would consequently be increased from 5,600 lots to 9,500 lots.

- Estimate of Total Annual Revenue

The revenue from the parking ticket system for the Level A, B and C zones should be basically used for the development of off-street parking facilities. To make a rough estimation of this revenue, the following is assumed (see Table 8.3.10):

Table 8.3.10 Rough Estimation of Total Annual Revenue

Items	Cairo CBD	Central Giza
Total parking capacity of parking ticket system (lots)	5,600	15.400
Average parking density (Times)	1.0	1.0
Management time period (Hours)	12.0	12.0
Rate of charge per hour (L.E)	1.0	1.0
Days per month (excluding Fridays) (Days)	25	25
Months per year (Months)	12	12
Total annual revenue (Million L.E)	20.1	55.4

Source: JICA Study Team 2002

8) Improvement of Building Owner Standards for the Provision of Parking Spaces by Introducing Japanese Standards

As described before, there is an immediate need to increase the off-street parking capacity in order to manage on-street parking and improve traffic problems in the Cairo CBD and Central Giza. Without a doubt, the parking problem is and will continue to be one of the most essential issues to be resolved. Therefore, on-street parking management ought to be more strictly enforced; every effort should be taken to increase off-street parking. At present, there is the Cairo Governor's decree No. 47/86; this decree, promulgated in 1986, obliges every new building owner to provide parking spaces wider than the area specified by the usage of the building. It is, however, necessary that the parking space should be established by specifying more detailed definitions of area and building use. The following improvement of building owner standards for providing parking spaces, based on the type of building use, is highly recommended (see Table 8.3.11).

Table 8.3.11 Recommendation for Building Owner for Providing Parking Spaces

Population of Urban City	Area	Specified Building Use		Not Specified Building Use
		Department Store, Other Shops and Offices	Others	
Above 1.0 Million	Parking Management Area & Commercial Area	One car per 200 m^2	One car per 250 m^2	One car per 450 m^2
	Periphery of Above Area or Traffic Congested Area	One car per 250 m^2	-	-
1.0 - 0.5 Million	Parking Management Area & Commercial Area	One car per 150 m^2	One car per 200 m^2	One car per 450 m^2
	Periphery of Above Area or Traffic Congested Area	One car per 200 m^2	-	-
Under 0.5 Million	Parking Management Area & Commercial Area	One car per 150 m^2	-	One car per 450 m^2
	Periphery of Above Area or Traffic Congested Area	One car per 150 m^2	-	-

Note: the required area for one car parking = 15 m^2 in average, excluding pass way.

Source: Japanese standard for building owners to provide parking spaces.

(4) Improvement of Traffic Safety Facilities

The traffic safety facilities are not sufficient in number, such as pedestrian crossings (including bridges), safety guard devices and traffic signs. Pedestrian behavior in the city of Cairo is seen as lawless, in some cases, pedestrians cross streets in the middle section of roads (jay-walking), and they walk along vehicle lanes to shortcut their journey, whilst in bus waiting areas, pedestrians and passengers overflow onto vehicle lanes. Pedestrians in Egypt are generally low priority. It is observed that drivers generally pay little attention to pedestrians even when the pedestrians are using pedestrian crossings at intersections. This attitude must be changed, with pedestrian traffic considered as important as vehicular traffic through the provision of safe and convenient facilities and the according of sufficient priority to pedestrians on roads, including pedestrian education through campaigns.

This section, in particular, discusses safety facilities for pedestrians in order to prevent traffic accidents involve to pedestrians, the objectives of development of pedestrian facilities in the Cairo CBD and Central Giza are:

- To prevent "jay-walking" of pedestrians;
- To ensure a safe pedestrian environment; and
- To create "pedestrian-friendly" facilities.

1) Plan Locations for Pedestrian Crossing

Pedestrian crossings with traffic light or scramble pedestrian crossings are highly recommended. In determining the locations for the installation of such safety facilities, the following criteria based on an analysis of the current situation was used:

***Criteria for determining locations of pedestrian crossings with traffic lights or scramble pedestrian crossings*:**

- Locations where both vehicles and pedestrian traffic intermingle to a high degree, and where there is a need to achieve a smooth and safe traffic flow; and
- Traffic congestion sections indicating less than 10km/h of average travel speed due to pedestrians crossing.

Based on the foregoing, pedestrian crossings will be provided in the Cairo CBD bordered by Ramsees, Clot Bey, Magless El Shaab, and Cornish El Neel roads, and on Port Said St., Sudan St., Doqy St. and Sphinx Sq. as shown in Figure 3.8.26.

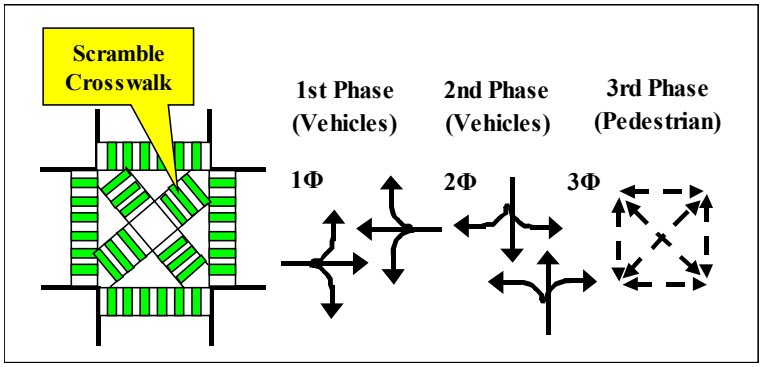
2) Plan of Scramble Pedestrian Crossing

At principal road intersections with large volumes of pedestrians, where there are conflicts between pedestrians and right-turning traffic, this leads to traffic accidents involving pedestrians. In order to reduce crossing times for pedestrians, by minimizing the carriageway crossing distance, and contributing to pedestrian safety,

it is recommended that scramble pedestrian crossings should be installed at signalized intersections with high volumes of pedestrians crossing.

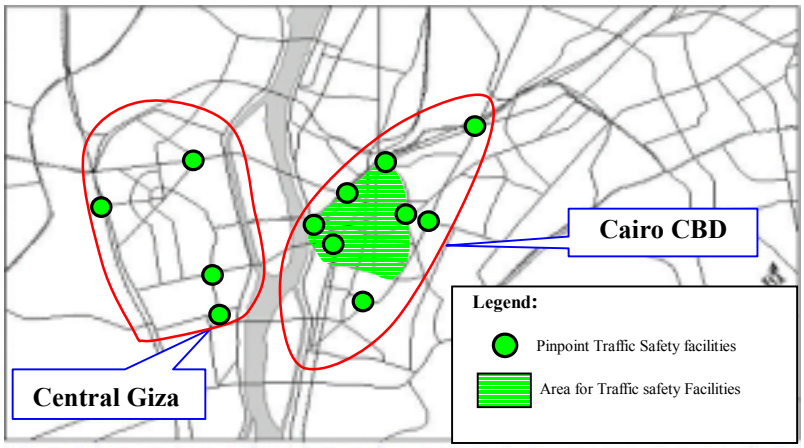
a) Scramble Control of Signal

There are two types of scramble pedestrian crossings such as part-time operation and whole day operation. A scramble control can be used for an intersection with many pedestrians. An exclusive pedestrian phase is incorporated, it is equivalent to the all-red situation for vehicular traffic. In determining the calculation of the cycle length and the saturation ratio, the time required for the exclusive pedestrian phase is regarded as lost time. The duration of the exclusive pedestrian phase is determined from the physical dimensions of the size of intersection and expressed as the time required to cross the intersection. Since this is a signal control system giving priority of pedestrians crossing, the vehicular capacity at intersection will be decreased. Therefore, the implementation of scramble control must be adjusted for the situation of traffic congestion. An example of a layout and a scramble phase is shown in Figure 8.3.25.



Source: JICA Study Team 2002

Figure 8.3.25 A Layout and Scramble Phase



Source: JICA Study Team 2002

Figure 8.3.26 Plan Location for Pedestrian Crossing with Signal Light or Scramble Pedestrian Crossing

(5) Improvement of Bus Facilities

This section discusses the immediate action plan for the bus priority system, in relation to TDM strategies such as the policy zoning for parking management. If drivers change their mode due to on-street parking prohibition, it is necessary that bus facilities should promote the service level. Currently, there are serious bottlenecks caused by the conflict of shared taxies and buses near bus stops on the principal roads, and so safe bus stop facilities for passengers and a bus priority system for promoting a service level bus transportation system should be considered.

Based on the promoting service level of public transport system in the Cairo CBD and Central Giza, a plan of time periods within a bus priority lane system will be proposed for achieving smooth bus operated flow. The bus priority lane system will only be used so that priority is given to bus traffic.

1) Plan Locations for Bus Priority Lane at Timed Periods

The plan is based on the analysis of bottlenecks where there is a conflict of bus buses/shared taxies and the plan will cover the key bus routes on major roads where a smooth bus operated flow is to be achieved. The following criteria, based on an analysis of the current situation, was used:

***Criteria for determining locations of time periods within a bus priority lane*:**

- Key bus routes on the 6-lanes principal roads where a smooth bus operated flow is to be achieved; and
- Traffic congestion sections indicating less than 10km/h of average travel speed, due to conflict of shared taxies and buses near bus stops.

Based on the foregoing, time periods on bus priority lanes will be provided on Ramsees St., Cornish El Neel St. & Qasr El Einy St., Port Said St., and Doqy St. as shown in Figure 3.8.27.

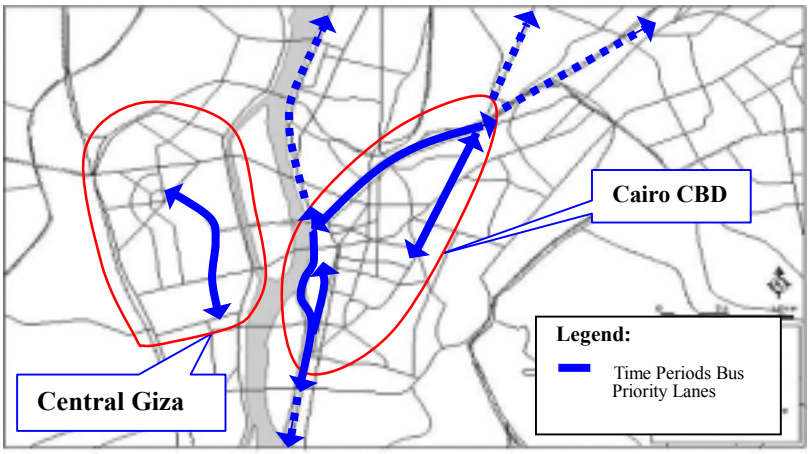


Figure 8.3.27 Plan Locations for Bus Priority Lane with Timed Periods

2) Operating Method

a) Time Periods

The bus priority lane system will only be used so that priority is given to inbound bus traffic during the morning peak hours when commuter traffic is heavy and to outbound bus traffic during the evening peak hours. These time periods were established on the basis of an analysis of the current traffic condition. The time periods for operation of the bus priority lane system is as follows:

- Morning peak hour (inbound bus traffic) 7:00- 9:00
- Evening peak hour (outbound bus traffic) 14:00-16:00

b) Traffic operation system

The bus priority lane in the morning peak hours will be allotted only one lane of inbound priority in the bus priority lane system, and in the evening peak hours the bus priority lane will be allotted only one lane of outbound priority. Upon the implementation of the bus priority lane plan, parking restriction must be carried out to maintain the bus lane capacity, and it is also necessary to strengthen the enforcement of other cars, flowing into the bus priority lane, by the traffic police. Road markings and guide signs should be installed for securing a smooth bus flow.

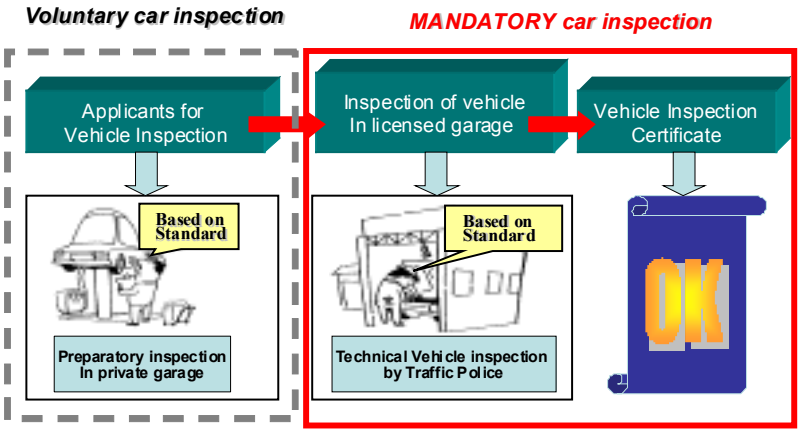
(6) Improvement of Vehicle Inspection System

The congested sections caused by vehicles stopping due to engine trouble/puncture were observed on elevated roads. Stationary vehicles on elevated roads, resulting from engine trouble, can lead to traffic congestion and/or further accidents. A technical improvement of the vehicle inspection system is highly recommended. Based on a planned standard of inspection system, a new technical inspection standard is classified into three parts i.e. chassis, body and lamps. Each part is stipulated by detailed technical inspection items based on a new format standard.

At present, the vehicles inspection system is conducted by the Traffic Police of each Governorate. In the case of private cars, the vehicles must be inspected at intervals of three years, and a car owner pays the vehicle tax at the same time. In order to implement more stringent vehicle inspection system, all privately-owned regular passenger cars that are for example older than 5 years should be inspected once a year, by vehicle inspection offices, recognized by Traffic Police. The inspection procedure can be licensed to private companies or can remain the full responsibility of the traffic police. A proposed vehicle inspection system will be considered two steps as follows (see Figure 8.3.28):

- Applicants could prepare for that inspection by having their car *updated for inspection* by a private garage. This, however, is not mandatory but will ensure that the car is prepared to maximize the chance of passing the more rigorous inspection system.

- It is necessary to regulate the car inspection system by law. Offenders, those failing to provide a regular inspection certificate, should be penalized by suspension of vehicle's license until a regular and updated vehicle inspection certificate can be shown. This system revolution is possible but requires an administrative decision and a will to change.



Source: JICA Study Team 2002

Figure 8.3.28 A Proposed Vehicle Inspection System

Regarding the technical inspection items, the quality of existing inspection is quite simple, and it is highly recommended that effective standard for technical inspection item should be adopted. The inspection items, by part, are as follows:

a) Vehicle body: Brand name, Year of production, Model Shape, Color, Radio, No. of seats, and No of doors.

b) Motor: Brand name & No., No. of cylinder, Fuel type, and Fuel capacity.

c) Chassis: Brand name & No., and Steering wheel.

d) Identical to the vehicle feature:

e) Motor: Identical or not identical.

f) Chassis: Identical or not identical.

g) Result:

h) Comments:

i) Inform the owner of the car (in case the feature does not match with acceptable measures):

A proposed standard inspection item is comprised of 1) Part I: Chassis, 2) part II: Body, 3) Part III: Lamp. Each part is composed of detailed items. The detailed items for technical inspection are shown in Table 8.3.12. A sample of a format sheet for the technical inspection items is shown in Table 8.3.13.

Table 8.3.12 Proposed Standard of Inspection Items

Part		Items	No. of Sub-	Truck, Tractor	Bus	Motor Vehicle
I. Chassis	1	Frame	3	●	●	-
	2	Bumper	3	●	●	●
	3	Turning control system	4	●	●	-
	4	Disc wheel	1	●	●	-
	5	Tires	2	●	●	●
	6	Axle	1	●	●	-
	7	Spring	1	●	●	-
	8	Shock absorber	2	●	●	-
	9	Mud flap	6	●	●	-
	10	Hand brake	2	●	●	●
	11	Parking brake	6	●	●	●
	12	Engine	3	●	●	●
	13	Exhaust system	5	●	●	●
	14	Drive train system	3	●	●	-
	15	Ignition system	1	●	●	-
	16	Electric system	6	●	●	●
	17	Horn	6	●	●	●
	18	Fuel tank	4	●	●	-
	19	Speedometer	3	●	●	●
	20	Tachometer	3	●	●	-

Part		Items	No.	Truck, Tractor	Bus	Motor Vehicle
II. Body	1	Windshield and glass	4	●	●	-
	2	Rear view mirror	2	●	●	●
	3	Wiper	4	●	●	●
	4	Sun visor	1	-	-	●
	5	Rear body	4	●	-	-
	6	Letter, Picture or any mark	7	●	●	-
	7	Body color	1	●	●	-
	8	Roof	2	-	●	-
	9	Floor	2	-	●	-
	10	Side window	7	-	●	-
	11	Entrance door	8	-	●	-
	12	Emergency door	7	-	●	-
	13	Driver seat	3	-	●	-
	14	Passenger seat	2	-	●	-
	15	Driver cab	3	●	-	-
	16	Driver partition	2	-	●	-
	17	Passenger grip	4	-	●	-
	18	Bell for stop signal	2	-	●	-
	19	Fluorescent pad	13	●	●	●
	20	Safety belt	1	●	●	●

Part		Items	No.	Truck, Tractor	Bus	Motor Vehicle
III. Lamp	1	High beam lamp	7	●	●	●
	2	Low beam lamp	5	●	●	●
	3	Lamp for vehicle width	7	●	●	●
	4	Turning lamp	8	●	●	●
	5	Tail lamp	5	●	●	●
	6	Stop lamp	6	●	●	●
	7	Reversing lamp	6	●	●	●
	8	License plate lamp	6	●	●	●
	9	Lamp for vehicle's height and categories (for vehicles whose height exceeds 2.5m)	12	●	●	-
	10	Inside vehicle lamp	5	●	●	●
	11	Lamp for route plate	2	-	●	-
	12	Side lamp (option)	10	●	●	●
	13	Side turn lamp (option)	5	●	●	●
	14	Fog lamp (option)	7	●	●	●
	15	High mount stop lamp (option)	9	●	●	●
	16	Other lamps	1	●	●	●

Source: JICA Study Team 2002

Table 8.3.13 A Sample of a Format Sheet for Technical Inspection Items

Part	Items		How to check	Truck, Tractor	Bus	Motor Vehicle
III. Lamp	1	High beam lamp	1. White or light yellow	●	●	●
			2. 2 units	●	●	●
			3. Fixed at the front in the same level, both left & right	●	●	●
			4. Both of them must be the same color	●	●	●
			5. Fixed higher than the ground at least 40cm but not exceeding 1.35m	●	●	●
			6. They will be lightened whenever tail lamps are lightened except in case of temporary signal	●	●	●
			7. Additional 2 units are allowed (option)	●	●	●
	2	Low beam lamp	1. White or light yellow same as high beam lamp	●	●	●
			2. 2 units	●	●	●
			3. Fixed at the front in the same level, both left & right			
			4. Fixed higher than the ground 40cm but not exceeding 1.35m. And the length from the edge must not exceed 40 cm.	●	●	●
			5. They will be lightened whenever tail lamps are	●	●	●

(7) Traffic Enforcement for Traffic Friction because of Informal Roadside Use Activities

Traffic friction because of informal roadside use activity leads to lower traffic capacity and the occurrence of traffic accidents. Currently, two types of traffic friction with informal roadside use activities in the city are seen as follows:

- To erect neon light etc., near a traffic light or post signs which can be confused with traffic signs; and
- Street vendors on the shoulder of streets.

The first one is dangerous when traffic lights or road signs are difficult to distinguish, and the law should prohibit this. Periodic inspection should be enforced by the traffic police. The second one is popular in Asia countries and are obstacles not only for vehicular traffic but also for pedestrians. Periodic inspection should be also enforced by the traffic police, or existing street vendors along streets should be transferred to neighboring open spaces, such as pedestrian malls.

8.3.4 Cost Estimate

The total outlay for the short-term plan (Immediate Action Plan) in the traffic management sector will require some xxx billion constant year 2001 L.E, excepting the soft-technical projects. Table 8.3.14 show the name of the proposed projects with constant year 2001 cost, description and expected responsible government entities.

Table 8.3.14 Short-Term Plan in the Traffic Management Sector

CREATS Proposal		Cost (L.E Mil.)	Description	Agency
1. Improvement of Traffic Signal Control System		235.6		Cairo/Giza Gov.
1-1	Traffic Response System[*1)]	163.5	44 existing signalized int., 8 new loca.	Cairo Gov.
1-2	Synchronized System[*2)]	64.1	13 existing signalized int., 19 new loca.	Cairo/Giza Gov.
1-3	Traffic Signal Lights at Non-signalized intersections[*3)]	7.1	8 locations	Cairo/Giza Gov.
1-4	Traffic Signal Lights at U-turn Points[*4)]	0.9	2 locations	Giza Gov.
2. Improvement of intersection		4.1		Cairo Gov.
2-1	Improvement of Abdul Moniem Ryad Sq.	4.1	4 signalized int., 4 scramble, 1 ped. Br.	Cairo Gov.
3. Improvement of Parking System		36.4		Cairo/Giza Gov.
3-1	Parking Ticket System[*5)]	36.4	21,000 lots (Cairo:5,600, Giza:15,400)	Cairo/Giza Gov.
4. Improvement of Traffic Safety Facilities		23.3		Cairo/Giza Gov.
4-1	Pedestrian Crossing With Signal Lights	14.0	50 locations	Cairo/Giza Gov.
4-2	Scramble Pedestrian Crossing	1.9	12 locations	Cairo/Giza Gov.
5. Improvement of Bus Facilities		3.7		Cairo/Giza Gov.
5-1	Bus Priority Lane System	3.7	Totally 16 km length	Cairo/Giza Gov.
Total		303.1	-	

Source: JICA Study Team

Note: [*1)*2)] Existing signal light will be replaced by newly signal light. Including locations for installation of newly signal light.

[*3)] Excluding locations of newly signal lights for the traffic response system/synchronized system.

[*4)] Excluding locations of newly signal lights for the synchronized system.

[*5)] Including annual personnel cost and annual operation cost.

8.4 MEDIUM AND LONG TERM PLAN

8.4.1 Traffic Information System

The medium and long-term plans related to traffic management are focused on the traffic information system and traffic control system from a medium and long-term perspective; the new system uses vehicles detectors which enable automatic and real-time collection of traffic information supplied to drivers through message sign boards.

(1) Concept for the Plan

The traffic information system should be installed stepwise, because the existing traffic signal control system must also continue to function. The system expansion should be done as follows:

- Renewal for the functional upgrading of various traffic control installations of the control center and the local facilities of signal lights and traffic detectors.
- Expansion of the traffic control area providing traffic signals at new intersections.
- CCTV cameras should be installed at effective points, such as susceptible traffic congestion locations in order to expand traffic surveillance and to improve traffic control.
- Expansion of the linear traffic-actuated control for each sub-area of the existing route.

- Expansion of an area traffic control through the interconnection of sub-areas around the city center.
- Improvement and expansion to achieve an advanced system which can control traffic quickly and in a timely manner, in response to real changes.

The system will be conceived with the improvement and expansion done in the following three stages:

- 1st stage: installation of terminal equipment in the city center of each Governorate and traffic signal local facilities, and individual linear controls and surveillance systems on major radial roads.
- 2nd stage: improvement of traffic control operation transit to area traffic control.
- 3rd stage: Operational start-up of a concentrated-control advanced system.

(2) System Configuration

The system configuration is comprised of an information collection system, a data processing system and an information supply system. Each basic function is shown in Figure 8.4.1.

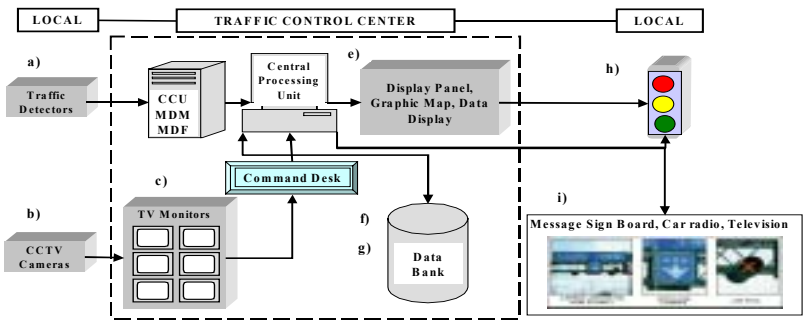
1) Information Collection System (Local)

Traffic information is collected by (see Figure 8.4.1 item a- b):

a) Automatic collection of traffic data using roadside vehicle detectors.

The traffic detectors will be installed at the entrance of major intersections and road sections of uninterrupted flow, which are required for traffic control. The data observed by the detectors at these points will be sent to the control center in real time. The observed traffic data include traffic volume, length of traffic queue, occupancy rate, traveling speed etc. and they should be selected and decided according to the adopted traffic control policy, because such data will be used in traffic analysis and planning as well as for signal control.

b) CCTV camera installed at roadside.



Source: JICA Study Team 2002

Figure 8.4.1 System Configuration for Traffic Information

2) Data Processing System (Traffic Control Center)

Collected information is processed as follows (see figure 8.4.1 item c-g):

c) Monitoring of traffic conditions by means of CCTV cameras.

The CCTV cameras (Closed Circuit Television System Camera) will be installed at the points where observation is necessary at all times such as chronically congested intersections, merging or diverging points and places where traffic accidents often occur. The surveillance system of road conditions and traffic situations in the control center (at all times) is very important in traffic control. The monitors that systematically observe the information from the TV cameras, by route, will be provided in the control center, strengthening the surveillance system. The surveillance of various situations such as road conditions and accident conditions in real time at the control center will facilitate the necessary counter-actions, and will enable appropriate instructions to be given for such congestion and accidents.

d) Aggregation of collected traffic data for calculation of signal parameters, such as controlling the intervals of signals (red/green) in proportion to traffic volume.

In the Central Processing Unit, information on traffic flows monitored by the traffic detectors will be collected and processed, and the parameters of signal control will be set. In addition, the control of exchange and monitor of traffic information with the sub-center will be carried out.

e) Display of traffic congestion and traffic incidents on the Central Graphic Panel Display Board.

In the display panels, the following data will be monitored, providing information for decisions on traffic flow control for the traffic controller at the command desk.

- Route map & road conditions;
- Traffic situation such as traffic volume, length of traffic queue, occupancy rate, traveling speed etc.;
- Condition of traffic incidents;
- Traffic regulations; and
- Traffic control devices.

f) g) Accumulation of traffic data in a data bank & collection of basic data for traffic control operations.

The detected data for traffic control, such as traffic flow data, will be collected and processed by route, by areas and by time zones etc. as a database, which should be updated periodically. The database will be utilized for the analysis and improvement of various traffic technologies as well as for setting the parameters of signal control.

3) Information Supply System (Local)

Providing traffic information by the following devices (see Figure 8.4.1 item h-i):

h) Control of signal lights.

The traffic signal lights will be operated based on the parameters of signal control from the Central Processing Unit (CPU).

i) Supply of necessary traffic information to users.

Traffic information, such as the traffic situation and the location, cause and result of the incident will be also offered to drivers for a safe and pleasant drive as much as possible. In particular, the quick delivery of information on unusual traffic phenomena will contribute to reducing secondary traffic incidents such as accidents and traffic congestion. Appropriate instruction and regulation to drivers on the unusual phenomena can be made through analyzing the correct situation with visual information from the CCTV camera and data.

(3) Traffic Information Supply Plan

It is proposed to install a system to supply information on road and traffic conditions, necessary for drivers, through a resident traffic manager, in addition to the traffic control system to control traffic signal lights. Figure 8.4.2 shows the relationship between the signal control system and the information system.

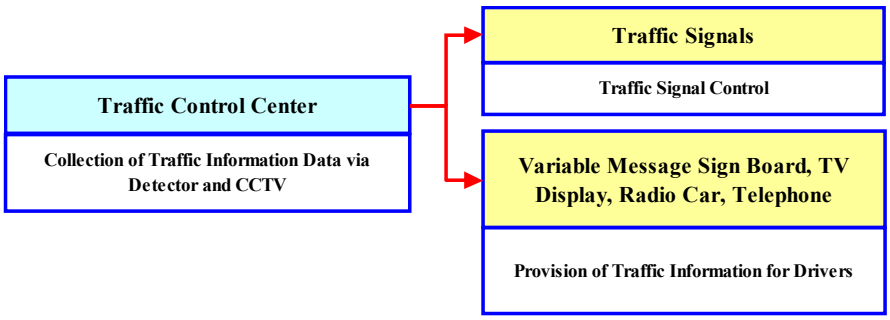


Figure 8.4.2 Relationship Between Signal Control System And Information System

1) Objectives for Supplying Road Traffic Information

By supplying emergency information such as accidents, abnormalities and traffic regulations, the following effects are aimed at:

- Immediate notification of incidents to drivers;
- Selection of routes, to prevent secondary congestion;

- Traffic flows will be re-distributed as a result; and
- Drivers can participate in the reduction of traffic problems by having such information and this will help to mitigate traffic congestion.

2) Information Supply

The following information will be supplied:

- Information concerning route prohibition;
- Information on congestion and route guidance for detour;
- Road and traffic regulations; and
- Other public information.

3) Location of information Indication Unit

The center will be housed in the traffic signal control center and the information indication units will be installed at major crossroads on arterial roads, as shown in Figure 8.4.3. The information supply system includes an exchange of road & traffic information between the proposed future urban expressway and the at-grade road network.

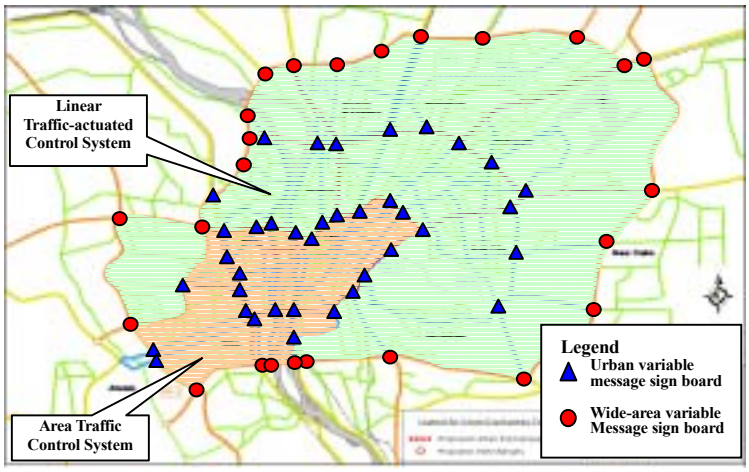


Figure 8.4.3 Location of Information Indication Unit

4) Positive Collection and Accumulation of Data for the Traffic Center

To perform adequate traffic control, the collection, accumulation, and analysis of various fundamental data, by location and by route, is essential. The following data should be collected and accumulated without exception. A database should be formulated and information supplied to those who are concerned with traffic control and study. The data will be collected by periodical survey and vehicle detectors, etc.

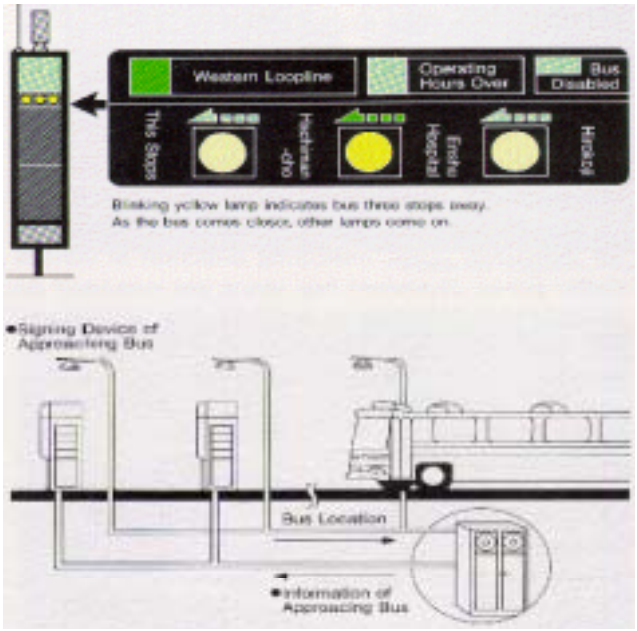
- Traffic volume;
- Traffic volume occupancy rate;
- Travel speed; and
- Conditions of traffic signal lights, etc.

8.4.2 Bus Location Information System & Bus Priority Signal Control System

This section discusses the bus priority system for the medium and long terms by introducing the bus location information system and the bus priority signal control system at signalized intersection. This section introduces a brief description of these systems.

(1) Bus Location Information System

In terms of public transport, public transport service information such as time/fare table, route network, transfer points, operation schedule and bus location is considered to be important to the users. This information system does not alleviate traffic congestion directly, but indirectly by encouraging people to use public transport mode. To alleviate passenger discomfort caused by unpunctuality and to improve management of operation, the bus location information system enables individual display of the location of approaching buses at respective bus stops and integrated display of locations of all buses under operation at the control center. The system will enable public transport operators to manage and control their business operations effectively and efficiently. Furthermore, the system will alleviate users' frustration towards unreliable services by displaying relatively accurate bus arrival schedule at bus stops. The system, therefore, is expected to increase public mode users extensively. Figure 8.4.4 shows an information board of the system and a mechanism of the system.



Source: "Urban Transport Facilities in Japan 1993", City Bureau Ministry of Construction and Japan Transportation Planning Association.

Figure 8.4.4 Information Board and Mechanism of Bus Location System

(2) Bus Priority Signal Control System

In addition, in order to provide traffic signal priority, bus priority traffic signal control system at signalized intersection is effective at the bottlenecks. The purpose of the bus priority signal control system is to realize punctual public transportation, improve convenience for bus users and promote car owners to use public transportation, giving priority to bus transportation. By implementing the system, public transportation will become more dominant, road traffic demand of private cars will be reduced, and traffic flow will become more efficient. When a bus passes under an infrared beacon at the local facility, the infrared beacon receives vehicle ID information from an in-vehicle unit installed in a bus and transfers the data to the Traffic Control Center. The Traffic Control Center, with vehicle ID information, traveling point and destination, controls traffic signal so that buses do not have to stop or shortens the waiting time at intersections as much as possible. Figure 8.4.5 shows the bus priority signal control system and a mechanism of the system.

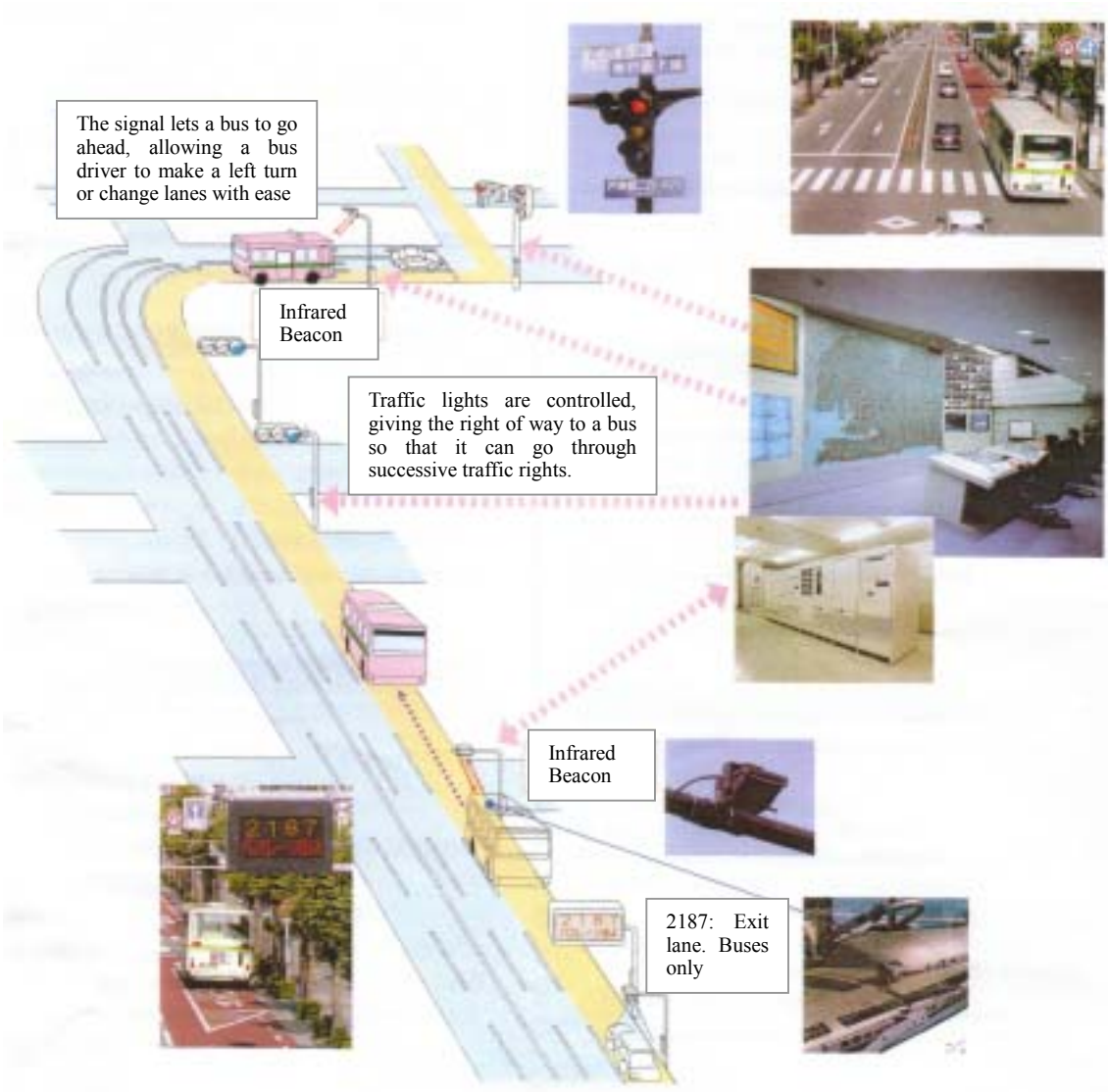


Figure 8.4.5 Bus Priority Signal Control System

In general, the following effects are achieved by operating mainly during commute hours.

- Ensure punctual bus operation.
- Reduce waiting time for bus at intersection.
- Ensure safety when changing lane to make a left turn at intersection.

In Japan, the effect of bus travel time was reduced by an average of 11% as a result of implementing the bus priority signal control system at the sampled roads, for a length of about 46 km, during the year 2000.

8.4.3 More Vigorous Parking Policies

The policy zoning system for parking management in the immediate action plan was proposed. In the long run, unrestricted car movement should be limited in Cairo CBD and Central Giza by means of restrain 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 present parking occupancy on the streets in the central area is already extremely high exceeding 100% of the capacity in the peak hours. Accordingly, while on-street parking control ought to be more strictly enforced, every effort should be taken to increase off-street parking. Measures to increase off-street parking capacity are suggested.

In order to promote the development of new parking space, 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);

The management of parking for public use is not a profitable business while the urban space in the central area 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 sectors.

- Easement of floor space rate requirement of private parking building;

It is effective to promote the development of public parking building, if the floor space rate requirement of private parking building will ease.

- Impositions of heavier taxes on non-utilized land;

The non-utilized spaces in the central area should be imposed heavier taxes, in order to promote development of public parking.

- Strict enforcement of the regulation obligating new construction to provide parking space.

The decree promulgated in 1986 (Cairo Governor's decree No. 47/86) 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 the central area.

8.4.4 Electronic Demand Management Measures

The full-scale development of ITS will create the development of infrastructures, distribution of terminal equipment and diversification of applications. The information and functions for ITS services are roughly divided into nine (9) development areas such as advances in navigation systems, electronic toll collection system, assistance for safe driving system, optimization of traffic management system, increasing efficiency in road management system, support for public transport system, increasing efficiency in commercial vehicle operation system, support for emergency system, and support for emergency vehicle operations system. In terms of the electric demand management measures for the future Cairo, the advances in navigation system, the electronic toll collection system and the support for public transport system will helpfully reduce traffic congestion that causes a tremendous economic loss in monetary terms. This section introduces a brief description of such effective electric demand management measures.

(1) Advances in Navigation System

The advanced in navigation system is divided into two (2) users services as the provision of route guidance traffic information and the provision of destination-related information, and then into six (6) specific user services: 1) provision of route guidance information to drivers, 2) provision of information on other modes of transportation to drivers, 3) advanced provision of route guidance information, 4) advanced provision of information on other modes of transportation, 5) advanced provision of destination-related information, and 6) provision of destination-related information for drivers. Especially, in this specific user services, the description of services are shown below.

1) Provision of Route Guidance Information to Drivers

- Provide optimum route information;
- Provide road traffic congestion;
- Provide required travel time when congested; and
- Guide along the selected route.

2) Provision of Information on Other Modes of Transportation to Drivers

- Provide information on other modes operations;
- Provide information on parking availability; and

- Provide information on availability of other public transportation service during emergency.

3) Advanced Provision of Route Guidance Information

- Provide optimum route information in advance; and
- Provide road traffic information in advance.

4) Advanced Provision of Information on Other Modes of Transportation

- Provide information on other modes of transportation operations in advance; and
- Provide information on parking availability in advance.

5) Advanced Provision of Destination-related Information/, and 6) Provision of Destination-related Information for Drivers

- Provide detailed information and reservation on destination facility and other in advance.

(2) Electronic Toll Collection System

The electronic toll collection system is divided into two (2) specific user services: 1) electronic toll collection on toll roads, and 2) electronic charge of fare collection of parking lot, ferry and others. Especially, in this specific user services, the description of services are shown below.

1) Electronic Toll Collection on Toll Roads

- Collect toll electronically on toll roads;
- Collect toll electronically on toll roads during peak hours (peak road pricing system); and
- Collect toll electronically in CBD area (area pricing system).

2) Electronic Charge of Fare Collection of Parking Lot, Ferry and Others

- Collect parking charges electronically;
- Collect the charges for roadside parking electronically; and
- Collect fares for ferry electronically.

(3) Support for Public Transport System

The support for public transport system is divided into two (2) users services as the provision of public transport information and the assistance for public transport operations and operations management, and then into four (4) specific user services: 1) provision of information on public transport operations or other transit transfer system, 2) assistance for taxi and on demand bus use system, 3) implementation of

priority passing for public transport system, and 4) provision of public transport operations and others system. Especially, in this specific user services, the description of services are shown below.

1) Provision of Information on Public Transport Operations or Other Transit Transfer System

- Provide information on public transport in advance;
- Provide information on public transport in route;
- Provide information on other public transportation service while on board public transportation; and
- Provide information on delay or accidents of public transport.

2) Assistance for Taxi And on Demand Bus Use System

- Assistance for bus use on demand; and
- Assistance for taxi use.

3) Implementation of Priority Passing for Public Transport System

- Provide traffic signal priority to bus and tram; and
- Monitor operations on segregated lanes such as for a bus.

4) Provision of Public Transport Operations and Others System

- Provide road traffic information and others;
- Provide information on public transport operations; and
- Provide information on expressway bus users.

8.4.5 Toll Management on GCR Internal Expressway

(1) Toll System

The decision on whether the toll expressway adopts the "Flat-rate Toll System" or "Distance-based-rate Toll System will affect the road user's usage patterns and toll revenue. Flat-rate Toll System is effective and convenient to users for urban expressways, where the average trip distance is relatively shorter and the average frequency of usage per user is higher. Urban expressways are usually crowded, and many users often enter and exit on daily basis, and the operator handle many similar short trips. In such circumstances, a flat toll system is preferable because the operator can save the collection cost, shorten the service time at payment, and the user can easily remember the toll amount.

Distance-based-rate Toll System, on the other hand, is effective and fair to users for inter-urban expressways, where the average trip distance is longer, and frequency of

usage per user is less. If the difference in distance between longer trip user and shorter trip users become large, the distance-based-rate toll creates unfairness. The longer service time, normally less than ten seconds, is not a major problem when the average distance is longer.

GCR Internal Expressways are located at urban city area in the future, the expressways are comprised of a mini ring road and five (5) radial roads, where the average trip distance is relatively short and the average frequency of usage per user is high. The average interchange interval will be about 5 km, and the interchange interval varies depending on each section. Considering such nature of the expressway system, it is recommended that the toll system on GCR Internal Expressway be "Flat-rate Toll System.

(2) Toll Collection System

In order to efficiently deal with huge volume of traffic in urban area, a "Flat-rate Toll System will be adopted for the GCR Internal Expressway. Flat-rate Toll System can be operated by paying cash or coupon ticket at the entrance gates. The system simplified toll collection, which saves time for toll collection and requires no exit gates, eliminating the need for land acquisition and construction, and operating costs for such facilities.

(3) Toll Collection Office

A toll collection office will be established at each interchanges to collect the toll from the expressway users. Main toll collection office will have the toll booths, police branch office and power facilities.

8.5 RECOMMENDATIONS

8.5.1 Short-term Plan for Immediate Actions

There are many traffic and transportation problems in Cairo. As the city grows, with an increase of population and economic activities, the traffic management problems will become more serious. In the traffic management sector, the following immediate action plans and projects are highly recommended as the short-term measures targeting the year 2007. This would ensure the most effective use of existing facilities and provide smooth, safe and comfortable trips.

(1) Improvement of the Traffic Signal Control System

Existing manual signal control system should be improved by introducing automatic computerized control system. The new system uses vehicle detectors which enable automatic and real-time collection of traffic information, the traffic response system and the synchronized system are recommended to be introduced in Cairo CBD and Central Giza.

(2) Improvement of Intersection

The current traffic congestion is mainly caused by spill-back due to near or over-saturated bottlenecks. Improvement of intersections to increase the road capacity is recommended through adequate engineering such widening at approach of intersection, shifting to the centerline or median, in association with the improvement of channeling and signal control system.

(3) Improvement of Parking System

The Cairo CBD and Central Giza area have a great amount of parking demands, where the on-street parking occupancy rate always exceeds 100% during mid-day peak hours. On-street parking ought to be more efficiency managed or strictly controlled to shift to off-street parking in areas with chronically high parking occupancy. The parking behaviors should be improved by introducing a policy zoning system for parking management (PZM), where three levels of zonal parking management are designated, based on the zone attributes in terms of the total building floor areas of business & commercial and public uses. For each categorized zone, the time-duration of parking prohibition and charge for on-street parking (parking ticket system) are highly recommended.

(4) Improvement of Traffic Safety Facilities

It is often observed that pedestrians cross streets at middle section of roads (Jay-walking), and walk vehicle lane to make shortcut on their journey. These dangerous behaviors must be changed, providing safe and convenient facilities for pedestrian crossing and promoting public education by traffic safety campaign. For engineering solutions, pedestrian bridges and pedestrian crossing zones with traffic light (i.e. scramble pedestrian crossing) are recommended to develop at the intersections where both vehicles and pedestrian traffics intermingle to a high degree, and where there is a need to achieve a smooth and safe traffic flows.

(5) Improvement of Bus Facilities

In order to uplift the service level of bus transport system in the Cairo CBD and Central Giza, a bus priority lane system is recommended on selected trunk routes in limited peak hours, taking into account a fact that traffic congestion often takes place with conflicts of buses/shared taxies and other vehicles.

(6) Improvement of Vehicle Inspection System

Congested sections caused by blocking of engine-trouble vehicles are often observed on heavy traffic roads. This could-be-avoidable incident yields enormous economic losses and environmental pollution, given driver's cars of their vehicles. Technical improvement of the vehicle inspection system, therefore, is highly recommended. An inspection standard needs to be developed with new inspection items. Detailed inspection items for each category should be stipulated on a new format table.

8.5.2 Medium and Long-term Plans

From a medium and long-term perspective, the traffic management plans which is focused on the traffic information system, more vigorous parking policies, electronic demand management measures and toll management system on GCR internal expressways will be recommended.

(1) Traffic Information System

Given drivers the traffic information on road congestion status, locations of accidents and/or estimated time to pass through bottlenecks, they could select beast alternative routes to avoid troubles and get more comfortable travel. This can eliminate economic losses in the society that it would otherwise suffer from. In particular, quicker delivery of such traffic information is more effective. A traffic information system is nowadays available in wide varies from simple to advanced surveillance technologies, e.g., a CCTV camera cum data processing information system.

(2) Bus Location Information System & Bus Priority Signal Control System

In terms of public transport, to alleviate passenger discomfort caused by unpunctuality and to improve management of operation, a bus location system should consider on the major bus routes. The system enables individual display of the location of approaching buses at major bus stops and integrated display of locations of all buses under operation at the control center. In addition, in order to provide traffic signal priority, bus priority traffic signal control system is effective at the bottlenecks.

(3) More Vigorous Parking Polices

On-street parking control ought to be more strictly enforced, every effort should be taken to increase off-street parking. Measures to increase off-street parking capacity are suggested. In order to promote the development of new parking space, it is necessary to obtain the cooperation of the government. The possibility of implementing the administrative measures such as subsidy and/or tax incentives, easement of floor space rate requirement of private parking building, impositions of heavier taxes on non-utilized land, and strict enforcement of the regulation obligating new construction to provide parking space should be considered.

(4) Electronic Demand Management Measures

The full-scale development of ITS will create the development of infrastructures, distribution of terminal equipment and diversification of applications. In terms of the electric demand management measures for the future Cairo, the advances in navigation system, the electronic toll collection system and the support for public transport system will helpfully reduce traffic congestion that causes a tremendous economic loss in monetary terms.

(5) Toll Management of GCR Internal Expressways

GCR Internal Expressways are located at urban city area, where the average trip distance is relatively short and the average frequency of usage per user is high. The average interchange interval will be about 5 km. Based on the foregoing, it is recommended that the toll system on GCR Internal Expressway be "Flat-rate Toll System. The toll system can be operated by paying cash or coupon ticket at the entrance gates. The system simplified toll collection, which saves time for toll collection and requires no exit gates, eliminating the need for land acquisition and construction, and operating costs for such facilities.

CHAPTER 9: ORGANIZATIONAL AND INSTITUTIONAL MATTERS

9.1 EXISTING ISSUES, OPPORTUNITIES AND CONSTRAINTS

This chapter delineates the results of the study about improving the current organizations and institutional aspects so as to be in better position to implement the components of the Master Plan. Experience in transport planning in developing countries confirms that institutional weaknesses are the source of many observed failures in urban transport. It has become widely accepted that there is a need to integrate polices both within the transport sector and between the transport and other aspects of urban development. This calls for the development of institutions which minimize functional and jurisdictional obstacles to policy integration and operation optimization. The main objective of institution building is to provide a strong institutional and technical base for the formulation and implementation of policies and projects. This objective can be achieved through "investment" in institutional and administrative reforms, technical education, training and equipment. Such investment represents a small portion of the total cost, but is often fundamental to successful project completion and the establishment of a permanent operation and maintenance capability. It should be understood that there is no blue print which can be implemented in all countries. Institutions in any country are the result of long evolution process which is controlled by many factors including cultural background, political realities and historical facts. To develop an existing institutional setup to a more modernized functional oriented one, the first prerequisite is to know the shortcomings of the existing one and to be open for objective evaluation.

At the beginning a discussion about the administrative boundaries is made. The relation between Cairo Planning Region as defined by the Ministry of Planning, the Greater Cairo Region as defined by the General Organization for Physical Planning and the Study Area of the current master plan study is explained. There is a need to unify the definition for the Greater Cairo Region for planning and financing compatibility.

Comparison between the responsibilities of the current organizations and those required for functional organization setup at both the regional level and local level indicates the need for establishment of new organizations at both levels. Strengthen urban transport planning capabilities at the Egypt National Institute of Transport is recommended to continue the updating of this Master Plan. Capacity building and

human resources development is a vital issue for the staffing of the recommended organizations.

Coordination between the different organizations is the cornerstone for successful transport system. All related organizations should strive for spatial, jurisdiction and functional coordination.

Most of the cost of the Master Plan Projects can be covered if the level of transport investment attained in the Five Year Plan 1997-2002 is maintained in the next four Five Year plans. The remaining investment part can be secured through some recommended measures such as rationalizing the public transport fare structure, earmarked fuel taxation, parking fees, tolls from express highways and sharing the windfall earning from transport projects.

9.2 ADMINISTRATIVE AND PLANNING BOUNDARIES IN THE STUDY AREA

The Arab Republic of Egypt is divided into 26 local administrative units each one of them has a Governor and thus called Governorate. The Governors are appointed by the President and they have considerable power in the decision making process related to all the services in their respective governorates. The budgets of those local administrative units are channeled to them from the national budget through the Ministry of Local Administration in addition to limited local taxes. Each Governorate has an elected Local Council which reflects the requirements of the inhabitants of each Governorate. The Local Councils approve the budget and plans of the Governorates.

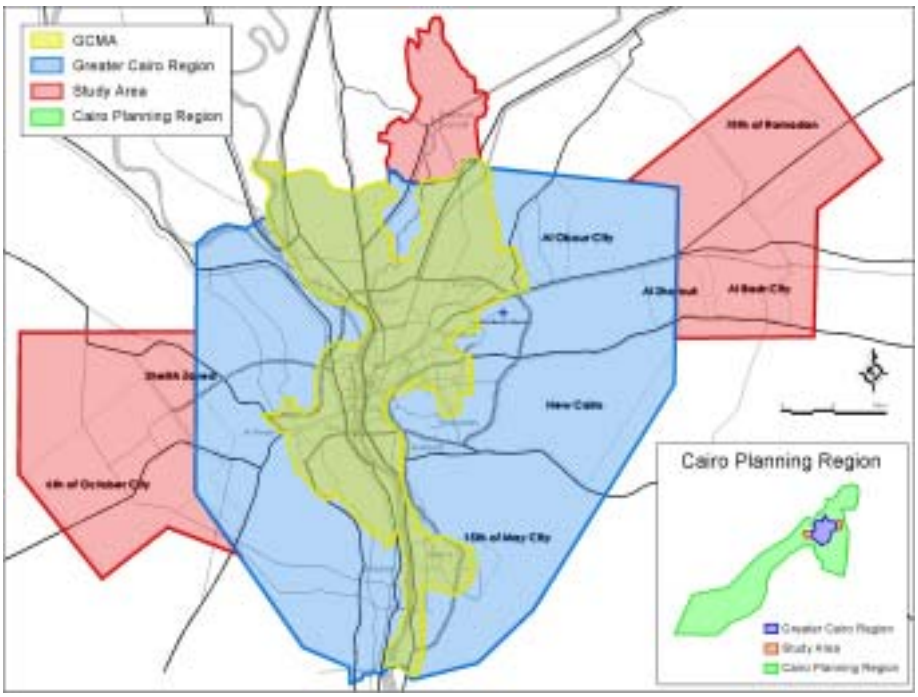
The Study Area covers primarily the Greater Cairo Region. But the term Greater Cairo Region does not imply the same boundaries for all related parties (see Figure 10.2.1). For the Ministry of Planning, Cairo Planning Region encloses all the three Governorates: Cairo, Giza and Qalyobeya in addition to the new city of Tenth of Ramadan which is part of Sharqeya Governorate. The total area of the Cairo Planning Region is about 36,570 Km^2, and most of it is desert land in Giza Governorate. For the Ministry of Housing, Utilities and Urban Communities, the term Greater Cairo Region includes mainly the three cities of Cairo, Giza and Shobra El Khiema without including the surrounding new communities. In the Greater Cairo Public Transport Study conducted by the National Authority for Tunnels, the term of Greater Cairo Metropolitan area was used to represent urban boundaries of the above mentioned three cities. Such unclear definition of the term and its boundaries has some negative implications and is a source of misunderstanding. The concerned parties should reach an agreement about a defined boundary of the Greater Cairo Region in order to match the different planning and budgetary efforts.

For the sake of urban transport planning, and in view of the growing economic activities in the New Cities and New Communities around Cairo and Giza cities, the boundaries of the Greater Cairo Region in this study has been expanded to include all these New Cities and New Communities. The area of the Greater Cairo Region as defined in this Study is 2110.94 Km^2.

Each Governorate is divided into qisms (in the urban governorates) or Markazs (in rural governorates). Each Markaz is a local administration unit with regard to police and public services and thus has its local budget, but in Cairo and Giza each several qisms, primarily police zone, makes larger administrative units called "Hay". Cairo City has 39 qisms, Giza City has 13 qisms and Shobra El Khiema City has 7 qisms. Each Hay has a Head of the Hay appointed by the relevant governor. Each of the New Cities and New Communities in the Study Area has its development organization which is in charge of the management of all the public services (including transportation) within the new city or new community. Examples are the Tenth of Ramadan Development Organization and the Sixth of October Development Organization. These development organizations are under the Ministry of Housing, Utilities and Urban Communities and their budget are channeled to them from the budget of that Ministry. It is supposed that the administration of the new communities will be transferred to the relevant governorate when the new city and/or new community reaches maturity, but so far no such transfer has taken effect.

The Grater Cairo Region is the largest urban cologmoration in the Middle East and Africa with current population of more than 14.39 million and is estimated to reach a population of more than 20 million by the target year of the study 2022.

The physical plan for the Greater Cairo Region prepared by the General Organization for Physical Planning (GOPP) aims to divide the region into homogeneous sectors. It may be appropriate if the administrative boundaries within the region coincide with the boundaries of the planned homogeneous sectors.



Source: JICA Study Team

Figure 9.2.1 Administrative and Planning Boundaries in the Study Area

9.3 ORGANIZATIONS RELATED TO URBAN TRANSPORT

Although it is one of the public services, transportation differs from other services such as water supply or telephone communication in that the planning, implementation and operation of such services are usually the responsibility of single body, while there are many organizations involved in some aspect or another of the transportation service.

In GCR the organizations related to urban transport can be divided into government organizations and private organizations. The former can be divided into national government organizations that belong to one of the Ministries and local government organizations that belong to one of the Governorates. Examples of the national government organizations are the National Authority for Tunnels, the General Authority for Roads, Bridges and Land Transport, Egypt National Institute of Transport and other organizations under the Ministry of Transport. Although such organizations are concerned mainly with the issues of national transport, they also deal with many issues at the regional level of Greater Cairo.

The Ministry of Housing, Utilities and Urban Communities (MHUUC) has a special role in urban transport of GCR because it is the Ministry in charge of the preparation of the land use plans for the whole of Egypt and because of its role in the development of new urban communities in the desert areas around the traditional cities of GCR. The development of the new communities started about 20 years ago by the two cities of the Tenth of Ramadan City to the East of Cairo and the Sixth of October City to the West of Giza. The industrial growth of these two cities together with other new communities around Cairo and Giza has dramatically changed the transport patterns in the Region. MHUUC has constructed the Ring Road around Cairo Region in addition to the 15th of May Corridor which connects the Sixth of October City to Cairo. Almost half of the national investments in transport in GCR are allocated to projects implemented by MHUUC.

The Traffic Police which is under the Ministry of Interior is responsible for the enforcement of traffic rules, issuance of driving license and vehicle operation license. The Traffic Police is also involved in traffic planning and management. There is a Traffic Police assigned for each Governorate in addition to the Central Traffic Police which is in charge of traffic on the intercity roads.

Each Governorate has its own Roads and Transport Directorate for road planning, construction and maintenance. Cairo Governorate has established Cairo Traffic Engineering Bureau (CTEB) to be in charge of traffic engineering and planning in Cairo, but other Governorates do not have similar organizations. Cairo Transport Authority which is under Cairo Governor is in charge of the operation of buses, minibuses, river buses and tram network for all the region of GCR. Due to pricing ceilings imposed on public transport fares, CTA has not been able to expand its services to meet the demand.

To attend to part of the demand for improved bus service, Greater Cairo Bus Company has been established under the Ministry of Public Enterprise. The company operates air conditioned buses on selected main routs.

Historically the Private Sector was involved in bus and tram operation until the Fifties of last century. Since then Public Sector took over and the role of private sector was limited to the ownership and operation of taxis within the cities and between cities. The inability of CTA to cope with increasing demand in trips has opened the door to the rapid growth of shared taxis or microbuses. The share of these shared taxis has reached to about 40% of the total public transport trips in GCR. Most of these microbuses are owned and operated by individuals and their uncontrolled driving behavior is one of the main reasons of traffic problems in GCR.

Taxis equipped with fare meters are mostly owned and operated by individuals mainly because the controlled fares does not make its operation attractive to company ownership. Most of these taxis are more than 10 years old and large portion are more than 20 years old.

Cargo trucks are mostly owned and operated by either private companies or private individuals.

Table 9.3.1 gives an overview of the role of each of the related organizations in the field of urban transportation in the Study Area.

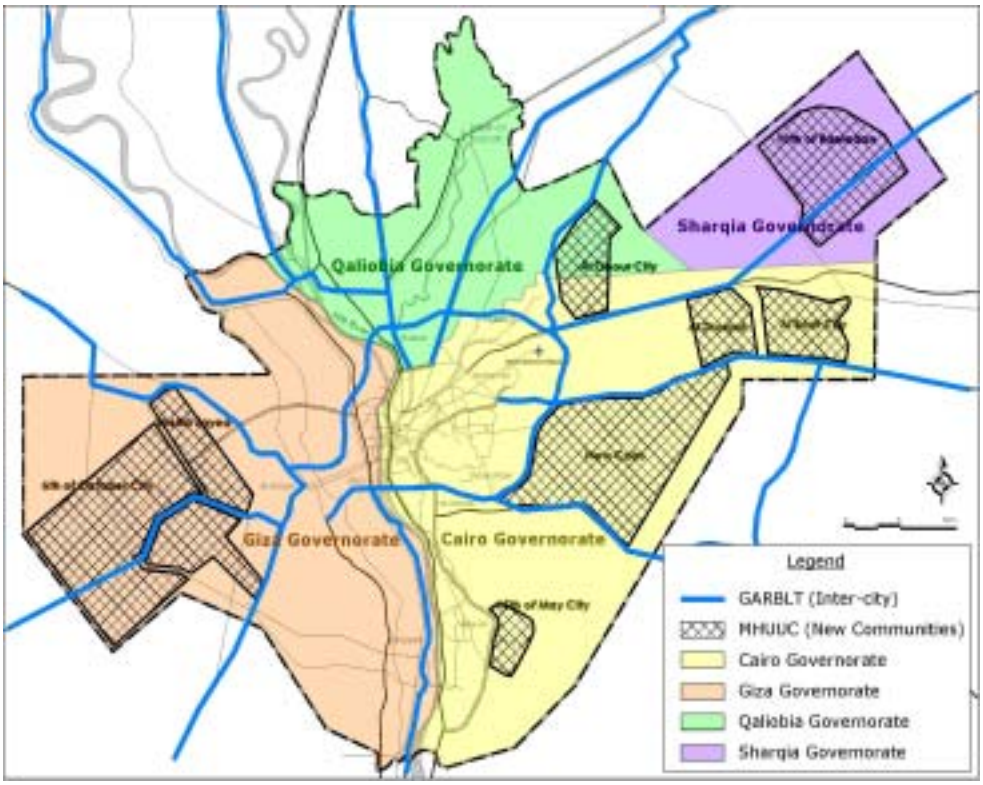
Table 9.3.1 Organizations Related to Urban Transport in Greater Cairo

	Organization	Major Role in Urban Transport
Ministry of Transport		
1	The Higher Committee for Greater Cairo Transportation Planning (H.C.)	Established by a Prime Ministerial Decree in 2000, the Committee is headed by the Minister of Transport and is responsible for the overall transport planning of the Greater Cairo Region. The Committee supervises the current master plan study and is expected to be responsible for its continuous updating and modifying.
2	Transport Planning Authority (TPA)	Although this Authority is concerned mainly with national level transport planning, it has commissioned several studies about some transport issues in Greater Cairo Region such as: - Survey of own Account Passenger Transport by Government Agencies in GCR (1985) - The Development of the Role of the Private Sector in Urban and Inter-city Passenger Transport (1986) - Cairo Metro Interchange Coordination Study (1987) - Greater Cairo Public Transport Fare Policy Study (1992-1995) - Cairo Urban Transport Project (1980) - Greater Cairo Transportation Planning (1973)
3	Egypt National Institute of Transport (ENIT)	- The Institute provides post graduate studies in the fields of transport planning, transport engineering and transport economics. - It provides technical training for the employee in the transport sector. - It conducted limited number of studies such as a study about the effect of underground metro as a transportation mean for the limited income group. - It maintains a library for transportation science. - The Institute is the executive agency for the Higher Committee for Greater Cairo Transportation Planning.
4	The National Authority for Tunnels (NAT)	NAT is in charge of planning and implementation of Metro and tunneling Projects such as Cairo Metro Lines 1 and 2 and Azhar Car Tunnel. Recently NAT has been the counterpart organization for the Greater Cairo Public Transport Study 2000.
5	The Cairo Metro Organization (CMO)	CMO has been part of the Egyptian National Railway, but it has been separated in 2001. CMO is in charge of operation and maintenance of the Metro network in Greater Cairo.
6	The Egyptian National Railways (ENR)	ENR is the Authority in charge of planning, implementation, operation and maintenance of the national railway network. The sections of railways within the Greater Cairo Region are part of the transportation system of the region.
7	The General Authority for Roads, Bridges and Land Transport (GARBLT)	GARBLT is the Authority in charge of planning, implementation, operation and maintenance of the intercity national road network. Because the boundaries of Greater Cairo Region extends beyond the limits of the road departments of the three Governorates, parts of the road network of Greater Cairo are under the jurisdiction of GARBLT. Figure 10.3.1 shows the parts of the national road network in the Study Area.

Ministry of Housing, Utilities and New Communities		
8	The General Organization for Physical Planning (GOPP)	GOPP is responsible for setting the overall policy for physical planning, preparing urban development plans and the supervision of the implementation of these plans. The GOPP has a Regional Urban Planning Center for the Greater Cairo Region. The GOPP has prepared the development plan for the Greater Cairo Region which is one of the main inputs for the preparation of the long term transportation planning for Greater Cairo Region. Beside its role in physical planning, the GOPP has planned some transport projects in the Greater Cairo Region such as the Ring Road, 15th of May corridor, traffic planning in Roxy area and traffic planning in Azhar Street.
9	The Central Development Organization (CDO)	The Central Development Organization has several regional executive organizations. One of them is the Executive Organization for Greater Cairo Development. This Organization is the implementing body for the projects related to future developments of the Greater Cairo. It is the Organization in charge of the implementation of the New Communities Projects around Cairo and Giza Cities. Beside the implementation of the new communities, the Executive Organization for Greater Cairo Development has implemented transportation projects such as Cairo Ring Roads, 26th of July corridor, traffic improvement in Sphinx Square, traffic improvement in El Galaa Square, etc.
10	The Development Organization for each New City or New Community	Road planning and implementation in addition to operation of the intracity bus and microbus within the new city or the new community.
Ministry of Interior		
11	The Traffic Police Directorates for Cairo, Giza and Qalyobeya Governorates	- Vehicle inspection and issuance of vehicle operation license - Issuance of driving license - Traffic planning - Traffic management and control
Ministry of Planning		
12	Transportation Sector	- Preparation of the five-year development plans for the transportation sector on the national and the regional levels. - Coordination and preparation of the budget for the five-year development plans.
Cairo Governorate		
13	Cairo Traffic Engineering Bureau (CTEB)	- Traffic Engineering and Planning for Cairo Governorate
14	Roads and Transport Directorate (RTD)	Planning, implementation and maintenance of road projects within Cairo Governorate.
15	Cairo Transport Authority (CTA)	Planning, operation and maintenance of busses, minibuses, river busses and tram network in the Greater Cairo Region
Giza Governorate		
16	Roads and Transport	Planning, implementation and maintenance of road projects

	Directorate	within Giza Governorate.
Qalyobeya Governorate		
17	Roads and Transport Directorate	Planning, implementation and maintenance of road projects within Qalyobeya Governorate.
Other Governmental Organizations		
18	Greater Cairo Bus Company	The Company is under the Ministry of Public Enterprise and it operates bus transportation network within the Greater Cairo Region
Non Governmental Organizations and operators		
19	Operators of Microbus Taxi Service	Individual operation of Microbus taxi service
20	Taxi Operators	Operate the taxis equipped with fare meters.
21	Operators of Special Use Buses	These buses are owned by governmental or private bodies for the exclusive transportation of its employee or tourist groups.
22	Operators of Limousine taxi	Limousine taxis are operated by travel companies for transportation between the airport and the hotels and for hotel service.

Source: JICA Study Team



Source: JICA Study Team

Figure 9.3.1 The National Road Network in the Study Area

9.4 FUNCTIONS AND RESPONSIBILITIES OF THE CURRENT TRANSPORT ORGANIZATIONS IN THE STUDY AREA

Before embarking on the discussion about the current status of the transport organizations in the Greater Cairo Region, it is important to mention some points:

1) The objective of this discussion is not to criticize the performance of any of the organizations but rather to identify the areas which need intervention.

2) The institutional problems in GCR are not unique in nature but rather they are common to most developing countries. The differences lie in two aspects; the cultural environment of each country and the personalities involved in institutional framework.

3) Compared to many developing countries, Egypt has a very good chance to improve its institutional structure due to the availability of a vast pool of qualified and semi-qualified personnel.

4) In spite of the limitations in the current institutional setup, there has been many positive aspects such as:

a) In the planning function, the General Organization for Physical Planning (GOPP) of the Ministry of Housing, Utilities and Urban Communities is in charge of the preparation of the urban structural plans (land use plans) for all the cities of Egypt. GOPP has provided the urban plan for the GCR up to year 2017. Compared to other developing countries this is a very positive step because it controls the urban growth to be within approved and enforced land use plan.

b) In the project implementation function, large and important transport projects have been implemented. Examples are the Ring Road, the 15th of May Corridor, 6th October Flyover, and the two Metro Lines. Most of these projects have been implemented with local resources which indicate the system capability to take difficult decisions and the ability to implement them with reasonable quality. It is obvious that without these projects, transportation in GCR would have been in much bad shape.

c) In the enforcement function, the prohibition of the entry of heavy trucks to the cities of Cairo and Giza has been successfully enforced. Also the enforcement of using the seat belt has been remarkably successful. These two examples indicate that once the will and the resources are mobilized, there is a fairly good chance to attain the targeted enforcement objectives.

Figure 9.4.1 shows the current organization setup of the main organizations related to transport in GCR (Regional Level). In this figure only Cairo Governorate is shown for simplicity (Gov.).

The Higher Committee for Greater Cairo Transportation Planning (H.C.) is chaired by the Minister of Transport, its members are the representatives from related organizations and ENIT is its executive agency.

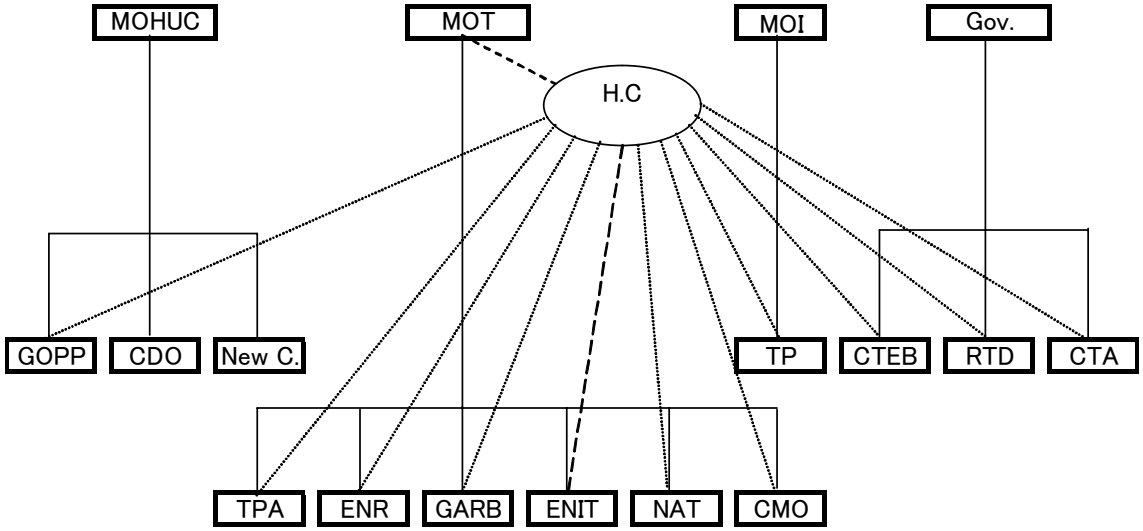


Figure 9.4.1 Current Organizations Setup (Principal Organizations only)

The functions of H.C. as defined in the Prime Minister Decree are:

1) Defining the boundary of the Greater Cairo Region (GCR) so as to insure the integration of planning and implementation of transport projects.
2) Execute the procedures for the preparation of transport plans for the GCR and follow-up of implementation including the preparation of long term comprehensive plan for the region to cope with transport demand and to improve the transportation efficiency and improve service level.
3) Preparation of terms of reference for the studies of the comprehensive transport master plan and preparation of all required elements for starting these studies.
4) Technical follow-up of the steps and phases of the preparation of the Master Plan.
5) Evaluate Studies, approve plans and establish the priorities for the implementation of transport projects within GCR. The decision of the Committee will be binding to all organizations related to Transport in the GCR.
6) Follow-up of the implementation of the Comprehensive Transport Plan and evaluation of the activities of all transport related organizations in the GCR.
7) Coordination between transport and traffic plans submitted from the different Governorates and approval of these plans within the framework of the Comprehensive Master Plan.
8) Establishment and continuous updating of transport database.

On the local level, Cairo Governorate has established Cairo Traffic Engineering Bureau in 1997. The organization chart of CTEB is shown in Figure 9.4.2.

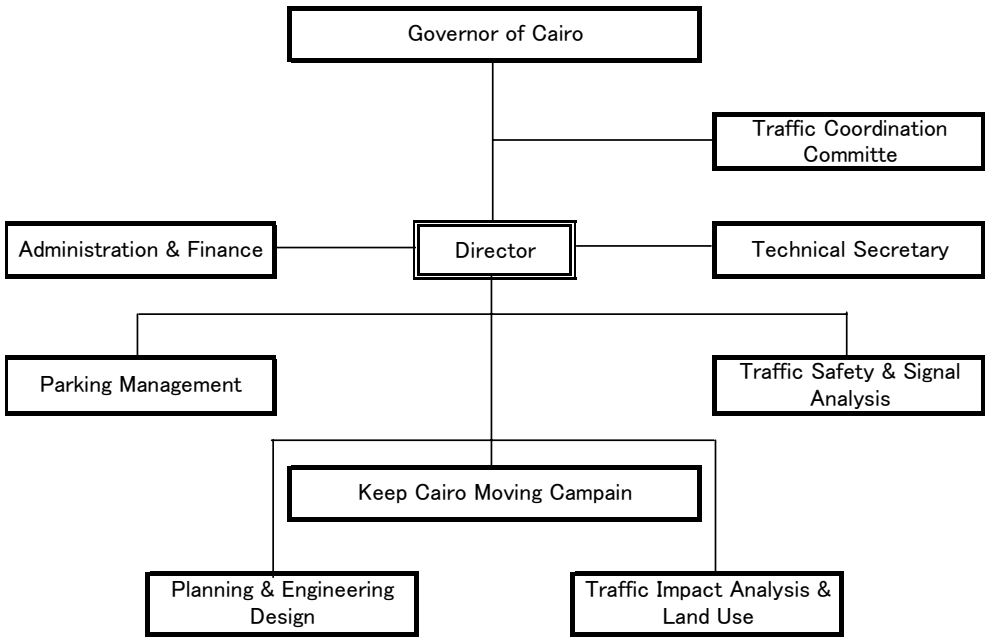


Figure 9.4.2 Organization Chart of CTEB

The principal responsibilities of CTEB as defined in the Governor's Decree are:

1) Planning & Engineering Design: Study and improvement of road network including traffic design and signal design.
2) Traffic Safety & Signal Analysis: Preparing traffic data base, conducting traffic surveys and Monitoring of traffic condition.
3) Parking: Establishment and enforcement of parking policies
4) Keep Cairo Moving Campaign: Design and implementation of public awareness campaign to help improve traffic conditions in Cairo.
5) Traffic Impact Analysis & Land Use: Approval of Building permissions and other activities with impact on traffic.

The staffing schedule of the technical departments mentioned above as defined in CTEB's establishment decree is 14 persons including its director, but the current technical staff is 7 persons only.

To make thorough diagnosis of the current status of the main institutional aspects of the principal organizations related to transportation in the Study Area, detailed Agency Responsibility Analysis and Agency Performance Evaluation should be conducted as mentioned in the World Bank Study, "Study on Urban Transport Development" in August 2000. Such exercise is beyond the scope of the current Master Plan and should be conducted by separate endeavor. For the purpose of this study we will look into the required institutional functions in two levels, the regional level and the local level. By the regional level we mean the functions that should be undertaken for the whole region of Greater Cairo and by the local level we mean the functions that should be undertaken by local agencies on the City or Ward levels. Tables 9.4.1 and 9.4.2 show the agency responsibility matrices for these two levels.

Table 9.4.1 Agency Responsibility Matrix (Regional Level)

Responsibility	Urban Transport Policy Coordination[1]	Road Infrastructure			Public Transport Infrastructure		Public Transport Coordination[5]	Traffic Management	Road Safety[6]	Traffic Enforcement	Traffic & Road Safety Coordination[7]	Accident Recording[8]	Vehicle Licensing	Vehicle Safety[9]	Traffic/Transport Training	Traffic/Transport Research[10]	Urban Planning	Environment Monitoring
		National[2]	Gov.[3]	New[4]	Rail & Metro	Bus & Tram												
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)
1. Policy Formulation	H.C.	RBA	GOV.	MOH	E – N	GOV.	-	TP	-	TP	-	-	TP	-	ENIT	NU	MOH	MOE
2. Program Finance	MOT	MOT	GOV.	MOH	MOT	GOV.	-	MOI	-	MOI	-	-	MOI	-	MOT	NU	MOH	MOE
3. Project	-																	
A) Identification	-	RBA	GOV.	MOH	E – N	GOV.	-	TP	-	TP	-	-	TP	-	ENIT	NU	MOH	MOE
B) Preparation	-	RBA	GOV.	MOH	E – N	GOV.	-	TP	-	TP	-	-	TP	-	ENIT	NU	MOH	MOE
C) Appraisal	-	RBA	GOV.	MOH	E – N	GOV.	-	TP	-	TP	-	-	TP	-	ENIT	NU	MOH	MOE
D) Implementation	-	RBA	GOV.	MOH	E – N	GOV.	-	TP	-	TP	-	-	TP	-	ENIT	NU	MOH	MOE
E) Supervision	-	RBA	GOV.	MOH	E – N	GOV.	-	TP	-	TP	-	-	TP	-	ENIT	NU	MOH	MOE
F) Monitoring[11]	-	-	-	-	-	-	-	TP	-	TP	-	-	TP	-	-	-	-	MOE
G) Evaluation[11]	-	-	-	-	-	-	-	TP	-	TP	-	-	-	-	-	-	-	MOE
4. Standards[11]	-	MOH	MOH	MOH	-	-	-	-	-	-	-	-	-	-	-	-	-	MOE
5. Regulation[11]	-	MOT	GOV.	-	-	-	-	TP	-	TP	-	-	-	-	-	-	-	MOE
6. Control[11]	-	MOT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A hyphen (-) indicates that the responsibility is not assigned or not effectively carried out by any agency

H.C. – Higher Committee for GCR Transportation Planning
RBA – General Authority for Roads, Bridges and Land Transport (GARBLT)
MOH – Ministry of Housing, Utilities and Urban Communities
MOI – Ministry of Interior
NU – National Universities
MOT – Ministry of Transport
Gov. = GOV. - Governorate
E – N – ENR & NAT
TP – Traffic Police
MOE – Ministry of Environment

1) The Higher Committee for GCR Transportation Planning has been formed by a Prime Ministerial Decree in Year 2000. The H.C. is a standing Committee Chaired by the Minister of Transport with membership from all related organizations. ENIT is the executive agency for the H.C. The current Master Plan is the first project to be undertaken by H.C.
2) RBA = GARBLT is in charge of National Road Network including the portions of the network within the GCR Metropolis
3) The road system within the Governorates is the responsibility of the Governorate
4) The roads in the New Communities or constructed by the Ministry of Housing, New Communities and Urban Communities within the GCR, Ex. The Cairo Ring Road.
5) There is no agency with clear responsibility for transportation coordination
6) There is no agency with clear responsibility for road safety
7) There is no agency with clear responsibility for Traffic & Road Safety Coordination
8) There is no agency with clear responsibility for accident recording
9) There is no agency with clear responsibility for vehicle safety
10) Research for Traffic and Transport is mainly done by the National Universities
11) The functions of monitoring, evaluation, standards, regulation and control are generally poor.

Table 9.4.2 Local Agency Responsibility Matrix (City Level)

Responsibility	Transport Planning[1]	Road Construction[2]	Road Maintenance[2]	Road Safety Education[3]	Traffic Enforcement	Road Marking[4]	Traffic Signals[4]	Traffic Signs[4]	Public Transport Coordination[5]	Public Transport Operation			Planning of Pedestrian Movement[6]	Parking Planning[7]	Tariff Control[8]	Vehicle and Fuel Taxes[9]
										Rail & Metro	Bus & Tram	Micro Bus				
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)
1. Policy Formulation	GOV.	GOV.	GOV.	-	TP	GOV.	GOV.	GOV.	-	E –N	CTA	CTA	-	-	GOV.	MOF
2. Program Finance	GOV.	GOV.	GOV.	-	MOI	GOV.	GOV.	GOV.	-	MOT	GOV.	PRIV.	-	-	-	MOF
3. Project																
A) Identification	GOV.	GOV.	GOV.	-	TP	GOV.	GOV.	GOV.	-	E-N	CTA	PRIV.	-	-	TP	-
B) Preparation	GOV.	GOV.	GOV.	-	TP	GOV.	GOV.	GOV.	-	E-N	CTA	PRIV.	-	-	TP	-
C) Appraisal	GOV.	GOV.	GOV.	-	TP	GOV.	GOV.	GOV.	-	E-N	CTA	PRIV.	-	-	TP	-
D) Implementation	GOV.	GOV.	GOV.	-	TP	TP	TP	TP	-	E-N	CTA	PRIV.	-	-	TP	-
E) Supervision	GOV.	GOV.	GOV.	-	TP	TP	TP	TP	-	E-N	CTA	PRIV.	-	-	TP	-
F) Monitoring	-	-	-	-	TP	-	-	-	-	-	-	-	-	-	-	-
G) Evaluation	-	-	-	-	TP	-	-	-	-	-	-	-	-	-	-	-
4. Standards	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Regulations	-	-	-	-	TP	-	-	-	-	-	-	-	-	-	-	-
6. Control	-	-	-	-	TP	-	-	-	-	-	-	-	-	-	-	-

A hyphen (-) indicates that the responsibility is not assigned or not effectively carried out by any agency

GOV. – Governorate
TP- Traffic Police
E-N – ENR & NAT
MOI – Ministry of Interior
CTA – Cairo Transport Authority
MOF – Ministry of Finance
PRIV. – Private
MOT – Ministry of Transport

1) Transport planning as such is not practiced. CTEB is in charge of planning of some traffic areas for Cairo Governorate. Giza Governorate and Qalubiya Governorate do not have similar traffic and engineering bureaus.
2) Road construction and maintenance within the boundaries of each governorate is primarily the responsibility of the governorate. Nevertheless, the Ministry of Housing, Utilities and Urban Communities undertakes the constructions of some major roads.
3) There is no road safety education programs
4) Planning of Traffic Marketing, Traffic Signals and Traffic Signs is done by CTEB and implemented by the Traffic Police.
5) There is no organization in charge of coordination.
6) There is no organization with clear responsibility about pedestrian movement.
7) Parking planning in Cairo Governorate is one of the responsibilities of CTEB, but due to the limited staff it is still not effectively carried out
8) Local councils are involved in the function of tariff control, but the responsibility is not clear.
9) Taxation is decided by law, but there is no organization of preparing policy or evaluating the different alternatives.

From Tables 9.4.1 and 9.4.2 together with the attached notes, the discussion of the previous sections, and interviews with concerned organizations, we can notice the following:

1) The need for the continuous process of regional transport planning calls for strengthening the role of the Higher Committee for GCR Transportation Planning together with its executive agency, Egypt National Institute for Transport (ENIT). A special unit should be established within ENIT for the purpose of regional urban transport planning. Its name could be "Urban Transport Planning Unit" (UTPU). Through its participation as the counterpart for this Master Plan study, ENIT has gained the jumpstart needed to establish UTPU. It is important to have a permanent planning organization because the planning process depends on solid, continuously updated database and a group of specialist capable of handling the sophisticated transportation mathematical model. The functions and organization of UTPU will be discussed within the recommended institutional setup in the next section. It is important to separate the planning function from other executive functions; otherwise the daily obligations of the executive functions will be at the expense of the planning functions. This may end up by discarding the planning functions altogether. An Example is the Transport Planning Authority where it's original mandate was national transport planning, but it ended up with commissioning consultants for the preparation of national transport studies instead of conducting them by its own resources.

2) On the regional level there are many functions that are left without clear responsible agency. Such important functions are typically transport plan formulation and its decisions, the coordinated implementing body of new projects and programs and implementing procedures. Other examples are public transport coordination, road safety, traffic and road safety coordination, vehicle safety, accident recording, monitoring and evaluation of projects, establishment of standards, regulations and overall control. Such functions should be the responsibility of a metropolitan level transport integration and coordination Agency in the initial stage. We shall name it tentatively as Cairo Metropolitan Transport Bureau (CMTB). Such agency should be in charge of integrating and coordinating several functions performed by different agencies that belong to either a ministry or governorate. This means that CMTB should not belong to one of the related ministries or governorates. For such bureau to be effective it should be under the Prime Minister Office and it should be supervised by a ministerial committee formed from the related Ministers and Governors. The functions and organization of CMTB and the Ministerial Committee will be discussed within the recommended institutional setup in the next section.

3) There is a definite shortage in the institutional setup at the local level. The establishment of Cairo Traffic and Engineering Bureau (CTEB) is one step in the right direction, but it needs more resources in manpower and equipment. Each Governorate should have similar bureaus and these bureaus should have branches at each city or ward level to be able to carry out the required functions of transport and traffic management. The functions and organization of these

bureaus will be discussed within the recommended institutional setup in the next section.

4) Transportation safety is a very important subject and many countries have national level transport safety bureaus in charge of charting and enforcing safety regulations. Egypt does not have such organization. The recommended CMTB may have a safety unit as a first step. It should be planned that this unit will develop into a national transport safety bureau.

9.5 OTHER INSTITUTIONAL AND ORGANIZATIONAL SUBJECTS

9.5.1 Institutional Issues on On-street Parking

Before starting the discussion on this subject, we have to establish some principles:

1) The roads are public utilities owned by the public. This means using the road for private objective should be either prohibited or otherwise charged for the public benefit.
2) The main objective of the road is to be used for transportation i.e. movement, and not for the storage of the transportation means (vehicle parking).
3) Vehicle parking is the private objective of the owner and/or the user. It does not serve the public ownership of the road. On the contrary it obstructs the movement of firefighting vehicle, ambulance police cars and other public service vehicles.

Based on these principles, in Japan, on road parking is prohibited for more than 7 hours at any location even at night. Vehicle operation permit can not be granted without having an assigned location with suitable dimensions for parking the vehicle off road. In Egypt such rule can not be enforced due to the habit of using the road for parking without any obligation. In the same time, if the present trend is not changed the ever increasing number of vehicle will lead to traffic problems, public hazards with consequent adverse economic effects. The current situation means that each additional car owner is deducting a permanent space from the limited available street area.

The following observation can be noticed regarding on-street parking in the Greater Cairo Region.

1) Most of the roads have no indication for prohibiting or allowing vehicle parking. No-parking signs are installed only at some limited number of streets in downtown or along the flyovers.
2) When the space is not enough to park the vehicle parallel to the curb, drivers revert to parking vertical or inclined to the curb without any regulation. This in turn decrease the street capacity and in many cases the remaining street width is barely enough for the passage of a single car.
3) When it become difficult to park in the street, many vehicles revert to parking on the side walks and thus obstructing the safe movement of pedestrians. The pedestrians leave the side walks and walk in the street proper with adverse effects

on the smooth movement of the vehicles and dangerous implications to pedestrians.

4) In many cases cars are parked in double lines and in some cases a side street is blocked altogether with parked cars to the extent that it cannot be used for car passage without the movement of several cars. The inaccessibility of side roads for traffic is one of the main reasons for the congestion of Cairo streets in spite of the ample percent of the total street area compared to other cities
5) In spite of the fact that Article 73 of the Executive Regulation of the Traffic Law stipulates that any car left on the street for more than 48 hours is considered as abundant vehicle, many people leave their old unused cars (without number plate) in the street without bothering to transfer them to car junk area. Due to this fact, it is difficult to find any car junk area in or around Greater Cairo Region while it is a common view around the cities in many countries.
6) Some car owners arrange some poles or obstacles in front of their houses and/or offices to prevent or discourage other cars from parking in front of their houses. And since these people are parking in other places when they leave the space in front of their houses and/or offices, they are, in effect, occupying two parking spaces (two public owned spaces) for each of their cars. Some car owners, offices or shops employ guard men for the sole purpose of keeping parking space for their employers or for the clients of their offices and shops. Such behavior adds to the car parking problems and violates the principle of the public ownership of the streets.
7) Wherever any parking car starts to move, some sort of car dispatcher appears and claim a tip from the car owner. Considering 1 L.E. to be the normal tip amount and that half the cars in GCR makes one parking per day, the collected amount of money by those dispatchers is enormous for doing nothing. In fact those dispatchers are one of the chronic problems of traffic in GCR. To maximize their potential revenue, they try to use every available space for car parking disregarding the requirements for reasonable traffic flow of the through traffic or the parked cars.
8) The fees charged at the renewal of vehicle operation permit are the same for those who have assigned parking space for their vehicles and those who park on the street. The implication is that there is no obligation for car owners to arrange parking space for their cars, and there is no incentive for those who have parking space to keep that space for car parking. This situation leads to converting the available parking space at some villas or buildings to other usage such as small shops, clinics, or stores. It is also the main reason behind the reluctance of private sector to invest in building parking lots because people do not feel any obligation to pay money for parking.

From the above observations, it is required to consider the application of some or all of the following measures:

1) To charge additional fees at the time of the renewal of the car operation permission on vehicles which can not submit a solid proof of having an assigned parking space with dimensions enough to accommodate the vehicle size. The additional fees should correlate to the size of vehicle which means that the fees

for busses may be 3 or 4 times that of the smaller cars. The level of those additional fees should be considered in detail if the principle is approved. The revenue from these fees should be channeled exclusively for transportation projects and for traffic improvement. Depending on the level of such additional fees, it could be one of the main financial sources for the implementation of the components of this transportation master plan.

2) All the cars without renewed registration number should be removed from the street and stored out of the city area.
3) All schools and other organizations operating bus fleets for its own transportation needs should arrange parking spaces for their busses off the street. It is worth noting that CTA (a public organization) has parking space for the major portion of its bus fleet while many travel agents (private establishment) park their bus fleets on street.
4) All new supermarkets and other activities, which need car parking, should arrange parking space for their customers before getting their license.
5) Design and implement chargeable on-street parking spaces in downtown and congested areas.
6) Abolish car dispatchers from all of GCR or train them to help the police in maintaining sound traffic rules.

Such measures, if applied, can lead to the following consequences:

1) It will encourage those who have their own parking to keep them for parking without transfer them into other use, and it will encourage those who are parking on the street to find parking place for their cars.
2) Parking will have a cost and thus it will encourage investors to build parking facilities (underground, multi story or mechanized). Without such measure, such parking facilities can not compete with free-of-charge-on-street parking.
3) In cities like Cairo, there are always some vacant land spaces waiting for development or waiting for solving some legal conflict. Such areas could be used as temporary parking space if the local authorities provide some incentive.
4) The collecting revenue from the additional fees for lack of parking space and the revenue from on-street parking facilities can be channeled for the finance of new transportation and traffic projects.

9.5.2 Institutional Issues on Pedestrian Facilities

The surveys of this study show that pedestrian trips constitute more than one-third of the total trips generated in GCR. In addition, all other users of mechanized transportation means walk to their riding location or after getting off. In short, every body is pedestrian at some time or another. This means that ensuring the safety of pedestrians should be at the top of any transportation and traffic planning efforts. In the GCR, pedestrian movements receive the least attention and this is clear from the following observations:

1) Sidewalks in most roads are not properly maintained. The width is not enough for the pedestrian volume especially at congested locations such as bus terminals, school entrances, etc. The surface of the sidewalks is uneven which imply hazards for walking. In many cases there are obstructions that may occupy the whole width of the side walks such as plantation, kiosks, and construction materials or even built walls. Such obstructions force pedestrians to leave the side walk and compete with the running vehicles for street space. This leads to decrease in the traffic efficiency and constitute hazard for pedestrians. The governorates recognize such cases and started to improve the sidewalks along the banks of the River Nile in Cairo and Giza.
2) Pedestrian crossing of wide roads is a life threatening exercise. In most cases there are no marked crossing location and even if it there, car drivers simply do not care. At road intersections, vehicles turning to the right or to the left do not give chance for pedestrian crossing even in green light signals. Some of the pedestrian crossings are marked too far from each others and they are not designed according to pedestrian needs. Pedestrians respond by neglecting them and cross the road from any location. The result is disturbance to car flow and danger for pedestrians.
3) To secure smoother vehicle movement, which is the main concern of traffic police, many street crossings have been replaced by U-turns. This resulted in cancellation of pedestrian crossings and increased vehicle speed and left the pedestrians with no alternative but to cross the street between the running cars.
4) On their part, pedestrians have become used to be the neglected group and had developed unparallel skills to cross the road between the running cars, they feel no need to cross the road through the underpasses or overhead bridges constructed for the sole purpose of their safety. In some cases they try to destroy the fences made to prevent them from crossing the road at uncontrolled locations. It is clear that public education and awareness efforts are badly needed as a prerequisite for the success of any improvement for pedestrian facilities.
5) Tourism is one of the main economic activities for Egypt. One of the main attractions for tourists is to be able to enjoy walking around the city and feel its life. Without improving pedestrian facilities, tourists will not consider Egypt as one of their favorite destinations. This means that improving pedestrian facilities will not only improve public safety, but it will also have economic benefits. The same saying applies to improve transport safety in general.
6) Pedestrian safety, in fact transport safety in general, has no prominent advocates in Egypt. NGO's activities should be encouraged in this arena. The Egyptian Automobile Club could have an effective role in advocating transport safety.

From these observations, it is clear that pedestrian facilities and awareness programs should be one of the main components of an integrated plan to improve the traffic problems in the Study Area.

9.5.3 Non Motorized Vehicles

The term non motorized vehicles is used here to mean animal (horse or donkey) driven carts used for cargo and/or solid waste transportation. Most of the drivers of these carts are not educated and do not have any idea about traffic rules. Due to the slow speed of such carts, they cause traffic chaos. The drivers tend to cross the roads at illegal locations to shorten the trip distance and in some cases they go in the wrong direction of the traffic. In spite of the fact that traffic law stipulates that non motorized vehicles and their drivers should have license, most of these vehicles and their drivers do not have any license. In crowded cities like Cairo or Giza where there are increasing number of flyovers and bridges, allowing such slow moving vehicles will only add to the mounting traffic problems. Banning such traffic is the only logical approach.

9.5.4 Vehicle Inspection and Related Problems

The life span is usually 8 years for small cars and reaches up to 12 years for larger cars. The preventive maintenance programs require the replacement of specified parts that are subject to wear and tear after certain period of time. The replacement should be made by authorized dealers using authentic parts. If the specified preventive maintenance routine is not performed, the vehicle maker will not be responsible for any damage or accident. In Egypt, most car owners do not perform preventive maintenance. They only go to the repair shop when the car is not moving or when they find some major malfunction. It is estimated that about 30% of the vehicle fleet in GCR is older than 20 years[1]. Such old vehicles without proper periodical maintenance are liable to breakdowns and accidents on the road. When a vehicle stops on 6th of October Bridge for example it causes congestion and delays for hundreds or thousands of vehicle. The economic loss due to such delay definitely exceeds the limited social benefits of allowing such vehicle to operate. In addition to that, the emissions from old vehicles exceed the safe limits and thus add health hazard to the economic loss.

Articles 134 ~ 155 of the Executive Regulations of the Traffic Law stipulate detailed requirements in high speed transport vehicles to qualify for operation permission. Article 215 of the same regulation stipulates that technical inspection of vehicles is executed by a "Technical Committee" appointed by the Head of the Traffic Police at each qism. However, in reality the procedures of vehicle inspection are limited only to checking the engraved numbers of the chassis and engine to verify that the vehicle is not stolen, checking front and rear lights, wind shield wiper and fire extinguisher in addition to the general appearance of the vehicle. No check is made for the under parts of the vehicle and no check is made for replacement of the defective parts. In most cases, the inspection process is done on the street without tools or equipment and it lasts for few minutes only.

The direct result of the relaxed environment of vehicle inspection is that once car is introduced it lasts on the street until it is no longer able to move. Even if the vehicle

[1] World Bank, "Cairo Urban Transport Note", May 2000

is damaged beyond repair, it still has a value because some body will buy it and use its parts for the repair of other vehicles. The governmental organizations their self cannot scrap their vehicles. They have to sell their aged vehicles in auction, and the buyer will find some way to renew their operating permission or dismantle them as spare parts.

There are only three inspection stations in the whole country and they are not authorized to issue inspection certificate. Vehicles inspected in these stations are re-inspected by technical committee of the qism in the manner explained above. The dealers of the major vehicle makers have their workshops and they perform periodical inspection for the vehicle manufactured by them in Egypt or abroad. However, the vehicle owners do not prefer to go to there because they are expensive compared to smaller repair shop.

The improvement of vehicle inspection system should be addressed as one of the main components of this mater plan. Such improvement may include:

1) Expansion in the number and capacity of inspection stations (public or private) including a system for training and qualification of the inspectors so that such stations can issue an inspection certificate acceptable to the traffic police without the need for re-inspection.
2) Issue standard procedures for vehicle inspection which should be implemented by all inspection stations. Such standard will include tailpipe emission limits beside mechanical, durability and safety requirements.
3) The role of the traffic police will be to license and supervise the operation of these inspection stations.

9.5.5 Traffic Rules and Enforcement of Traffic Law

Driver education and licensing is one of the main elements of traffic management. In Egypt, most of the drivers do not know the basics of traffic regulation. They did not get reasonable education to qualify for driving license. The Executive Regulations of the Traffic Law stipulate that the requirements for application of driving license are a general health certificate from a physician and sight test certificate from an ophthalmologist in addition to passing an oral test in the traffic law and driving test. In reality, the traffic law test shrinks to simplified questions about the traffic signs and the driving test is to drive the car for some 10 minutes around the police station. Recently the traffic police are making it more difficult to get a license, but the drivers' behavior on the street indicates either ignorance of the rules or otherwise intentional disregard of them. Some examples are:

1) Disregard of traffic signals when the police man is not at hand.
2) Keep right rule is not followed and lane marking if existed has no meaning to the drivers. It is common to find three cars running abreast in two lane street. Most of the drivers drive their cars anywhere in the street.
3) No signaling when changing the lane or when turning to left or right.

4) Driving and parking on the wrong side of the road and some time against the traffic of one way streets.
5) Disregard of pedestrians rights to use the road.
6) No observation of suitable distance between the cars.
7) Double parking and parking right at the edge of the intersection.
8) Driving with child on the driver's lap or with one hand ore using mobile phone while driving.
9) No abiding with speed limits.

In short, the rules of the traffic law and safe driving are not observed by the majority of the drivers. The police man writes the violation tickets using the number of car license plate and sends them to the car files. The fines are collected at the time of renewal of the car operation permit every year. In most cases, the driver does not know what kind of violation has been committed and thus one of the main objectives of making a violation ticket, i.e. education, is lost.

The traffic chaos in the streets of Greater Cairo has reached a point where it became impossible for the traffic police with the current level of resources to enforce the law. Education programs, awareness campaigns for both the public and police should start immediately and continue without slackness until concrete measurable results are attained. It is important also to increase the human and mechanical resources of traffic police. The concentration should be on the quality of the human resources and not the numbers.

In the mean time the following measures should be implemented:

1) Violation tickets should be charged on the driver and not on the car. Violated cars should be stopped and tickets should be written on the spot. This requires training of the police men and increase in the use of police motorcycle for the movement of the police men. The current system of standing police men can not help to enforce the traffic law.
2) Due to the wide scope of violations, the logical way is to start a program for law enforcement in steps. Some limited zones should be selected for strict law enforcement using much larger and educated police force. The results should be closely monitored and evaluated and after reaching successful results in these zones, the limits of each zone can be enlarged until the whole region is under control.
3) Law should apply to all without any exceptions including even police cars and governmental cars which should give good example to the public.
4) NGOs should have a role in the public awareness. Incentives to the law abiding drivers should be considered. Such incentives could be just a sticker for the drivers without any violation for one year or two years. The stickers could be removed from the car if the driver makes any new violation.

9.5.6 Vehicle Insurance

There are two main types of vehicle insurance. The first one is the compulsory insurance, which is one of the requirements to get a vehicle operation license. This insurance is made at one of the public insurance companies. Its premium is low and the beneficiaries are neither the driver nor the passengers of the insured vehicle, but the other parties injured or died at accidents. The insurance companies are usually reluctant to pay the insurance amount, and the beneficiary has to file a case against the insurance company to get the insurance amount. This takes several years and ends with lawyer involved being the main winner. The second insurance type is the optional insurance. It is not required by law and because the number of the participating vehicles is less than one percent, its premium is high, some 5% of the market value of the vehicle. The market value of the vehicle is decided by the vehicle type and the year of manufacture and is not related to the vehicle condition. No vehicle inspection is required for making insurance policy.

Since insurance companies should have direct interest in improving the traffic safety, their participation in public safety awareness programs and in NGOs safety activities should be encouraged. For instance, they could be the shareholders of vehicle inspection stations. Improving traffic safety can lead to decrease in the losses of the insurance companies. This can result in a decrease in the insurance premium and encourage more vehicle owners to have insurance policy to the benefit of all related parties.

9.5.7 Fuel Pricing Policies

The price of gasoline and diesel fuel has been fixed for more than 10 years while the price of all other commodities has been increasing. This means that fuel price has been decreased relative to the level of other commodities. The low fuel price encourages the use of private cars. It is observed that the traffic volume remains relatively high till late at night when compared to other cities world wide. The trip purpose of late traffic is surely not work related, but rather social and/or entertainment. Such traffic is a direct consequence of low fuel cost. The increase in domestic consumption of fuel decreases the amount for export and thus limits the earning of foreign currencies. Gradual increase in fuel price in the form of earmarked tax should be seriously considered as a tool to finance transportation projects and to rationalize the use of cars. It is understandable that raising the fuel price will have inflationary effects on the economy, but the current long lasting freeze can not be maintained without adverse effects.

9.5.8 Public Awareness

The first step to solve any problem is the knowledge that the problem exists. The current traffic situation in the Study Area and the lack of efforts to improve it indicates that the problems of transport and traffic do not receive enough attention from the decision makers. The “Cairo Urban Transport Note” prepared by the World Bank estimated that economic loss due to poor traffic management is about 1.5

billion L.E. per year in addition to the inestimable costs due to noise pollution and accidents risk. This is a huge economic loss, but so far the counteractions to alleviate it are very limited. It is vital to convince the decision makers with the importance and seriousness of the situation.

9.5.9 The Role of NGOs

The current role of NGOs in transport and traffic activities in GCR is very limited. We can mention two NGOs with some activities in this field:

(1) Arab Roads Association

Established in 1953, the main objective of the association is to promulgate knowledge and information related to road planning, design, operation and maintenance and to improve the awareness about traffic safety. The association is member of the International Road Federation (IRF). The association arranges periodical seminars on subjects related to these fields. The membership consists of 60 organizations (authorities and firms) in addition to about 1000 individuals closely related to road transport. The association publishes a quarterly scientific cultural refereed journal named "Arab Roads". The activities of the association are financed by the membership fees only.

(2) Automobile and Touring Club of Egypt

Established in 1924, the main objective of the club is to promote automobile related activities such as arranging car races, suggesting road improvement scheme, road safety, road signs to the related organizations and preparing road maps. The club issues international driving licenses. The membership consists of limited number of private car owners. The club is under the supervision of the Ministry of Tourism. The revenues of the club comes from the membership fees, the fees of issuing the international driving licenses and international car pass (TRIPTECK).

9.6 THE RECOMMENDED ORGANIZATION SETUP

9.6.1 Considerations for the recommended organizations

In this section we are going to introduce the recommended organization setup for transportation and traffic management in the GCR. This recommended organization has been decided after considering the situation of other world wide metropolitan cities and taking into consideration the local circumstances in GCR.

In this regard the following points have been taken into consideration:

1) The Study Team upholds the view of the World Bank expressed in Cairo Urban Transport Note that the proper role of the different institutions involved in traffic planning, management and enforcement must be addressed at the highest political levels. This is the main reason behind the recommendation of forming

the Ministerial Committee for GCR Transport. It is expected that such committee will have to deal with some difficult tasks regarding the coordination between the different Ministries and Governorates. The current situation is analogous to an orchestra where each member is playing without note and without conductor. The similarity is that the note resembles a transportation master plan and the conductor resembles the function of coordination between the different organizations. Without the note and the conductor there is no symphony and without the master plan and a coordinating body there is no efficient reliable transport system. Without good coordination, the different institutions or actors operate under different incentives, and they have no inducement to collaborate with each other. Developing institutional capacity to attain effective and efficient transport system is probably the most important task for the Government and it merits high-level attention.

2) While aware of the trend for leaner government which means less government intervention and less governmental organizations, the Study Team recommends the establishment of new organizations both on the regional level and the local levels. The rationale behind this is the fact that the existing institutional setup is simply inadequate to deal with the tasks required for planning, operation and management of an efficient transport system. The current institutional setup suffers from lack of clarity. An example is the area of traffic planning and traffic engineering where there is no articulation of responsibility between the traffic police and CTEB. The staffing involved in transport and traffic planning and management is inadequate in number and qualification. An example is the limited number of CTEB staff considering the required work volume for traffic engineering and traffic management in a city with Cairo size. It is to be noticed that the Egyptian Universities produces traffic engineers (although they need training) enough to fill the gap. Through the recommended institutional building the available human resources will be effectively employed.

3) Establishment the recommended institutions will not mean an added burden to the national budget. The fact is that through the work of these institutions, more efficient transport system can be attained with overall less cost. This leads to the concept of "investing" in institutional and administrative reforms. In terms of the overall cost of transportation system, the investment in institutional building is a small portion, but it is fundamental for the successful implementation of the transportation master plan.

4) Establishment of the recommended institutions can not be completed in a short period. It depends on the availability of funds and human resources, but all efforts should be utilized to establish these institutions in the shortest possible time span.

5) The recommended institutions is not a single answer approach. The emphasis should be on the performance of the required functions not on the establishment of organizations as such. The basic organization requirements for good urban transport are that each major functions is recognized, that responsibility for each function is clearly assigned to an identified management unit, that the units are properly resourced for their tasks, and that their relationship with other organizations is clearly designated. Table 9.5.1 shows a typical organization

for the performance of the required functions together with the responsibilities and resources requirements of the agencies at the metropolitan level. The contents of this table have been formulated using the current and recommended organizations.

6) There is always a need for a continuing re-examination of institutional arrangements, openness to new ideas, and a willingness to adopt a long-term approach spanning over decades, rather than years.

7) The performance of any institution depends on the capabilities of those working in it. Great care should be taken to attract capable staff not only with the required qualification but also with enough motivation to fulfill the goals of the institution. Periodical performance evaluation should be conducted to confirm the soundness of the decision making process.

Table 9.6.1 Professional Organization for Metropolitan Transport Functions (applied for GCR)

	Principal Responsibilities	Policy Functions	Professional Skills	Relationship to Other Organizations	Organization in Charge	Remarks
Urban Structure Planning	Prepare and maintain metropolitan structure plan.	Shape development structure, create basis for development controls	Land-use planners Environmental specialists, sociologists	Responsible to the MHUUC. Close cooperation with H.C for the strategic Transport Planning	GOPP – MHUUC	Existing
Strategic Transport Planning	Conduct strategic transportation studies. Prepare comprehensive transportation plans for the metropolitan area	Prepare broad strategies that other organizations should follow	Transport planners, economists, civil engineers	Responsible to the MOT. Coordinate with GOPP. Receives input from other transport organizations for the preparation of the strategies and plans.	- H.C - Urban Transport Planning Unit (ENIT)	- Existing - To be established
Traffic Management	Prepare traffic management plans. Review development proposals with traffic impacts. Operate traffic control and ITS Systems. Manage inspection and maintenance scheme. Monitor environmental impacts	Determine traffic priorities consistent with general strategy. Create parking and traffic management schemes	Traffic engineers, economists, parking specialists, electric engineers	*Regional Level* -Responsible to the Ministerial Committee for GCR Transportation. *Local Level* - Responsible to each Governorate Must work in coordination with police departments.	- *Regional Level*- CMTB - *Local Level* – ZTEB	-To be established - To be established
Public Transport	Plan and regulate public transport systems including buses, trams & light rail, taxis, and metros. Coordinate implementation	Prepare passenger transport policies consistent with strategy and financial capabilities. Set parameters for procurement agency	Public Transport and regulatory specialists	Responsible to the Ministerial Committee for GCR Transportation. Should be separate from any passenger transport operations	CMTB	- To be established
Traffic Enforcement	Enforce traffic regulations. Manage traffic events and incidents. Collect accident data	Collaborate in traffic management system design. Enforce traffic management policy	Police Officers	Traffic police provide traffic accident and traffic incidence information to MTB and ZTEB	Traffic Police	Existing
Road Design Construction Maintenance	Designing, constructing and maintaining roads and streets	Maintenance prioritization	Civil Engineers	Responsible to the Governorates. Work closely with MTB and ZTEB	Road Departments in the Governorates	Existing
Traffic Safety	Road traffic safety strategy, Coordinate all departmental inputs, including those from health, education, etc.	Analyze safety data. Orchestrate inter-departmental collaboration to implement strategy	Statisticians Traffic engineers	Responsible to the Ministerial Committee for GCR Transportation. Relationship with health authorities necessary	CMTB	- To be established

Source: "Cities on the Move – A world Bank Urban Transport Strategy" modified by JICA Study Team ZTEB- Zone Traffic Engineering Bureau

9.6.2 The Recommended Organizations

The recommended organization setup for the regional level is shown in Figure 9.6.1. In that figure only Cairo Governorate is shown to represent any of the Governorates in the Region.

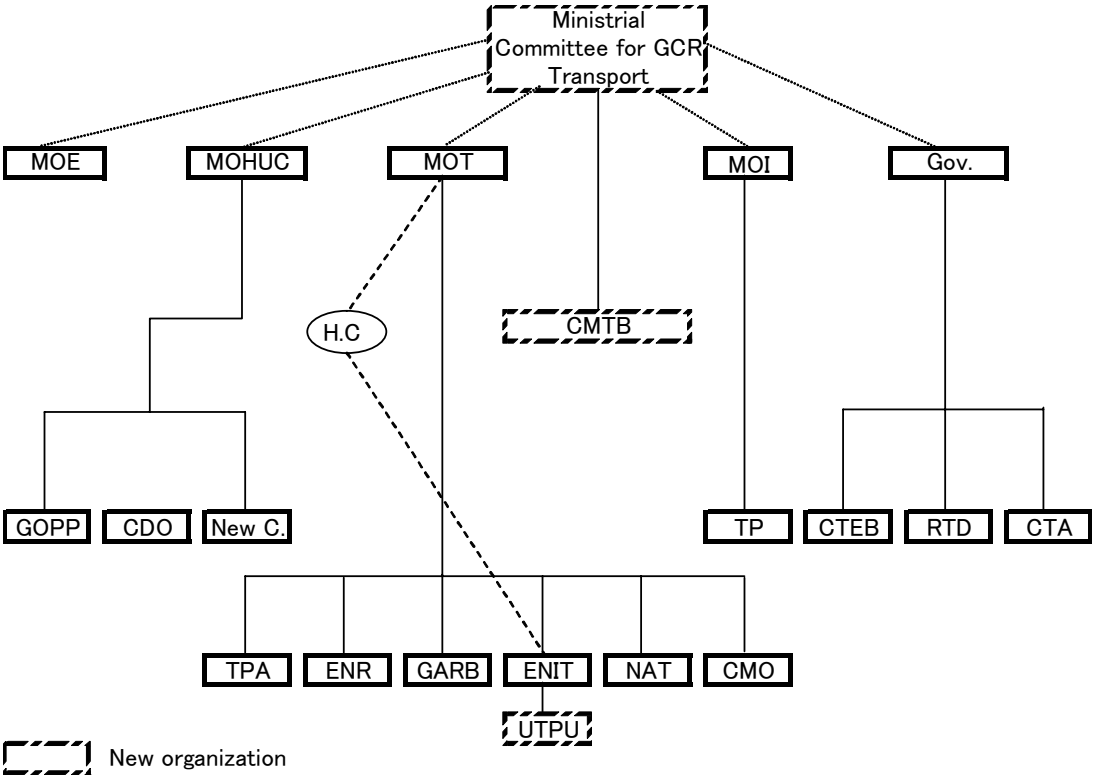


Figure 9.6.1 Recommended Organization setup on the Regional Level

9.6.3 The Ministerial Committee for Greater Cairo Region Transport

The committee will be the highest decision making body with regard to policy making for all functions related to transport in the Greater Cairo Region. The Committee members will be:

- Minister of Housing, Utilities and Urban Communities (MHUUC)
- Minister of Interior (MOI)
- Minister of Transport (MOT)
- Minister of Environment (MOE)
- Cairo Governor
- Giza Governor
- Qalyobeya Governor

The Chairman of the Committee should be the most senior Minister of its members. The Director of Cairo Metropolitan Transport Bureau (CMTB) will be the executive secretary of the Ministerial Committee.

The functions of the Committee could be:

1) Approval and ownership of the Greater Cairo Transportation Master Plan. By ownership we mean that the Committee will be in charge of the overall implementation of the Master Plan. It will seek the approval of the Master Plan by the cabinet. It will take active steps to include the projects components of the Master Plan into the successive five year plans and seek the required approval of the Ministry of Planning, Ministry of Finance and The People's Assembly.
2) Take the necessary steps for the establishment of Cairo Metropolitan Transport Bureau (CMTB) and the local traffic management bureaus.
3) Charting the policies for the operation of CMTB and local traffic management bureaus.
4) Supervise and monitoring of the functions of CMTB.
5) Approval of the recommendations of CMTB
6) Coordination and integration between the related ministries and governorates.
7) Budget allocation for the related organization in coordination with the Ministry of Planning and the Ministry of Finance

9.6.4 Cairo Metropolitan Transport Bureau (CMTB)

The rational for the establishment of CMTB is that it will be the main player in integrating and coordinating of all transport related activities in the Greater Cairo Region. The key elements for the sustainability of such a regional level transport institution are:

1) It should be based on a permanent structure, designed to outlive executive or legislative mandate periods
2) It should be accepted by the parties as an additional asset and not a threat to their autonomy or decision-making powers (even though the balance of power may shift at its inception or over time)
3) It will not interfere with jurisdictions that belong to the concerned parties, notwithstanding the fact that it will be granted a specific political status and its own specific powers
4) It should not assume the functions of a public enterprise nor should it be in charge of operation of any kind.

The organization of the CMTB should be as depicted in Figure 9.6.2 and it may include four operation units as follows:

(1) Policy planning Unit

The responsibilities of this unit may include:

- Formulating and implementing policies for urban transport, public transport and traffic management.
- Assisting other transport organizations and local traffic management bureaus with transport and traffic plans including project appraisal and supervising implementation.
- Monitoring and evaluation of traffic and transport projects including operating costs and preparation of cost effective operation plans.

(2) Integration and Coordination Unit

The responsibilities of this unit may include:

- Planning and implementation of inter-modal integration projects.
- Study and implementation of fare integration schemes between the different transportation modes.
- Coordination with the GOPP and local land use authorities for planning transportation facilities that meet the requirements of the land use plans.

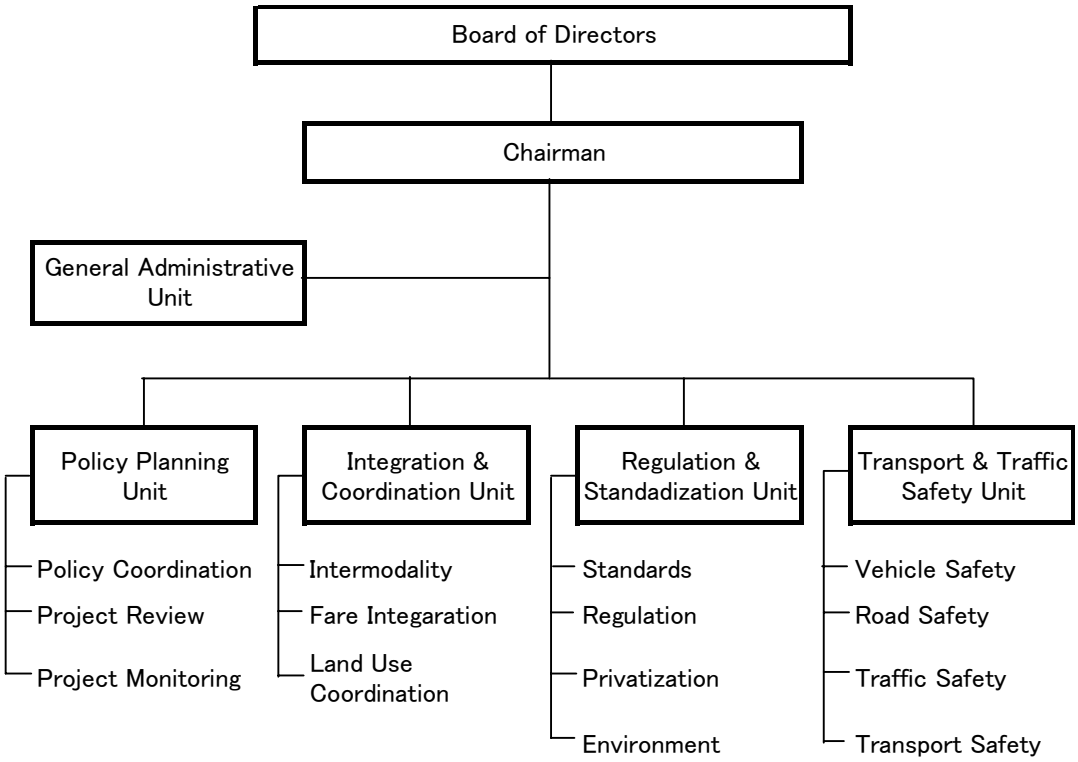


Figure 9.6.2 Organization Chart of (CMTB) – Principal Functions only

(3) Regulation and Standardization Unit

The responsibilities of this unit may include:

- Formulating laws and regulations concerning use of roads by various vehicle types, licensing, regulation and testing of vehicles, licensing of drivers, vehicle loading, speed limits, and traffic control devices.
- Preparation of road and highway capacity manuals.
- Formulating standards and specifications for materials, design, sitting, operation and maintenance of Traffic signs, road markings, and traffic control devices.
- Formulating regulations and schemes for privatization, private public partnership, area franchising for buses or microbus or other private participation schemes.

(4) Transport and Traffic Safety Unit

The responsibilities of this unit may include:

- Formulation, implementation and evaluation of safety measures for roads, vehicles, traffic and public transport in addition to accidents monitoring and analysis.
- Coordinate with the Ministry of Education for introducing traffic and safety education at the different education levels.
- Coordinate with the mass media for the preparations of traffic and safety education campaigns.
- Supervise the establishment of driving schools and preparing standard education materials for these schools.

For the CMTB to have realistic power it has to be equipped with sound financial sources. The potential budget at the beginning could be from the earmarked taxes on fuel, revenues from parking charges mentioned earlier or other similar revenue. When the CMTB reaches its maturity it should be able to handle all the transport related budget for GCR.

The staffing of CMTB at its inception can be by transferring of staff from the existing organizations. To attain such objective, the CMTB should have special authority status with salary structure comparable to universities or similar organizations.

Staffing levels should be commensurate with the scope of the CMTB's duties and the number and the capability of the local agencies it is asked to supervise. Chief Officers in the CMTB should include engineers, planners, economists and statisticians. At the beginning, CMTB may contract the Universities and/or consultants to conduct studies and research on its behalf, but it should gradually build-up its own manpower to be able to perform its responsibility with minimum help from other institutions.

9.6.5 Zone Level Traffic Engineering Bureaus (ZTEB)

Cairo Traffic Engineering Bureau (CTEB) is a good example of the required local level traffic management units. The required functions of a local level traffic management unit are:

1. Assist in the development and implementation of local transport policies;
2. Plan, design and implement public transport and general traffic improvement schemes;
3. Draw up and implement traffic regulations concerning the utilization of road space by different vehicle types and pedestrians;
4. Maintain traffic signs, carriageway markings and traffic control devices;
5. Monitor vehicle and pedestrian movements;
6. Develop traffic schemes of a temporary or experimental nature;
7. Coordinate the planning and design of traffic and transport plans.

Most of these functions are stated in the Governor's decree for the establishment of Cairo Traffic Engineering Bureau, but we have the following comments:

1) "Keep Cairo Moving Campaign" should be transferred to the responsibilities of CMTB because it is essentially a regional wide activity.
2) The current staffing level of CTEB is not enough to carry out the assigned functions for an area with Cairo Governorate scale.
3) Greater Cairo Region should be divided into about 9 traffic management zones. Four in Cairo Governorate, three in Giza Governorate (including one for 6th of October City), in for Shobra El Khiema City and one in 10th of Ramadan City. Each of these zones should have its local Traffic Engineering Bureaus. This division may be implemented in phases depending on the availability of qualified staff and budget.
4) The relation between the activities of the local traffic engineering bureaus and traffic police should be clearly defined to avoid conflict and over-lapping.

9.6.6 Urban Transport Planning Unit (UTPU) in ENIT

The functions of a regional transport planning institutions are:

1) Develop, maintain and run regional transportation and land-use simulation models.
2) Conduct periodical surveys of households for their daily movement, and of firms for their logistical needs.
3) Run simulation models to evaluate outcomes to significant changes to facilities.
4) Evaluate large changes to traffic signal timing schema to enhance system performance.

5) Conduct traffic counts / gather information on road facility performance as part of real-time traffic information network.

ENIT as the executive agency for the Higher Committee for Greater Cairo Transport Planning (H.C.) has provided the core counterpart team for the activities of this Master Plan. It has provided the office facilities for JICA Study Team. It is maintaining a reasonable library for transport related science. It has the qualified personnel to operate and maintain computer simulation models. Through these close activities with JICA Study Team and the resulted on-job training; ENIT has got the required jump-start to be the institution in charge of continuing the transport planning process for Greater Cairo Region. Accordingly, it is recommended that ENIT should establish an Urban Transport Planning Unit (UTPU). UTPU will be responsible for the above mentioned regional transport planning functions. UTPU should continue to be the executive agency for the H.C. which should continue its role as the Regional Transport Planning Committee. UTPU should own, operate and develop the region transport model in cooperation with other organizations in particular the Ministerial Committee and CMTB.

9.7 SOME INSTITUTIONAL RELATED SUBJECTS

Establishment of the above mentioned recommended institutional set-up, although important to implement the Master Plan, is not enough. The related organizations should be aware of the following subjects:

9.7.1 Importance of Coordination

Coordination is the cornerstone for any successful transportation system. In developed countries, coordination has been the main reason for their efficient transport. Such coordination can be established through mutual understanding and working to attain commonly agreed objectives. The tool to attain coordination is by forming coordinating committees by the CMTB from the related organizations. For such committees to be effective they should be made from those in charge of the problems and their discussions should be based on data and facts and not on argument views. In this regard, it is required to address the following types of coordination:

1) Spatial coordination: Traffic movement is mostly between cities and thus close coordination between these cities is important for overall traffic efficiency.
2) Jurisdictional coordination: Overlapping levels of authority within a hierarchical system are often the source of jurisdictional conflicts. An example is the conflict between the financial authority and fare level determination authority. The related authorities should continually discuss and coordinate between there vies.
3) Functional coordination: This includes three types. The first type is the coordination between land use and transport development which calls for close cooperation between GOPP on one side and UTPU and CMTB on the other side. The second type is the coordination between transport modes especially when the modes are independently operated such as Metro and Bus which calls for

coordination between the different operators. The third type is the coordination in traffic management and enforcement which calls for close coordination between local traffic management units and the traffic police.

4) Operational coordination between public sector and private sector which calls for the establishment of appropriate public institutions for the planning, procurement and regulation of private sector services in order to reconcile the different interests and efficiently mobilize private participation.

9.7.2 Civilian / Police Responsibilities

Assigning traffic management responsibilities between civilian and police agencies is typically one of the sensitive issues. The reason is due to the fact that historically the civil engineers were in charge of building and maintaining roads while the police was in charge of enforcing traffic laws and regulations. As it was recognized that the demands of the growing traffic volume could not be satisfied by the construction of more roads due to environmental and financial constraints, the science of traffic engineering began to emerge. At the beginning, traffic engineering was involved making regulation to create one-way streets and ban parking on some street sections. These measures were seen as a natural extension of police duties. As traffic improvement schemes became more complex, it was quickly recognized that traffic engineers were better equipped to design, implement and maintain traffic management schemes than the police, while the police still have an important role to play in planning and enforcement. In Egypt as in many other developing countries this evolutionary process is still in its infancy due to the lack of traffic management institutions. Through the establishment of the recommended institutional setup, the function of traffic planning and traffic management should be gradually shifted to traffic management engineers at both the regional and local levels. In all cases it should be clearly understood that the key to successful traffic management depends on complete cooperation between both the traffic engineers and the police at all levels.

9.7.3 Restructuring and Integrated Railway Operation

At present, the two metro lines are operated by Cairo Metro Organization (CMO), tramways are operated by Cairo Transport Authority (CTA) and suburban railway lines are operated by ENR. Such fragmented operation in spite of limited financial and human resources not only hinder development but also increase operation cost due overhead expenses, separate spare parts storage, different maintenance practice, non-integrated fare structure, inefficient intermodality and others. The Study Team recommends that the operation of these modes should be restructured to be under single organization.

9.7.4 Strengthening the Role of NGOs.

The role of NGOs in civil societies is very important as a tool for public awareness and participation and as watch dogs for government decisions. Examples are pedestrian rights societies, traffic safety societies and others. The finance of NGOs

activities could be from the organizations that share the interest of the targeted activity. Examples are insurance companies where they have interest in improving safety and travel agents where they have interest in improving pedestrian facilities. This trend has already started in the form of initiatives from private companies to improve road and curb conditions in return of permission for installing advertisement for their products or their activities. Instead of having such activities by individual initiatives, it is better to organize NGOs through the participation of several interested companies. In Japan, the Government provides sizable part of the finance of the NGOs activities in the field of safety and standardization.

9.8 TRANSPORT FINANCE INSTITUTIONS

9.8.1 The Current Finance Setup

As it has been mentioned in section 9.3, there are many ministries and organizations with some role or other in urban transport in GCR. It has been also mentioned that compared to other services, transportation is the only public service which has so many institutions involved in its planning, implementation and operation. A direct corollary of this state is the fragmentation of finance. Each organization competes separately for its budget and the final allocation of the budget depends on the degree of persuasion provided by the concerned organization. In most cases the allocated budget does not reflect a rigorous prioritization system. This state is not limited to GCR but in fact it is the prevailing condition in many developing countries.

In principle, the current governmental finance can be divided into four types:

1) Budget allocated from the Ministry of Finance
2) Loans from the National Bank of Investment. The National Bank of Investment has been under the Ministry of Planning but it has been shifted to the Ministry of Finance in 2002. The Bank provides soft loans for governmental authorities only. Interest rate and repayment conditions differ according to project conditions.
3) Own finance if the concerned authority or ministry has its own revenue. An example is the revenue from toll roads in the case of the General Authority for Roads, Bridges and Land Transport.
4) Grants and loans from foreign donors.

A mix of two or more types for one project is not ruled out.

Private Finance in urban transport in GCR is limited to taxis, shared taxis and limousine service. The first two are financed by individuals who own one or more vehicles. The third is financed by companies which in most cases provide rent car service also.

9.8.2 Public Finance, Private Finance and PPP

Transport financing institution should be formed to support the selected finance system. Selecting the appropriate financing system is not an easy task because there is wide spectrum of finance methods in which we have complete public finance at one end and complete private finance at the other end. In between we have many forms of Public Private Partnership (PPP). The PPP is a form of collaboration between public and private partners for a well defined period of time and related to one or more specific phases of a planned project. The responsibilities of both the private and public partners are explicitly defined in the Partnership Agreement, including punitive damages for both partners in case of non compliance with the terms of the contract. The key factor in formulating a PPP contract is the allocation of the project risks to each party in accordance to his ability to manage such risks without destroying the economic balance of the project.

In the case of Urban Transport in GCR we can find either complete public finance such as the Metro and CTA or complete private finance such as the case of mini-buses and taxi. PPP schemes have not yet developed due to several factors such as:

1) Transport projects are characterized by its large initial investment, low financial return and long term of capital recovery. It is practically difficult for a private sector to finance such projects and to get an annual return comparable to the current interest rates of commercial bank lending.
2) The private sector in Egypt does not have the managerial expertise to manage the operation of large scale transportation projects such as metro lines. Area franchise schemes as recommended in Chapter 4 should be the first step for acquiring such expertise.
3) The legal and contractual process in Egypt needs a lot of improvement to be able to establish a transparent easily defined contractual relationship between the public partner and the private partner in a PPP contract.

The above mentioned problems mean that PPP cannot be the solution for financing urban transport projects in GCR for the short term. In the mean time, the Study Team recommends that all the obstacles for realizing PPP in urban transport should be tackled through careful studies of successful PPP projects in other countries.

9.8.3 Finance as a Tool for Attaining Targeted Development Objectives

The issue of urban transport finance and pricing should be dealt taking into consideration the broader effects on development and social conditions. To demonstrate this point three examples are considered.

The first is the case of New York Subway where a flat fare system was adopted to finance the subway system. The flat fare encouraged new immigrants to live on the periphery of the city because they paid less for their longer trips. People living in the city has to pay relatively higher fares for their shorter trips but this was compensated by having less trip time and reduced congestion in the inner city. The

flat fare system attained its goals of reducing congestion and development of the peripheral areas around New York.

The second example is the case of Tokyo where the pressing desire of each Japanese family to have its own house with small garden has been the driving tool for the development of a vast area around Tokyo. Private developing companies have been given the concession to develop large plots of land together with the construction of a railway line to connect the developed area to the network of the city center. In the case of Tokyo a distance related fare system was adopted. To encourage people to live far from their working place in the inner city, banks were encouraged to give long range loans to those who want to build their own houses.

The same goals of New York City have been achieved in Tokyo through different approaches. These two examples demonstrate the significance of transport financing in bringing about the desired effect on urban form.

The third example is the case of shared taxi in GCR. In their bid to expand their sale volume, the car dealers have made arrangements with the banks to sell the shared taxi to individual owners by installments. The taxi itself is the collateral and to insure the payment of the installments in case of accident, the car dealers insure the taxi as part of the deal. The arrangement helped to increase the number of shared taxis owners and most of the owners have one or taxis. Payment of the cost installments is the main concern of the shared taxies owner and the driver. This arrangement has attained its original objective of increasing the sales of the car dealers, but since the arrangement did not include any restrictions or regulations regarding the operations of the mini-buses, the behavior of the mini-bus drivers is one of the main causes of traffic problems in GCR. If the finance arrangement is targeted to grouped mini-bus operators in the form of companies or associations with defined rules of operation, much better results can be attained because the operators will try to enforce the rules to keep their credibility for new financial deal. The current arrangement helped to keep the fares of the mini-taxis within affordable limits of the poor because it eliminated the overhead cost associated with companies operation, but in the mean time the operation of these shared taxies is causing chaos in traffic.

The above examples indicate the strong effect of financial methods in attaining targeted goals. Realizing this concept is very important because it indicates that the first step is to decide the goals and the strategies. After that the finance arrangement together with the fare structure should be tailored to achieve the established goals. The goals and strategies of CREATS are mentioned in Chapter 11.

9.8.4 Establishment of Special Fund for Urban Transport

As discussed above private participation in transport projects in GCR may continue to be limited in the area of taxis and shared taxis until suitable legal framework is established for PPP type finance. Public finance will continue to be the backbone of transportation project for some time. To improve the fragmentation of public finance mentioned above and to finance transportation projects according to the same

established set of prioritization criteria it is important to establish a special fund for GCR transport. All transportation aimed budgets allocated to the different ministries, governorates and authorities related to transport in the Region should be channeled to this fund. In addition to these budgets, the fund management should be in charge of exploiting other finance alternatives such as the earmarked fuel tax, parking fees, sharing in the windfall earnings from transport projects and others. Some explanation about these alternative finance sources is mentioned in Section 13.3.

The fund could be established under the Ministry of Finance but its operation policy should be charted by the recommended Ministerial Committee for GCR Transport. Close coordination between the recommended Cairo Metropolitan Transport Bureau and this fund is needed regarding to information flow and transport planning. The fund should start the process of lifting all regulations hindering the private sector participation in transport project and formulate new regulations for encouraging such participation.

9.9 INSTITUTIONAL STRENGTHENING AND EXPERTISE BUILDING

9.9.1 Introduction

It is not enough to issue decrees for the establishment of new institutions. Recruiting qualified staff, training available personnel and providing them the necessary software tools for their efficient functioning is critical for these institutions.

While there may be sufficient highway or construction engineers, other professional staff such as traffic engineers, transport planners and economists and transport regulators tends to be in short supply. Technical and administrative supporting staff may be adequate in number but frequently lack the necessary skills.

At the software level, technical tools such as traffic forecasting models based upon uniform design standards and guidelines, good practice manuals and more sophisticated knowledge management systems also tend to be underdeveloped or completely absent.

Developing and structuring the necessary human resources and providing them with the adequate tools are therefore no simple or short term tasks. They should be organized within the context of an *integrated institutional strengthening and expertise building program (ISEB-program), a long-term program that should be* ***at the top of the agenda of the Ministerial Committee for GCR transport***.

9.9.2 Structural context

Transport infrastructure in itself is not sufficient for sustainable economic growth and social welfare. Infrastructure development needs to be supported by in-depth programs and initiatives related to software and humanware development of those

responsible in managing the transport system. It is only by a balanced and simultaneous development of these three components that sustainable progress is achieved. The CREATS study clearly demonstrated that, although transport infrastructure might be available, the lack of adapted human expertise and technological and technical tools makes the socio-economic return on many (transport) infrastructure investments below what could be achieved.

The need for an ISEB-program thus comes from the regulatory role of public authorities in respect of the increased complexity of transport and the changed perceptions on the role of transport in the economy and the society as a whole. Creating sustainable transport in Egypt cannot fully be transferred to private sector initiatives although their contribution will be(come) an essential success-factor.

The public sector will continue to play an important role. Public authorities will guarantee sustainability of transport / mobility via:

- Further development of transport infrastructure;
- Maintenance and improvement of the transport infrastructure;
- Further development and improvement of public transport services and infrastructure;
- Deciding upon rational transport infrastructure investments;
- Integration of private sector investments in a controlled and beneficial way;
- Control of transport flows and activities.

Rationalizing transport infrastructure investments and controlling transport flows is the most complicated public responsibility and should at the same time satisfy national and regional needs both at the societal and economic / industrial level. Building and managing an integrated and sustainable transport system to cater for current and future mobility needs in the GCR is therefore an essential element of economic success and social welfare.

One key problem of public authorities seems the inability to meet the increasingly complex logistic requirements of an economy operating in a competitive and global market while at the same time take into consideration the needs and aspirations of the public at large. "*The efficiency of transport systems continues to be essential to the competitiveness of Europe, and to growth and employment. ... It is equally important that the CTP should serve the citizens of Europe. Fundamental to economic and social cohesion, transport services must therefore be easily available, including in peripheral and less-developed regions, affordable and safe as well as providing satisfactory job opportunities. The different components of the system must be better integrated to provide convenient door-to-door service. Developing efficient and integrated transport systems will, in turn, permit to take fully into account the need to protect and enhance the environment, both at the local and the global level, ensuring that transport contributes to environmental objectives.*"[1].

[1] Commission Communication to the Council, European Parliament, Economic and Social Committee and Committee of the Regions: The Common Transport Policy, Sustainable Mobility: Perspectives for the Future, Brussels, 1995

This all relates to the key-issue: how doe public authorities have to react in order to attain sustainable socio-economic growth and mobility?

The European Union has since long recognized the socio-economic importance of human expertise and technological development: "*The gap in RTDI*[2] *between the most developed and the least developed regions is much wider than in income per head. The concentration of these activities in the more dynamic regions is a key aspect of the 'virtuous circle' as regards growth, competitiveness and employment. By contrast, less dynamic regions have a scientific and technological system which is still afflicted by structural problems, by low RTDI expenditure; excessive concentration on Government research rather than on stimulating private sector demand for innovation; inadequate resources to maintain the existing infrastructure; strong dependence on external (Community) sources of finance and excessive concentration of research activities in and around capital cities ....*"[3].

Four main factors have a direct impact on the structure of the ISEB-program, namely the transport offer, the transport demand, the intervention of public regulators and the available infrastructure (including information transfer technology).

However, secondary factors influence the impact of the four main factors and thus indirectly influence the transport policy. These factors are:

- Mobility and the environment needs that orient regulator's policy;
- Efficiency and flexibility needs of personalized private transport and commercial logistics demand, including specialized expertise and services;
- Financing and spatial planning that determine future infrastructure developments;
- Transport integration and innovative technology that improve the quality of transport services.

It is thus clear that any public policy in this complex environment no longer requires only a transport perspective, but is in need of a global and multi-dimensional scope that can offer concrete socio-economic transport solutions. The structural framework is visualized in next Figure 9.9.X

[2] *Research, Technological Development and Innovation*

[3] "Second Report on Economic and Social Cohesion in the European Union" Brussels, European Commission; 1999, III.2/p 133

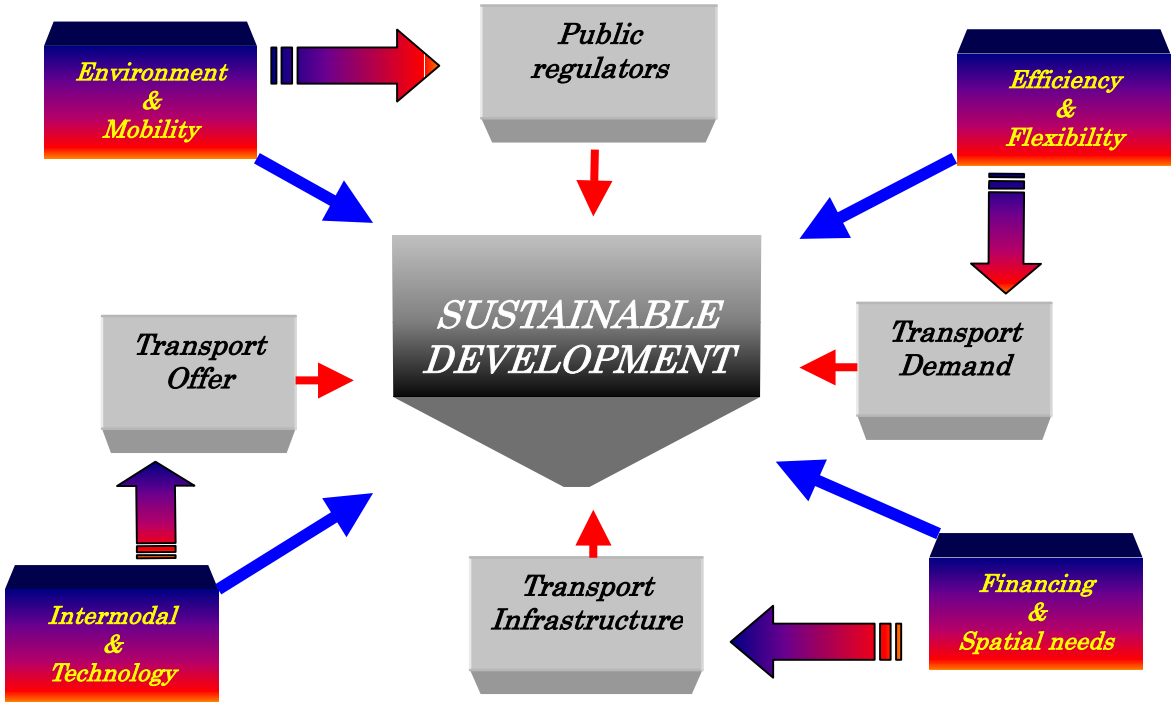


Figure 9.8.1 Structural framework for the ISEB-Program

The implementation of an adequate ISEB-program is therefore determined by a number of structural parameters:

1. The decision-making context of modern transport policy and the various dimensions influencing it, namely
   - Trans-national co-operation and globalization
   - Infrastructure development and use
   - Environmental impact/protection (rules and regulations)
   - Sustainable socio-economic development
   - Changes in society and social behavior
   - The changed role of public decision-makers
   - The increased private sector involvement

2. The impact of transport (private and commercial), including
   - Issues and opportunities relevant to develop sustainable regional economies
   - Interactions between commercial transport and private / public transport
   - The integration of social and economic development in commercial logistics and private transport behavior.

3. Sectoral and industrial characteristics of transport and logistics
   - Introduction of modern sectoral and industrial logistics systems
   - Cross-sector and cross-industry features of logistics systems
   - Integrated logistics systems and business practices

4. The modernization needs of commercial and public transport services
   - Advanced information technology
   - Virtual logistics and Intermodality
   - Standardization of formal processes and regulations

5. Financing structures
   - Limitations traditional financing mechanisms
   - Potential innovative financing schemes
   - Practical issues and obstacles in innovative financing schemes and public private partnerships
   - Implications for business and society of investment selection procedures

6. Human resources utilization and management
   - Creating awareness
   - Training and education (expertise building)
   - Stimulating entrepreneurship

7. Increased management techniques by public decision makers
   - Limitations of traditional performance measuring systems
   - Value of Integrated Decision Support Systems and Instruments
   - Value of Transport Planning Process and Simulation Models

9.9.3 The need for a long-term ISEB-program

The above two paragraphs clearly demonstrate that the present decision-making structure (procedures, structures, methods) is far from adapted in meeting the needs.

The expected growth of transport in Egypt and in particular in the GCR will make that traffic will become one of the dominant issues in public policy making. As an example, every day, in the fifteen countries of the European Union, transport systems:

- Carry 150 million people to work and home again
- Enable 100 million business trips to be made
- Enable 90 million people to go shopping
- Carry 50 million tonnes of freight

The major share of this transport is done by road. The results of this evolution are clear:

- *Congestion*: today, as we approach the 21st century, urban traffic is such that a car, equipped with the very latest in engine technology, progresses about as fast as a coach and horses a hundred years ago. The cost to the Member States: over …100 billion a year.

- *Accidents*: 42.000 people die on the roads every year in the European Union

- *Pollution*: if nothing is done at EU level to reverse the trend, transport will be responsible for 40% of CO2 emissions in the EU by the year 2010 (compared with 26% at present), seriously undermining the strategy against global warming launched world-wide after the 1997 Kyoto summit.

As the European Commission concluded, ***the situation has been further aggravated by a lack of vision and an overall political knowledge of the role of transport***. It is only with expertise building measures within the context of an ISEB-program that this lack of vision and knowledge can be overcome.

The CREATS study provides the necessary building blocks for the development of an integrated and long-term ISEB-program. The CREATS-components only need to be integrated into one structured program and any missing components have to be added. The already available CREATS-components are:

1. Institutional reform and strengthening as discussed in this Chapter 9;

2. Expertise building and awareness creation in respect of transport and mobility (in particular in safety of transport) as discussed in Chapter 10;

3. Cargo transport sector rehabilitation as discussed in Chapter 6;

4. Public transport sector rehabilitation as discussed in Chapter 4;

5. Traffic Demand Management schemes (see e.g., Chapter 11, Chapter 7).

9.10 RECOMMENDATION

The priority projects identified and tested in the CREATS study clearly show that *Institutional Strengthening and Human Resources Development* are key issues for the future. This paragraph discussed some of the framework conditions of such program.

It is highly recommended that a detailed ISEB-study is initiated to

1. Identify in detail the existing expertise in the different organizations responsible for traffic in the GCR;

2. Assess the level of relevant knowledge at all levels of its staff (including managers and decision makers);

3. *Benchmark* the existing knowledge levels with various foreign best practices;

4. Determine a structure for institutional reform and human resources development

5. Develop a detailed implementation plan for the short, medium and long term that identifies the required legal, financial, structural and operational requirements for change.

Institutional reform and expertise building is not easy to achieve. Support should be obtained through technical assistance programs provided by donor countries. The proposed ISEB-study should investigate the availability of funds / support in the various programs of donor countries and international organizations.