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STRATEGY 2: OPTIMAL INFRASTRUCTURE DEVELOPMENT & MANAGEMENT

A gap between the transport demand and the transport capacity should be mitigated in order to capture smooth traffic flows. The traffic demand is evidently growing along with the economic growth, while the transport capacity cannot easily be expanded unless appropriate investments are injected to provide transport infrastructures. The transport capacity, however, is determined by not only physical development of the transport infrastructures but also their management system.

The strategy for infrastructure developments, therefore, addresses how to structure an optimal network system integrated with all transport modes and how to manage the vested assets for:

- Public Transport System;
- Road Transport Network;
- Intermodal Transport System;
- Traffic Management; and
- Cargo Transport System.

Meanwhile, the optimality of the infrastructure development is considered to satisfy three critical factors:

1. *Economic efficiency* in terms of cost-benefit effectiveness and financial affordability;
2. *Technical appropriateness* in terms of operation and maintenance; and
3. *Environmental friendliness* in terms of adopted technologies and enforcement to users.

Taking into account the above three factors, the CREATS proposals for this strategy are formulated to structure an integrated transport network system, the optimality of which has been proven through a network analysis as discussed in Chapter 4.

PUBLIC TRANSPORT SYSTEM

AN EFFICIENT AND USER-FRIENDLY PUBLIC TRANSPORT SYSTEM AS THE BACKBONE OF URBAN MOBILITY

In Cairo, as in other major cities of the world, future growth in income will inevitably catalyze an increase in trip making, as well as changes in the types of modes used to accomplish such trips. It is expected that private modes of transport, such as passenger cars, will continue to become increasingly popular with Cairenes, yet public transport, both at present and in future, will serve as the backbone of urban mobility carrying some two-thirds of daily person trips made within the urban area. The key issue is therefore how to manage growth in transport demand by developing transport systems that ultimately enhance economic productivity, increase personal mobility, improve the urban environment and ensure financial viability. **A key consideration in this regard is that**

the need to move people must take precedence over the need to move vehicles. This requirement is met through the CREATS public transport planning process.

The most efficient way to enhance ease of movement and foster continued economic vitality is to encourage the use of an efficient, user-friendly public transport system, in particular high capacity, segregated modes. Greater Cairo is densely developed, thus scarce vacant space should in general be devoted to mass public transport systems, which consume the least space per passenger. Unrestrained car traffic invariably leads to severe traffic congestion, which is counterproductive and has high social costs. Cities that have upgraded their public transport systems in parallel with growth in population and wealth have managed to avoid the worst aspects of traffic congestion.

It is noted that some recommended adjustments in transport practices require changes in current policies or regulations and can only be realized if political will for such change exists at appropriate levels of Government. **Thus, in the final analysis, the impetus for implementation of the Master Plan, and many of its projects and programs, rests with the Egyptian people and those persons elected to lead them.**

BUILDING AN INTEGRATED NETWORK

Public transport systems exhibit a wide range of capabilities. Bus lanes/busways can carry to near 20,000 persons per hour per direction with bypass opportunities at critical junctures such as loading/unloading areas. Light rail transit can accommodate some 10,000-30,000 persons per hour per direction in segregated alignments. Mass rapid transit can accommodate 30,000-90,000 persons per hour per direction at much higher speeds; indeed, the maximum capacity of Cairo Metro Line 1 (which retains some aspects of a regional rail system) is estimated at some 70,000 persons per hour. The capacity of freeway lane is, at 2,000-3,000 persons per hour, comparatively low (Fig. 6.1).

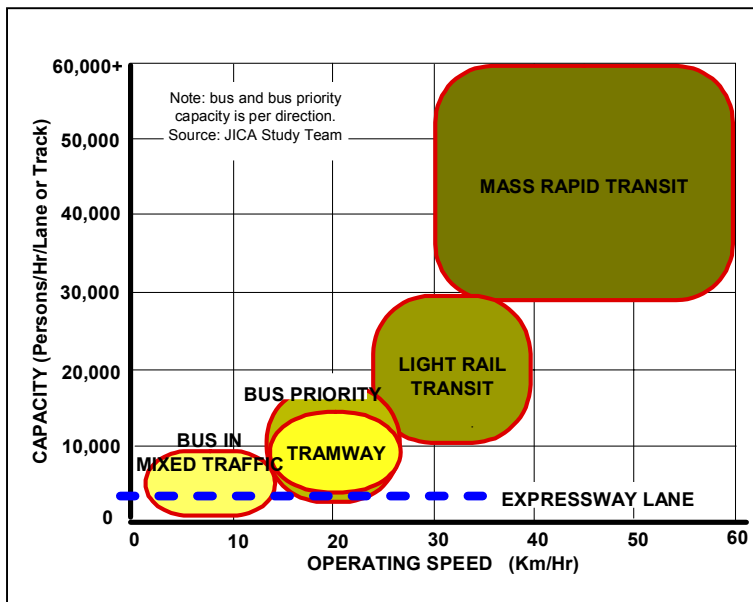


Fig. 6.1 A Hierarchy of Public Transport Systems

Coordination among the different public transport modes, and between public transport and private cars, is minimal at present. In order to achieve a fully integrated and efficient public transport network, planning for future public transport systems has been carried out according to a clear functional hierarchy. Each mode is allocated to specific corridors or functions as deemed appropriate for meeting forecast demand at acceptable capacity and speed. Each mode thus has its own domain where it can operate under optimal conditions, in complement with other modes, as part of a multi-modal system. Under this approach, fixed-route and high capacity systems are given priority in the scheme, while other more flexible public transport systems are superimposed to create an integrated network. Conversely, low capacity but highly demand-responsive and flexible systems such as shared taxis could be considered end-line service providers, arrayed under an area franchising scheme but not necessarily operating under a (currently ineffective) fixed route constraint (Fig. 6.2).

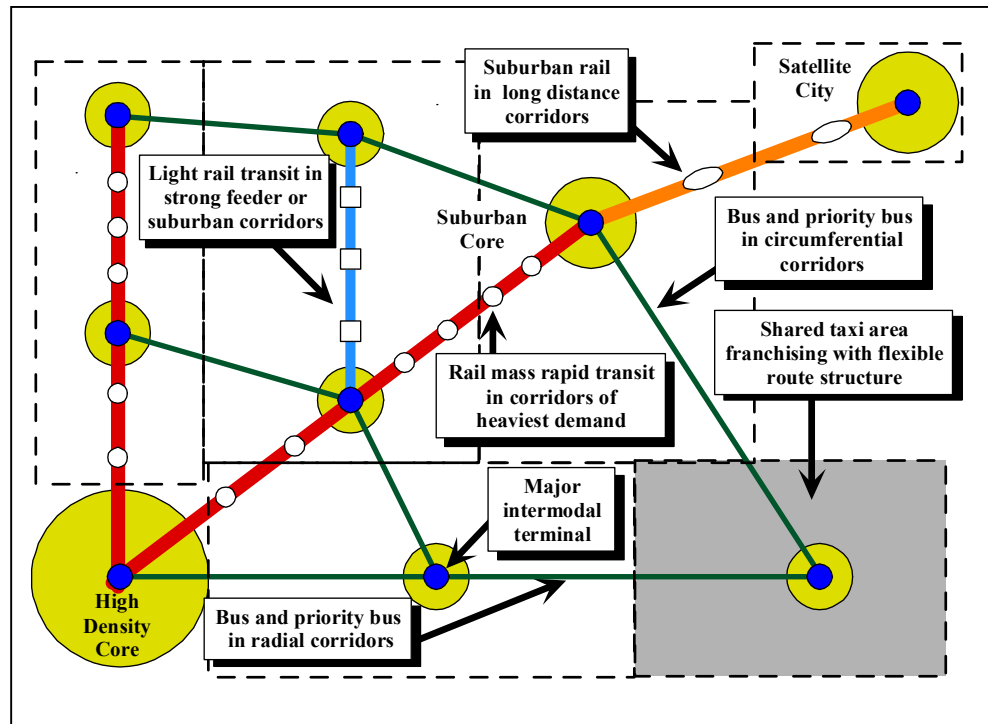


Fig. 6.2 A Model for Integrated Service

OWNERSHIP AND SUSTAINABILITY

Costs of the Cairo formal public transport sector, with few exceptions, exceed revenues. Conversely, the private sector is anecdotally seen as having largely achieved positive cash flow. The decline in ridership for some public operators, in combination with growing costs and politically frozen fares, is catalyzing a need for ever-increasing subsidies from public coffers. For the fiscal year ended 2001, needed subsidy for Cairo urban public modes is on the order of LE 720 million.

A program of reform of surface public transport should therefore be developed with two principal and inter-related goals. First, it should strive to create an efficient and effective sector capable of meeting the social and public policy needs of Greater Cairo with as little public subsidy as possible. Such a goal is not meant to imply that subsidization of service is not desirable, only that for a given policy goal, the amount of subsidy needed should be as small as possible. Second, the program should aspire to make the sector as commercial as possible, and responsive to potential private sector participation and capital, thereby freeing scarce public resources for other purposes.

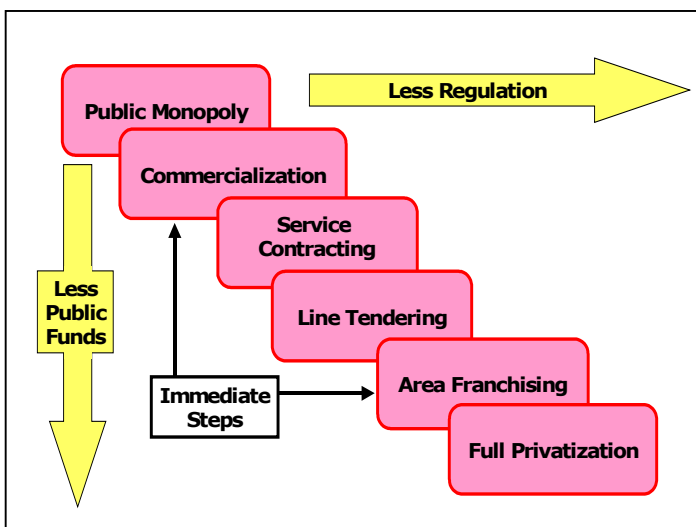


Fig. 6.3 The Path to Bus Sector Privatization

The ultimate goal is to provide the best service at the least cost to government developed around a model where the government's eventual role is that of strategic planner, coordinator and regulator, and that the private sector is increasingly responsible for the actual operation of services under minimal regulation and in a competitive environment. A series of steps are proposed which re-shape the

current industry into a more effective structure and encourage gradual transition toward the ultimate goal and privatization. These include the immediate commercialization of the CTA, area franchising of the shared taxi industry, and the eventual integration of service contracting and line tendering (Fig. 6.3).

Fare policy must be re-assessed region-wide across all modes from an operational, as opposed to political, perspective. It will be necessary to adjust fares based on realistic commercial return which implies, for some operators, an increase in base fares, and/or a revision in the approach for carrying privileged (free, reduced fare) passengers. A principal of "user pays" is encouraged. Public transport operators should not serve as the tool responsible for implementing social policy. For example, costs for the carriage of a privileged passenger should be reimbursed to the operator from the relevant Ministry sponsoring that passenger group.

**PUBLIC
TRANSPORT FOR
THE URBAN POOR**

Fare levels in the formal public transport sector are not merely controlled, they are virtually frozen, ostensibly for the benefit of poorer Cairenes. While some segments of the population have undoubtedly benefited from this, paralleling problems have arisen. In particular bus operations, and formal urban transit in general, are yielding insufficient cash flow to allow upgrading of services and fleet renewal. Concurrently, public operators are coming under increasing pressure to provide enhanced/expanded public transport services, but with largely stagnant revenue sources. The effects of such policies are clearly manifested, for example, in the deteriorating quality of public bus services provided in Cairo. One might indeed argue that frozen fares have hurt, not benefited, certain segments of the poor, particularly those residing in more outlying portions of the study area. CREATS surveys confirm that the shared taxi mode, which levies the highest average single-journey fare, is used most by the poorest segments of society (Fig. 6.4).

The essential question is therefore if the Government of Egypt wishes to subsidize public transport travel for a designated sub-group of society (and that the commitment has been made that it can indeed afford to do so), how may this be achieved most efficiently? One of the most effective means of providing a subsidy to low-income citizens, while maintaining the incentive for public transport operator efficiency and commercial operation, is to provide the subsidy directly to the person - not the enterprise. The Study Team has suggested that a cooperative approach via the Ministry of Social Affairs and Insurance be adopted which includes a realistic definition of urban poorness, and a strategy for a direct transport subsidy to the deserving poor, such as the current free pass provision to the defined disabled persons. The subsidy should directly benefit the urban poor in the form of compensation for the free pass to the operator.

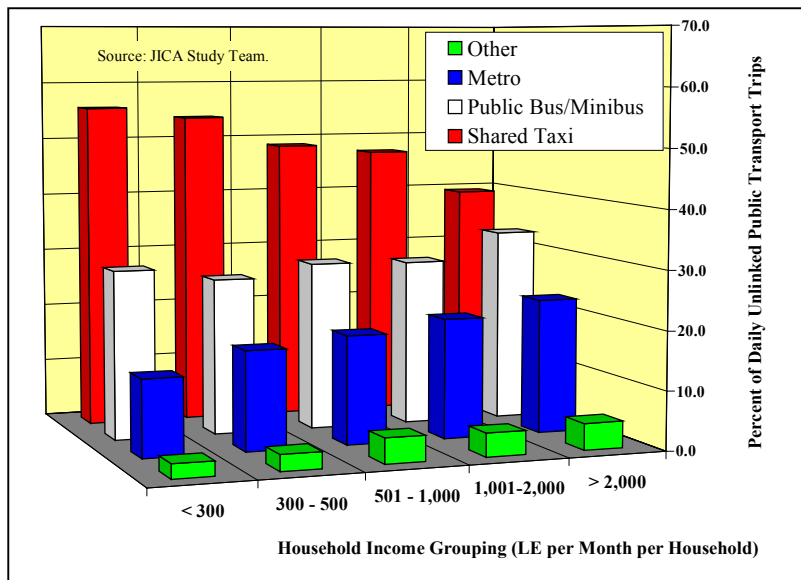


Fig. 6.4 Existing Public Transport Use by Income Group

INFRASTRUCTURE PROPOSALS FOR STRUCTURING AN INTEGRATED PUBLIC TRANSPORT SYSTEM

A variety of alternative solutions were examined using the CREATS computerized model and GIS data base. The final recommended infrastructure strategy integrates several modes and technologies into a cohesive plan (Fig. 6.5).



Fig. 6.5 The Recommended Public Transport Network 2022

MASS RAPID TRANSIT

Rail-based MRT is the cornerstone for moving large volumes of persons in the highest demand corridors. Metro Line 3, which is planned to run from the Airport through Heliopolis to the center of the city, and end in branches to Imbaba and Bulak, as well as the extension of Line 2 to Moneeb, are considered committed projects whose implementation is currently being actively pursued by the Government of Egypt. **The primary elements of the Master Plan are, in addition to construction of the committed Line 2 extension and Line 3, further extensions of Metro Lines 2 and 3, and the realization of Metro Line 4 (the Pyramid Line).** Line 2 is extended from Shubra Station to Qalyub in order to relieve the heavily loaded Alexandria Agricultural Road and to provide enhanced mobility for residents of southern Qalyobeya Governorate. The proposed southward extension of the Line 3 Bulak branch reaches Metro Line 2 at Behoos station. Metro Line 4 satisfies a massive person trip demand corridor along El Malik Faysal Street to central Giza and Cairo, and on to Port Said Street and the Ring Road. This line is seen as being particularly beneficial as it reaches a broad range of the population in very dense areas of the city. The construction of some 27 kilometers of new

MRT lines is proposed. The MRT is mainly underground but can also partially be constructed at or above grade to reduce costs.

SUPERTRAMS

In support of the MRT network, and to enhance transport between suburban sub-centers, the **realization of three Supertram lines** is proposed. A sample technology is depicted in Fig. 6.6. These lines function as regular LRT systems in their own right-of-way, but use smaller rolling stock resembling that of a tram. Supertram Line 1 runs from Ramses Square to Nasr City and ultimately ends in New Cairo. Supertram 2 connects Attaba with El Nozha, and Supertram 3 is a circumferential line linking Nasr City and Heliopolis with Port Said Street, as well as intermediate intermodal points with ENR, buses and metro. A total of 53 kilometers of Supertram lines is planned using, whenever possible, existing Heliopolis Metro and CTA Tram rights-of-way. Construction of some viaducts or tunnels at road-crossings is required in order to ensure complete modal separation. The supertrams should be considered an exceptional opportunity to obtain a modern and efficient system at relatively low cost by re-using existing infrastructure and property. The supertram also has the advantage of boosting an environmentally friendly and more convivial image of Cairo.



Fig. 6.6 Modern Tram Technology, Brussels, Belgium

TRAMS: The remaining tram lines in Heliopolis and Helwan are rationalized and rehabilitated so as to improve commercial speed and comfort. Upgrading is expected to include trackage, signaling, power supply and rolling stock.

SUBURBAN RAIL

The role of ENR suburban services is expected to strengthen in future in light of growing urban densities and gradual maturity of the satellite cities program. **The existing suburban commuter rail lines are to be upgraded to provide enhanced service and comfort.** This improvement is to focus on new rolling stock and upgraded stations. The implementation of more expansive projects within the traditional suburban services corridors, such as track replacement and electrification, is expected to originate at the national level, not from within an urban master plan.

Two new rail corridors are proposed linking Cairo with the 6th of October and 10th of Ramadan cities (the Wings). The 10th of Ramadan connection from Ain Shams station will, in the near term future, consist of single track upgrading with station turnouts, new stations, an extension to the 10th of Ramadan central area, and modern diesel rolling stock. In the longer term, and as warranted by demand, upgrading to double-track electrified service is possible. All improvements would maximize the use of existing ENR rights-of-way. The 6th of October service could also ultimately consist of dual-track operation between 6th of October city and Ramses station. However, all rights-of-way must be reserved immediately for this venture, with early indications favoring an alignment near 15th of May corridor. In the interim, and following reservation of rights-of-way, a cost effective and high capacity solution is the construction of a **trunk busway** whose design is so as to permit upgrading to rail once warranted by demand.

THE 6TH OF OCTOBER TRUNK BUSWAY

This facility is visualized as consisting of two bus lanes (with bypass opportunities at stations) within an exclusive alignment; high-order service is to be provided via over-sized, articulated buses operating at frequent headways. Fig. 6.7 provides an example of a Bogotá, Colombia trunk busway. This system is, at present, carrying some 34,000 persons per hour, total both directions of travel. Similar design principles could



Fig. 6.7 Trunk Busway, Bogotá, Colombia

readily, depending on conclusions of further technical reviews as well as liaison with local experts and organizations, be incorporated into the 6th of October corridor.

BUS PRIORITY TREATMENTS Busways and bus lanes are planned on important urban road arteries including parts of the Ring Road, elements of the proposed urban expressway network, Seket El Waily, El Fangary St., near Nasr City and the West and East banks of the Nile river. The allocation of bus priority facilities over some 150 road kilometers reflects not only forecast patronage demand, but is also intended to mesh with rail-based public transport proposals to ensure that a continuous and logical system of integrated public transport services is provided, particularly in principal corridors where demand does not, during the

course of the CREATS planning horizon, warrant higher-order rail modes.

PUBLIC BUS FLEET

The existing full-size public bus fleet is aged and overcrowded. It is proposed that a wholesale fleet modernization and expansion program be undertaken, hand in hand with CTA commercialization, to meet anticipated levels of future ridership, and to realize a modern fleet of recent vintage.

FERRY SERVICES

The retention, and upgrading of, a single line, with modern vessels and docks, is incorporated as a public transport element into the Master Plan.

INFRASTRUCTURE INVESTMENT: SUMMARY

The proposed public transport investment, by five year fiscal periods, is summarized in Table 6.1. The total investment for committed projects and CREATS proposals for the next 20 years will be about LE 48.4 billion at 2002 prices.

Table 6.1 Staged Public Transport Investment Program

(Million Constant 2001 LE)

Mode and Period	2002-07	2007-12	2012-17	2017-22	Total
Mass Rapid Transit	0	0	2,851	8,049	10,900
Tram and Supertram	1,041	1,923	1,469	1,474	5,907
ENR Suburban, Wings	571	1,927	1,994	5,674	10,166
Bus Fleet	1,154	1,009	1,154	1,009	4,326
Priority Bus Facility	762	738	267	277	2,044
Nile Ferry	25	25	0	0	50
Committed Projects	2,356	6,683	5,675	300	15,014
CREATS Plan Total	5,909	12,305	13,410	16,783	48,407

ROAD TRANSPORT NETWORK

STRUCTURING A HIERARCHICAL AND FUNCTIONAL ROAD NETWORK TO MEET INCREASING TRAFFIC DEMANDS

The arterial road network in GCR has two major functions, which are **Regional** and **Urban** connection functions. The regional road system serves between the inner-Ring Road urban area and other new communities (Fig. 6.8), whereas urban road system serves among the inner-Ring Road urban centers (Fig. 6.9).



Fig. 6.8 Regional Road Scheme

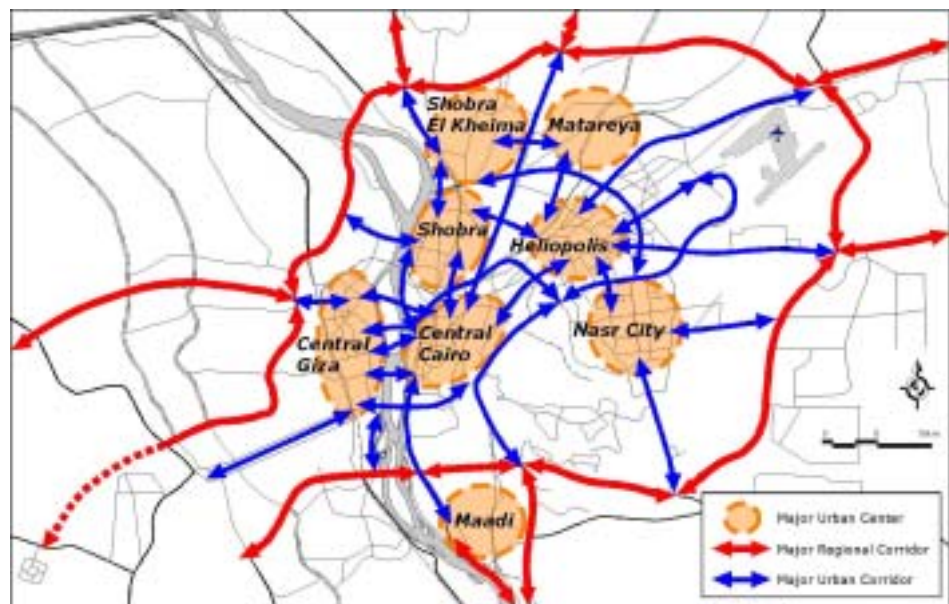


Fig. 6.9 Urban Road Scheme

The major road network hierarchy in GCR can be functionally classified as **Regional Primary, Urban Primary, Urban Secondary** and **Urban Expressway**. The functional road network will be formulated by properly categorizing the existing road network, and giving appropriate operation policies on road structures, traffic management and environmental measures for each classified road category.

NETWORK IMPROVEMENT PLAN

Such hierarchy structuring will identify the missing links and improvement necessity in the road network system. Fig. 6.10 shows the Regional road network and its improvement plans for the entire Study Area.

The current major governmental plan for regional road improvement is the Regional Ring Road planned by Ministry of Housing, Utilities and Urban Communities (MHUUC). CREATS future traffic demand forecasts that the road capacity will be insufficient mainly in the east area, on Ismaylia Desert Road and Suez Road over the next 20 years. The widening of these two links will be of higher priority for connecting 10th of Ramadan, Badr, Shrook with inner-Ring Road urban areas.

Fig. 6.11 shows the Urban road network and its improvement plans for the inner-Ring Road area. CREATS recommends that the most important missing links in the urban area will be in Shobra El Kheima, Matareya, Nasr City, as well as Ring Road access road improvements, among others.

Grade separation at intersections should also be planned in accordance with the hierarchy of the network. In addition to the current grade separation plans of each Governorate (Cairo, Giza, Qalyobeya), CREATS recommends that the at-grade intersections of Urban Primary vs. Urban Primary be given a higher priority for the next grade separation project candidates after implementing the Governorates' plans.

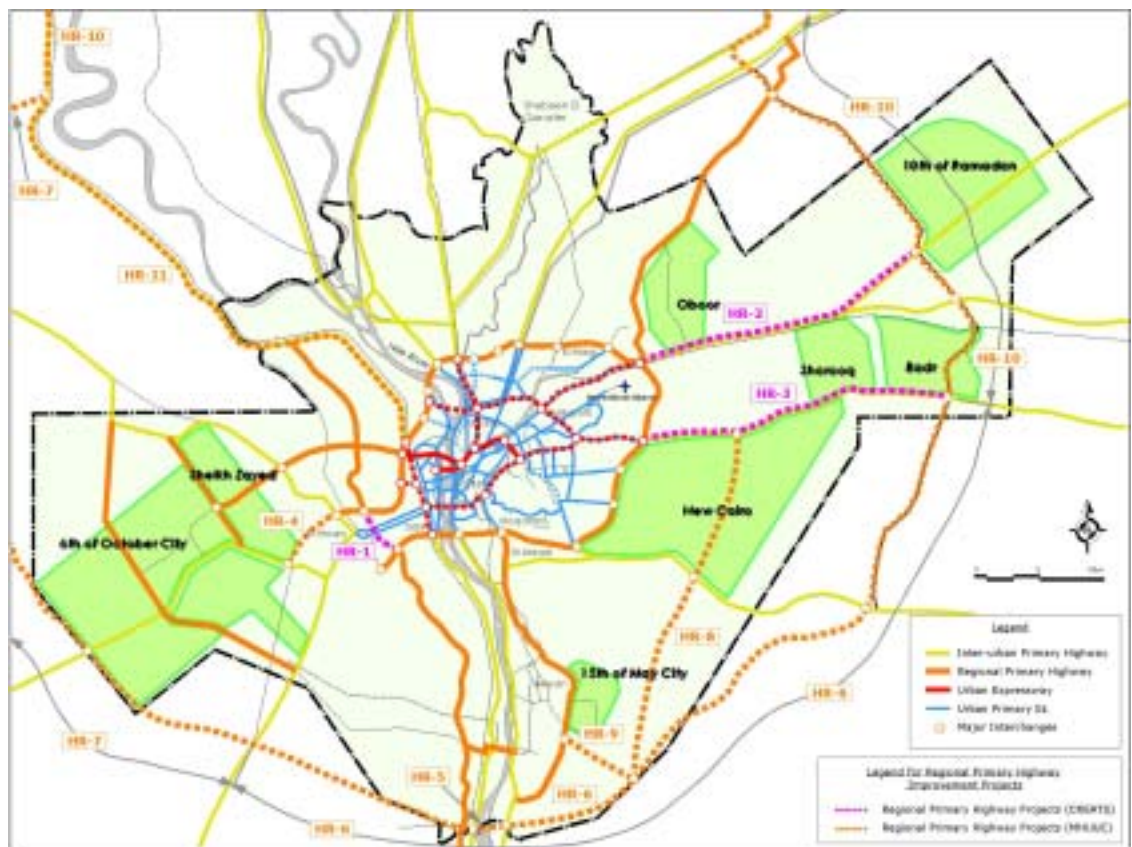


Fig. 6.10 Regional Road Network and Projects



Fig. 6.11 Urban Road Network and Projects

URBAN EXPRESSWAY

Although the urban transport policy in CREATS is to give higher priority to “People’s Mobility” rather than “Vehicle’s Mobility”, it does not mean the road development can be ignored. On the contrary, the sharp increase in vehicle ownership (CREATS estimates current 1.05 million vehicles in GCR will be 2.4 times or 2.5 million vehicles in 2022) suggests substantial increase of road capacity will be indispensable for Cairo over the next 20 years.

The major road capacity increase in the 20 million population (year 2022) mega city like Cairo can only be achieved by providing well-planned Urban Expressway system. Fig. 6.12 shows the recommended Cairo Urban Expressway network with a total length of 78km.

The recommended Urban Expressway network is formulated with two major planning policies. First is to establish an “Inner Ring Road” to serve as a bypass for already heavily congested 6th of October and 26th of July elevated corridors. Second is that the Urban Expressway network will function as a “Mini Ring Road” for each urban center to reduce the congestion by preventing unnecessary through-traffic from entering into the urban centers surrounded by the Mini Ring Road.

TOLL FINANCING FOR EXPRESSWAY

The total road sector investment program suggests that the government expenditure in the road sector must be approximately doubled to directly finance the expressway system if it is constructed by conventional tax revenue and government budget. An alternative financing mechanism to be proposed is the **Toll Road Finance**, in which a toll will be charged for expressway users and the construction cost will be recovered by the toll, at least its certain portion. It is often discussed as a more direct road user charge system, which is widely accepted in many countries since the expressway users can expect higher level of service (with higher speed), therefore the users should directly bear the cost equivalent to the economic benefit they could receive. It is even unfair to bear such

high-level service facility from ordinary budget because it means non-users will also pay the cost.



Fig. 6.12 Recommended Urban Expressway Network

Although the economic benefit would be maximized with no toll expressway, CREATS preliminary financial analysis shows that a flat toll of LE5.0 (year 2022 toll level) would generate the highest revenue comparing traffic volume and toll level (Fig. 6.13).

The simulated annual revenue of year 2022 shows that LE5.0 toll could self-finance the investment if the financial cost can be properly minimized, for example, by international finance. It is recommended, however, the toll level be initiated with lower level, such as LE2.0, at earlier years for social acceptability. If the toll road finance mechanism is followed, it is also recommended that the projects be implemented by a new independent organization, such as Metropolitan Expressway Authority (MEA) to crystallize the finance system.

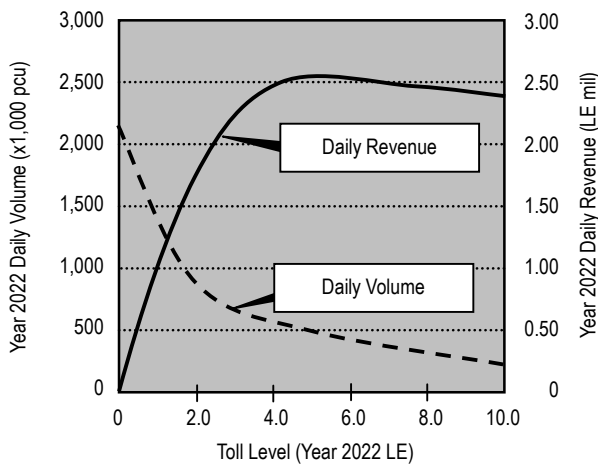


Fig. 6.13 Toll Expressway Daily Volume & Revenue (Year 2022)

The beneficiary of Urban Expressway, however, is not only the user of the Expressway. While vehicle owners will pay the toll for higher level of service on the Expressway, the public transport should be able to implement more priority treatment for public transport on the at-grade road network after providing the high-service alternative for the private vehicle users. Such functional separation of the road system can furnish more reasonable road transport structure in GCR.

ROAD SECTOR INVESTMENT: SUMMARY

The current five-year plan investment plan in the road sector and CREATS recommendations are summarized in Table 6.2. The total of committed projects investment for the next five years and CREATS proposal for the next 20 years will be about LE10.5 billion at 2002 prices for the Road Sector.

Table 6.2 Road Sector Investment Program (LE mil)

Year	2002-07	2008-12	2013-17	2018-22	Total
Committed Projects					
MOT	111	---	---	---	111
MHUUC	471	---	---	---	471
Cairo Governorate	518	---	---	---	518
Giza Governorate	357	---	---	---	357
Qalyob. Governorate	109	---	---	---	109
Committed Projects Total	1,566	0	0	0	1,566
CREATS Proposal					
Regional Roads	190	59	78	0	327
Primary/Secondary	215	105	0	0	321
Grade Separation	140	140	140	105	525
Expressway	0	2,652	2,432	2,788	7,872
CREATS Proposal Total	569	2,956	2,651	2,893	9,045
Road Investment Total	2,111	2,956	2,651	2,893	10,611



INTERMODAL TRANSPORT SYSTEM

USER-ORIENTED INTERMODAL SYSTEM WITH MORE ACCESSIBLE PUBLIC TRANSPORT FOR ALL

Intermodality will be a key-success factor for the public transport system of the future. Intermodal integration of the different public transport systems in Cairo will increase efficiency, reduce travel time and make the system more accessible for all. The future public transport systems can only operate efficiently if the interconnecting points guarantee an efficient transit from one transport mode to another. Four different types of interconnecting points can be identified (Fig. 6.14):

- Primary Interconnecting Points
- Secondary Interconnecting Points
- Network Interconnecting Points
- Park and Ride

Primary Interconnecting Points are locations where all public transport modes converge and a high number of passengers are transiting from one mode to another. Most of these terminals are centrally located in the network. Secondary Interconnecting Points are located on major intersections between two types of public transport, for example metro and supertram. Their functionality is similar to the Primary Interconnecting Points but their importance and impact is somewhat lower. Network Interconnecting Points are generally located at the boundaries of the network and link the urban public transport system with inter-city modes such as long-distance bus and rail services. The fourth and final type of terminal is the Park and Ride Interconnecting Point.

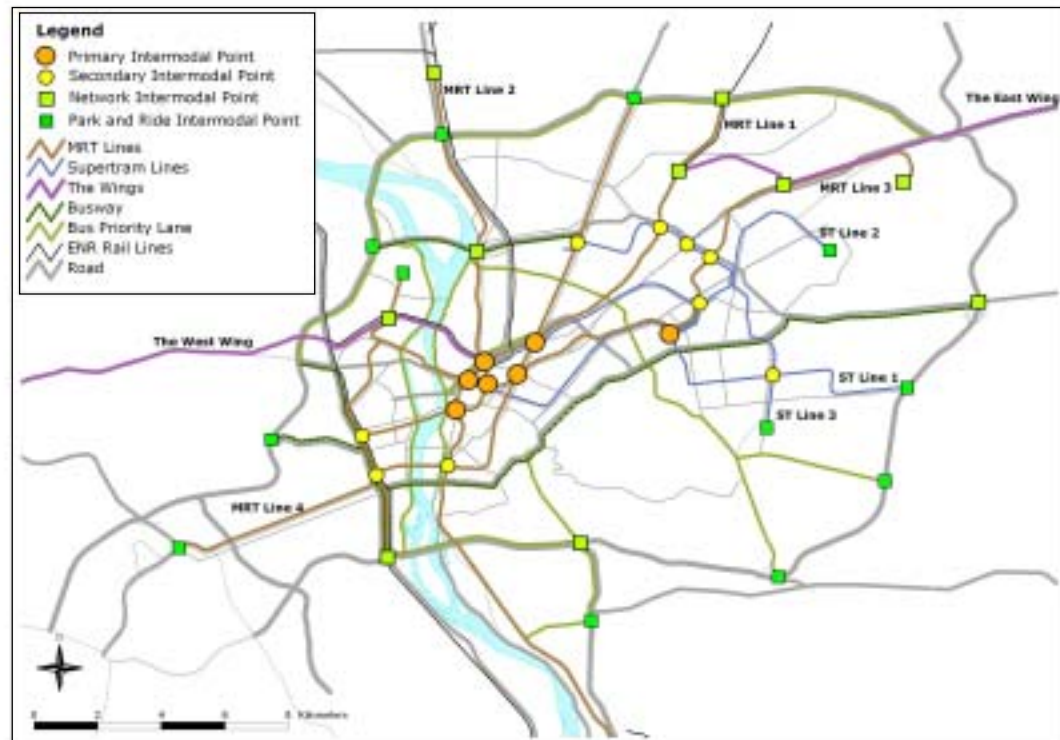


Fig. 6.14 Public Transport Network with Intermodal Terminals

CRITICAL SUPPORTING MEASURES

At present, there exists no *intended* intermodal public transport system. Only transport links are provided without the necessary supporting measures to make these links efficient and effective. The public transport plan for the future proposes new or improved infrastructure with the specific objective of integrating the different public transport modes. But infrastructure alone is not sufficient to achieve intermodality. Only combining new public transport infrastructure with supporting measures will guarantee an efficient intermodal public transport system. The effects of the flanking measures should not be underestimated.

EFFECTS OF INTERMODAL MEASURES

The proposed measures include the *integrated fare policy and single ticketing and integrated timetables* to ensure operational efficiency.

A sensitivity analysis was made on the impact of fare structure and fare amount by using the CREATS model, and the results are summarized in Table 6.3.

This analysis demonstrates three important implications for the public sector; namely:

- 1) The introduction of a **common fare policy** among public bus, MRT, ENR suburban rail and LRT/tram services, is significantly beneficial in terms of ridership;
- 2) A distance-proportional fare system applied uniformly to all public operators can be a catalyst for increased ridership, particularly, of Supertram/Tram (about 80% increase) and ENR (36% increase); and
- 3) Opportunities exist for increasing (commercializing) the absolute fare levels with modest impacts upon ridership, i.e., given a unified distance-proportional fare system, an increase to 10 Piasters/km, instead of the current level of 6.6 Piasters, will decrease the demand for public transport passenger only by **5.2%**, or from 15.9 million to 15.1 million.

The analysis also clearly demonstrates that intermodal improvement of the public transport system should involve both public modes and the private sector (shared taxi, cooperative minibus). An integrated and coordinated system, if properly conceived and managed, will fulfill a valuable role in meeting the mobility needs of Cairenes.

Table 6.3 Absolute Variation in Year 2022 Public Transport Passenger Demand: A Sensitivity Analysis on Fare Structure and Fare Amount

Mode ⁽¹⁾	Million Daily Boardings, Scenario D ⁽²⁾			
	Unified Public 5 Piasters/ km	Independent Public Fares	Unified Public 7 Piasters/ km	Unified Public 10 Piasters/ km
Public Bus	3,688	3,910	3,508	3,165
Tram, Supertram	2,050	1,129	2,017	1,869
Metro	8,711	9,082	8,398	8,142
ENR ⁽³⁾	2,007	1,438	1,953	1,865
Subtotal Public	16,456	15,561	15,899	15,068
Private ⁽⁴⁾	3,936	4,761	4,091	4,517
Total	20,392	20,322	19,990	19,585

(1) Nile ferry not shown due to small ridership vis-à-vis other urban modes.

(2) Unified public defined as all public modes of transport having an identical distance proportional fare at init rates of five, seven and ten Piasters per kilometre. Independent public fares defined as current are structure with real growth in fare amount; weighted average approximated at 6.6 Piasters per kilometre. Private fare unchanged in all scenarios; reflects current fare structure with real growth in fare amount. All amounts in 2001.

(3) Suburban operations including services to satellite cities.

(4) Shared taxi and transport cooperative minibus.

Source: JICA Study Team

THE VALUE OF INFORMATION

One of the reasons why public transport is unattractive is the low quality service and uncertainty related to the arrival and departure times. Improvements can only be achieved if the complex fare systems and time tables of the different operators are simplified and balanced with each other, thus providing for the customer an integrated public transport offer featuring minimal transfer delay and a guaranteed arrival and departure time. Achieving integration of fares, tickets and time tables can only be achieved through efficient information exchange between public transport operators, as well as between operators and passengers. Information dissemination is seen as a critical success-factor in efficiently managing and operating the intermodal public transport system. Without clear and comprehensive information, the proposed intermodal integration measures are unlikely to be as successful as they could be.

TRAFFIC MANAGEMENT

TRAFFIC MANAGEMENT FOR PEDESTRIAN-FRIENDLY, SAFE AND SMOOTH TRAFFIC

The existing traffic congestion is largely caused by inadequate road usage due to a lack of well-developed traffic management. An appropriate systematic traffic management system is essential for safe and smooth vehicle traffic flows on roads, making a maximum use of existing road facilities to enlarge the current road capacities. The traffic management, given adequate technologies, yields remarkable effects to facilitate traffics with relatively low costs. Technically it can allow a trial-error process until reaching an optimal system, while observing the emerged effects on the traffic flow and other factors. It necessitates responsive revision and improvement to be acceptable to the society. The traffic management plan is composed of several issues such as:

- 1) Traffic signal control,
- 2) Improvement of intersections,
- 3) Parking system;
- 4) Traffic safety facilities; and
- 5) Vehicle inspection system.

Most of the proposed projects are incorporated into the Short-term Plan, and some advanced technologies such as a computerized traffic information system should be introduced in the medium-term.

SHORT-TERM (2007) PLAN FOR IMMEDIATE ACTIONS

Immediate actions and measures for improvement of traffic management systems are proposed with the objectives of:

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

(1) Improvement of Traffic Signal Control System

It is often observed that current traffic congestion is caused mainly by spill-back due to near or over-saturated bottlenecks. The signal control system must be effectively worked as long as traffic shows a stable fluctuation pattern. Installation of "area signal

lights control system” with channelization should be considered. In order to alleviate traffic congestion at bottlenecks, a traffic response system is recommended to be introduced in busy areas, e.g., the area encompassed by Ramses, Clot Bey, Port Said, Magless El Shaab and Cornish El Neel roads where 44 intersections are located. The synchronized system should be introduced on the 8 heaviest routes such as Doqy, Abdel Salam Aref, and Tahreer roads, with installation of signal lights at the roundabout, U-turn points, as shown in Fig. 6.15.

It has been proven in Tokyo that by introduction of a traffic response system, total travel time during the daytime reduces by 9%, the total delay falls down by 23% and the congestion length-time is shorten by 28%.

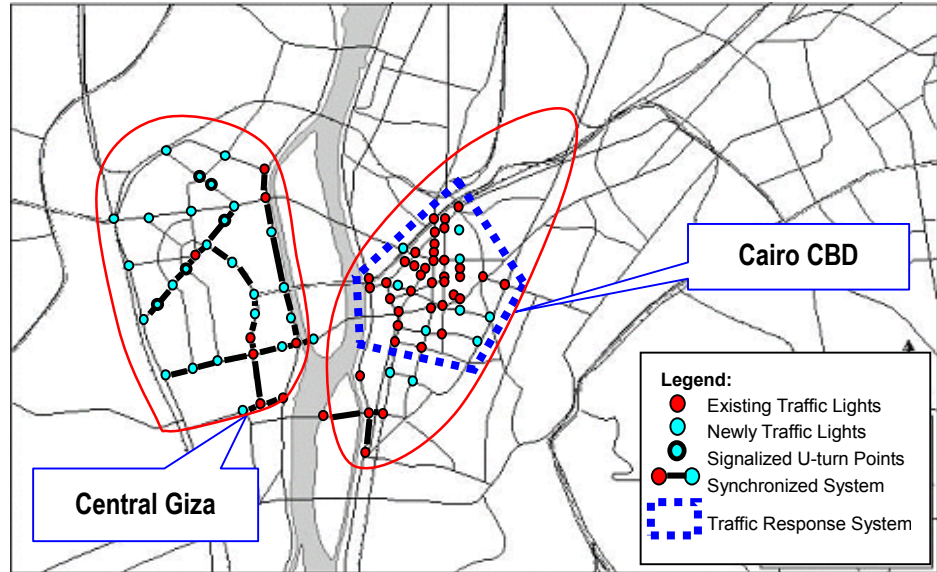


Fig. 6.15 Proposed Locations for Signal Control

(2) Improvement of Intersections

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 systems. As a model, the intersection improvement at Abdel Moniem Ryad Square, one of serious traffic bottlenecks, needs to be urgently carried out, referring to the dynamic simulation analysis presented in Chapter 8, Volume III.

(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 efficiently 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 are enforced, as shown in Table 6.4. The PZM area shall be designated in Cairo CBD and Central Giza area.

Table 6.4 Designation of PZM

Zone	Enforcement	St. Share Of Prohibition
A	Prohibit: 8:00-20:00	50%
	With Charge	50%
B	Prohibit: 8:00-20:00	30%
	With Charge	70%
C	Prohibit: 8:00-20:00	20%
	With Charge	80%

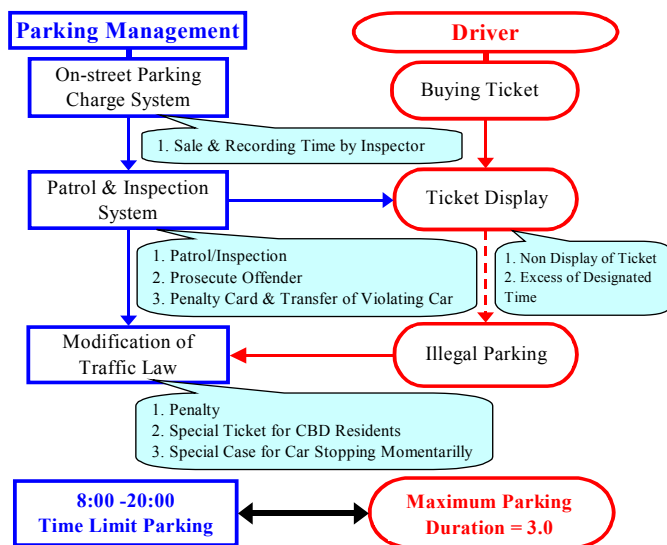
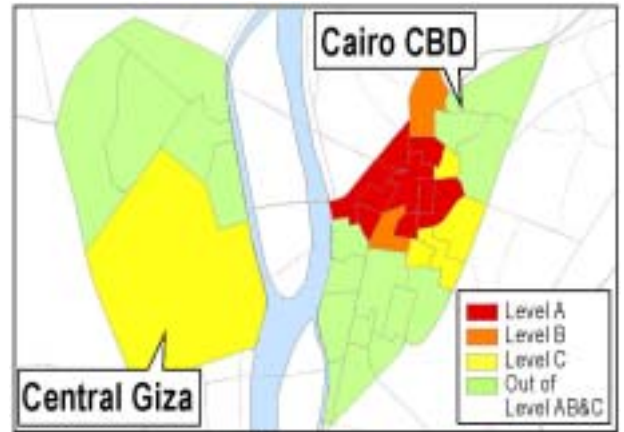


Fig. 6.16 Outline of Parking Ticket System

This on-street parking restriction policy, however, should be compensated with development of parking lots, otherwise illegal parking could not disappear. It is estimated that under enforcing no-parking completely during 8:00-20:00, about 7,600 lots in Cairo CBD and 8,400 lots in Central Giza additional parking development will be required, assuming that the number of cars affected by this no-parking policy are about 25,000 and 37,000 vehicles/day respectively.

During hours of on-street parking, the authority may control it with a **parking ticket system** as recommended as shown in Fig. 6.16 that is an economical way without using any machine or instrument.

(4) Improvement of Traffic Safety Facilities

It is often observed that pedestrians cross streets at middle section of roads (Jay-walking), and walk vehicle lanes 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.

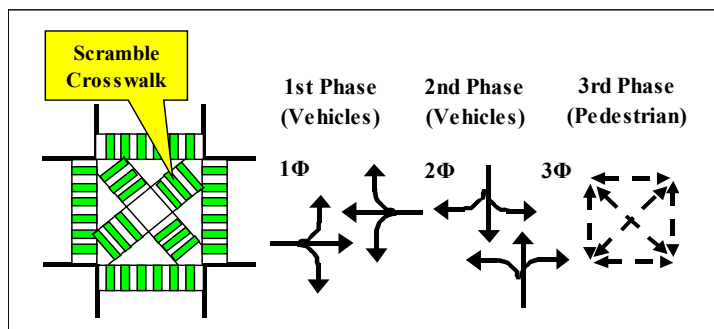


Fig. 6.17 A Sample of Scramble Crossing

A norm of **“Pedestrian Priority”** should be facilitated as a social value.

For engineering solutions, pedestrian bridges and pedestrian crossing zones with traffic light (i.e. scramble pedestrian crossing as shown in Fig. 6.17) are recommended to develop at the intersections where both vehicle and pedestrian traffics intermingle to a high degree, and where there is a need to achieve a smooth and safe traffic flows.

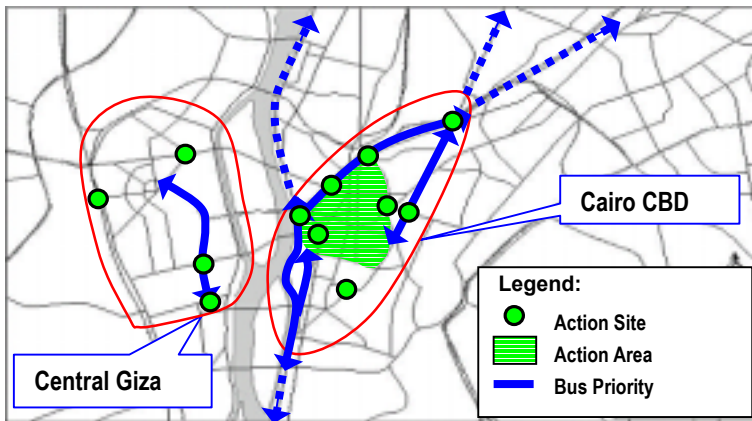


Fig. 6.18 Plan Location for Traffic Safety Facilities and Bus Priority Lane System

(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 proposed to be introduced on selected trunk routes (as shown in Fig. 6.18) in limited peak hours, taking into account a fact that traffic congestion often takes place with conflicts of buses/shared taxis and other vehicles. The bus priority lane system shall only be applied so that priority is given to inbound bus traffic during morning peak hours when commuter traffic is heavy, and to outbound bus traffic during evening peak hours.

(6) Improvement of the Vehicle Inspection System

Congested sections caused by blocking of engine-troubled vehicles are often observed on heavy traffic roads. This could-be-avoidable incident yields enormous economic losses and environmental pollution, given drivers' cares 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. This system revolution is possible by balancing technical and enforcement capability and affordability to users but requires an administrative decision on the possibility of legislative reforms.

MEDIUM- (2012) AND LONG-TERM (2022) ACTIONS

Given drivers the traffic information on road congestion status, locations of accidents and/or estimated time to pass through bottlenecks, they could select best 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 varieties from simple to advanced surveillance technologies, e.g., a CCTV camera cum data-processing information system. An appropriate system should be equipped in a phased manner, for instance, the 1st stage: installation of terminal equipment in the city control center and surveillance systems on radial roads; the 2nd stage: expansion of the system to an area traffic control system, and the 3rd stage: development of a centralized control system covering entire the metropolitan area. In terms of public transport, to alleviate passenger discomfort caused by unpunctuality and to improve management of operation, a **bus location information system and bus priority signal control system** should consider on the major bus routes.

CARGO TRANSPORT SYSTEM

RATIONALIZATION OF CARGO TRAFFIC MOVEMENTS AND MITIGATION OF NEGATIVE IMPACTS

Cargo transport does not create substantial problems in and around Cairo. The overall percentage of trucks on Ring Road and on various roads inside and outside Ring Road remains moderate with only few specific exceptions.

The highest prevalence of truck activity was noted at traffic counting Station C35, the **Alexandria Agricultural Road** north of the Ring Road (followed by Station C25, Ring Road between Alexandria Agricultural Road and Ismailia Desert Road). A total of some 35,000 trucks crossed Station C35 during the course of a weekday, consisting of about 13,700 pick-ups, 14,700 2-axle trucks, 600 3-axle trucks and 6,300 trucks having more than three axles. A total of 83,700 vehicles of all types were concurrently counted; thus, trucks represent near 42 percent of total daily traffic volume. On a pcu basis, trucks aggregated to 63,300 pcu's, or about 51 percent of the total pcu stream. Highest relative share at the higher-volume locations was noted at Station C27, Ring Road between Ismailia Desert Road and Suez Desert Road, at which some 60 percent of counted vehicles (a modest total of 23,300 units) consisted of trucks (14,200 units) (Fig. 6.19).

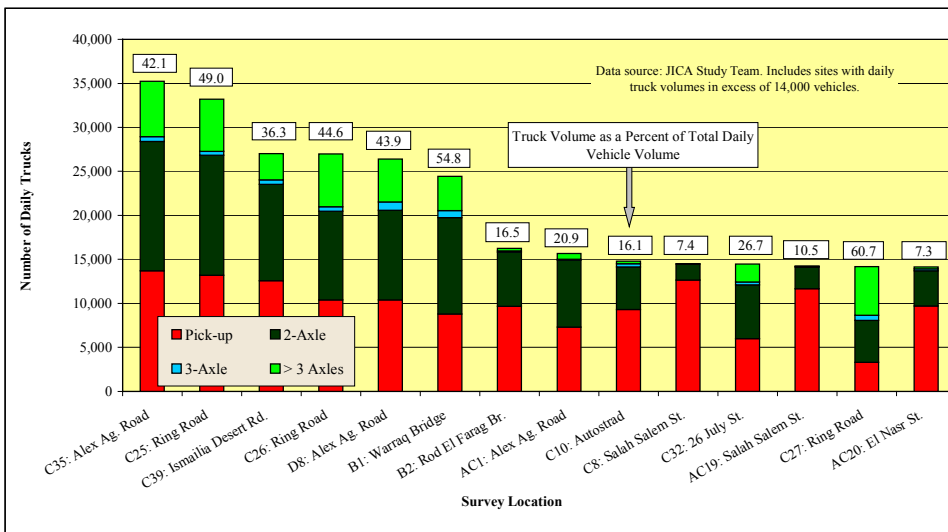


Fig. 6.19 Survey Locations with Highest Truck Volumes Representative a 2001 Weekday

At the north and north western section between the start of Ring Road at 6th of October City and Ismailia Desert Road, truck traffic converges towards Alexandria Agricultural Road. This section of Ring Road accommodates over 10,000 trucks per day per direction, mainly coming and going to the industries located in Giza, Doqy and Imbaba and further on towards 6th of October City.

Most streets inside the Ring Road have a share of trucks that is below 20% of total traffic, and nowhere the share is above 60% of total traffic. Compared to the total road network, only a limited number of road sections have a share that is between 20% and 40% of total traffic as shown in Fig. 6.20.

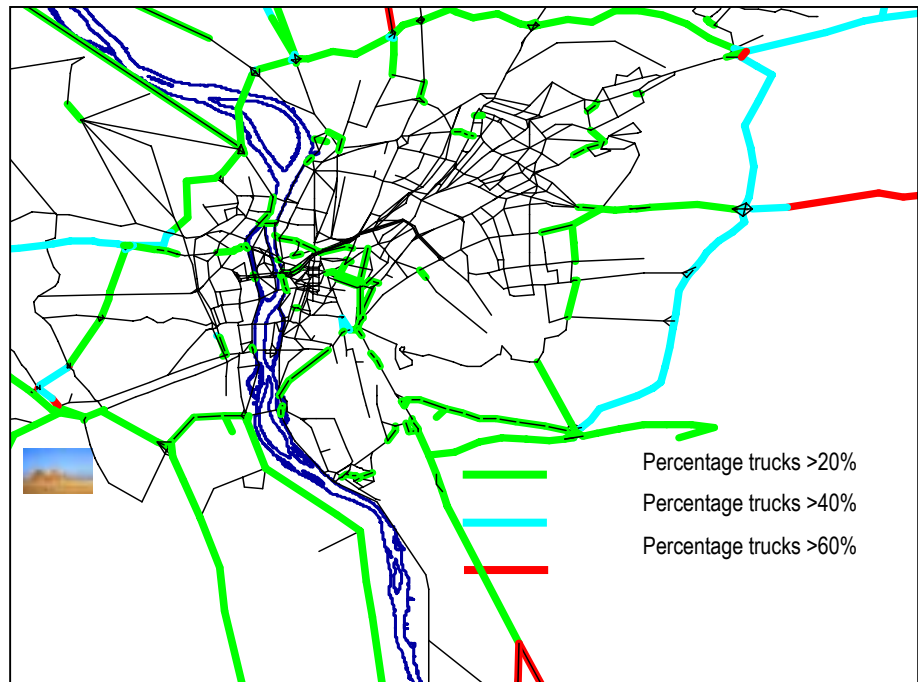


Fig. 6.20 Percentage of Trucks in Total Traffic (2002)

FUTURE PERSPECTIVES

The impact of cargo transport will substantially increase in the future. Total volume of trucks will double over the next 20 years, and measures will be necessary to structure and control truck traffic. If the proposed road infrastructure is not built in the future, cargo traffic will become a serious problem and add to the problems created by private and public transport, making that traffic in the GCR will almost come to a standstill. The development of **Regional Ring Road** and the construction of new and the improvement of existing roads will ensure that trucks will be able to continue supplying the economy and the population of Cairo over the next 20 years.

Alexandria Desert Road will become a more important corridor for trucks. The impact of these new truck flows will be on the access roads to **26th of July Corridor** and on the road towards 6th of October City, where truck traffic will become particularly dense. Another important corridor will be the Road to Qanater, where total truck volume will increase to over 10,000 PCU per day per direction.

The orientation of truck traffic inside Ring Road existing at present will remain in the future, but the access to these districts will change as a consequence of the proposed new and improved road infrastructure. For Nasr City, the Autostrad is no longer the priority access road and is replaced by the corridor from Ring Road to Amel City. The main entrance to the Shobra El Kheima area will in future no longer be the extension of the road to Bolqos inside Ring Road. This role will be taken over by the 15th of May street extension, proposed in the CREATS Master Plan and by the extension of Alexandria Agricultural Road.

STRATEGIC MEASURES FOR CARGO TRANSPORT SYSTEM

Any negative impact of cargo transport on traffic is now, and will remain in the future limited to a number of localized situations. Substantial infrastructure investments will not be necessary in the next 20 years, given that the proposed road infrastructures will be sufficient to accommodate truck traffic in the future. However, this does not mean that no

measures are necessary or that cargo transport should be ignored in the future (Fig. 6.21).

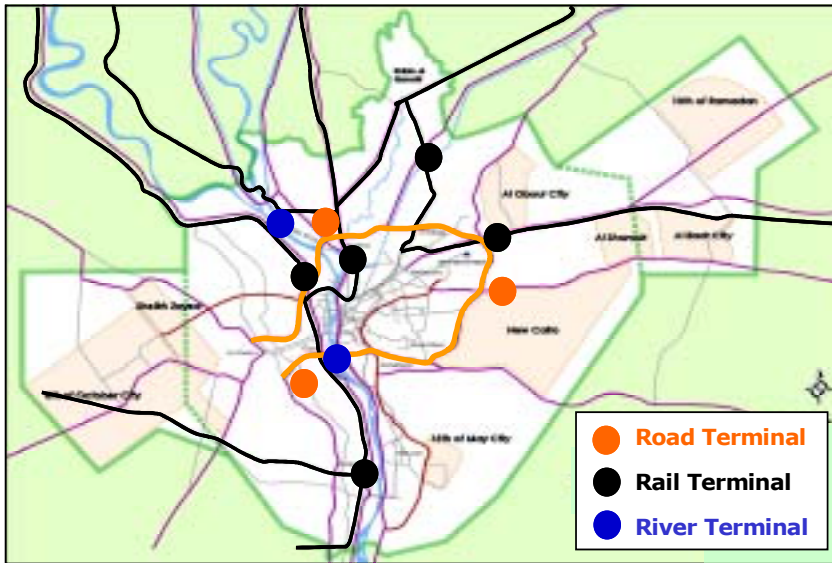


Fig. 6.21 Locations of Proposed cargo Terminals

(1) Measures for Modal Shift of Cargo Transport

A first important consideration is to support a modal shift in the future, by which a share of the cargo that is presently transported by road to/from Cairo, shifts to rail and river. This will require the structural and operational rehabilitation of existing rail and river terminals in the short-term future. In parallel with the growth of container transport, the proposed intermodal rail (Bashtil Dry Port) and river terminals (Ather EL Nabi Port) need to be developed in the medium term. Once intermodal transport concepts will become a part of the Egyptian transport system, Bashtil Dry Port and Ather EL Nabi Port need to be upgraded to a full intermodal terminal in the long-term.

(2) Cargo Traffic Management

Truck traffic orients towards industrial centres in the new communities and in Cairo where a higher concentration of truck traffic can be observed. Only flanking measures that control and structure these flows can bring a partial solution to these localized problems. The most critical problem is and will be CBD and the Central Giza where trucks represent a higher than average share of total traffic and frequently generate problems. Following measures could, in the short-term, contribute to alleviate these areas: increased enforcement of the existing truck ban and an extension of the truck ban to small trucks in Nasr City, the Cairo CBD and Central Giza areas.

Simultaneously, in the medium-term, the truck ban could be extended towards Ring Road between Alexandria Agricultural Road, Ismailia Desert Road and Suez Desert Road as well as the roads towards these inter-city roads inside the Ring Road area, where truck traffic is particularly dense. At this Ring Road section and on the access roads inside the Ring Road area, trucks should only be allowed between 11 p.m. and 6 a.m. This measure can be supported by the enforcement in these areas of a **night delivery system**. In that system, shops, warehouses and companies can only be supplied during night time (between 11 p.m. and 6 a.m.). Exceptions are only possible with an expensive license.

In the long-term and depending upon the evolution of traffic, the **generalized truck ban** could be extended to the entire Ring Road and generalized in the inner Ring Road area.

(3) Cargo Traffic Demand Management Linked with Industrial Relocation Policy

The ultimate goal is to transfer industrial activity from inside Ring Road to the new communities. This should be supported via the introduction of an **industrial relocation premium** that should be introduced in Cairo in the short-term. In the medium-term, this measure could be replaced by an industrial location license which has to be purchased at a large cost on an annual basis by the industries that still locate inside the Ring Road area.

(4) Modernization of the Freight Transport Sector

The truck ban on Ring Road will only be effective if trucks have a possibility to stop under better conditions than they do now on the access roads to Cairo (therewith frequently hindering other traffic). Therefore, at the critical intersections between Ring Road and the inter-city roads, **3 truck terminals** should be developed (Upper Egypt Road Terminal in the south, Alexandria Road Terminal in the north and the Suez Road Terminal in the east) to cope with the effects of the extended truck ban. In the medium- and long-term, these terminals could be transformed into **value-added terminals** for container transport, cargo consolidation and/or freight integration. The success here will depend upon the transformation for modernization of the freight transport sector, which is the most critical factor that will determine future cargo transport. The transformation of the transport sector into a modern and efficient service sector is of all measures the most important one, but the most difficult to realize and undoubtedly the most expensive one. Achieving this will require a long-term approach that includes following phases:

- Short term action: Conduct of a Freight Transport Sector Rehabilitation Study;
- Medium-term actions: Stimulating road container transport in association with introduction of the profession of integrator and consolidator for expertise of freight control systems; and
- Long-term actions: Development of an intermodal transport system with an international standard.

7

STRATEGY 3: SAFE AND ENVIRONMENT-FRIENDLY TRANSPORT

ENHANCEMENT OF HUMAN FACTORS TO PROMOTE SAFE TRANSPORT

Efficient and safe transport in Cairo will not be achieved solely by developing new infrastructure, but also requires a targeted action towards traffic users and managers simultaneously, because of several reasons. First, Egyptian drivers need to be disciplined with respect for traffic rules and regulations, considering other traffic users. Second, traffic should be managed by traffic signs and signals to keep traffic orderly. Third, “more responsive traffic management behavior” by police control is required at important intersections to ensure an efficient traffic system. Finally, **pedestrians** should not be “*Outsiders in Traffic*” and drivers pay strong attention to pedestrians in streets of Cairo. The **Pedestrian Priority Society** should be perceived as an invaluable social norm among all citizens.

Based on the above recognition, CREATS proposes a comprehensive traffic safety program including institutional building to facilitate the program, which needs positive participation of all transport-related stakeholders as well as the general public.

THE TRAFFIC SAFETY PROGRAM

The government of Egypt demonstrates its concern for the well-being of its citizens in Article 1 of the Traffic Law which states: “*Using the roads, whatever their nature, in traffic shall be in a manner that does not expose lives or properties to danger, or lead to perturbing the safety of the road, delaying or hampering their use by others, or disturbing people’s comfort or in a way prejudicial to the environment*”. But there seems to be a huge gap between the theory and the practice. Therefore there is much room to improve the current disorder traffic manner towards the spirit of the Traffic Law.

The expected increase in traffic over the next 20 years will require much more rational behavior from both traffic users and managers so that the progress of motorization shall neither hamper human progress nor bring social unrest. There is an urgent need to re-educate drivers traffic management expertise. For that reason, a suitable organization should be established with the objective to implement a sustainable traffic education and information program in Cairo.

(1) Traffic Education and Information Program (TEIP)

The TEIP will have to offer a comprehensive method to improve road user’s discipline and knowledge, to enhance traffic manager’s expertise and efficiency, while simultaneously addressing the citizenry’s passiveness towards transport and traffic problems.

The continued improvement of traffic infrastructure (**Engineering**) can improve traffic only if it is used rationally (**Education**) and efficiently controlled (**Enforcement**). The weak coordination between Traffic Engineering, Education and Enforcement at present reduce the effectiveness of efforts. The TEIP needs to be programmed so as to establish a direct link between the awareness of the traffic problems and a more rational attitude to ultimately change human behavior in traffic (Fig. 7.1).

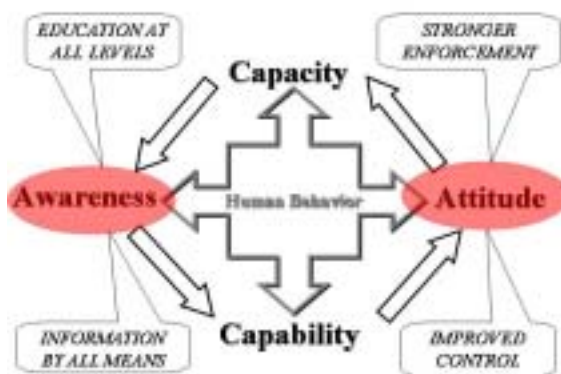


Fig. 7.1 Factors for Changing Human Behavior

(2) Organizational System for the TEIP Implementation

It is recommended that traffic safety responsibilities in each Ministry or public organization are integrated in an **Egyptian Traffic Safety Council (TRASAC)** at the national level. This council is responsible for the strategy, program and public financing. TRASAC shall assume to regulate a strengthened traffic law enforcement system with a *pro-active (prevention)* and *reactive (penalization)* approach to traffic offenders. **The Executive Committee** shall be installed under TRASAC as a management entity for the implementation of the strategy with the allocated annual budget.

In order to facilitate the daily execution of the TEIP, the **Traffic Safety Education Center (TRASEC)** should be organized as a practical implementing arm under supervision of the Executive Committee. At the same time, TRASEC shall have a function of a **Traffic Safety Information Center (TRASIC)** that is responsible for various initiatives to facilitate public awareness.

A sustainable financing system to support all activities by TRASAC and TRASEC should be assured as governmental administration. The finance could be appropriated via four sources: 1) governmentally allocated budget; 2) tax-deductible donations from the private sector; 3) international donations; and 4) inscription fees from participants in the various mandatory training and education programs. It is a rational thought that another possible and rational financial source comes from part of fines/penalties levied from traffic violators. The possibility of such a budgetary source deserves to be pursued.

At the regional and local level, **Traffic Safety Organizations (TRASO)**, which is non-governmental organizations, are proposed to be organized to catalyze drivers' traffic safety and responsible behavior. TRASAC shall support and coordinate regional activities through a nation-wide policy network (Fig. 7.2).

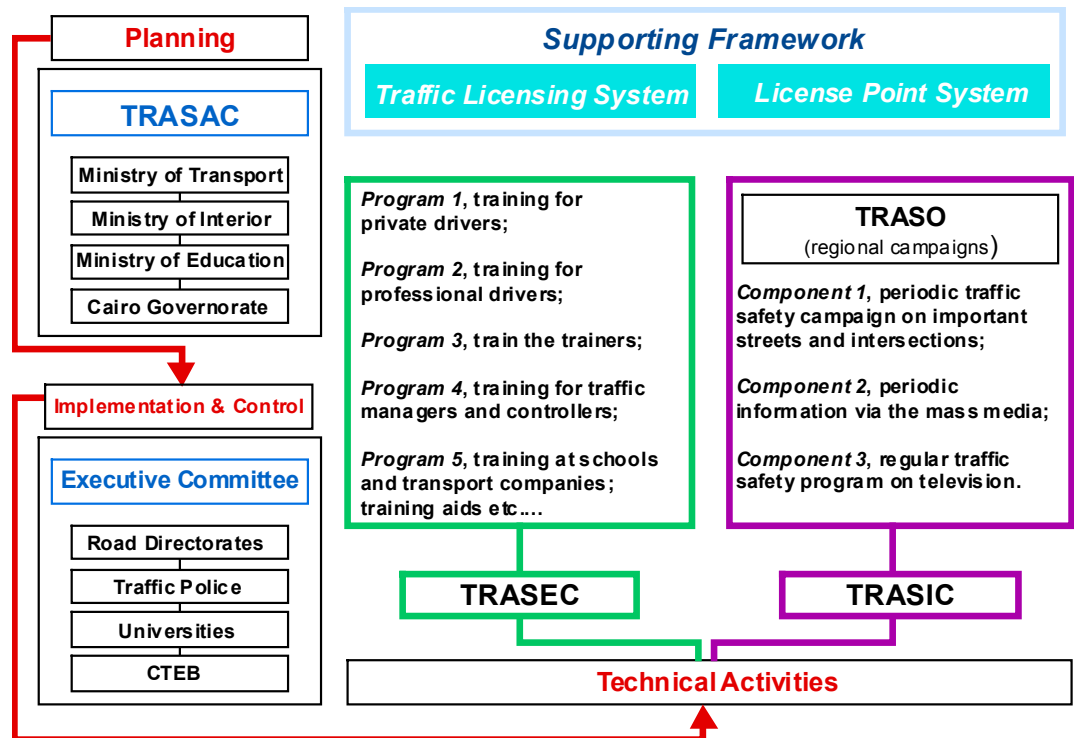


Fig. 7.2 Proposed Organizational Structure of the TRAFFIC SAFETY PROGRAM

(3) Operation of the Program

TRASAC shall annually launch the Traffic Safety Campaign and updates the TEIP based on monitoring the performance. While, TRASEC provides traffic safety education in several programs, e.g., Program 1: Training for private drivers; Program 2: Training for professional drivers; Program 3: Training for trainers; Program 4, Training for traffic managers and controllers; Program 5, Training at schools and transport companies. TRASAC shall develop and execute the annual campaign, integrating 3 components: 1) periodic traffic safety campaign; 2) periodic information dissemination program via mass media; and 3) regular traffic safety class at schools. TRASAC shall stimulate public participation in the campaign via the regional Traffic Safety Organizations.

ENFORCEMENT

Training and education will undoubtedly improve traffic behavior. It will also help traffic managers for better enforcement to improve their methods of controlling traffic. To this end, a rational and effective tool for enforcement needs to be prepared for both transport users and managers.

The traffic law is in place and introducing better signaling and traffic lights is a question of public willingness. These control tools and their functionality is what TRASAC introduces to traffic users and managers alike. Only one element is still missing, namely the tool “**convincing**” traffic users to follow the rules. This element, on the other hand, offers traffic managers the way of “**rehabilitating**” offenders. For this purpose, a more stringent traffic license system, or a “**penalty-point system**” is proposed.

Traffic offenders are enforced to receive penalty points, depending upon the seriousness of their violence, and their accumulated points are registered at the police office until the year of license renewal. Those who come to gain a certain amount of penalty points should compulsorily take the one day re-education program at TRASEC, and those whose points are over another certain level shall lose their driver license.

It is recognized, however, that an efficient penalty point system requires further progress in the computerization of traffic citation records.

CONSIDERATIONS OF ENVIRONMENT-FRIENDLY TRANSPORT

Generally, transport brings benefits (positive impacts) in terms of improved economic opportunities and social welfare. However, also negative impacts on the physical/biological as well as the socio-cultural environment may arise. Therefore, measures must be taken to reduce the short-term negative impacts and to mitigate and manage the long-term adverse environmental impacts. Environmental measures are vital elements of the strategy for safe and comfortable transport.

(1) Global and Local Environmental Effects

In the assessment and forecasting of environmental impacts, a distinction should be drawn between impacts at global, regional and local scales. Global and regional environmental impacts of traffic are large-scale impacts, like the depletion of sources of energy and natural resources, climate change, and increased global air pollution. The most useful indicators for global impacts are energy use and atmospheric emissions (greenhouse gases, like CO₂; NO_x, SO₂ and VOC). While environmental progress has been made in many sectors, unfortunately many transport activities result in a continued increase in CO₂ emission levels. Local environmental impacts mainly depend on the location and the design of transport infrastructure, and include (local) air pollution, noise, land take, water pollution, impacts on biodiversity and negative visual effects on landscape.

(2) Potential Positive and Negative Impacts

From the proposed transport improvement projects by CREATS, both positive and negative impacts are anticipated. Potential positive impacts, related to the socio-economic environment, are:

- Improved access and improved safe traffic connections;
- Reduced travel time and costs, as a result of improved mobility;
- Improved development of tourism, as a result of improved access;
- Improved conditions for economic development; and
- Reduced number of accidents/increased safety.

While, potential negative impacts on the socio-economic and physical/biological environment are:

- Long-term negative effects of increased air pollution and noise (public health);
- Risk of accidents (public health);
- Long-term effect on communities, split up by roads; and
- Long-term impact on aesthetics/modification of landscape or city environment.

Along with the progress of motorization, exhaust, gasses, emitted from vehicles, are increasing, thereby enlarging the environmental load. People residing alongside major roads and transport facilities will directly suffer from increased air pollution.

Improvement of the road condition enables vehicles to drive at higher speed, however, this is also results in a negative environmental impact, because large vehicles, such as bus as and trucks, tend to increase emissions (such as CO₂) at higher speeds (Fig. 7.3).

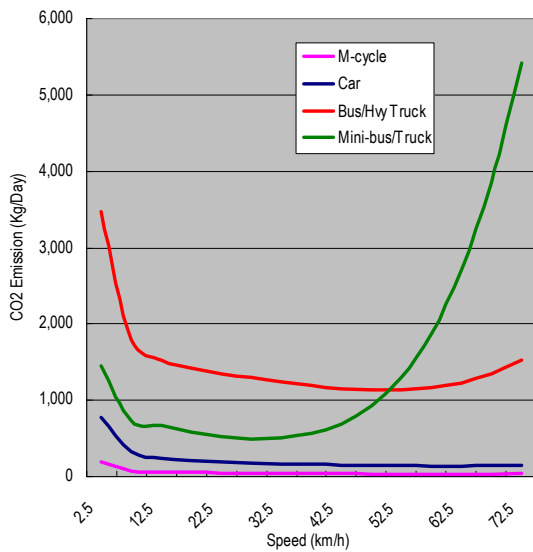


Fig. 7.3 Relations between Vehicle's Speed and CO₂ Emission

(3) Possible Environmental Measures for Transport

Measures to improve the environment in the transport sector, like reductions of emissions and energy consumption, should be undertaken. Those are:

- Increased use of public transport, with emphasis on rail transport;
- Increased public transport efficiency;
- Measures for better integration of intermodal systems for passengers and freight;
- Fair and efficient pricing in transport to mitigate unnecessary transport demands;
- Increased use of Compressed Natural Gas (CNG) and conversion of diesel buses/trucks, taxis to CNG;
- Improving transport regulations & operations for rational route services;
- Inspection of cars/better maintenance of cars;
- Measures for fuel savings;
- Introduction of alternative fuels/hybrid cars;
- Use of unleaded gasoline; and
- Environmental Awareness Campaigns.

8

STRATEGY 4: ACCESSIBLE TRANSPORT FOR ALL**ACCESSIBLE TRANSPORT FOR ALL TO ASSURE SOCIAL EQUITY**

Greater Cairo Region's ability to unleash its economic potential is closely linked to the efficiency of its transport system. Transport is also an integral part of almost all daily subsistence and social activities. Improving the access and mobility of the isolated poor paves the way for access to markets, services and opportunities. By improving public transport, poorer people are able to access to jobs, make better use of essential services such as health and education and keep abreast of social, economic and political developments happening in the city. The likelihood that children of poor families will go to secondary school, especially daughters, is much higher if there are reliable and affordable transport services. Without access to effective transport, poor people will not be able to accumulate enough human, physical, financial, and social assets to get ahead.

Low accessibility can significantly reduce the prospects of people's employment. This particularly affects people living on the periphery of the city, where the disadvantage of having a low income is often aggravated by poor connections to the main radial routes on which public transport service is concentrated. If poor people live in a peri-urban area, the lack of public transport can be a major cause of unwanted isolation, which in return is a major cause of continued poverty.

Providing accessible transport for all, and especially of the urban poor has therefore been an important part of the CREATS planning strategy.

**ACCESSIBILITY TO
TRANSPORT
SERVICE**

Motorization will further proceed along with the economic growth. As discussed in Chapter 3, the majority of households, or 70% of the total households, have no car accessibility at present in 2001, and even given a 4.2 % p.a. growth in motorization, the number of households without car access will still share a majority, or 55%, in 2022.

By and large, transport projects are assessed in terms of reducing transport costs, improving efficiency, and promoting economic growth. However, the contribution of transport operations to poverty alleviation should not only be seen as indirect and stemming from broadly based economic development. For this reason, the distributive impact of the transport projects (i.e., which parts of the population are served) and the potential for transport projects to play a direct proactive role in assisting the population, has received much attention in the design of the Cairo transport network for the year 2022.

From a planning approach, the definition of transport accessibility is concerned with the "ease of reaching" opportunities (schools, jobs, shops, leisure activities) or the "ease of being reached" by contacts (such as clients, customers, workers). CREATS has been concerned to make sure that the layout and cost of transport applies to all socio-professional classes of the population, in particular the poor.

Indeed, improving accessibility aims not only at expanding the public transport network but also at contributing to the provision of public transport services to all citizens in an equitable way.

The accessibility objective provides a focus for impacts on those who cannot afford a car, or those who would not buy a car if only public transport were accessible. In this way, improving accessibility of the poor is also a means to limiting growth in car traffic and congestion.

ACCESSIBLE NETWORK

The foremost measure of accessibility is the ease by which the population, employed, students, and especially low-income urban populations, reach the safer, faster, and more reliable integrated public transport network in the year 2022. This has been determined by counting the number of people, jobs, students and low-income households that served within a distance of **800 meters** from the various network alignment options. The distance of 800 meter is defined as an easy walking distance, and the buffer zone with 800 meters, as a public transport service attraction area.

of 800 meter is defined as an easy walking distance, and the buffer zone with 800 meters, as a public transport service attraction area.

Fig. 8.1 shows an example of a measurement of employed people, based on a Geographic Information System (GIS) for GCR. The committed MRT Line 3 and the proposed MRT Line 4 obtain the best overall results. Line 3 is characterized by reaching an important proportion of employed people, mainly along Gisir Al-Suweis Street and in the dense employment districts of Abaseya, Downtown, Mohandiseen, Doqy and Imbaba.

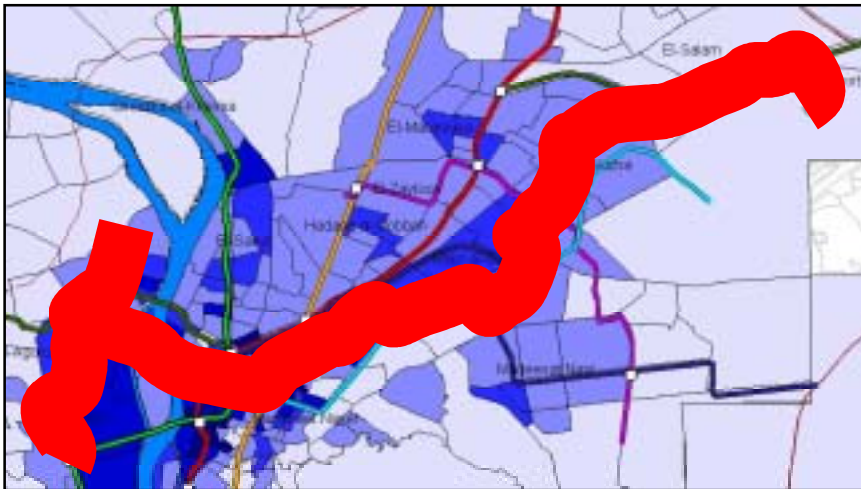


Fig. 8.1 Employment Densities and 800-meter Attraction Area of MRT Line 3 in Year 2022



Fig. 8.2 Distribution of Average Income Zones and 800-meter Attraction Area of MRT Line 4 in 2022

CREATS proposed **MRT Line 4** is characterized by reaching the most important proportion of low-income households (below 500 LE/month), mainly on the stretch from Abaseya to the Ring Road along Port Said Street. It should also be noted that many of these low-income households are in the periphery of the city and are thus especially sensitive due to their isolation. With the Line 4 they will obtain a direct access to most important social and economic areas of Cairo (Fig. 8.2).

Table 8.1 shows a summary of the coverage population by major public transport. The satellite city wing lines, which will link 6th of October to Cairo Station and 10th of Ramadan to Ain Shams Station, are also very interesting in terms of accessibility due to the important urban penetration of the line.

Table 8.1 Social Groups Served within 800 meters from the Recommended Rail Transport Network

Line	Population	Employed	Students	Low Income Household
MRT 1	1 073 525	536 640	362 667	25 385
MRT 2	982 845	637 994	355 254	26 677
MRT 3	1 155 934	873 762	502 711	22 751
MRT 4	1 467 159	507 198	419 988	40 001
The Wings	2 155 915	773 200	473 338	49 810
Supertram 1	375 775	221 332	166 979	5 516
Supertram 2	272 041	378 583	168 104	5 953
Supertram 3	353 823	168 111	108 741	7 354
Total network	7 837 018	4 096 821	2 557 781	183 447
Total study area	20 721 175	6 966 250	5 771 269	582 954

Source: JICA Study Team

TRANSPORT SERVICE WITHOUT BARRIERS

The concept of accessibility goes far wider than improving access to a range of jobs, services and facilities. It should include ensuring that everyone has the opportunity to use the full range of transport services. "Accessibility" does not just mean "easy to reach". It also means "easy to use".

Breaking down the barriers to use of public transport is vital to making public transport be a viable alternative to the private car. One obvious barrier, particularly for the occasional users of public transport, is the lack of available information. Interchanges are often problematic for passengers unfamiliar with the journey. Through-ticketing, timetabling that avoids lengthy waiting, and good signage can assist in providing a seamless journey.

(1) Gender Issues

The CREATS Surveys reveal differences in men's and women's attitude to and experience of public transport travel. Generally, women have a different travel pattern in their daily lives, and make significantly less trips than men, that is, women made significantly less trips (**1.2 trips** per person per day) on their daily lives than men (**2.1 trips** per person per day). This can be explained partially by the traditional social custom in the Islamic society and partially by the fact that safe and comfortable public transport systems are not sufficiently provided for women. Such a social characteristic, however, has been gradually evolving along with the economic growth, that is, they tend to be involved in more social activities and have more opportunities to get out of home.

Yet, women have different access to private transport, different patterns of commuting and employment, and different child-care and other family responsibilities. Thus, they have different concerns, preferences and priorities. Women are important users of public transport, so women's specific transport needs and aspirations should be sought or addressed.

The process of "**gender auditing**" offers transport operators and other providers a framework for checking that services take adequate account of these differences. Its aim is to improve the quality of transport service, which, in turn, will assist operators by increasing patronage.

(2) For Disabled People

The issue of access is closely related to that of access for people with restricted mobility, or those in wheelchairs and the elderly. Disabled and elderly people can plan and undertake a journey only if they can be confident that all stages of the journey will provide compatible levels of accessibility. Rail and bus travels are an obvious field in which compatibility between methods of access is required. Therefore, transport issues are important to disabled peoples' lives, being the single most prominent concern at the local level. Pavement and road maintenance generate the most dissatisfaction, along with access to transport vehicles and the frequency of public transport.

Building in accessibility for disabled people in all new investment is a condition of public money being spent. Local authorities and transport operators should ensure that the transport needs of disabled people are factored into their plans and that the full benefits of improved public transport are accessible to all. Accessibility is not a marginal issue. Disabled people make up a significant and growing part of the community and with an ageing population this is likely to increase in the future.

(3) Special Measures for the Poor

Affordability of transport is an essential aspect of accessibility when viewed by the poor. A good way to solve this problem is to provide a subsidy directly to poor people – not the operator (as it is currently the case), while maintaining the incentive for public transport operator efficiency and commercial operation. The Study Team has suggested that a cooperative approach via the Ministry of Social Affairs and Insurance be adopted which includes a realistic definition of urban poorness, and a strategy for a direct transport subsidy to the deserving poor (refer to *Public Transport System*, Chapter 6).

The poor people's habitat in Cairo often consists of dense and informal buildings. This makes it very difficult to plan public transport access in these areas, and even more, to provide it in practice. Para-transit should therefore be planned to serve these isolated areas in order to ensure the poor with access to the integrated transport network.

9

STRATEGY 5: SUSTAINABLE INSTITUTIONAL AND FINANCIAL MECHANISM

INSTITUTIONAL REFORM FOR TRANSPORT POLICY

Institutional weakness is the most common reason for many observed problems in transport planning in Egypt. There is a need to integrate policies both within the transport sector and between the transport sector and other aspects of urban development. This calls for the establishment of institutions that minimize functional and jurisdictional obstacles against policy integration and operation optimization. This objective can be achieved through “investment” in institutional and administrative reforms, technical education, training and equipment. Such investment represents a small amount of the total cost of transport projects, but is often fundamental to the successful completion of the projects and the establishment of permanent operation and maintenance capability.

Compared to many other developing countries, Egypt is in better position to achieve the required goals of institutional reform. This is mainly attributed to the availability of a large pool of qualified personnel and to the existence of some of the required institutions. Examples are the General Organization for Physical Planning (GOPP) which is in charge of the preparation and enforcement of land use plans, the Traffic Police that enforced the prohibition of truck traffic in the cities and Egypt National Institute of Transport (ENIT) which can provide training for the required staff of the related institutions. These institutions need to be further strengthened in their functions with definite policy linkages.

Meanwhile, the transport finance capacity needs to be strengthened to meet with the investment requirements for both the infrastructure development and the functional operation and maintenance of the vested facilities. Timely budgetary allocation is another issue to be tackled.

RECOMMENDED INSTITUTIONAL ARRANGEMENT

Regarding the transport policy planning and integration for the Greater Cairo Region, the following measures are recommended:

(1) Establishment of the Ministerial Committee for Greater Cairo Transport

Integration and coordination between policies of the related Ministries (Ministry of Transport, Ministry of Housing, Utilities and Urban Communities, Ministry of Interior, Ministry of Environment) and Governorates (Cairo, Giza, Qalubia and Sharqia) call for the establishment of a **Ministerial Committee for Greater Cairo Transport**. This Ministerial Committee should be the driving force for the implementation of the Master Plan. The existing **Higher Committee for Greater Cairo Transport Planning** under Ministry of Transport shall continuously function as a core under the Ministerial Committee.

(2) Establishment of Cairo Metropolitan Transport Bureau (CMTB)

On the regional level, there are some functions which are not clearly assigned to any of the existing organizations such as public transport coordination, traffic safety, standards, regulations and overall control. This calls for the establishment of a regional organization in charge of these functions in addition to the preparation of integration and coordination policies and regulations for the Ministerial Committee. The recommended organization is tentatively called **Cairo Metropolitan Transport Bureau (CMTB)**. This Bureau should be under the Prime Minister Office to facilitate inter-ministerial coordination. It is better to establish the bureau by a Presidential Decree to give it the

needed authority. Staff for CMTB should be recruited from existing organizations as far as possible. CMTB assumes at least the three fundamental functions as follows:

- Transport-related policy planning;
- Preparation of necessary regularization, standardization and legalization; and
- Initiation of integrated transport policy and/or program and its monitoring.

CMTB is expected to examine and determine several transport policies and legislative frameworks that are crucial for the materialization of the CREATS Master Plan. Those, for instance, are:

- Establishment of an integrated operation systems of public transport, including a common ticketing and intermodal operation system;
- Restructuring of the bus fare structure;
- Application of “User Pay Concept”, including a toll system for the Urban Expressway Development;
- Application of an Earmarked-taxation System to strengthening the financial mechanism for the transport sector;
- Application of TDM policies under coordination with relevant Governorates;
- Organization of Traffic Safety Programs including establishment of the financial mechanism;
- Establishment of a new entity responsible for urban expressway development and management; and
- Restructuring and modernization of public operators.

(3) Local Institutions for Transport Engineering Management

On the local level, Cairo Governorate has established Cairo Traffic Engineering Bureau (CTEB) to be in charge of traffic planning and engineering, but the staffing of that bureau is not enough to cope with traffic problems in a city with Cairo size. It is recommended to have similar bureaus at other governorates and to coordinate with each other.

(4) Establishment of Urban Transport Planning Unit in ENIT

It should also be noted that a permanent organization in charge of comprehensive transportation planning in GCR is needed to seek for proper policy directions. The establishment of the **Higher Committee for Greater Cairo Transport Planning** has been one step in the right direction, but it is still required to establish an Urban Transport Planning Unit within ENIT (the executive organization for the Higher Committee) to be in charge of the continuous updating of the CREATS Master Plan. For this purpose, ENIT should be further strengthened in its research capability as well as planning management capability including maintenance of the transport database built by CREATS which is a great asset for expansion of transport research.

(5) Jurisdictional Definition of Greater Cairo Region

In terms of the legalization issues, an important issue is to clear a jurisdictional definition of “Greater Cairo Region” in consideration of the long-term urbanization process and its metropolitan structure, which is not currently unified between related organizations. There is a need to establish an agreed definition for GCR in order to establish a unified database and integrated policies to be shared by all relevant authorities. In this sense, the CREATS Area, encompassing new communities, needs to be re-defined as the GCR.

ENHANCED CAPACITY BUILDING PROGRAM

Capacity building calls for training of the required staff for both the regional level and local level organizations. ENIT can provide such training for university graduates with some help from abroad in the form of training programs and technical assistance. International assistance could be requested for the establishment of the regional level and local level organizations and in the training programs.

Safety is a very important aspect of transportation. Due to the high accident level in Egypt, this subject should be given all required attention. Based on this recognition, **public education and awareness** is an essential factor for the success of traffic management programs. Well-organized campaigns are required through all educational levels and through the mass media. For this purpose, the institutional arrangement as proposed in "Strategy 3: Safe and Environment-friendly Transport" in Chapter 7 is needed to materialize a really practical implementation. This institutional arrangement should be initiated by the proposed CMTB.

ESTABLISHMENT OF A SUSTAINABLE FINANCIAL MECHANISM

The materialization of the transport development scenario recommended by CREATS will claim a massive amount of the investment cost for, approximately LE 60 billion, for the next twenty years. Reviewing the governmental capital investment capacity from the past investment level in GCR in transport projects in the Five Year Plan 1997-2002, it was estimated as around LE 10.25 billion for five years. Taking into account the future economic growth (about 4.6% p.a. on the average) which will affect an increase in the government revenue at the proportional rate, it can be estimated that the transport investment capability for GCR will be approximately LE 73 billion for the next twenty years. It can be said that the required cost of LE 60 billion falls within the capable level.

This estimated budgetary capacity, however, is based on an assumption that the budgetary appropriation weight for the transport sector will be the same as that in the past five years. In practice, more government budget shall strategically be allocated towards other social sectors such as education, health and social welfare rather than transport infrastructures, as the society is being matured. Hence, this budgetary capacity of LE 73 billion should be regarded as a critical threshold level in terms of affordability, and the actual capacity will be less than this.

RECOMMENDED FINANCIAL REFORM

The implementation of the CREATS Master Plan needs to be constantly and stably financed by the government sector. The stop-and-go process, or all-or-nothing treatment for the improvement due to annual budgetary fluctuation, if it happens, would result in an enormous economic loss. In order to strengthen the budgetary base for the transport sector, the following financial measures are recommended to be further explored, although all are highly political issues.

(1) Rationalization of the Current Subsidy Policy for Transport

The government spends a massive amount of money for supporting the operation of the public transport systems such as bus, ENR and Metro services. The composite subsidy requirement (including operation, interest and depreciation) for formal public transport services aggregated to some LE 720 million in 2001, out of which LE 380 million for CTA, LE 309 million for CMO (Metro), and LE 32 million for ENR suburban services.

Since public transport services are essential for people's lives, the social subsidy to support them is recognized as an effective tool for income distribution. However, the subsidy should be rational, because the subsidy-dependant operation tends to hinder its being more efficient in business management. According to the average financial performance of European public transport operators (500 IUTC operators), A recommendable and practical guideline for the subsidy is that if operational revenues

should cover the recurrent operational costs and 70 % of the total costs including capital costs and depreciation, then the government subsidy is appropriated to fulfil the shortfall.

(2) Restructuring of the Public Transport Fare System

The bus ticket prices have increased but at a lesser rate than inflation. The revenue base for public transport operators, therefore, continues to erode in real terms concurrent with increasing absolute operating costs. This has resulted in low quality service and less responsive services than people's demand. The CREATS survey revealed a fact that people are willing to pay more (additional 24 Piasters on the average), given better service. A financially sustainable and better service operation should be more emphasized rather than keeping the fare level being below the people's actual affordable level. The fare structure should be flexibly and periodically changeable based on the economic indicators and the market mechanism.

The policy for supporting the poor needs to be associated with a social welfare policy, not imposing such a social responsibility on the public transport sector alone.

(3) Introduction of User Charge System

It is highly expected that the Egyptian society would accept the **user charge principle** that beneficiaries pay as much money as they can economically benefit, instead of asking for free transport service to the government, using tax money. The people's acceptance of this principle is a prerequisite in order for the government sector to facilitate huge capital investment projects such as an urban expressway network. **The toll-way system** provides users with two options: driving on a more comfortable highway with a shorter travel time even by paying the toll, or driving on an ordinal road with longer travel time, not paying the toll. The toll price is determined to be equivalent to the benefit that a driver would gain when he/she uses it.

This concept may be applied for an on-street parking charge system, that is, the user should pay money for use of public road space. By the levied funds, the authority can build public parking lots. This user charge policy should be further pursued by elected people.

(4) Introduction of an Earmarked Taxation for Transport Improvement

Given a stable and sufficient funding source that is exclusively utilized for the transport sector, the improvement of transport could be deliberately carried out. Such an earmarked funding system, although this requires an legislative amendment of the present budgetary system as well as the taxation, should be introduced to strengthen the governmental funding base.

For this institutional arrangement, many lessons can be taken from experiences in developed countries. A tax on fuel is commonly applied and the tax is earmarked for improvement of transport facilities. A computation envisages that should the current fuel price increase at 2% p.a. over the next twenty years, a total of about LE 41 billion could be available for the transport sector in GCR.

Another rational policy is recommended to be explored for funding for the traffic safety program, as proposed in "Strategy 4: Safe and Comfortable Transport", that is, part of fines imposed on traffic offenders are earmarked for execution of the transport safety program as well as the construction of traffic safety facilities including those for pedestrians.

A Simulation Result:**How much can the recommended financial measures cover the cost requirement...?**

The CREATS master plan will cost approximately LE 60 billion over the next two decades. Given an assumption that the Government adopts two of the major recommended measures for financing the master plan: 1) Earmarked Taxation from Fuel Tax Increase at 2% p.a.; and 2) the toll fee of LE 5.0 from the Urban Expressways, it is simulated that about 80% of the total cost, or LE 49 billion, will be able to be covered by the two financial sources, as summarized below.

Master Plan Cost and Financing Recommendations	
CREATS Master Plan Investment Cost	LE60 bil.
Revenues from Two Recommended Financial Measures	
1) Earmarked Taxation from Fuel Tax Increase	LE41 bil.
2) Self-sustainable Finance of Toll Expressway	LE8 bil.
<i>Total</i>	<i>LE49 bil.</i>

**PUBLIC-PRIVATE
PARTNERSHIP**

Several schemes/systems can be conceivable for the private sector to participate in development and operation of transport facilities and services, however, many lessons imply that all are very sophisticated and difficult in terms of successful achievement. Privatization does not mean “lessening burdens on public sector”, but in practice, the public sector is required to shoulder more serious responsibility for implementing the project accountably and successfully. The public sector needs to be capable and knowledgeable enough to manage risks and conflicts of interests. It is highly recommended that a thoughtful legal framework for the public-private partnership shall be developed prior to launching a privatization project particularly for the transport sector.

RESTRUCTURING AND MODERNIZATION OF PUBLIC OPERATORS

For providing better transport services in a more feasible and functional manner, the public transport operators should be restructured. The following are key issues in this regard.

(1) Commercialization and Rationalization of the Cairo Transport Authority (CTA)

CTA, the oligopolized public bus operator with about 40,000 employees, has long suffered from a chronically financial problem, thereby having not provided sufficient bus services to meet with the apparent demand, because of several reasons: the regulated low fare; insufficient subsidy; regulations against diversification of the business domain; therefore, less motivation for commercial operation. Removing these constraints, CTA needs to be commercialized to be a self-sustainable operator independent from the political influence. Under the commercialization process, CTA shall be restructured in terms of its organizational structure, business areas to be enhanced, rationalization of routing, financial and personnel management, engineering of maintenance and human resources development. Since the bus service improvement in GCR depends upon CTA, the institutional improvement of CTA is urgent.

(2) Area Franchising System for Shared-Taxi Operators

Shared-taxi service is at present predominant, sharing a half of the public transport person trips, however, the service seems to be functional for feeder transport services rather than trunk route services, taking into account that the average travel time by

shared-taxi is less than 25 minutes and the average trip length is about 6 km. Therefore, an “area franchising system” is proposed for shared-taxi operation to structure a more functionally integrated road-based public transport network with formal bus services, rather than being competitive against bus and metro services. Assuming that a franchised area where a business license is given to a shared-taxi operators association shall be about 100~150 Km², the entire GCR is divided into 9 franchised areas.

(3) New Organization for ENR Suburban Rail

Although ENR is currently operating suburban rail services in GCR, ENR is chiefly responsible for long-distance rail service over the nation. The suburban commuting rail service requires a different service system in frequency, operation and quality from the long-distance service. The proposed new wings connecting new communities such as the 10th of Ramadan and the 6th of October should be operated efficiently. Therefore, a new entity exclusively responsible for GCR suburban rail services is recommended to be established as a part of ENR or an independent cell of ENR with the private sector’s financial participation. Through such organizational arrangement, the new entity will be able to run the rail business more flexibly and more efficiently, being independent of the chronic financial difficulty held by ENR itself.

(4) Establishment of the Toll Expressway Development Public Corporation

CREATS proposes the development of an urban expressway network with a total of 78 km. This project is vital to meet with the increasing road traffic demands and provide urban express bus services to create a comprehensive public transport network for the Cairo megalopolis with a 20 million population. However, the project would be difficult to be completed over the next twenty years without introduction of a toll system that enables the project financially viable.

Given the toll system with a proper pricing policy, the project can be financially self-sustainable, or cost-recovery. Therefore, it is recommended to establish a new organization to be responsible for construction, operation and maintenance of the toll way system. Since the organization will be able to be commercially operable, it may be a public corporation under a public-private partnership scheme.

10

TDM POLICIES: EFFECTS AND IMPLICATIONS

EFFECTIVE NON-PHYSICAL POLICY TOOLS FOR TRANSPORT MANAGEMENT

The gap between increasing transport demands and the capacity to accommodate the demands is hardly fulfilled only with physical development of infrastructures, because of serious constraints against funds, land space, time and technologies. Although the CREATS Master Plan addresses a massive amount of investments on structuring a transport network in the most effective and efficient manner, traffic congestion on roads will not be perfectly mitigated in the future, because traffic demands will be increasing faster and greater than capacity expansion by providing the physical infrastructures. Therefore, a vital policy must be addressed to manage and/or control the demand side, instead of concentrating only on the supply side.

WHAT IS TDM FOR WHAT?

The transport demand is basically “derived” demand. It is rare that people travel only for a transport purpose. People travel, for instance to go to work, to school and/or to somewhere for recreation. The transport demand, therefore, is a demand of movement to attain some original purpose.

If many of those demands take place during a short period of time, the transport demand has a peak in consequence. In urban life, work starts in the morning, school begins in the morning. In the evening, work, school and major activities finish. The transport demand pattern for these activities, therefore, has peaks in the morning and evening as a result.

Transport Demand Management (TDM) is an idea to control transport demands mainly in the peak periods, because the peaks causes serious traffic congestion in urban areas, thereby producing economic losses in the society.

Traffic congestion is often generated in specific time of day and in specific urban areas. The TDM aims at solving the traffic congestion, by leveling the peaks over time and space. Moreover, shifting use of people’s transport modes from car to public transport is a significant aim of TDMs, because such a modal shift can increase the transport efficiency, or more people’s travels with less vehicles, thereby yielding economic and environmental benefits in the society. Major tools of the TDM are summarized as follows:

TDM Measures to Discourage Usage of Cars:

- Pricing such as road pricing in CBD;
- Surcharge tax on car ownership and car usage;
- Enforcement such as traffic restriction by number plates of cars; and a “Three in One” policy that at least three passengers should be in one car;
- Strict parking charge system in CBD or designated zone;

TDM Measures to Facilitate Usage of Public Transport:

- Priority traffic treatments for public transport;
- Common ticketing system among urban public transport;
- Public cooperation, such as transport management association, staggered working hours, car-pool/van pool and so on.

It is noted that the above two types of measures are complementally effective to catalyze a policy for people's modal shift to public transport.

As a long-term TDM policy, one of notable measures is to guide the urbanization process towards more transit-driven urbanization that aims to develop urban centers in association with rail-based public transport system.

EFFECTS AND IMPACTS OF SELECTED TDM POLICIES

CREATS examined effects of the selected TDM measures on the transport demand pattern, by using the CREATS model, as follows:

- **TDM 1:** Introduction of a Common Ticketing System among Public Transport Modes; and
- **TDM-2:** Introduction of a policy mix with a fuel tax increase and a parking charge system in the CBD areas in Cairo and Giza.

The TDM sensitivity tests indicate that the TDM is very effective to promote public transport in GCR.

(1) TDM-1: Common Ticketing System

The Study Team conducted a test run by using the CREATS model to identify the effects of introduction of a common ticketing system based on Scenario D which is the CREATS proposed network. The common ticketing system is thought to be a measure to facilitate the modal shift. The results revealed the followings:

- By introducing this system to ease the impedance of passengers' modal transfer, the total number of public mode passengers increase from 20.3 billion to 22.1 billion per day in GCR, or this measure contributes to a 9% increase in modal shift.
- Total revenue of public transport operators, thereby, increases from LE11.6 billion to LE12.2 billion.

These effects are not marginal, but remarkably significant. It can be definitely said that people tend to use public modes more, given a common ticketing system.

(2) TDM-2: Fuel Tax and Parking Charge System

This combined policy is thought to be effective to let car owners be reluctant to use their cars in daily life, and discourage them to drive to the CBD areas in particular. The model analysis was made on Scenario D, the CREATS proposed scenario.

Two assumptions are made: 1) the fuel price increase by 100% over the next 20 years (or a 3.5% p.a. increase), imposing a 100% tax; 2) the parking charge is imposed LE10 in the designated Cairo CBD and Central Giza area. The result indicates that the effects of this measure are remarkable. The followings are its summary:

- The total daily pcu-km of vehicle trips is dropped from 140 million to 126 million, which is equivalent to around 10% decrease.
- Because of the above change, the Volume Capacity Ratio (V/C) on roads drops from 1.3 to 1.2, thus the road congestion is mitigated.
- The modal share of public transport increases from 57.9% to 61.0%.
- The number of public transport passengers increases from 20.3 million to 22.0 million, which is a 8.4% increase.
- The total revenue of public transport operators increases from LE 11.6 billion to 13.0 billion, which is equivalent to 12% increase.

- The total number of cars entering into the CBD and Central Giza areas decreases from 519 thousands/day to 289 thousands/day, which is a drastic drop of as much as 44%.
- The fuel tax revenue amounts to LE 41 billion during the 20 year planning period, under an assumption that 5-piaster fuel tax is levied per 1 liter in 2003 and that the tax increases by 5 Piasters every year.

Based on the above result, it is suggested that the introduction of a fuel tax and parking charge would be significantly effective to facilitate people's modal shifts and reduce vehicle trips in GCR.

URBAN STRUCTURE REFORM

There exist a number of newly emerging sub-centers in Cairo such as Masir City, New Cairo, Maadi, Ain Shams, so on. However, the Cairo CBD and the central Giza areas are still attracting a significant volume of urban activities, forming an one center urban structure. This causes diseconomies from over-concentration in the Cairo urban economy as a whole.

A urban planning measure should be incorporated into the entire transport system in the long run in such a clear direction that the one-center system shall be shift to **a multi-polar urban structure** in the Cairo metropolis. This policy is regarded as another type of TDM, addressing decentralization of economic activities and pivotal urban functions from the Cairo CBD and Central Giza area onto other potential. A number of sub-centers are identified within Ring Road, as shown in Fig. 10.1, all of which locate along major public transport systems such as MRT, ENR Sub-urban Rail and/or Supertram lines, and are endowed with a great potential to be intermodal centers with those modes, thereby attracting more business, commercial and entertainment activities. In order to foster and encourage development of these potential sub-centers, a urban planning policy needs to address provision of incentives for private sector's development activities as well as study strategic area development plans.

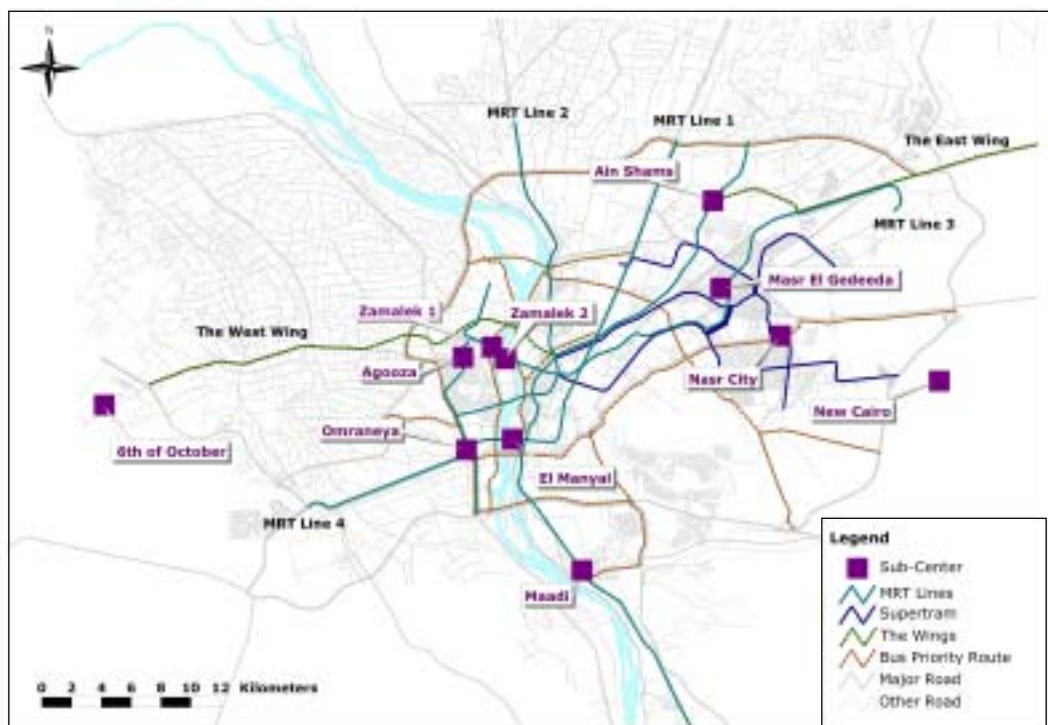


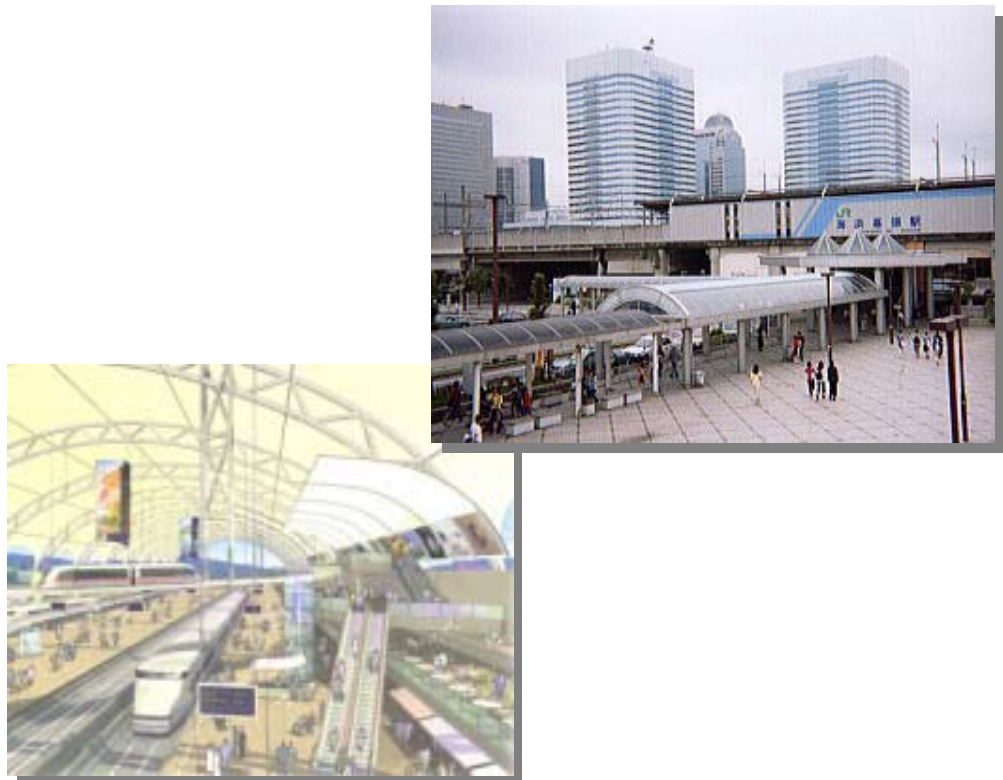
Fig. 10.1 Locations of Selected Potential Sub-Centers

CREATS recommends to designate eleven (11) sub-centers where would be potential enough to accommodate further commercial and business activities, and could provide more employments in the tertiary sector, of which ten (10) are within Ring Road, namely, Agooza, Omraneya, Ain Shams, Doqy; El Manyal, Maadi, Masr El Gedeeda, Zamalek, Nasr City; and New Cairo. The other is 6th of October in New Community. It is assumed that about 50% of the incremental employments in the service sector are strategically allocated in these eleven towards 2022.

Given such a multi-polar structure in 2022, the transport demand pattern is expected to present a different feature. The simulation result by the CREATS model shows favorable changes as follows:

- The total daily pcu-km of vehicle trips drops from 140 million to 128.8 million, which is equivalent to around 8% decrease.
- The modal share of public transport increases from 57.9% to 59.3%.
- The number of public transport passengers slightly increases from 20.3 million to 20.8 million, which is 2.5% increase.
- The total revenue of public transport operators increases from LE 11.6 billion to 12.9 billion, which is equivalent to 11% increase.

The effects of the multi-polar city development were not so much impressive, compared to those by TDM-2: the fuel tax and parking charge introduction. However, this examination implies that urban development pattern affects urban transport pretty much. Therefore, systematic and synthesized planning between urban and transport should be emphasized.



11 RECOMMENDED PROJECTS AND PROGRAMS

INTEGRATED PROGRAMMING OF THE CREATS MASTER PLAN

The five (5) key strategies, as aforementioned, should be materialized with the implementation of well-programmed projects. In the line with the objectives of each strategy, the CREATS Mater Plan proposes a total of 56 projects/programs in a phased manner, viewing the 20 years time horizon. Each project/program is related with the other in nature to bear its maximum benefit, therefore, project linkages need to be assured for the implementation.

PHASING CONCEPT

CREATS proposals are sorted out in a time framework based on a general phasing concept as illustrated on Fig. 11.1 that shows what activities, grouped into three dimensions, namely **hardware** (infrastructure); **software** (institutional arrangement); and **humanware** (education and training), should be carried out in the three phases over the next two decades, with both sectoral and inter-sectoral project linkages.

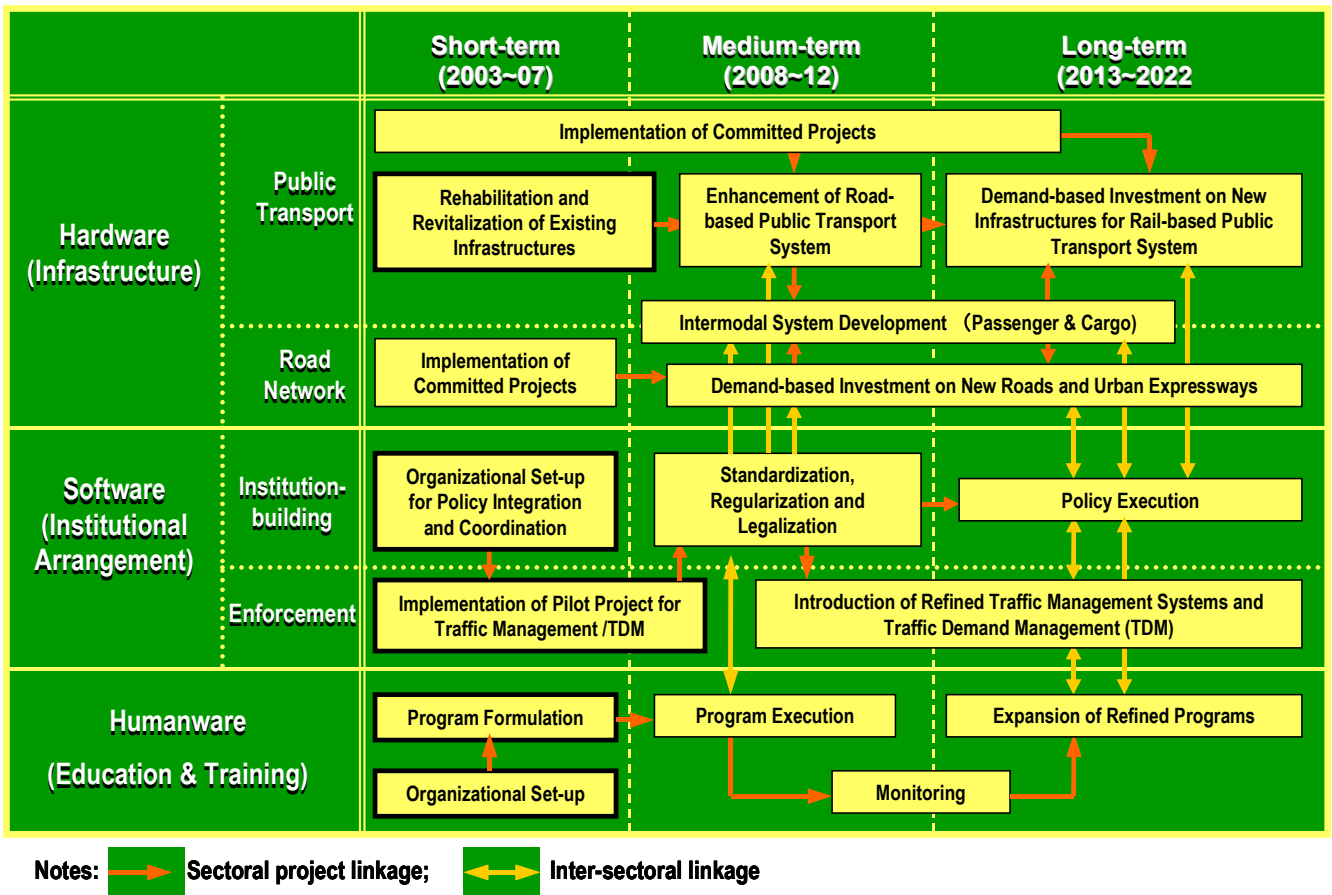


Fig. 11.1 Proposed Phasing Concept for Integrated Transport Development System

This framework presents an indicative phasing policy. Needless to say, it must be the most rational way to start with what can be done with less capital investment and less difficulties for initiation, because a front-heavy investment scheme will never be

economically feasible and institutionally acceptable. In this sense, revitalization and/or rehabilitation of existing assets of infrastructures to respond to apparent demands should be initiated in the short-term for the infrastructure development, while institutional/organizational setting and preparatory activities should be facilitated in the earliest stage for the software and Humanware-related programs. Thus, priority is given to those that satisfy the following conditions:

For initiation of the proposed CREATS strategies:

- 1) Needs/ demands to strengthen an integrated public transport system featuring MRT, LRT, suburban rail and bus services;
- 2) Essential initiatives to catalyze the improvement of efficient, safe and environment-friendly transport;
- 3) Institutional programs required as a prerequisite the implementation of the CREATS Master Plan.

For economically rational investments:

- 4) Rehabilitation and revitalization of existing infrastructures; and
- 5) Low-cost solutions with ease of implementation.

The committed projects, which are treated as given factors in the CREATS Master Plan, are expected to materialize as scheduled.

PROPOSED PROJECTS AND PROGRAMS

CREATS proposes a total of 56 projects and programs as tabulated in Table 10.1 to realize the five (5) key strategies embedded in the CREATS Master Plan for achieving an integrated transport system over the twenty (20) year time horizon. These include not only infrastructure development projects, *hardware*, but also “*software*” and “*humanware*” components such as institutional, organizational and human-based programs.

The CREATS proposed projects/programs, corresponding to the five key strategies, are listed in Table 11.1 which shows the conceptual magnitude of investments or initiatives necessary for the implementation to be allocated in three phases: the short-term (2003-2007), the medium-term (2008-201) and the long-term (2013-2022), based on the above phasing concept.

Table 11.1 CREATS Proposed Projects/Programs by Strategy

Strategy 1: Improvement of People’s Mobility

Proposed Measure and Project/Program	Short	Mid.	Long
Integrated Public Transport			
• Committed Projects			
• Hierarchy of Modes			
• Improvement of Strategic Intermodal Points/Facilities			
• Development of “Park and Ride System”			
• Complementary Routes Structure for PT			
• Introduction of an Integrated Ticketing System			
Traffic Demand Management			
• Introduction of measures and Policies			
• Truck Traffic Control (Generalized Truck Ban)			

Strategy 2: Optimal Infrastructure Development

Rail-based Public Transport			
• Committed Projects			
• New Metro Line 4 (Pyramid Line) Development			
• Heliopolis Metro and Tram Upgrading			
• Super Tram Introduction			
• ENR Suburban Line Improvement			
• East-West Wing Lines to New Communities			
• Intermodal Facilities Development			
Road-based Public Transport			
• Improvement of Public Bus Facilities			
• Public Bus Fleet Improvement			
• Priority Bus Facility Development			
Roads and Highways			
• Committed Projects			
• Primary/ Secondary Roads Development			
• Grade Separation Works			
• Expressway Network			
Cargo Transport			
• Truck Terminal Development (3 Locations)			
• Expansion of Existing Rail and River Terminals			
• Sector Restructuring			

Strategy 3: Accessible Transport for All

All Citizens			
• Public Transport Route Structure			
• Safe and Comfortable Amenities			
The Poor			
• Social Welfare Policy for Transport			
• Targeted Subsidy			
• Area-Specific par Transit Operation			
Gender-Based			
• Provision of Clean and Safe Bus Service			
• Establishment of a “Gender Auditing System”			
Handicapped			
• Improvement of Barrier-Free Facilities at Stations			

Strategy 4: Safe and Environment-friendly Transport

Proposed Measure and Project/Program	Short	Mid.	Long
Traffic Management			
• Improvement of Intersections/ Signal System			
• Policy Zoning System for Parking Management			
• Development of Parking Lots			
• Improvement of Bus Safety Facilities			
• Public Transport Information Dissemination			
• Introduction of Traffic Information System			
Human Resource Management			
• Establishment of Egyptian Traffic Safety Council			
• Traffic Safety Education & Information Program			
• Coordinated Enforcement for Drivers’ Licenses			
Environmental Measures			
• Enhanced Environmental Monitoring System			
• Increased Use of CNG and Unleaded Gasoline			
• Enforced Transport Regulations & Operations			
• Enhanced Vehicle Inspection System			
• Introduction of Alternative Fuels/ Hybrid Cars			
• Environmental Awareness Campaigns			

Strategy 5: Institutional and Financial Mechanism

Institutional Arrangement			
• Establishment of CMTB			
Sustainable Financial Mechanism			
• Rationalization of Subsidy Policy and Revision of Public Transport Fare Structure			
• Introduction of “User Pay System”			
• Stepwise Privatization of Bus Public Transport			
• Introduction of “Earmarked Taxation”			
Justifiable Investment Human Resource			
• Legalization of Public Private Partnership Scheme for Transport Investment			
• Facilitation of Public Awareness of “Safety and Environment”			
Improvement/ Restructuring of Operators			
• Capacity Building of Operators for “Good Practice”			
• Restructuring of CTA			
• “Area Franchising System” for Shared Taxi			
• Establishment of “Suburban Rail Service Corporation” and “Expressway Development Corporation”			

Notes:

- 1) Measures in "blue letters" represent "institutional, organizational and/or human-based program"; while those in black, physical and/or infrastructure projects.
- 2) The color gradation in phasing blocks stands for a relative magnitude of investment/ activity of the corresponding project/ program, that is, the darker, the more.

12

PRIORITIZATION OF PROJECTS AND PROGRAMS

METHODOLOGY AND PROCESS

The prioritization of recommended projects/programs was accomplished in two phases. During the initial step, projects and programs are ranked using a goal achievement matrix (GAM). Subsequently, projects and programs are integrated into a relational matrix. The findings of the former evaluation reflect the theoretical priority level of each of the recommended projects on the basis of a set of evaluation criteria. The latter analysis determines the interdependency of the projects. Based upon their priority level and typology, this final stage identifies the implementation logic that will maximize the expected benefits of each individual project or program.

The CREATS projects/programs address varying needs in the areas of hardware, software and humanware, a definitional structure which is important in assessing on a more qualitative level the context and complexity of realizing the projects and programs. The fundamental objective of CREATS, to move people rather than vehicles, was translated into five generic strategies, as documented in the previous Chapter 11:

Strategy 1: Improvement of people's mobility;

Strategy 2: Optimal infrastructure development and management;

Strategy 3: Accessible transport;

Strategy 4: Safe and environment-friendly transport; and,

Strategy 5: Institutional and financial mechanisms.

Each of the recommended projects and programs contributes to the achievement of one of these five strategies according to its nature and structure. This interrelationship is the basis upon which prioritization procedures rest.

THE GOAL ACHIEVEMENT MATRIX (GAM)

The goal achievement matrix (GAM) is widely used as a suitable process for evaluating the benefits and costs of large-scale investments. The GAM process relies upon the identification of a set of objectives (goals) that the recommended projects should achieve. The broad objectives (five strategies) are further refined using quantifiable criteria against which the objectives can be assessed. The process allows for the weighting of both the objectives and criteria to ensure that those considered most "important" are given a suitable and equitable evaluation. The process allows assessing the level to which any particular project is able to achieve the goal(s).

GAM is also a useful tool for the consideration of projects whose benefits and costs are not able to be totally quantified in monetary terms and are therefore unable to be included in a conventional benefit-cost analysis. The assessment of some criteria is necessarily subjective but introduction in GAM allows for a comparison against nominated key criteria. As far as possible, the scores allocated to each of the projects are based on quantitative data. Qualitative assessments are made and the attributing scores reflect the relative merits of the projects, considering the scope and scale of the work and the expected results.

The individual projects and programs were measured against 20 different criteria, as listed in Table 12.1.

Table 12.1 Goal Achievement Matrix Criteria

Criteria Code	Criteria
Operational Indicators	
1	Person Demand
2	Supply Utilization
3	Cargo Transport Facilitation
Performance Indicators	
4	Improved Governance
5	Enhanced Market Mechanisms
6	Public Private Partnership Potential
7	Knowledge Based Management
Implementation Indicators	
8	Right-of-Way
9	Financing Potential
10	Project Approval Procedures
11	Legal Framework
12	Stakeholder Involvement
13	Development Cost
14	Cost Recovery Potential
Socio-economic Indicators	
15	Regional Economic Development
16	Transport Access
17	Social Integration
Environment and Safety Indicators	
18	Quality of Life
19	Aesthetics
20	Transport Safety

Source: JICA Study Team

Each of these criteria reflects to issues which are important to assess the overall quality and need of the recommended projects and programs. The criteria are attributed a weight indicating its level of importance. A low weight means that an indicator is of lower importance than an indicator with a high(er) weight. Several sensitivity tests were conducted with different weight variations to assess their individual impacts on the priority of the list of projects and programs.

THE RELATIONAL MATRIX

Once the recommended projects are quantified and ranked according to their theoretical priority, a second analysis is necessary to assess the practical implementation potential. The relational matrix correlates the urgency of implementation to the implementation logic and adjusts priorities accordingly. Two examples follow:

The first example relates to the comparative evaluation of the commercialization of CTA and the expansion as well as modernization of the existing public bus fleet. It is possible that the GAM evaluation could indicate that the rehabilitation of the existing fleet has a higher theoretical priority than the commercialization of CTA. But from a relational perspective, the effects of rehabilitating the fleet will only be maximized if fleet operations are improved (new integrated bus services; improved information to the public; better accounting methods; new ticketing and adjusted fare level; rationalized route structure; etc.). The improvement of fleet operations can only be achieved through the commercialization of CTA via which a new approach to operating bus services is introduced that will make the service more attractive and functional to the public.

The second example compares building new intermodal public terminals with the development of the supertram. Upgrading, for example, Stadium Station according to the

recommendations is useless until the supertram is operational. For an efficient supertram on that service line, the best option will probably be above or below grade which means that to optimize the investment costs, the construction of the supertram should be coordinated with the construction of Metro Line 3. So from a relational perspective, the implementation logic is that the new metro line, the supertram line and the Stadium Station intermodal terminal should be realized simultaneously.

PRIORITY OF RECOMMENDED PROJECTS AND PROGRAMS

Previous chapters of this report have presented projects and programs, as well as five milestone CREATS strategies. These are, for clarification purposes, compiled in Table 12.2.

Table 12.2 Compilation of CREATS Strategies, Projects and Programs

Strategy, Project and Program	Code	Strategy, Project and Program	Code
Strategy 1: Improvement of Peoples Mobility		Supertram Line 3	PTST-3
Integrated Public Transport System	IPT	Tram / Heliopolis Metro Rehabilitation	PTT-1/2
Traffic Demand Management	TDM	ENR Rails	
Strategy 2: Optimal Infrastructure Development and Management		Rail Wing East (Phase 1)	PTXR-1
<u>Road Transport</u>		Rail Wing East (Phase 2)	PTXR-2
Ring Road (on Maryooteya Road)	HR-9	Rail Wing West (Phase 2)	PTXR-3
Ismailya Desert Rd.	HR-10	Suburban Rail Rehabilitation	PTSR-1-4
Suez Desert Rd.	HR-11	Bus Transport	
Saft El Laban Axis	HP-2	Public Bus Fleet Expansion/ Modernization	PTB-1
Rod El Farag Axis	HP-3	6th of October Trunk Busway	PTB-2
15th May St. Extension	HP-4	Bus Priority Treatments	PTB-3-5
Ahmed Oraby St.	HP-5	Public Transport Intermodal Terminals	I-1
Moasaset El Zakah St.	HP-6	Cargo Transport	
Ain Sukhna-Nasr City Rd. Extension	HP-7	Road Cargo Terminals	CT-1
Matareya Secondary Arterial Improvement Package	HS-1 through 3	River and Rail Container Terminals	CT-2
Giza Secondary Arterial Improvement Package	HS-4 through 7	Strategy 3: Accessible Transport	
Shobra El Kheima GS Plan Package	HG-15 through 17	Accessible Public Transport For All	AC-1
North Cairo GS Plan Package	HG-18 through 20	Targeted Support for the Poor	AC-2
Heliopolis/Nasr City GS Plan Package	HG-21 through 25	Gender-based Sensitivities	AC-3
Central Cairo GS Plan Package	HG-26 and 27	Handicapped Accessibility	AC-4
Giza GS Plan Package	HG-28 and 29	Strategy 4: Safe and Environment-friendly Transport	
Expway No. 3 (Autostrad-Salah Salem Route)	HE-3	Traffic Management and Control	SAF-1
Expway No. 4 (Abu Bakr El Sadeeq Route)	HE-4	Traffic Safety Strategies	SAF-2
Expway No. 5 (Alex. Agriculture Rd. Route)	HE-5	Environmental Measures	SAF-3
Expway No. 6 (Suez Rd. Route)	HE-6	Strategy 5: Institutional and Financial Mechanisms	
Expway No. 7 (Gesr El Suez Route)	HE-7	Institutional Strengthening	IN-1
Expway No. 8 (Tereat El Zumur South Route)	HE-8	Sustainable Financial Mechanisms	IN-2
Expway No. 9 (Tereat El Zumur North Route)	HE-9	Investment Decision Procedures	IN-3
<u>Public Rail Transport</u>		Human Resources Development Improvement / restructuring of Operators	IN-4
MRT Line 1 Improvements	PTM-1	Cargo Transport Sector Restructuring	IN-5
MRT Line 2 Extensions	PTM-2/3		IN-6
MRT Line 3	PTM-4		
MRT Line 4	PTM-5		
Supertram Line 1	PTST-1		
Supertram Line 2	PTST-2		

Source: JICA Study Team

FINDINGS

The testing of projects and programs resulted in a prioritized listing which subsequently serves as a guideline for the formulation of a staged implementation program, and selection of high-priority projects for possible follow-on, more detailed, feasibility investigations. The results are considered satisfactory and rankings reflect a CREATS project logic. The main objective of CREATS is to **move people** and offer **affordable transport for all** in an efficient way. MRT projects, which have a high capacity for moving people, score high as do the supertram projects which move less people but are still high contributors to efficient public transport. Finally, social mobility and linking the satellite cities ranked high, indicating that projects which efficiently and cost effectively link the satellite cities highly contribute to the transport needs of Greater Cairo. But offering affordable transport in an efficient manner requires expertise and structured organizations. “Soft projects” that improve management systems and decision procedures or increase knowledge and expertise can also be found in the top 20 list of projects and programs (Table 12.3).

It is noted that the ranking demonstrates that measures are necessary not only to facilitate public transport system, but also to control the movement of cargo through the “Cargo Transport Sector Restructuring” Program (15th place) and “River and Rail Container Terminals” (17th place).

Table 12.3 Prioritized Top Twenty Listing of CREATS Projects and Programs

Project and Program	Rank	Points	Phase
• MRT Line 1 Improvements	1	18	S
• MRT Line 4	2	20	L
• MRT Line 3	3	21	S
• Improvement/restructuring of Operators	4	39	S
• Public Bus Fleet Modernization	5	48	S/M
• MRT Line 2 Extensions	6	51	S
• Institutional Strengthening	7	52	S
• Supertram Line 1	8	57	S
• Supertram Line 3	9	74	M/L
• 6th of October Trunk Busway	10	75	S
• Accessible Public Transport For All	11	78	S
• Central Cairo GS Plan Package	12	82	S
• Rail Wing East (Phase 1)	13	86	S/M
• Cargo Transport Sector Restructuring	14	90	M
• Tram / Heliopolis Metro Rehabilitation	15	93	S/M
• Rail Wing East (Phase 2)	15	93	L
• Human Resources Development	16	97	S
• River and Rail Container Terminals	17	98	M
• Investment Decision Procedures	17	98	S
• Shobra El Kheima GS Plan Package	18	100	S

Notes: “**Ranking**” contains top twenty projects/programs only based on accumulated “**Points**” achieved via testing and sensitivity analyses. “**Phase**” refers to initiation of project during short (to 2007), medium (to 2012) or long (after 2012) terms. Refer Volume III for more precise sector scheduling.

Source: JICA Study Team

Another priority lists are depicted in Tables 12.4 and 12.5 which demonstrate the top 20 infrastructure projects and the top 10 institutional and organizational programs respectively. Looking into the infrastructure projects, MRT-related projects such as the improvement of MRT Line 1, the extension of Line 2 and the new construction of Line 3, are ranked at the highest places. These have been all committed, therefore, should be executed as scheduled. Metro Line 4, proposed by CREATS, is also at the highest

rank, however, it is recommended that this project is commenced soon after the committed MRT projects are accomplished or get started along the right lines.

Table 12.4 Top 20 CREATS Infrastructure Projects

Project and Program	Rank	Points	Begin
MRT Line 1 Improvements	1	18	S
MRT Line 4	2	20	L
MRT Line 3	3	21	S
Public Bus Fleet Modernization	4	48	S/M
MRT Line 2 Extensions	5	51	S
Supertram Line 1	6	57	S
Supertram Line 3	7	74	M/L
6th of October Trunk Busway	8	75	S
Central Cairo GS Plan Package	9	82	S
Rail Wing East (Phase 1)	10	86	S/M
Tram / Heliopolis Metro Rehabilitation	11	93	S/M
Rail Wing East (Phase 2)	12	93	L
River and Rail Container Terminals	13	98	M
Shobra El Kheima GS Plan Package	14	100	S
Supertram Line 2	15	113	M/L
Rail Wing West (Phase 2)	16	114	L
North Cairo GS Plan Package	17	122	M/L
Giza GS Plan Package	18	133	S/M
Heliopolis/Nasr City GS Plan Package	19	148	M/L
Ring Road (on Maryooteya Road)	20	151	S

Note: ranking contains top twenty projects based on accumulated points achieved via testing and sensitivity analyses. "Begin" refers to initiation of project during short (to year 2007), medium (years 2008 to 2012) or long (after year 2012) terms. Refer Volume III for more precise sectorial scheduling.

Source: JICA Study Team

Table 12.5 Top 10 Institutional and Organizational Programs

Project and Program	Rank	Points	Begin
Improvement/restructuring of Operators	1	39	S
Public Bus Fleet Modernization	2	48	S/M
Institutional Strengthening	3	52	S
Accessible Public Transport For All	4	78	S
Cargo Transport Sector Restructuring	5	90	M
Human Resources Development	6	97	S
Investment Decision Procedures	7	98	S
Targeted Support for the Poor	8	113	S
Traffic Demand Management	9	128	M/L
Traffic Management and Control	10	131	S/M

Note: ranking contains top ten programs based on accumulated points achieved via testing and sensitivity analyses. "Begin" refers to initiation of project during short (to year 2007), medium (years 2008 to 2012) or long (after year 2012) terms. Refer Volume III for more precise sectorial scheduling.

Source: JICA Study Team

Other than the MRT projects, three projects are evaluated to be of the highest priority, namely,

- Supertram projects;
- Public bus fleet expansion and modernization project (to proceed hand in hand with commercialization of the CTA); and
- The 6th of October trunk busway project.

These are vital to structure an integrated mass-transit system, therefore, should be initiated at the early phase.

Regarding the institutional and human-based programs, all the programs ranked at the top 10 are equally crucial. Among them, the highest priority is given to the programs for:

- Improvement and restructuring public transport operators;
- Institutional component for "public fleet expansion and modernization", and
- Institutional strengthening for integrated policy.

Although all the programs listed in the top 10 are related to each other, these may be pursued individually. However, in order to make them successful, definite political decision-making for a comprehensive sector reform is needed. This should start with establishment of an organizational structure for integrated policy formulation as soon as practical.

IMPLEMENTATION LOGIC

From an implementation logic perspective, the individual projects in modal groupings are seen as follows:

MRT: Although **Metro Line 4** (the CREATS proposal) is highly important from a traffic effectiveness perspective, the priority of the project is lower in terms of implementation.

This of course does not mean that no consideration should be given to the project. On the contrary, many issues need to be solved and require substantial study. This preparation process (alignment, engineering design, etc.) should be initiated in parallel with the implementation of the three **other committed metro projects**, which can start as soon as the financing is available. This is not the case for Line 4, which is a project that still needs substantial studies and budgeting prior to any decision regarding implementation.

Supertram: Supertram Line 1 is the best ranked project because it offers a high potential to improve public transport, it is located along one of the most dense traffic demand corridors and it links with, via Ramses Station, a multitude of other modes. Undoubtedly, the benefits in terms of improved public transport are high and implementation is not too difficult given that the right of way is available and most stakeholders and decision makers consider developing such system as a desirable project. Closely related thereto is the upgrading of the existing Heliopolis Metro network, including replacing the rolling stock and adjusting time tables. This project complements the Supertram 1 network. **Supertram Line 3** can be developed subsequent to Supertram Line 1, but needs right-of-way acquisition, as does **Supertram Line 2**. The urgency of both lines is thus lower given the demand and implementation problems.

The Wings: The objective of the Wings is to link 6th of October and 10th of Ramadan Cities with Cairo. In total four projects have been evaluated. **The 6th of October trunk busway** has the highest priority because all conditions for implementation are in place (right of way, technology, etc) and the overall costs are low vis-à-vis rail-based solutions. Furthermore, the 6th of October trunk busway is matching specific traffic demand. Traffic demand is the reason why Rail Wing West Phase 2 (upgrading trunk busway to rail) scores relatively low given that demand forecasts do not warrant such investment in the near future. Rail Wing East (Phase 1) scores reasonably high because the plan foresees an upgrading and extension of existing rail infrastructure. From an implementation logic, this project is strong on all fronts. The second phase of both projects (Rail Wings East and West) is of less urgency because the upgrade of the link to electrified rail, double track will depend upon observed future demand.

Software and Humanware: Given that buses and shared taxis have an important role in feeding the main supertram and metro lines, their managerial efficiency and operational effectiveness becomes an important success factor. Therefore, the improvement and restructuring of public transport operators becomes a highly critical project.

At the same time, the final objective is to develop over time an integrated public transport system. This means that the coordination and operations of many presently fragmented operators needs to be streamlined and structured in an integrated manner. Via an institutional strengthening program, the creation of an integrated organization of public transport operators could be established over time, therewith validating the infrastructure efforts. At the same time, investment decision procedures can be adjusted and based upon methodologies that evaluate investments from that integrated perspective.

Initiatives should also be taken to divert as much as possible cargo traffic from roads to rail and river transport. As noted in Chapter 6, the infrastructure is/will be available, but the sector and the operators are lacking in expertise and equipment. A comprehensive sector restructuring study will establish the framework conditions for increased competitiveness and efficiency of transport operations and indicate the needs in terms of infrastructure, equipment and operational conditions. Only after this study, investments in the proposed road terminals and the upgrading of the river and rail terminals will be successful and maximize the return on the necessary investments.

The above proposed measures all come down to an important final element, namely the development of expertise and awareness. A comprehensive human resources development plan is the final urgent measure. This program relates to structures, methods and organizations that are responsible for training and education in all fields of transport and for the creating of awareness among the professionals and the public at large on traffic safety and traffic behavior.

13 FOR THE IMPLEMENTATION

ECONOMIC EVALUATION OF THE CREATS MASTER PLAN

The proposed CREATS Master Plan requires a total of **LE 59.8 billion** (at 2002 prices) over the next twenty years up to the year 2022, out of which **LE 18.2 billion** are allocated for the committed projects, which have been budgeted in the Five Year Plan (2002-2007) or are about to be constructed in a few years, and **LE 41.6 billion** are necessary for newly proposed infrastructure development in addition to the committed projects. It is noted that Metro Line 3 is included in the committed project package. The economic justification of the investment of LE 41.6 billion was examined in terms of the economic benefit against the cost through a conventional cost-benefit analysis.

ECONOMIC FEASIBILITY

The results of the economic feasibility analysis are summarized in Table 13.1. As seen in the table, the investment of LE 41.6 billion (which is converted to the economic cost of LE 34.4 billion) will produce annual economic benefits equivalent to LE 7.52 billion, thus, the **B/C ratio** (at 12% discount rate) is computed to be **1.77**. Another evaluation indicator, the **EIRR** (Economic Internal Rate of Return), is computed at **20.1%**.

These indicators are considerably favorable, and it can be concluded that the proposed Master Plan is economically feasible, therefore, is worth being implemented from the economic point of view.

Table 13.1 Economic Evaluation of the Proposed CREATS Master Plan

Cost for Committed Projects		18.2 billion LE
Newly Required Capital	Total in Financial Prices	41.6 billion LE
Costs (CREATS proposed Projects)	Total in Economic Prices	34.4 billion LE
	(2003 to 2006)	(4.6)
	(2007 to 2011)	(6.3)
	(2012 to 2016)	(8.1)
	(2017 to 2022)	(15.3)
Benefits (in 2022)	Total (Economic Prices)	7.52 billion LE
	Saving in Operating Cost	- 1.22 billion LE
	Saving in Time Cost	8.74 billion LE
Evaluation Indicators	B/C Ratio (at 12% discounted rate)	1.77
	EIRR	20.1%

Source: JICA Study Team

FINANCIAL RESOURCE MOBILIZATION

The huge amount of capital funds, approximately LE 60 billion including the committed projects, are necessary to be provided for development of the urban transport sector for GCR. This amount is equivalent to **1.7%** of the accumulated GRDP (Gross Regional Domestic Product) in GCR during the period between 2003 and 2022. This percentage ratio is assessed rational and affordable in view of the macro economy, in comparison with the magnitude of economic activities.

However, the government should strive to deliberately procure and allocate the funds for the transport infrastructure projects. In order to make it sure and stable, as discussed in Chapter 8, some innovative approaches are needed to strengthen the financial base and expand the financial framework. The recommended urgent measures are:

- 1) Introduction of "User Pay Systems" such as a toll system for development of the proposed expressway network and a parking charge system;
- 2) Restructuring of the current public transport fare system so as to be flexibly;
- 3) Preparation of proper guidelines and regulations for the Public-Private Partnership scheme for development of public transport facility and service operation; and
- 4) Pursuance of external resources from international aid community to support the implementation.

URGENT INITIATIVES NECESSARY FOR MATERIALIZING THE CREATS MASTER PLAN

URGENT ACTIONS

The CREATS Master Plan should be translated into actions, otherwise the Cairo transport status would be getting worse day by day. Out of the proposed projects/programs, the following are recommended to be urgently taken into action with collective efforts by relevant authorities.

- 1) All committed projects need be uneventfully implemented in the short-term. In particular, the construction of **Metro Line 3** should be urgently initiated to structure one of the significant stems of the public transport corridors. The CREATS model shows that the highest sectional volume of demand will be 472,000 passengers/day/direction in 2022 under the CREATS public transport network, which implies that this project will be undoubtedly feasible and justifiable.
- 2) The CREATS Master Plan shall be verified and shared among the stakeholders, and expected to be authorized as the policy guidelines for the medium-term transport sector investment program in GCR.
- 3) For the above reason and the inter-ministerial coordination, the proposed Cairo Metropolitan Transport Bureau (CMTB) needs to be urgently established to initiate and formulate a legislation framework as proposed by Strategy 5: Sustainable Institutional and Financial Mechanism (Chapter 9).
- 4) Feasibility studies for some selected priority projects/programs identified in the CREATS Master Plan should be conducted to initiate the implementation.

MONITORING OF THE CREATS MASTER PLAN

The CREATS Master Plan is a long-term blueprint, therefore, should be periodically (every five years) monitored so as to meet with the reality along with socioeconomic changes. To this end, the CREATS database needs to be periodically updated to support rational decision-making for transport investments. **ENIT** shall be responsible for such technical and professional tasks.

14

THE WAY FORWARD

CREATS is a comprehensive effort which integrates approaches designed to mitigate urban transport problems and contribute to the sustainable development of the Greater Cairo Region. The transport strategy embedded in the Master Plan is concurrently intended to support an efficient economic structure of the region, strengthen linkages with other parts of Egypt and provide a base for market-oriented transport activity. Economic expansion within Egypt is well underway; continuing improvements in productivity and well-being are expected. As economic growth continues, changes in transport activities and behavior will follow suit. Thus, the foci of transport planning must gradually shift from alleviation of present deficiencies to realization of a transport system founded upon sustainable evolution and integrated, mutually supportive transport solutions. This strategy is particularly valid, given the 20-year planning horizon.

The components of the Master Plan diversify beyond the traditional “hardware” concepts associated with infrastructure provision. Additional key elements are “software” aspects, that is, available technology, international standards, and multi-modal integration requirements; “humanware” needs, or the cultivation of human resources via the designation of training and education programs as well as other requirements for developing expertise; and, “sustainability”, that is, the notion that the planning process must allow Egyptian stakeholders to participate in visualizing and shaping their own future. This is of substantial importance in terms of ownership building if the Master Plan is to be adopted and used by the people and their elected officials.

The proposed Cairo Metropolitan Transport Bureau is seen as being particularly relevant in this regard. It is a central mechanism for integrating transport policy, systems, organizations and operation into a unified force that transcends the current fragmented approach to problem solving. The immediate focus for the Bureau should be threefold, that is, initiate a review of policies and regulations related to transport; define appropriate legal mechanisms which support and foster an integrated approach to the provision of urban transport; and, initiate implementation of the central tenets of the Master Plan.

The path to success will not be easy; many difficult decisions lie ahead. It is unavoidable that transport policy formulation involves an element of trade-off between conflicts of interest. It is therefore, as are other elements of Egyptian society, influenced by political processes. However, with dedicated support of the people, and once unified policy and financial responsibilities are properly set in place, it is possible to create institutional and financial arrangements which better reflect the complex interactions within the urban transport sector. That is how the fundamental issues of urban transport can be resolved.