Higher Committee for
Greater Cairo Transportation Planning
Government of the Arab Republic of Egypt

Japan International Cooperation Agency
(JICA)

Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt

PHASE I FINAL REPORT

Volume III: Transport Master Plan

November 2002

Pacific Consultants International (PCI)

The following foreign exchange rates are applied in this study.
USD $1.00 = 4.58 Egyptian Pound (LE)

（As of August 2002）

PREFACE

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct the Study for the Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Dr. Katsuhide Nagayama of Pacific Consultants International to the Arab Republic of Egypt between March 2001 and September 2002. In addition, JICA set up an Advisory Committee headed by Professor Noboru Harata of Tokyo University between March 2001 and October 2002, which examined the Study from Specialist and technical point of view.

The Study Team held discussions with the officials concerned of the Government of the Arab Republic of Egypt and conducted field surveys at the study area. Upon returning to Japan, the Study Team conducted further studies and prepared this report.

I hope that this report will contribute to development in the Arab Republic of Egypt, and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Arab Republic of Egypt for their close cooperation extended to the Study Team.

November 2002

Takao Kawakami
President
Japan International Cooperation Agency

November 2002

Mr. Takao Kawakami
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the Final Report of "Transportation Master Plan and Feasibility Study of Urban Transport Project in Greater Cairo Region in the Arab Republic of Egypt."

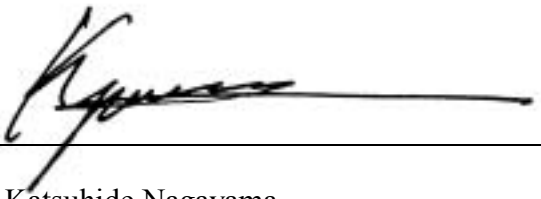
This report compiles the results of the Study which was undertaken in the Arab Republic of Egypt from March 2001 through September 2002 by the Study Team organized by Pacific Consultants International under the contract with the JICA.

This report compiles Transport Master Plan based upon identification of present condition in order to contribute to the sustainable development in Greater Cairo Region.

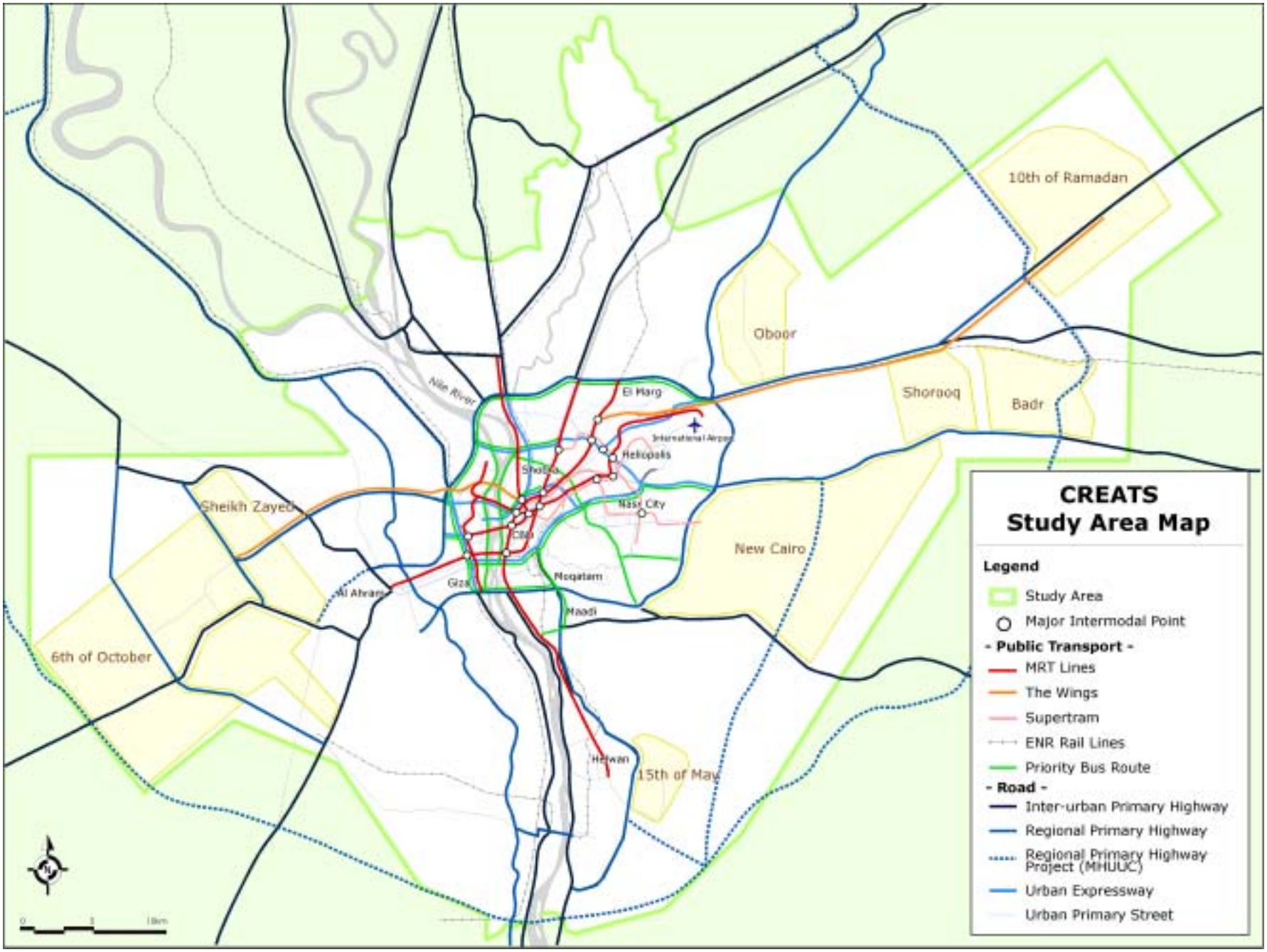
We would like to express our sincere gratitude and appreciation to all the officials of your agency and the JICA advisory Committee. We also would like to send our great appreciation to all those extended their kind assistance and cooperation to the Study Team, in particular, Ministry of Transport and Egyptian National Institute of Egypt as the counterpart agency. We beg to acknowledge our sincere gratitude to Dr. Ibrahim El Dimeery, the ex-Minister of Transport, for his devoted initiation of the Study as well as H.E. Eng. Hamdy Al Shayeb, the Minister of Transport, for his strong support to our activities.

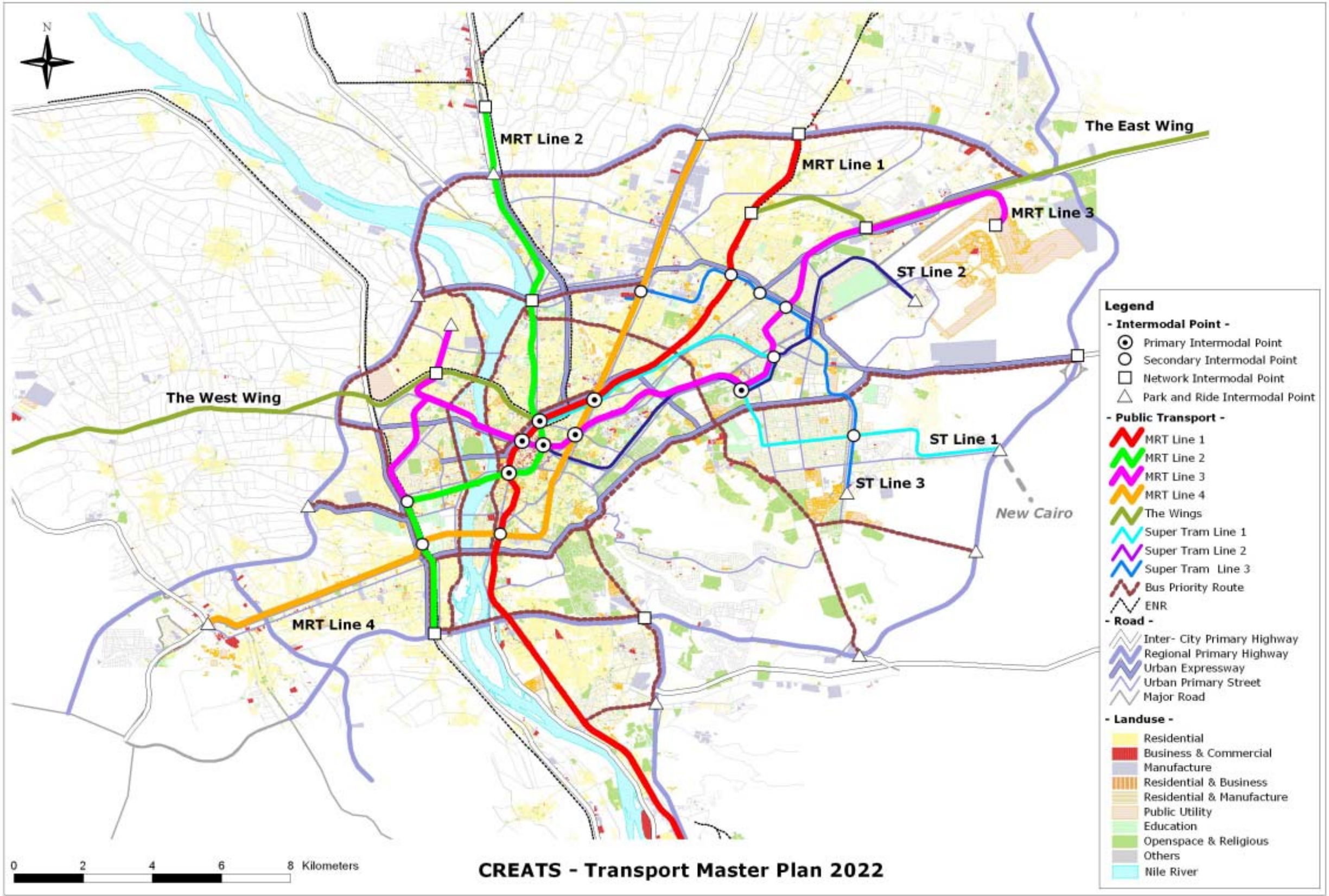
We hope that the report will be able to contribute significantly to development in the Arab Republic of Egypt.

Very truly yours,



Dr. Katsuhide Nagayama
Team Leader,
The Study Team for the Transportation Master Plan and Feasibility Study of Urban Transport Project in Greater Cairo Region in the Arab Republic of Egypt


10th of Ramadan
Oboor
Shorouq
Badr
Nile River
El Marg
International Airport
Heliopolis
Sheraton
Nasr City
Sheikh Zayed
New Cairo
Giza
Mohandessin
Al Ahram
Maadi
6th of October
Helwan
15th of May
CREATS
Study Area Map
Legend
Study Area
Major Intermodal Point
- Public Transport -
MRT Lines
The Wings
Supertram
ENR Rail Lines
Priority Bus Route
- Road -
Inter-urban Primary Highway
Regional Primary Highway
Regional Primary Highway Project (MHUUC)
Urban Expressway
Urban Primary Street


N
MRT Line 2
MRT Line 1
The East Wing
MRT Line 3
ST Line 2
The West Wing
ST Line 1
ST Line 3
New Cairo
MRT Line 4
Legend
- Intermodal Point -
Primary Intermodal Point
Secondary Intermodal Point
Network Intermodal Point
Park and Ride Intermodal Point
- Public Transport -
MRT Line 1
MRT Line 2
MRT Line 3
MRT Line 4
The Wings
Super Tram Line 1
Super Tram Line 2
Super Tram Line 3
Bus Priority Route
ENR
- Road -
Inter- City Primary Highway
Regional Primary Highway
Urban Expressway
Urban Primary Street
Major Road
- Landuse -
Residential
Business & Commercial
Manufacture
Residential & Business
Residential & Manufacture
Public Utility
Education
Openspace & Religious
Others
Nile River
0 2 4 6 8 Kilometers
CREATS - Transport Master Plan 2022

CREATS INTERIM REPORT
Volume III: Transport Master Plan

TABLE OF CONTENTS

CHAPTER 10: HUMAN RESOURCES DEVELOPMENT IN TRAFFIC SAFETY

CHAPTER 11: THE INTEGRATED TRANSPORT MASTER PLAN

CHAPTER 12: INITIAL ENVIRONMENTAL EXAMINATION (IEE)

CHAPTER 13: ECONOMIC AND FINANCIAL ANALYSES AND INVESTMENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A/C	Air Conditioned
ACLM	American Council of Logistics Management
AE	Acid Equivalent
ASG	Assignment Group (Code)
AfDB	African Development Bank
ATMs	Automatic Teller Machines
BC Ratio	Benefit-Cost Ratio
B/C	Benefit / Cost Ratio
BiH	Bosnia and Herzegovina
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
Br.	Bridge
C/C	Counterpart Committee
CAIP	Cairo Air Improvement Project
CAPMAS	Central Agency for Public Mobilization and Statistics
CBD	Central Business District
CCTV	Closed Circuit Television System
CDO	Central Development Organization
CDC	Cairo Demographic Center
CEDARE	Center for Environment and Development for Arab Region and Europe
CEHM	Cairo University Center for Environmental Hazard Mitigation
CFC's	Chloro-Fluoro-Carbons
CIDA	Canadian International Development Agency
CH_4	Methane
CLS	Cordon Line Survey
CMO	Cairo Metro Organization
CMTB	Cairo Metropolitan Transport Bureau
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Di-Oxide
CORPS	Corniche, Ramses and Port Said Streets
CREATS	Cairo Regional Area Transportation Study
CRR	Cairo Ring Road
CTA	Cairo Transport Authority
CTEB	Cairo Traffic Engineering Bureau
CTP	Common Transport Policy
CTS	Cargo Transport Survey
DANIDA	Danish Agency for Development Assistance
DRTPC	Development Research and Technological Planning Center of Cairo University
DfID	Department for International Development (UK)
EAS	Environmental Awareness Survey
EBRD	European Bank for Reconstruction and Development
EC	European Community

EC	Executive Committee
ECMT	European Conference of Ministers of Transport
EEA	European Environment Agency
EEAA	Egyptian Environmental Affairs Agency
EEIF	Egyptian Environmental Initiative Fund
EEIS	Egyptian Environmental Information System
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Study
EIMP	Environmental Information and Monitoring Program
EMT	Environmental Management and Technology Fund
ENIT	Egyptian National Institute of Transport
ENL	Effective Number of Lanes
ENR	Egyptian National Railways
EQI	Environmental Quality International
ESCAP	Economic and Social Commission for Asia and Pacific
ESCPR	Economic and Social Counsel of Paris Region
ESE	Egyptian Stock Exchange
EU	European Union
FLC	Fully Loaded Containers
FDI	Foreign Direct Investments
FIRR	Financial Internal Rage of Return
FRN	French Railway Network
FY	Fiscal Year
GAM	Goal Achievement Matrix
GARBLT	General Authority for Roads, Bridges and Land Transport
GC	Greater Cairo
GCBC	Greater Cairo Bus Company
GCMA	Greater Cairo Metropolitan Area
GCMP	Greater Cairo Master Plan
GCR	Greater Cairo Region
GDP	Gross Domestic Product
GIS	Geographic Information System
GNP	Gross National Product
GOE	Government of Egypt
GOPP	General Organization for Physical Planning
GOV.	Governorate
GRDP	Gross Regional Domestic Product
GSLTD	General Syndicate for Land Transport Drivers
HBE	Home Based Education
HBO	Home Based Other
HBW	Home Based Work
HC	Hydro-Carbons
H.C.	Higher Committee
HCM	Highway Capacity Manual
HDM	Highway Development and Management System

HIS	Home Interview Survey
HM	Heavy Metals
HOV	High Occupancy Vehicle (Lane)
HRT	Heavy Rail Transit
HSR	High Speed Rail
IAURIF	I'Insitut d'Aménagement et d'Urbanisme de la Region d'Ile-de-France
I/C	Interchange
ICM	Intermodal Concept and Management
ICT	International Cargo Transport
ID	Identification
IEE	Initial Environmental Examination
IHCM	Indonesian Highway Capacity Manual
IHS	Internal Homogeneous Planning Sector
IIA	Independence of Irrelevant Alternative
IM	Inter-Modal
IMF	International Monetary Fund
IRF	International Road Federation
IRMS	Integrated Road Management System
ISESCO	Islamic Educational, Scientific and Cultural Organization
ISO	International Organization for Standardization
ITS	Information Transfer Strategy
ITU	Intermodal Transport Unit
JICA	Japan International Cooperation Agency
JIT	Just In Time
KAP	Knowledge, Attitude and Practice
LAN	Local Area Network
LE	Egyptian Pound
LOS	Level of Service
LRT	Light Rail Transit
MAD	Mean Absolute Difference
M/M	Minutes of the Meetings
MCA	Multi-Criteria Analysis
MEA	Metropolitan Expressway Authority
MENA	Middle East and North African Nations
MHUUC	Ministry of Housing, Utilities and Urban Communities
MINUTP	Mini Urban Transport Planning Program
MOE	Ministry of Environment
MOI	Ministry of Interior
MOIC	Ministry of International Cooperation
MOO	Metro Operation Organization
MOP	Ministry of Planning
MOT	Ministry of Transport
MP	Master Plan
MRT	Mass Rapid Transit
MS	Mobile Station for Air Quality Monitoring
MSEA	Ministry of State for Environmental Affairs

MTBE	Methyl Tertiary Butyl Ether
Mμ	Micrometer
N.A.	Not Applicable/Available
NAT	National Authority for Tunnels
NCPDM	National Council of Physical Distribution Management
NEAP	National Environmental Action Plan
NGO	Non Governmental Organization
NH_4	Methane
NHB	Non Home Based
NMHC	Non Methane Hydro-Carbons
NMVOC's	Non-Methane Volatile Organic Compounds
NNL	Nominal Number of Lanes
NO	Nitrogen Monoxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPDCR	National Project for the Development of Cairo Region
NPV	Net Present Value
NRR	Net Reproduction Rate
NU	National Universities
O_3	Ozone
OD	Origin-Destination
OECD	Organization for Economic Co-operation and Development
O&M	Operation & Maintenance
PCI	Pacific Consultants International
PCI	Pavement Condition Index
PCU	Passenger Car Unit
PHR	Peak Hour Ratio (peak hour volume/daily volume)
PM_{10}	Particulate Matter (particles) less than 10 micro meter (μm)
$PM_{2.5}$	Particulate Matter (particles) less than 2.5 micro meter (μm)
PPP	Public-Private Partnership
PPP	Purchasing Power Parity
PRD	Paris Region Division
PR/PI	Public Relations and Public Involvement
PRT	Public Road Transport
PRTC	Parisian Region Transport Company
PT	Public Transport
PTB	Public Transport Bus
PTF	Public Transport Ferry
PTM	Public Transport Metro
PTSR	Public Transport Suburban Rail
PTST	Public Transport Super Tram
PTT	Public Transport Tram
PTXR	Public Transport Express Rail
RCPR	Regional Council of Paris Region
ROI	Return on Investment
RPS	Revealed Preference Survey

S/C	Steering Committee
SCF	Standard Conversion Factor
SE	Socio-economic
SEA	Strategic Environmental Assessment
SLS	Screen Line Survey
SO_2	Sulphur Dioxide
SO_x	Sulphur Oxide
SPS	Stated Preference Survey
TAP	Transport Action Program
TCB/AET	Technical Consultation Bureau & Applied Engineering Technologies
TDM	Transport Demand Management
TEN	Trans-European Networks
TEU	Twenty-feet Equivalent Unit
TNI	Traffic Noise Index
TOR	Terms of Reference
TP	Traffic Police
TPA	Transport Planning Authority
TRASAC	Traffic Safety Council
TRASEC	Traffic Safety Education Center
TRASIC	Traffic Safety Information Center
TRASOs	Traffic Safety Organizations
TSP	Total Suspended Particulate Matter
TSP	Traffic Safety Program
TransCAD	Transportation Computer Assisted Design Program
UAE	United Arab Emirates
UK	United Kingdom of Great Britain and Northern Ireland
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
USAID	United States Agency for International Development
UTPU	Urban Transport Planning Unit
V/C	Volume to Capacity Ratio (Volume divided by Capacity)
VOC	Vehicle Operating Cost
VOC	Volatile Organic Compounds
WB	World Bank (International Bank for Reconstruction and Development)
WHO	World Health Organization
ZTEB	Zone Traffic Engineering Bureau

CREATS PARTICIPANTS

Higher Committee	
H.E. Eng. Hamdy EL SHAYEB	Chairman of Higher Committee Minister of Transport
General / Ahab Mostafa ELWI	CAPMAS
General/ Abd El Fatah KATO	Egypt Air Co., Ministry of Civil Aviation
Eng. Mohammed Talaat KHATTAB	Transport Planning Authority, Ministry of Transport
Eng. Mohammed Arafa AL NEWEAM	National Authority for Railways, Ministry of Transport
Eng. Ahmed Fouad ABDUL RAHMAN	General Authority for Roads, Bridges and Land Transport, Ministry of Transport
Eng. Saad Hassan SHEHATA	National Authority for Tunnels, Ministry of Transport
Counselor/ Essam Abdel Aziz Gad EL HAQ	State Council, Ministry of Justice
Eng. Hussein Mahmoud EL GEBALY	General Organization of Physical Planning, Ministry of Housing
Eng. Nabil EL MAZNY	Cairo Transport Authority, Cairo Governorate
Eng. Magdy EL AZAB	Cairo Metro Organization, Ministry of Transport.
Prof. Dr. Ali S. HEIKAL	Executive Director, ENIT
General/ Fawzy Ahmed HASSAN	Cairo Traffic Police Department, Ministry of Interior
General/ Sherief GOMAA	Giza Traffic Police Department, Ministry of Interior
General/ Khaled ZORDOQ	Qalubia Traffic Police Department, Ministry of Interior
Eng. Ahmed El Araby Abdel Hamid SOBAIH	General Secretary, Qalubia Governorate.
Eng. Fouad Ahmed AWWAD	Roads and Transport Directorate, Cairo Governorate
General/ Medhat DRAZ	Head of Giza City, Giza Governorte
Eng. Mokhtar Mostafa HASSAN	Chairman of Arab Federation Bus Co.
Prof. Dr. Mohammed Abdul Rahman EL HAWARY	Professor of Transportation Planning, Cairo University
Prof. Dr. Ali S. HUZZAYIN	Professor of Transportation Planning and Traffic Engineering, Cairo University
Prof. Dr. Galal Mostafa SAID	Prof. of Transportation & Traffic Engineering, Fayoum Branch- Cairo University
Prof. Dr. Mohamed Rashad EL MITAINY	Prof. of Highway and Airport Engineering, Cairo University

Steering Committee	
Prof. Dr. Ali S. HUZAYYIN	Chairman of the Steering Committee Prof. of Transportation & Traffic Engineering, Cairo University
Prof. Dr. Galal Mostafa SAID	Prof. of Transportation & Traffic Engineering, Fayoum Branch- Cairo University
Prof. Dr. Mohamed Rashad EL MITAINY	Prof. of Highway and Airport Engineering, Cairo University
Prof. Dr. Ali S. HEIKAL	Executive Director, Egyptian National Institute of Transport (ENIT)
Prof. Dr. Moustafa Sabry ALY	Prof. Transportation & Traffic, Ain Shams University

Eng. Nabil Fathi El MAZNY	Chairman of the Board, Cairo Transport Authority (CTA)
Eng. Fouad Ahmed AWWAD	Roads and Transport Directorate, Cairo Governorate
Eng. Hassan Ahmed SELIM	Transport Planning Authority, Ministry of Transport
Eng. Refki Khalil AL KADI	Director of Cairo Traffic Engineering and Planning Bureau, Cairo Govern orate
Eng. Hoda Edward MICHEAL	Director of Greater Cairo Region Urban Planning Center- GOPP, Ministry of Housing
General/ Fawzy Ahmed HASSAN	Cairo Traffic Police Department, Ministry of Interior
General/ Sherif GOMAAH	Giza Traffic Police Department, Ministry of Interior
Ms. Sanaa HEGAZY	State Ministry for Foreign Affairs, Sector of International Cooperation
Eng. Enayat Benyamin KOLTA	Ministry of Planning
Dr. Mawahab ABOU EL-AZM	Egyptian Environmental Affairs Agency

Counterpart Committee	
Prof. Dr. Ali. S. HEIKAL	Chairman of the Counterpart Committee Executive Director, ENIT
Dr Fathi Said EL TONI	Associate Prof., ENIT
Dr. Adel ABDEL MAKSOUD,	Instructor-ENIT
Eng. Fifi Mohamed ABDEL GHANI	Cairo Traffic Eng. Bureau -Cairo Governorate
Eng. Ashraf Mahmoud Mohamed ZAKARIA	Representative from TPA
Eng. Mona Moustafa ABDEL HAMEED	CTA
Eng. Karim Said ABOU EL- KHAIR	NAT
Eng. Sami ABU ZAID	GOPP
Miss. Yosra Hassan EL-GOHARI	ENIT
Eng. Abdul Azeem MABROUK	Cairo Metro Organization
Eng. Magdi MOUSA	ENR
Dr. Ahmed Abul SAOUD	Egyptian Environmental Affairs Agency
Eng. Hossam SAOUDI	Giza Governorate

JICA Study Team	
Dr. Katsuhide NAGAYAMA	Team Leader and Urban Planning
Mr. Yoshikazu UMEKI	Deputy Team Leader and Urban Transport Planning
Mr. Mitsuyoshi ASADA P.E.	Deputy Team Leader and Urban Road Planning
Mr. John THOMPSON P.E.	Deputy Team Leader and Road Public Transport Planning
Mr. Hurbert METGE	Rail Public Transport Planning
Mr. Len JOHNSTONE	Traffic Demand Forecast
Mr. Yoichi ENOKIDO	Traffic Survey

Mr. Kazuto HONDA	Traffic Survey and Analysis
Dr. Ahmed Hamdy GHAREIB	Traffic Data Analysis
Dr. Eddy DECLERCQ	Mode Interchange and Cargo Transport Planning
Mr. Kimio KANEKO	Traffic Management Planning
Mr. Masao OWADA	Construction Planning, Design and Cost Estimate
Dr. Nabil SEHSAH	Organization, Management and Legal Structure
Mr. Frank de ZANGER	Environmental Evaluation
Mr. Masatoshi KANEKO	Economic & Financial Analyses
Mr. Peter WATSON	Socio-economic Framework and Transport Economy
Ms. Mihoko OGASAWARA	Administration and Urban Land Use

JICA Advisory Committee	
Prof. Dr. Noboru HARATA	Chairman of JICA Advisory Committee, University of Tokyo
Mr. Kazuhiro TANAKA	Railway Technical Research Institute
Mr. Tsuyoshi FUJISAKI	Japan Institute of Construction Engineering
Mr. Akira ENDO	Japan Institute of Construction Engineering

JICA Secretariat	
Mr. Takeshi NARUSE	Director, First Development Study Division, Social Development Study Department
Mr. Satoshi UMENAGA	Deputy Director, First Development Study Division, Social Development Study Department
Mr. Kenichi KONYA	First Development Study Division, Social Development Study Department
Mr. Norio SHIMOMURA	Resident Representative, Egypt Office
Mr. Toshiyuki IWAMA	Deputy Resident Representative, Egypt Office
Mr. Tomoyuki UDA	Assistant Resident Representative Egypt Office

Consultants	
Group 1	
The Transportation Programme, Development Research and Technological Planning Center, DRTPC, Cairo University	<u>Surveys</u> • Household Interview Survey (HIS) • Revealed Preference Survey (RPS) • Stated Preference Survey (SPS) • Environmental Awareness Survey (EAS) • Cordon Line Survey • Cargo Transport Survey • Public Transport Passengers Survey • Transport Network Survey
The Transport and Traffic Consultations Unit (TTCU), Ain Shams University	

Group 2	
Technical Consultations Bureau & Applied Engineering Technologies (TCB/AET)	<u>Surveys</u> • Household Interview Survey (HIS) • Revealed Preference Survey (RPS) • Stated Preference Survey (SPS) • Environmental Awareness Survey (EAS) • Cordon Line Survey • Cargo Transport Survey • Public Transport Passengers Survey
	<u>Practical Demonstration</u> • Demonstration of A Traffic Safety Education Program and Campaign
Group 3	
Sound and Vibration Lab, Faculty of Engineering, Ain Shams University	<u>Surveys</u> • Environmental Survey

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The Japan International Cooperation Agency (JICA) and the Higher Committee for Greater Cairo Transport Planning are cooperating in the conduct of the *Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt* (CREATS – Cairo Regional Area Transportation Study), based upon agreements finalized during November, 2000[1]. Pacific Consultants International, headquartered in Tokyo, Japan, is the designated lead consultant for the study. Technical efforts in Egypt were initiated during March, 2001.

1.2 STUDY SCOPE AND OBJECTIVES

A basic premise of all investigations is that the CREATS shall be comprehensive in nature, that is, adopt approaches designed to mitigate urban transport problems and contribute to the sustainable development of the Greater Cairo Region[2]. Three key products form the foundation upon which planning efforts are based:

- Formulation of an integrated, multi-modal transport master plan extending over a twenty year planning horizon to year 2022 (termed the Phase I analysis);

- Identification, within the Phase I master plan framework, of high-priority projects whose implementation is to be achieved in the near-term future, and whose merit is determined via feasibility studies (the follow-on feasibility studies are termed the Phase II analysis)[3]; and,

[1] *Scope of Work - Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt*, as mutually agreed upon between the Japan International Cooperation Agency and the Higher Committee for Greater Cairo Transportation Planning, November, 2000.

[2] Further detail regarding scope of work, Study Team composition and technical framework is contained in *Inception Report - Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt*, prepared for the Japan International Cooperation Agency and the Higher Committee for Greater Cairo Transportation Planning, by Pacific Consultants International, et. al., April, 2001.

[3] It is noted that while CREATS will identify such priority projects, the actual conduct of Phase II feasibility studies is not included within the framework of the current contract, but will be the subject of additional, follow-on efforts sponsored by JICA.

- Implementation of an effective and productive technology transfer program with Egyptian counterparts.

The transport strategy embedded in the Master Plan must concurrently contribute to an efficient economic structure of the region, strengthen linkages with other parts of Egypt as well as neighboring countries, 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 adopted by the current study.

The components of the Master Plan must further diversify beyond the traditional "hardware" concepts associated with infrastructure provision. Additional key elements of the process will consist of:

- "software" aspects, that is, available technology, international standards, and multi-modal integration needs (cargo/passenger terminals, transfer points);

- "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 CREATS is to be adopted and used by the people and their elected officials both during, and following, the conduct of CREATS. A participatory planning process is, therefore, one of the most important elements of CREATS.

Thus, the formulation of enhanced operation and management strategies of transport systems and infrastructure have been addressed during the conduct of the Master Plan.

1.3 THE PARTICIPATORY PLANNING PROCESS

The final structure of CREATS, and the successful reception thereof, can only be achieved as a direct result of cooperative efforts and close liaison between the Study Team and local experts. Considerable efforts have expended in gathering information, reviewing previous studies and holding numerous discussions to enhance knowledge of, and sensitivity to, local transport conditions, norms and practices.

The Study Team, housed in the offices of the Egyptian National Institute of Transport, has been strongly assisted by its designated Counterpart Committee, Steering Committee and Higher Committee. Thus, continuous and productive technical liaison has been maintained with a number of organizations including the

Office of the Prime Minister; Ministry of Transport and various entities thereof (Egyptian National Institute of Transport, National Authority for Tunnels, Egypt National Railways, General Authority for Roads, Bridges and Land Transport, General Authority for Civil Aviation, Cairo Metro Organization, Transport Planning Authority); the Ministry of Housing, Utilities and Urban Communities; Ministry of Planning; State Ministry of Foreign Affairs, Sector of International Cooperation; Ministry of the Environment; CAPMAS (Central Agency for Public Mobilization and Statistics); Ministry of Justice; as well as Cairo, Giza and Qalubia Governorates and various entities thereof (General Secretaries Offices, Cairo Transport Authority, Traffic Police Departments, Road and Transport Directorates, Traffic Engineering Bureaus). Close coordination has also been effected with Universities (University of Cairo, Ain Shams University, Al Azhar University) and various departments within those learned institutions.

Likewise, effective consultations has been carried out with various international agencies, funding institutions, donors, and consultant groups in order to obtain an overview of previous, current, and likely future activities and/or involvement in Egypt.

Wide-spread information dissemination methodologies were, in addition to the issuance of reports, being employed. These include exchanges of information via periodic focused presentation and discussion programs with study committees and members thereof; conduct of two public workshops with a primarily technical orientation with timing roughly in accordance with submission of *Progress Reports (1) and (2)*; conduct of a public seminar with a primarily strategic focus with timing roughly in accordance with submission of a draft version of the *Phase I Final Report*[4]; publication of a periodic CREATS newsletter; submittal of monthly progress reports to the committees associated with the study; and, opening of a CREATS web page (http//www:creats.net). Furthermore, focused pamphlets, press releases and similar task-specific items were prepared in association with conduct of data collection surveys.

1.4 REPORTING APPROACH

The Phase I reporting structure adopted by the Study Team incorporates both core reports (contractual obligations specified in the *Inception Report*), and, on an as-needed basis, a series of a supplementary technical reports (Figure 1.1). Each report is an independent and self-contained document. While a synopsis of the most relevant findings is transferred between reports, the interested reader is urged to consult the specific report in question for desired detailed information. Core reports include:

- *Inception Report*, submitted during April, 2001, contains detail regarding study methodologies, staffing plan and programmed study outputs. This document

[4] A draft version of the *Phase I Final Report* was submitted during September, 2002. Following receipt, and incorporation of, comments from the Egyptian and Japanese sides, the final version of the *Phase I Final Report* was submitted during November, 2002.

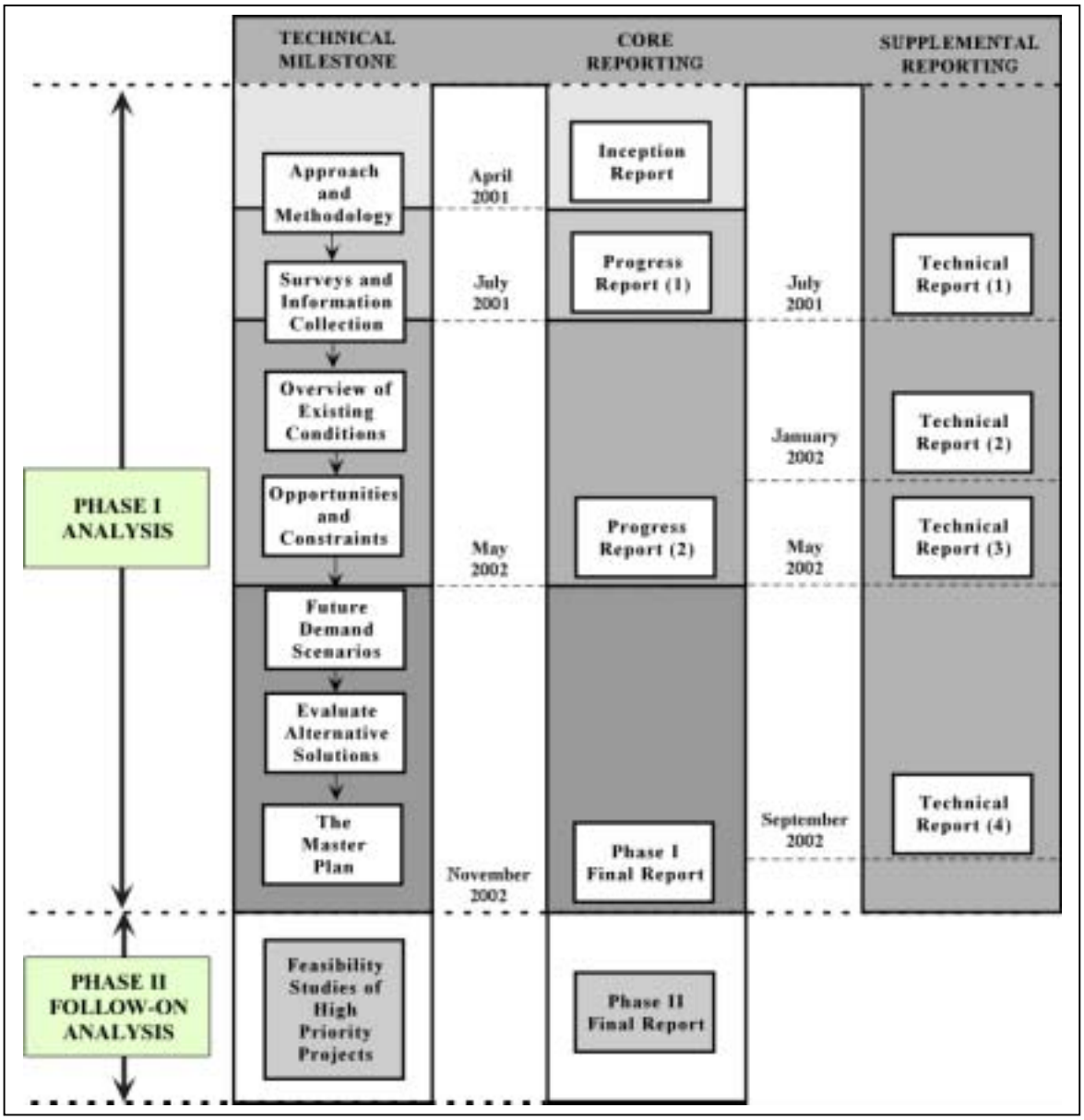


Figure 1.1 CREATS Reporting Schedule and Approach

was finalized in close cooperation with JICA, committees associated with the study and other local experts.

- *Progress Report (1)*[5], submitted during July, 2001, details approaches and methodologies to be employed during the conduct of surveys. These include a home interview survey, cordon line survey; screen line survey; traffic count

[5] *Progress Report (1) - Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt*, prepared for the Japan International Cooperation Agency and the Higher Committee for Greater Cairo Transportation Planning, by Pacific Consultants International, et. al., July, 2001.

survey; interview survey for public transport passengers; travel speed survey; road condition survey; transport networks survey; parking survey; cargo transport survey; and, environmental survey.

- *Progress Report (2)*[6], submitted during May, 2002, quantifies and clarifies study progress to near conclusion of data collection and survey programs. The content of *Progress Report (2)* amplifies, as necessary, technical techniques and methodologies; quantifies findings as to existing conditions, documents results of surveys and highlights early opportunities as well as constraints.

- *Phase I Final Report,* that is, the current report, submitted during November, 2002, documents the Master Plan, details sector plans and describes high-priority projects nominated for follow-on feasibility investigations slated for completion during Phase II.

The Study Team has, on an as-needed basis, published a series of:

- *Technical Reports*, which summarize key technical issues, or milestone events, which are seen as being of particular relevance and which may be of interest to project participants outside of guidelines imposed by the *Inception, Progress* and *Final Reports*[7].

Content of the current *Phase I Final Report,* which presents a wide variety of technical and analytical concepts related to master planning evaluations, are presented in four separate volumes:

- *Volume I: Executive Summary*, contains highlights of recommended strategies, projects and programs;

- *Volume II: Urban Transport Policy and Strategy,* summarizes the essence of the transport master plan and those policies upon which core plan elements of hardware (infrastructure), software (technology and institution) and humanware (human aspect) rest;

- ***Volume III: Transport Master Plan*** **(this report) presents detailed sector-specific technical analyses and procedural approaches used in the derivation of the Master Plan and its essential elements;** and,

[6] *Progress Report (2) - Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt*, *Volume I (Current Urban Transport Status) and Volume II (Results of Transport and Traffic Surveys)*, prepared for the Japan International Cooperation Agency and the Higher Committee for Greater Cairo Transportation Planning, by Pacific Consultants International, et. al., May, 2002

[7] Refer *Technical Report (1)*, July 2001; *Technical Report (2): Framework of the Transport Model*, January, 2002; *Technical Report (3): Urban Public Transport Perspectives*, May, 2002; and, *Technical Report (4): Traffic Safety and Environmental Programs*, September, 2002; all under *Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region in the Arab Republic of Egypt*, prepared for the Japan International Cooperation Agency and the Higher Committee for Greater Cairo Transportation Planning, by Pacific Consultants International, et. al.

- *Volume IV: CREATS Urban Transport Database*, contains the extensive numeric database collected and generated as part of CREATS technical procedures, as well as explanatory documentation regarding its content.

1.5 STRUCTURE OF VOLUME III OF THE FINAL REPORT

The structure of *Volume III* is consistent with essential formats and tenets voiced in the *Inception Report*, as well as guidance received from the studies committees. The report consists of twelve chapters in addition to this *Introduction*:

- *Chapter 2: Urbanization Structure and Socioeconomic Framework* quantifies recent macro-economic and socio-economic trends within Egypt, in general, and the study area in particular. Estimates of key study area indicators, such as population and Gross Regional Product, are presented through year 2022, the adopted CREATS planning horizon.

- *Chapter 3: The Transport Model,* documents the computerized simulation model, and its various sub-elements, utilized during demand forecasting and sufficiency investigation procedures.

- *Chapter 4: Public Transport System* defines an approach for providing, in future, sustainable and user responsive public transport services within Greater Cairo. Particular focus is dedicated to maximizing the relative strengths of various public transport modes and technologies, and combining these into affordable solutions.

- *Chapter 5: Urban Road System* discusses proposals for the road network and a road hierarchy designed to meet long-term demand from both urban and regional perspectives.

- *Chapter 6: Cargo Transport* provides a perspective of freight and truck movements within the CREATS study area, and approaches to defining future strategies for this vital sector.

- *Chapter 7: Intermodality,* is seen as being particularly critical and transcending specific sectorial requirements. Chapter 7 addresses intermodal approaches and applications for cargo and passenger movements.

- *Chapter 8: Target Areas Transport Management,* focuses on near-term Transportation System Management issues such as traffic control system, traffic regulations, parking conditions and traffic safety within key demand precincts. Issues regarding human resources, training, enforcement and policies are addressed.

- *Chapter 9: Organizational and Institutional Matters* presents recommendations, innovative yet sensitive to local norms and expectations, for new approaches to the planning, operation and management of an integrated transport system in the Greater Cairo region.

- *Chapter 10: Human Resources Development in Traffic Safety* analyzes the current status of human resources within the transport sector, and presents tailored solutions for training and management opportunities.

- *Chapter 11, The Integrated Transport Master Plan* combines recommendations of sectorial analyses (as documented in preceding chapters) into a cohesive plan. Policy implications, and key elements, of this plan are the main topic of *Volume II* of the *Phase I Final Report*.

- The feasibility and ramifications of the Master Plan documented in Chapter 11 is examined in two subsequent chapters; that is, *Chapter 12, Initial Environmental Examination*, and *Chapter 13, Economic and Financial Analyses*.

The Study Team, and members of the committees associated with CREATS, stand ready to discuss technical content of this report in additional detail at any mutually convenient time.

CHAPTER 2: URBANIZATION STRUCTURE AND SOCIO-ECONOMIC FRAMEWORK

2.1 EXISTING ISSUES, OPPORTUNITIES AND CONSTRAINTS

The analysis of the existing situation can be summarized, as follows:

- There has been a considerable decrease in population growth over the last decade, both in the country as a whole and in the Study Area. The population in the Study Area increased by only 2.1% over the period 1986-96. The previous two decades recorded higher levels, between 2.6 % and 3 %.
- The economy continues to increase but, at present, this increase is lower, 3.3% GDP growth[1] in 2001, than was experienced in the period 1996-2000 (average 5.4 % per annum). The higher rates of growth over the period 1996-2000 are partly based on the government's privatization program
- The implementation of the policy of targeting population growth in the new town areas has been less successful than was anticipated. However, over the study period (to the year 2022), the impact of such a policy will have an obvious effect on future transportation levels in the Study Area. The proposed long-term population capacity of these new towns is 4 million inhabitants
- Vehicle ownership in the study area continues to increase and at a faster rate than personal incomes.

Given this lower population growth, the impact on future transport patterns will be lesser than would have been expected.

At the same as this lower population increase, official projections for the growth of the economy are of the order of 7.6 % per annum over the study period. The Study Team considers that lower growth rates should also be considered for several reasons. Firstly, on the basis of historic growth rates throughout the world, such a growth rate over an extended period would be unprecedented. Secondly, and drawn from the experience of other countries (particularly in Eastern Europe) who have embarked on privatization

[1] World Economic Outlook, International Monetary Fund, 2002

programs, the impact of such programs tends to level out at a period of 5-7 years. Finally, an economic growth of such proportions is even harder to sustain given the projected slower rates of population growth.

The observed vehicle ownership growth rates, and the projected increase in personal incomes, will increase pressure on the capacity of the existing transport network. One effect of increasing wealth is the preference for users to switch from public transport to personal car use. This has a detrimental effect on the revenues of public transport companies. Given the current budgetary limitations, there will be less opportunity to subsidize those with lower incomes who can only afford to use public transport. From experience elsewhere in the world, it has been seen that the debate over the funding of public transport continues even in countries with much higher personal incomes.

One important issue for the study remains the intended implementation of the new towns. Given the large planned capacity of these new towns, such an implementation would also have an impact on travel patterns within the Study Area. At present, it has been observed that many inhabitants live in established residential areas whilst traveling to work in the new towns. As these towns continue to grow, it is likely that they will attract a larger proportion of people who will both live and work in these settlements.

This chapter contains three sections of 2.2 Urban Structure, 2.3 Current Socio-economic Situation and 2.4 Future Socio-economic Framework.

In the Urban Structure section, the Study Team reviewed urban development of the Greater Cairo Region in the past, followed by analyses of characteristics of urban structure of Greater Cairo Region by comparing with other urban areas in Egypt.

Regarding future development of the area, the Study Team confirmed a development direction towards East-West axis, by reviewing long-term development strategies for the Greater Cairo Region.

New settlement developments, which have been underway based on the strategies, were examined next. The Study Team pointed out some issues of the developments.

Finally, the Study Team raised an issue on urban growth management, which is not considered as satisfactory in the area.

Next section of Current Socio-economic Situation and the last Future Socio-economic Framework section are closely connected with transport demand analysis, modeling and future forecast of the Study. The transport demand forecast works are done based on relationship analyses between transport demand and socio-economic activities of the region. Therefore, the analyses, modeling and forecast are basically depended on the socio-economic framework. The socio-economic indicators are indispensable for transport planning works, in this sense.

In the Current Socio-economic Situation section, major efforts were paid to estimate 2001 socio-economic indicators, because the year 2001 was selected as a base year of analyses of the Study. All surveys were done basically in 2001. Relation between socio-economic indicators and transport demand were analyzed in the year of 2001.

The section begins with a definition of the Study Area, followed by economic development review and national development plans, by concentrating to the 5-year plan of Egypt and the Study area. After those review, the section discusses past socio-economic trends in various sectors. The section finally estimates current socio-economic situation by using indices such as population, number of employees and so on. Detailed study on the new communities is included in the examination. The vehicle ownership of Egypt is also discussed in the section. The section describes the ownership trends in not only Egypt but also in foreign countries in relation with economic development.

The Future Socio-economic Framework section forecasts four kinds of socio-economic indicators (population, employment, students and household income) for future transport demand forecast. The section begins with an examination of past economic development of the nation. Past developments in neighboring countries including East European countries are discussed. The Study Team prepared three economic development scenarios (low, medium and high) by referring to the National Development Plan and estimates by international organizations.

Next, the section forecasts population, employment, students and monthly household income of the Study area. The new community developments were duly incorporated in the forecast.

2.2 URBAN STRUCTURE

2.2.1 A Historical Overview

Cairo, as the capital region of Egypt, has been growing in terms of population and urban economies along with the national economic growth. The urbanization speed is not so rapid as experienced in Asian cities, a steady population increase has been taking place with a more or less 2.5 % p.a. growth during the past three decades between 1966 and 1986[2]. The Greater Cairo Region is nowadays one of the greatest megalopolis in the world with a 13.5 million population (1996), encompassing the surrounding urban agglomerations in Governorates of Giza and Qaliobia.[3]

Although the history of the Cairo city began from BC 4200 in the Nile River frontage areas, the modernization process in the present location took place in the 19th century, when Cairo was the most progressed urban agglomeration as a commercial and trading

[2] The World Bank "Cairo Urban Transport Note, Arab Republic of Egypt", (May 2000)
[3] The current population (as of 2001) of the Study Area, encompasses most of the GCR plus new communities, is projected to be approximately 14.3 million.

center with a population of 267,000 in 16 sq. km.[4] From the late 19th century, Zamarek and Garden City were developed for high income residential areas and located international trading business and diplomatic facilities.

The urban economic expansion in these eras called for an innovative urban planning approach to a deliberate new town development in Heliopolis in the early 20th century. The Heliopolis area development started with a target of about 100,000 inhabitants in the 2,500 ha (25 km^2). The newly developed urban areas grew up shortly, accommodating the emerging middle and high-income groups, while migrants from rural areas high-densely inhabited in old city areas. Since then a number of new commercial and housing areas were developed in both side of the bank of Nile River.

Several land development projects were intensively undertaken in the 1960's by the Egyptian Government towards the eastern part of Cairo, which was initiated by the development of Nasr City as the government center. During this period, the urbanization direction was oriented from the north-south corridor along Nile River to the east-west corridor towards desert areas.

The Egyptian Government took a more definite strategy to develop new housing areas in desert areas to cope with the increasing housing demands and protect the arable agricultural land in the Nile Delta from habitants' encroachment. Ministry of Housing, Utilities and Urban Communities officially launched the New Community Development Programs in 1979, and then another innovative regional development policy was built in 1982, based on the Physical Planning Law No. 3. Concentration of new urban agglomerations was planned to disperse in desert areas located 20~50 km distant from the center of Cairo, and in the late 1980s, the construction of two large-scale new urban communities such as the 15th of May in Helwan and the 6th of October in the western desert area commenced. Nowadays, five (5) large urban agglomerations, including three adjacent new communities, appeared to shape a Cairo metropolitan structure, encompassing over 60 km radius areas. The Master Plan was originally depicted so as to accommodate about 3.9 million population in association with about 1,000 sq. km land development in these suburban communities. The Master Plan of Greater Cairo Region has been revised in 1991, 1994 and 1997 since then, and the 1997 revised target of population is 5.4 million.

Eventually, such a spatially expanded megalopolis structure requites a massive amount of capital investments ceaselessly for provision of infrastructures and urban utilities, including those for the transportation system. In order not to hinder an expected economic growth, the establishment of a functionally integrated transport network system, needless to say, must be a key issue in the GCR.

[4] The JICA Transport Study, 1989

2.2.2 Characteristics of Urbanization in the Greater Cairo Region

(1) Urbanization Pattern

1) Urban Population Growth

The Greater Cairo Region, under the definition by GOPP, encompasses the Cairo Governorate and part of the Giza and Qaliobia Governorates, the boundary of which is slightly different from that of the Study Area. The Study Area includes part of new communities of the 10th of Ramadan and the 6th of October and part of the Sharqia Governorate, representing the actual urbanized sphere to be discussed. To avoid some statistical confusions depending upon the data sources, the arguments here follow the statistical data in the GOPP-defined GCR. More detailed demographic discussions for the Study Area are made in following sections of this chapter.

According to the 1996 Census, the GCR has a 13,488 thousand population. This shares 22.7% of the national population in Egypt. During the past three decades (1966-1996), the three metropolitan Governorates increased its population at a 2.5% p.a. Among those, the Cairo population is growing at 1.60% p.a. that is lower than the national average rate of 2.29% p.a., while the average growth rates of the Giza and Qaliobia Governorates during the same period accounted for 3.6% p.a. and 3.4% p.a. respectively. Thus, the urbanization has been progressing more rapidly in the outskirts of Cairo.

Looking at the Census, a demographically notable fact is that during the past decade between 1986 and 1996, the national population growth rate dropped to 2.08% p.a. and at the same time, the urban population growth rate at the national level also dropped at 1.8% p.a. The population growth rate in three metropolitan Governorates is observed to be quite moderate at 1.9% p.a. during the past one decade that is slightly lower than the national average.

2) Expansion of Urban Development Areas

The satellite images show a spatial expansion pattern of the urbanization process during the past two decades during 1982 and 2000. As seen in the 1982 image demonstrated on Figure 2.2.1, urbanization had been concentrated inside the area with a more or less 10 km radius from the center of Cairo, and in the northeastern corridors with a 20 km radius where is recognized as the most strong urbanization potential corridor. No settlements appeared in new communities yet.

While, looking at the 2000 image as shown in Figure 2.2.2, the urbanized area had been spread over the area within a 15-20 Km radius, and more extensive urbanization was taking place in the northeastern corridor. Seven new communities had been shaped out and housing settlements emerged there. The 10th of Ramadan City and the 6th of

October City had most progressed. Thus, it is found that a great momentum of new urban developments appeared in the last two decades.

The spatial expansion of built-up urbanized areas in the central area of the GCR can also be identified from Figure 2.2.3 that shows a historical evolution from 1968 through 2000. As seen in these illustrations, an extensive urbanization took place particularly in the past two decades from 1982 to the present.

On the other hand, based on the area measurement of the maps shown in Figure 2.2.3, it was computed that the population density of the urbanized areas is 3.9 persons/ km^2 (3.9 persons/km^2), as shown in Table 2.2.1. This extremely high-dense urbanization pattern represents a uniqueness of the physical urban structure in Cairo.

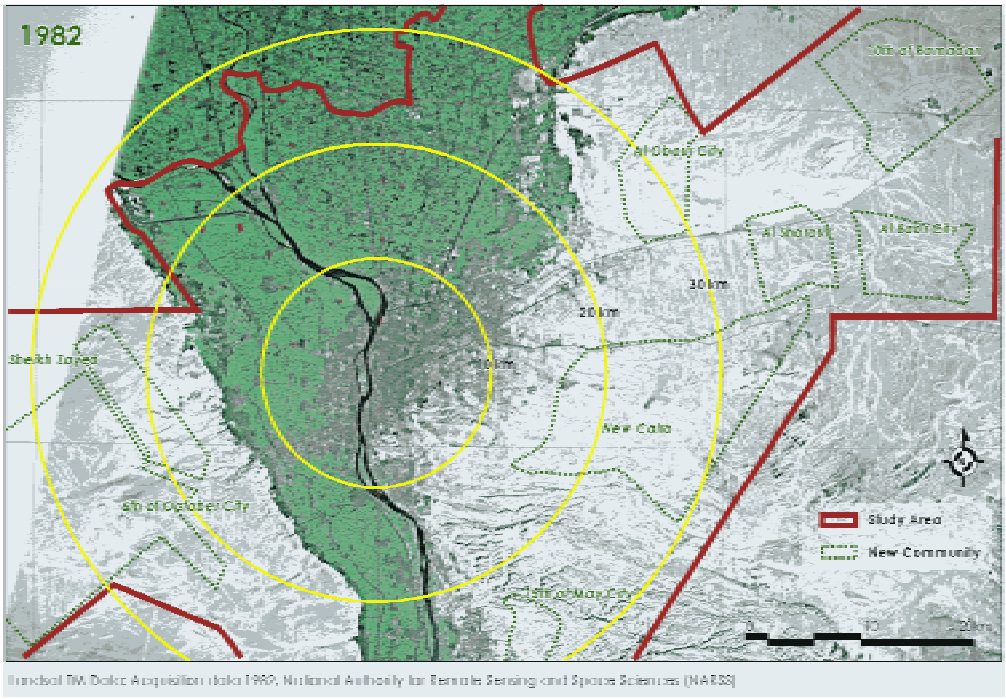


Figure 2.2.1 A Macro View of the Urbanization Process of the Study Area in 1982