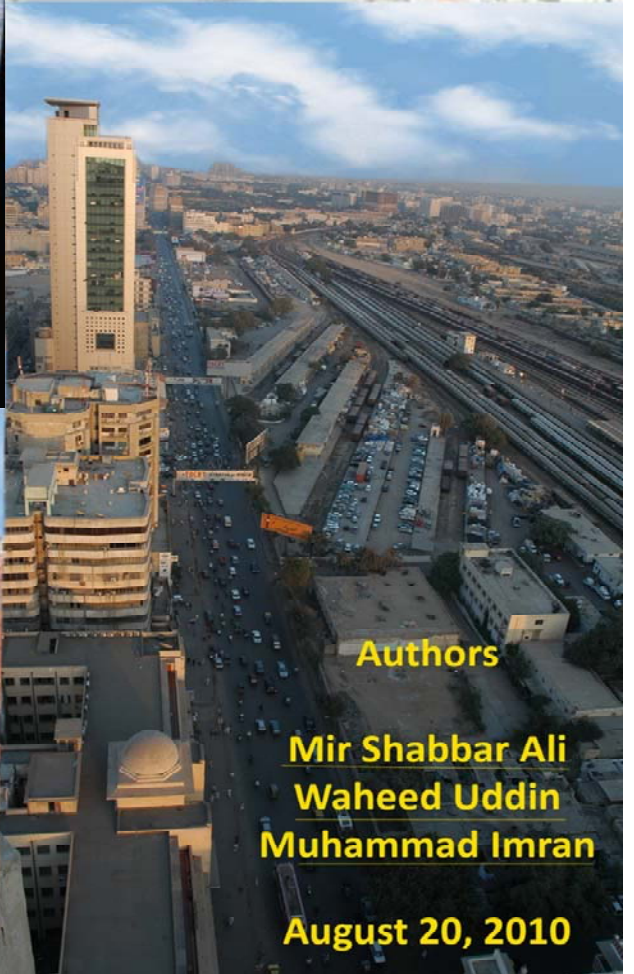


# Urban Transportation Policy for Karachi & other Pakistani Cities



**Authors**

**Mir Shabbar Ali  
Waheed Uddin  
Muhammad Imran**

**August 20, 2010**



**USAID**  
FROM THE AMERICAN PEOPLE



# Karachi Metropolitan Intelligent Transportation System (MITS) Project

## Urban Transportation Policy for Karachi & other Pakistani Cities

This urban transportation policy is recommended for further review and adaptation by metropolitan areas, cities, and provincial and federal government authorities.

### Table of Contents

	Section Title	Page
1	Overview of Pak-USAID Karachi Metropolitan ITS Project	3
2	Urban Transportation Problems in Pakistan	3
3	Key Findings from MITS Stakeholders Workshop and Evidence of Traffic Management Performance	4
4	Key Findings from First International Conference on Sustainable Transportation & Traffic Management, July 1-3, 2010, Karachi	5
5	Urban Transportation Policy Recommended for Pakistani Cities	7
6	The Way Forward	8
	References	9
	Acknowledgements	10
	Abbreviations	10
	<b>COMPENDIUM</b>	<b>11</b>
	<i>I – 2007 MITS Stakeholders Group Workshop, Executive Summary Report</i>	
	<i>II - Urban Transportation Policy Framework for Karachi by Mir Shabbar Ali and Uneb Gazder</i>	
	<i>III – Spaceborne Remote Sensing Data for Inventory and Visualization of Transportation Infrastructure and Traffic Attributes by Waheed Uddin</i>	
	<i>IV – Sustainable Urban Transport in Pakistan – an Institutional Analysis by Muhammad Imran</i>	
	<i>V – Copies of Pakistani Newspaper Articles</i>	

## 1. Overview of Pak-USAID Karachi Metropolitan ITS Project

“Development of an Intelligent Transportation System (ITS)-based traffic management model for metropolitan areas of Pakistan with Karachi as a pilot study” has been a joint research project of the University of Mississippi (UM), USA and NED University of Engineering & Technology (NED), Pakistan. This project has been funded by the United States Agency for International Development (USAID)/National Academy of Sciences (NAS) and the Pakistan Higher Education Commission (HEC) under the ‘US-Pakistan Science and Technology Cooperative Program’ The primary objective was to implement ITS video surveillance for traffic management and geospatial technologies to improve urban traffic flow, reduce vehicle emissions and air pollution, and decrease road crashes and public health costs in Karachi<sup>1</sup>. This was accomplished by developing Karachi Metropolitan Intelligent Transportation System (MITS) plans, adopting modern geographical information system (GIS) and geospatial technologies, creating road network GIS, implementing science models of air quality, and strengthening the research and education capabilities of the Pakistani partner institution (Uddin and Ali 2007).

## 2. Urban Transportation Problems in Pakistan

A comprehensive review of many research reports/articles and policy documents identified the following urban transport related problems in Pakistani cities (Ali and Gazder 2010; Haider and Badami 2007; Imran 2009, 2010; NTRC 1991, 2001, 2009; Querishi *et al.* 2008; Russell and Anjum 1997; SMEDA 1999; Sohail 2000; TSDI 2001; Uddin and Ali 2007; Uddin *et al.* 2009; Uddin 2010; Uddin and Uddin 2010; URC 2001):

- Rapid urbanisation (5% per annum in Karachi and over 3% per annum in other cities), economic growth (over 5% per annum) and motorisation (over 13% per annum).
- Inadequate public transport and transit services in general and for women in particular, lack of female rider considerations in transit vehicle stocks.
- Inadequate transport infrastructure networks, poorly designed and constructed roadways, and lack of or insufficient roadside drainage facilities for surface runoff.
- Lack of consideration of pedestrian friendly facilities in transport infrastructure design (in view of 50-60% non-motorised trips in major cities).
- Poor traffic management resulting in increased congestion, travel time, emissions, and wastage of fuel.
- Degradation of air quality in cities especially particulate matter pollution which is 6-10 times above World Health Organization (WHO) standards. This has led to increase in respiratory diseases, deteriorated public health, and increased health costs.
- Inadequate road safety measures shown by increased road crashes and fatalities (19 fatalities per 10,000 vehicles per annum or over 5000 fatalities per year) involving a relatively large proportion of pedestrians and bike/motorcycle riders.
- Increasing transport energy demand (importation of crude oil increased from 45.5% in 1990-91 to 71.8% in 2003-04; transport sector accounted for an average of 48.7% of total petroleum consumption between 1990 and 2004; petroleum demand increased by an average of 4.9% annually between 1990 and 2004).
- Institutional barriers in urban and transport planning and operating agencies.

---

<sup>1</sup> [http://sites.nationalacademies.org/PGA/dsc/pakistan/PGA\\_052872](http://sites.nationalacademies.org/PGA/dsc/pakistan/PGA_052872)

### 3. Key Findings from 2007 MITS Stakeholders Workshop and Evidence of Traffic Management Performance

Karachi MITS stakeholders' group workshop (Uddin and Ali 2007) identified four categories of traffic problems. The following bullets summarize highlights of these problem areas and evidence from 2007-2010 traffic management performance evaluation:

- **Road User Safety Problems** — These problems include: overcrowded transit buses and other vehicles (minivans, auto-rickshaws, motorcycles), excessive vehicle speed, overloaded and speedy freight trucks, lack of safety restraints and enforcement of applicable laws, lack of traffic control devices, roadway design and parking management problems, and inadequate traffic law enforcement.

*Evidence from 2007-2010 traffic management performance evaluation in Karachi: Construction of U-turn lanes and overhead pedestrian crossings on several busy roads enhanced traffic flow and pedestrian safety. However, non-existent or inadequate roadway drainage facilities along most roads and newly constructed signal-free corridors make them inconvenient and hard to use by most travelling public during heavy rainy season.*

- **Public Transport and Transit Problems** — These problems include: inadequate transit services, poor fleet conditions, and lack of innovative strategies to invest in public transport.

*Evidence from 2007-2010 traffic management performance evaluation in Karachi: Increased use of CNG auto-rickshaws is a good sign because it reduces CO<sub>2</sub>, other pollutants and noise. No improvement in other public transport, transit fleet and operation is evident by overcrowded transit buses and vans, even people hanging from doors and sitting on the roof during afternoon peak hours endangering their safety. Many of these vehicles are old with faulty brakes, worn tires, and high emissions due to insufficient and ineffective official vehicle inspection programs. There is lack of government investment in public transport infrastructure and services/vehicle fleet and regularization of private transit services.*

- **Institutional and Infrastructure Issues** — These issues include: identifying the 'right' problems, setting priorities, effective use of resources, poor communication within or between agencies and public, lack of rational decision making, and coordination with emergency service organisations.

*Evidence from 2007-2010 traffic management performance evaluation in Karachi: Construction of new corridors and completion of many road construction projects inside inner city areas and outskirts have improved traffic flow and reduced congestion during peak hours. The Command and Control Centre of City District Government of Karachi (CDGK) is a significant addition to City's infrastructure for traffic flow and incident management, emergency response, and crime prevention. This is essentially an ITS based traffic video surveillance infrastructure with over 130 video cameras located on most road corridors, which are being successfully operated in cooperation with the city infrastructure construction monitoring staff, traffic police, and security forces with positive results (Qureshi 2010). This ITS video surveillance network presents a good model for other cities.*

*The CDGK embarked upon an aggressive scheme of tree plantation and horticulture in the median of dual carriageway (divided) roads in many parts. However, some plants may be producing pollen and causing allergic conditions/respiratory diseases. These plants have grown tall rapidly in a couple of years and may be obstructions to safe sight distance on intersections and hazards to overhead electric power lines particularly during stormy and rainy weather. When grown tall they also pose hazard to safety during crash events due to their thick trunks. There is an urgent need for planting alternative trees, periodic*

*maintenance such as cutting of branches, and pruning trees near intersections to remove any obstruction to the line of sight.*

- **Traffic and Road Management Problems** — These problems include: inadequate provision of traffic signals and signs, lack of maintenance of road pavements and markings, frequent electric power outages, insufficient law enforcement related to encroachments, and absence of vehicle emission testing.

*Evidence from 2007-2010 traffic management performance evaluation in Karachi: The City's Command and Control Centre (CCC) is helping to reduce emergency response time, improve incident management, and promote timely utilization of traffic police for traffic flow management during peak hours and crash incidents. However, frequent power breakdowns, non-functioning and/or inadequate traffic signals, unchecked encroachments, lack of traffic law enforcement to discourage speeding, and absence of well planned parking management practices are important hurdles to efficient traffic management and better road user safety.*

#### **4. Key Findings from First International Conference on Sustainable Transportation & Traffic Management, July 1-3, 2010, Karachi**

The International conference on sustainable transport and traffic management (Rafeeqi *et al.* 2010) was organized by NED University in Karachi on July 1-3, 2010 and attended by transport planning officials, researchers, and academia from around Pakistan. The participants discussed and unanimously identified the following traffic management and associated landuse and development issues facing Pakistani cities:

- Mixed landuse and high population densities in the inner city attract people and traffic for work and commercial purposes. Due to lack of pedestrian/non-motorised facilities and poor or non-existing public transport/transit services, public transport relies heavily on privately owned and operated buses and other transport vehicles (van, car, motorcycle, taxi, auto-rickshaw). These modes of travel overcrowd the scarce road space and are responsible for increased number of crashes, severe congestion, wastage of fuel and energy, and alarming levels of air pollution.
- The most neglected part of transport planning and practice is the social aspect. The concern is how to make transport friendly for women and other disadvantaged groups of the society. The proportion of number of women in Pakistan's labour force and enrolment in educational and technical training centres has increased significantly over the last two decades. However, safe and comfortable means of transportation to facilitate their mobility has neither increased nor improved. Women are facing significant physical and mental harassments in crowded and inadequate public transport system and transit buses in Pakistan.
- In view of the large proportion of pedestrian traffic and walking trips in Pakistani cities, either there are limited or no provisions for pedestrian friendly facilities. This is due to lack of understanding of the role of pedestrians in a multimodal transport system. As a result, there has been a long period of absence of appropriate urban transport policies and under investments in pedestrian friendly road transport facilities in Pakistani cities.

In the concluding session, the conference participants unanimously approved the following recommendations:

1. The design and location of manmade structures should be regularized since they pose a threat to human lives during a natural calamity such as an earthquake.
2. Proper manuals and codes should be “adapted” and not “adopted” keeping public safety and our own infrastructure needs in mind.
3. Future hazard predictions through appropriate research models should be discussed with the concerned authorities so that precautions can be implemented.
4. Urban planning, transportation and infrastructure professionals should be made part of the concerned decision-making process at every government level to formulate appropriate policies and programs.
5. Public safety laws should be enforced and made as a regular feature of all transportation and driver’s education manuals.
6. Public awareness campaigns should be held to promote the various dimensions of travel safety.
7. Confidence building measures and mechanism should be introduced to encourage data sharing between government agencies, universities and other stakeholders.
8. Mechanism for increased coordination between law enforcement agencies and emergency response units should be designed.
9. Traffic law enforcement agencies and city authorities should work together properly to enforce the laws relevant to reducing vehicle crashes and road user fatalities.
10. The use of GIS should be promoted through curriculum, workshops and training courses for all stakeholders.
11. Road user safety would be enhanced by expanding the ITS video surveillance network throughout major cities of Pakistan (including efficient traffic and incident management, crime prevention surveillance, and other benefits realized by Karachi City’s Command & Control Centre).
12. Calibrate traffic flow and assignment models using ITS video surveillance data in cooperation with the city authorities.
13. Sustainable transportation and development requires mixed landuse and increased transit mode share. Pakistani cities mostly have mixed landuse which should be a priority in future development in combination with clean transit modes, such as compressed natural gas (CNG) buses.
14. Women professionals should be involved in transport planning, policy making, operation, and maintenance of all modes of transportation so that women’s points of view are incorporated appropriately.
15. A special section of the traffic police should be established to record accident data and share it with other stakeholders.
16. Traffic police, city authorities and provincial authorities should work together to establish and implement vehicle inspection and emission testing programs to reduce air pollution in cities and remove faulty and unsafe vehicles from roads.
17. Investment in transportation infrastructure should be given high priority by government agencies at all levels considering ‘clean’ public transit, women preferences, and pedestrian friendly strategies.

## **5. Urban Transportation Policy Recommended for Pakistani Cities**

Based on the above mentioned process, literature review, stakeholder's meetings and the International Conference on Sustainable Transport and Traffic Management, the following urban transport policy is recommended:

### **A) Mixed Landuse, Pedestrian, Women, and Green Space Considerations**

- a1. Plan and implement transport solutions by recognizing and complementing the unique characteristics of Pakistani cities which include rapid urbanisation, high population density, mixed landuse and high usage of public and non-motorised transport. For example, mixed landuse brings shorter travel distance (trip length) and can be addressed by promoting walking, cycling, buses, mass transit, and other less polluting public transport alternatives.
- a2. Use a multimodal approach to provide mobility to all sections of the society for safe and efficient travel. Recognize the large percentage of walking trips and number of pedestrians involved in crashes. Invest in construction of pedestrian friendly infrastructure and facilities by reallocating road space to favour pedestrians and banning unwanted encroachment. Design all pedestrian transport infrastructure assets taking into account the hot summer weather and rainy season experienced in Pakistani cities.
- a3. Consider the patterns of movement, special needs of handicapped and elderly persons, and unique needs and facilities for women in public transport planning and provision in every city. Consult with women professionals to provide safe, comfortable, and economical means of transport for women in order to promote women's mobility and safety in large cities.
- a4. Give priority to green spaces in every community with lots of trees and horticulture along road corridors in every project to improve: existing landuse and traffic corridors, future landuse planning, and community development schemes. This approach will reduce "heat-island" effects on air quality degradation and electric power demand, provide safe play areas for children and walking opportunities for adults, and improve the quality of life for all citizens.

### **B) Road User Safety, Congestion, and Vehicle Emissions**

- b1. Enhance road user safety by adopting modern engineering design standards for roads, providing drainage and horticulture, implementing emission standards for vehicles and vehicle inspection programs, and incorporating education campaigns for all road users in road safety plans and in school education. Implement road safety audits to improve unsafe roads.
- b2. Improve traffic law enforcement by expanding and training the traffic police force in order to deal with traffic law violations, enforcing vehicle inspection regulations, implementing emission testing standards, and strengthening the traffic police force proportional to the city population.
- b3. Design and maintain a congestion free transport network by promoting different modes of transport and mass transit strategies.
- b4. Reduce emissions from the transport network (actions to remove bottlenecks, construct turning lanes, enforce traffic laws, and improve traffic flow using ITS traffic video surveillance technology, etc.) in order to improve the liveability of cities, reduce health hazards, and combat climate change mechanisms.

### **C) Public Investment for Transit, Multimodal Strategies, and Freight Infrastructure**

- c1. Evaluate and implement multimodal transport strategies by providing clear priority to public transit and dedicated corridors for multimodal freight transport.
- c2. Implement and/or improve efficient public transit, preferably CNG buses on dedicated bus lanes, in order to provide efficient mobility for the larger city population.
- c3. Upgrade public transit on dedicated bus lanes over time by adding Bus Rapid Transit (BRT) and plan Light Rail Transit (LRT) systems for improving connectivity.
- c4. Pursue public investment and/or Public-Private Partnerships on higher government levels for funding multimodal mass transit systems, public transport facilities, intermodal facilities, and multimodal freight transport infrastructure.

### **D) Traffic Management and Road Network Infrastructure Asset Management**

- d1. Develop comprehensive road network GIS maps and traffic databases to establish inventory of roads and identify congested road sections and intersections.
- d2. Implement modern geospatial analysis, GIS, and ITS traffic surveillance technologies to accurately assess citywide daily travel volume demand and develop decision support systems for prioritizing corridors to enhance traffic management.
- d3. Deploy ITS video surveillance infrastructure and geospatial technologies to establish enhanced traffic management, inventory of roads and bridges, and infrastructure asset management systems.
- d4. Encourage other public works agencies to adopt road network GIS for inventory and operation management to reduce utility related traffic flow interruptions.

### **E) Institutional Barriers and Infrastructure Investment Issues**

- e1. Improve governance and urban planning in large cities by the meaningful involvement of all stakeholders for establishing long term plans and before implementing major transport infrastructure improvement programs.
- e2. Require large cities to prepare Master Plans or Visions of City Development Strategies on long term basis which should include multimodal transport plans for passenger travel and freight transport, traffic management performance indicators, and investment criteria for public and freight transport.
- e3. Strengthen the capacity of urban institutions, especially the City District Government agencies, by establishing fully functional and autonomous Metropolitan Transport Authorities (MTAs) with subsidiary Public Transport Agency (PTA) and Emergency Management Agency (EMA) in each city.
- e4. Enhance the capacity of urban institutions via training courses and research collaborations with reputed local universities and professional organizations to produce GIS workforce and resolve other unique problems of individual cities.

## **6. The Way Forward**

This urban transport policy is recommended for further review and adaptation by City District Government (CDG) authorities in metropolitan cities; the Planning & Development (P&D), Transport, Communication & Works (C&W), Town Planning or Housing and Urban Development, Environmental Protection and Home Departments in Provincial



Governments; and the Planning Commission, Ministry of Communication and its subsidiary National Transport Research Centre (NTRC), Ministry of Environment, and Pakistan-Environmental Protection Agency (EPA) on Federal Government level.

## References

1. Ali, M.S. and Gazder, U. 2010. *Urban Transportation Policy Framework for Karachi*. In Rafeeqi, S., Ali, M. and Adnan, M. (Eds.), In Proceedings of the first International Conference on Sustainable Transportation & Traffic Management, Karachi, pp. 271-278.
2. Haider, M., and Badami, M. 2007. *Balancing Efficiency and Equity in Public Transit in Pakistan*. In *The inclusive City: Infrastructure and Public Services for the Urban Poor in Asia*. Laquian, A., V. Tewari, and L. Hanley (eds). Baltimore: The Johns Hopkins University Press.
3. Imran, M. 2009. Public Transport in Pakistan: A Critical Review. *Journal of Public Transportation*, Vol. 12, No. 2. pp. 53-83.
4. Imran, M. 2010. *Institutional Barriers to Sustainable Urban Transport in Pakistan*. Karachi: Oxford University Press.
5. National Transport Research Centre (NTRC), Government of Pakistan. 1991. draft National Transport Policy. Islamabad.
6. National Transport Research Centre (NTRC), Government of Pakistan. 2001. draft National Transport Policy. Islamabad.
7. National Transport Research Centre (NTRC), Government of Pakistan. 2009. National Transport Policy (NTP Draft VIII). Islamabad.
8. Qureshi A., Huapu, L. and Shi, Y. 2008. Urban Transportation and Equity: a Case Study of Beijing and Karachi. *Transportation Research Part A*, 42, pp.125-139.
9. Qureshi, M. Faheem. 2010. *Overview of Karachi ITS video surveillance network implemented for CDGK's Command & Control Centre*. Presented at Karachi Traffic Management Forum, Urban Resource Centre, Karachi, July 7, 2010.
10. Rafeeqi, S., Ali, M., and Adnan, M. (Eds.). 2010. Proceedings of the First International Conference on Sustainable Transportation & Traffic Management, July 1-3, 2010. Karachi: Khawaja Printer and Publishers.
11. Russell, J. and Anjum, A. 1997. Public Transport and Urban Development in Pakistan. *Transport Reviews* 17(1), pp. 61-80.
12. Small and Medium Enterprise Development Authority (SMEDA), Government of Pakistan. 1999. Draft National Transport Strategy. Lahore.
13. Sohail, M. (Eds.). 2000. *Urban Public Transport and Sustainable Livelihoods for the Poor: a Case Study: Karachi, Pakistan*. UK: WEDC, Loughborough University.
14. Transport Sector Development Initiative (TSDI). 2001. TSDI Draft Policy - Consolidate Transport Policy for all Modes, A Collective Efforts by Citizens and Government of Pakistan. Islamabad.
15. Uddin, W. and Ali, M. 2007. Karachi Metropolitan Intelligent Transportation System (MITS) Stakeholders Group Workshop Executive Summary Report. Available at [http://sites.nationalacademies.org/PGA/dsc/pakistan/PGA\\_052872](http://sites.nationalacademies.org/PGA/dsc/pakistan/PGA_052872) accessed on 5 August 2010.
16. Uddin, W., Wodajo, B., Osborne, K., and White, M. 2009. *Expediting infrastructure condition assessment for disaster response and emergency management using remote sensing data*. In Proceedings of MAIREPAV6 - 6th International Conference on

- Maintenance and Rehabilitation of Pavements and Technological Control, Torino, Italy, July 8-10, 2009.
17. Uddin, W. 2010. *Spaceborne Remote Sensing Data for Inventory and Visualization of Transportation Infrastructure and Traffic Attributes (Keynote Paper)*. In Rafeeqi, S., Ali, M. and Adnan, M. (Eds.), Proceedings of the first International Conference on Sustainable Transportation & Traffic Management, Karachi, July 1-3, 2010, pp. 3-12.
  18. Uddin, W. and Uddin, U. 2010. *Sustainable Personal Rapid Transit Strategies for Congested Cities and Urban Communities*. In Proceedings of the Second International Conference on Transport Infrastructure, August 4-6, 2010 ICTI, Sao Paulo, Brazil.
  19. Urban Resource Centre (URC). 2001. Urban Poverty and Transport: A Case Study from Karachi. *Environment and Urbanization*, 13(1), pp.223–233.

## Acknowledgements

We would like to acknowledge funds provided by Pakistan-HEC to NED University and by USAID/NAS to the University of Mississippi without which this project could not have been undertaken. We appreciate the enthusiasm and interest shown by various stakeholders, presenters and participants in workshops and international conference organised as a part of Karachi Metropolitan ITS project. Thanks are also due to Faheem Qureshi for hosting a tour of CDGK's CCC facility in Karachi for the conference attendees. Finally, we would like to thank the University of Mississippi and NED University of Engineering & Technology, Karachi for their partnership, cooperation, and full support throughout this project.

## Abbreviations

BRT	Bus Rapid Transit
CCC	Command & Control Centre
CDG	City District Government
CDGK	City District Government of Karachi
CNG	Compressed Natural Gas
C&W	Communication & Works Department
EMA	Emergency Management Agency
GIS	Geographical Information System
HEC	Higher Education Commission, Pakistan
ITS	Intelligent Transportation System
LRT	Light Rail Transit
MTA	Metropolitan Transport Authority
MITS	[Karachi] Metropolitan Intelligent Transportation System
NAS	National Academy of Sciences
NED	NED University of Engineering & Technology, Karachi, Pakistan
NTRC	National Transport Research Centre
Pak-EPA	Pakistan Environmental Protection Agency
P&D	Planning & Development
PTA	Public Transport Agency
UM	University of Mississippi, USA
URC	Urban Resource Centre, Karachi, Pakistan
USAID	United States Agency for International Development
WHO	World Health Organisation

## COMPENDIUM

The following documents provide the background information used to formulate the urban transportation policy.

*I – 2007 MITS Stakeholders Group Workshop, Executive Summary Report*

*II - Urban Transportation Policy Framework for Karachi by Mir Shabbar Ali and Uneb Gazder*

*III – Spaceborne Remote Sensing Data for Inventory and Visualization of Transportation Infrastructure and Traffic Attributes by Waheed Uddin*

*IV – Sustainable Urban Transport in Pakistan – an Institutional Analysis by Muhammad Imran*

*V – Copies of Pakistani Newspaper Articles*

The compendium is available upon request from:

**Prof. Dr. Mir Shabbar Ali**

Pak-side PI, Karachi Metropolitan ITS Project  
Professor (Transportation Engineering)  
Chairman Department of Urban and Infrastructure Engineering  
NED University of Engineering and Technology  
University Road, Karachi, PAKISTAN  
Phone: (92-21) 9261261-8 Ext 2354  
[mshabbar@neduet.edu.pk](mailto:mshabbar@neduet.edu.pk)

**Prof. Dr. Waheed Uddin**

US-side PI, Karachi Metropolitan ITS Project  
Professor, Department of Civil Engineering  
Director, Center for Advanced Infrastructure Technology (CAIT)  
University of Mississippi  
University, MS 38677-1848, USA  
Phone: (001) 662-915-5363  
[cvuddin@olemiss.edu](mailto:cvuddin@olemiss.edu)

**This urban transportation policy is recommended for further review and adaptation by metropolitan areas, cities, and provincial and federal government authorities.**

**Authors:**

Dr. Mir Shabbar Ali, the Pakistan-side Principal Investigator of Karachi Metropolitan Intelligent Transportation System project, is Professor of Transportation Engineering at NED University of Engineering and Technology, Karachi, Pakistan. He published numerous papers in transportation planning and traffic engineering area and is currently Chairman of Department of Urban and Infrastructure Engineering. He organized and chaired the First International Conference on Sustainable Transportation and Traffic Management, held in Karachi, July 1-3, 2010.

Dr. Waheed Uddin, the US-side Principal Investigator of Karachi Metropolitan Intelligent Transportation System project, is Professor of Civil Engineering and Director of the Center for Advanced Infrastructure Technology at the University of Mississippi, USA. Previously a pavement expert for the United Nations, he is an author of over 200 publications including three books, one book chapter, and 100 peer reviewed papers in journals and conference books. He has conducted pioneering geospatial research using spaceborne and airborne remote sensing technologies for infrastructure asset management and disaster assessment applications.

Dr. Muhammad Imran is Lecturer in the Resource and Environmental Planning programme at Massey University, New Zealand. He received a PhD from the University of Melbourne, Australia and as an Asian Development Bank Scholar he received a Master's degree in Urban Planning at the University of Hong Kong. He published papers on public transportation policy and landuse integration topics. His book 'Institutional barriers to sustainable urban transport in Pakistan' has been published by the Oxford University Press in 2010.



**USAID**  
FROM THE AMERICAN PEOPLE

