Trip Report

FTA Mission to India –
Delhi, Visakhapatnam, Hyderabad, Mumbai
September 20-30, 2008

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13. ABSTRACT

This report summarizes the activities that occurred as part of the FTA Mission to India conducted in September 2008. The mission provided the opportunity to members of the U.S. delegation to meet with senior Indian transportation officials, and to learn of India's current plans for transportation infrastructure improvements. The tour was also designed to identify any lessons learned for the U.S. transit industry, particularly in relation to the implementation and operation of Bus Rapid Transit systems, and to identify opportunities for U.S. transit industry involvement in the development of India's transportation infrastructure. The mission itinerary included visits to Delhi, Visakhapatnam, Hyderabad, and Mumbai.

A highlight of the mission was the signing of a Memorandum of Cooperation between the United States Department of Transportation Federal Transit Administration and the State of Maharashtra while in Mumbai. The Memorandum is designed to facilitate knowledge exchange between the two countries in the fields of public transportation, science and technology.

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FTA Mission to India – Delhi, Visakhapatnam, Hyderabad, Mumbai September 20-30, 2008

Trip Report

Funded by the Federal Transit Administration

International Mass Transportation Program

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METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

1 inch (in)	=	2.5 centimeters (cm)
1 foot (ft)	=	30 centimeters (cm)
1 yard (yd)	=	0.9 meter (m)
1 mile (mi)	=	1.6 kilometers (km)

AREA (APPROXIMATE)

1 square inch (sq in, in^2)	=	6.5 square centimeters (cm^2)
1 square foot (sq ft, ft^2)	=	0.09 square meter (m^2)
1 square yard (sq yd, yd^2)	=	0.8 square meter (m^2)
1 square mile (sq mi, mi^2)	=	2.6 square kilometers (km^2)
1 acre = 0.4 hectare (he)	=	4,000 square meters (m^2)

MASS - WEIGHT (APPROXIMATE)

1 ounce (oz)	=	28 grams (gm)
1 pound (lb)	=	0.45 kilogram (kg)
1 short ton = 2,000 pounds (lb)	=	0.9 tonne (t)

VOLUME (APPROXIMATE)

1 teaspoon (tsp)	=	5 milliliters (ml)
1 tablespoon (tbsp)	=	15 milliliters (ml)
1 fluid ounce (fl oz)	=	30 milliliters (ml)
1 cup (c)	=	0.24 liter (l)
1 pint (pt)	=	0.47 liter (l)
1 quart (qt)	=	0.96 liter (l)
1 gallon (gal)	=	3.8 liters (l)
1 cubic foot (cu ft, ft^3)	=	0.03 cubic meter (m^3)
1 cubic yard (cu yd, yd^3)	=	0.76 cubic meter (m^3)

TEMPERATURE (EXACT)

[(x-32)(5/9)] °F	=	y °C

METRIC TO ENGLISH

LENGTH (APPROXIMATE)

1 millimeter (mm)	=	0.04 inch (in)
1 centimeter (cm)	=	0.4 inch (in)
1 meter (m)	=	3.3 feet (ft)
1 meter (m)	=	1.1 yards (yd)
1 kilometer (km)	=	0.6 mile (mi)

AREA (APPROXIMATE)

1 square centimeter (cm^2)	=	0.16 square inch (sq in, in^2)
1 square meter (m^2)	=	1.2 square yards (sq yd, yd^2)
1 square kilometer (km^2)	=	0.4 square mile (sq mi, mi^2)
10,000 square meters (m^2)	=	1 hectare (ha) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

1 gram (gm)	=	0.036 ounce (oz)
1 kilogram (kg)	=	2.2 pounds (lb)
1 tonne (t)	=	1,000 kilograms (kg)
	=	1.1 short tons

VOLUME (APPROXIMATE)

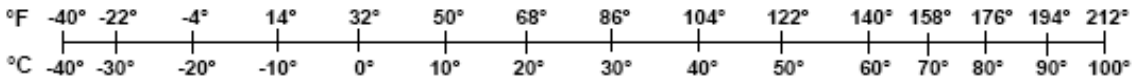
1 milliliter (ml)	=	0.03 fluid ounce (fl oz)
1 liter (l)	=	2.1 pints (pt)
1 liter (l)	=	1.06 quarts (qt)
1 liter (l)	=	0.26 gallon (gal)
1 cubic meter (m^3)	=	36 cubic feet (cu ft, ft^3)
1 cubic meter (m^3)	=	1.3 cubic yards (cu yd, yd^3)

TEMPERATURE (EXACT)

[(9/5) y + 32] °C	=	x °F

QUICK INCH - CENTIMETER LENGTH CONVERSION

QUICK FAHRENHEIT - CELSIUS TEMPERATURE CONVERSION



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Executive Summary

In September 2008, a Federal Transit Administration (FTA) mission to India was organized. The main objectives of the mission were to follow up on the mission that was conducted in 2007, discuss next steps in pursuance of the 2007 Memorandum of Cooperation in the field of public transportation science and technology, and to provide opportunities to further develop the relationship between the United States of America and India. In addition to learning about the current status of India's transportation infrastructure and planned improvements, the delegation was able to have an open dialogue with senior Indian transportation officials and ascertain possible involvement of the U.S. transit industry in the development of infrastructure as well as develop a network of contacts. Information regarding lessons learned in both the U.S. and India also was also exchanged.

In relation to the purpose of the Memorandum of Cooperation, the mission was successful in furthering the relationship between the two countries, and in providing a forum where transportation officials were able to collectively exchange information. While members of the delegation were able to provide information on lessons learned in the U.S., Indian officials shared information on the National Urban Transport Policy (NUTP) and the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), which both serve as well-organized resources that commit to the implementation of Public Private Partnerships (PPP) and provide an approach to mitigate congestion, and obtain goals and objectives in regard to urban transportation.

Introduction

Background

In September 2007, a delegation of transportation professionals led by the Federal Transit Administration's (FTA) Deputy Administrator, Sherry Little, visited three cities in India to meet with urban transportation and government officials. During the tour, a formal agreement that was drafted in the form of a Memorandum of Cooperation (MOC) and signed by US Department of Transportation Secretary Mary Peters was ratified by the Indian Minister of Urban Development, S. Jaipal Reddy at a formal signing ceremony. The purpose of the MOC was to develop a bilateral working agreement, permitting knowledge transfer and the mutual sharing of expertise in the urban transportation field.

As a follow up to the signing of the agreement in 2007, FTA organized a trade delegation to India that was led by the FTA Administrator, James Simpson in September 2008. During this tour, the delegation visited four cities and met with government officials, while also attending a formal signing ceremony that was held near the end of the delegation tour in the City of Mumbai.

Mission Itinerary and Objectives

The purpose of the mission was to create a forum where members of the U.S. delegation would meet Indian transportation and government officials and share information regarding transportation plans and improvements in both India and the U.S. The mission also provided the chance for the delegation to learn about opportunities for involvement in the development and improvements of India's infrastructure.

The delegation visited four cities in India, with the tour commencing in the nation's capital, Delhi, which included a meeting with the Ministry of Urban Development. Following Delhi, the delegation also visited Visakhapatnam, located on the east coast of the country, Hyderabad, and finally Mumbai.

Delhi

Indian Institute of Technology, Delhi
September 21, 2008

The delegation attended a breakfast meeting where Ms. S. Geetam Tiwari, Ph.D., Associate Professor of Transport Planning at the Indian Institute of Technology, Delhi, presented on the system design, lessons learned, and constraints of the first corridor of the Delhi Bus Rapid Transit (BRT).

In Delhi, a city with a population of approximately 15 million, about 60 percent of trips that are made are less than 5 km (3.1 miles). This is a direct result of the population living in close proximity to their place of employment and large numbers of walking trips. Because these short trips are dominant, the first BRT line was implemented to complement the travel pattern. The corridor in which the BRT operates was designated for the mode based on the results of a study commissioned by the Government of National Capital Territory of Delhi (GNCTD) in 2005 to recommend the implementation of an integrated multi-modal transportation network.

Delhi BRT Vehicle

The BRT is 14.5 km (9 miles) in length, crosses over 17 intersections, and consists of 29 stations. Separate bus lanes have been provided in an effort to allow for faster travel times and safer trips. The corridor in which it operates is the first in Delhi to offer designated lanes for non-motorized vehicles and pedestrians. During peak time, the reported passengers per hour are 12,000. New low-floor Compressed Natural Gas (CNG) buses were purchased for operations, with the cost ranging from $116,000 (non air conditioned) to $138,000 (air conditioned) and about 60 real time passenger information systems that employ GPS have been implemented at the stations. For future BRT corridors, further enhancements that are expected to be implemented are transit signal priority, automated fare collection, and foot bridges where necessary.

Indian Ministry of Urban Development
September 22, 2008

A meeting at the Indian Ministry of Urban Development was held during the morning at which Dr. M. Ramachandran, Secretary to the Government of India, Ministry of Urban Development and other senior Ministry officials attended. At the meeting the National Urban Transport Policy was discussed as well as the Delhi BRT, and further steps to implement the MOC.

Meetings at the Ministry of Urban Development

The National Urban Transport Policy was drafted in an effort to mitigate and plan for transportation challenges that the country faces due to the rapid population growth experienced in cities. The policy provides an integrated approach to incorporate transportation as an important consideration while in the planning stage in order to help eliminate the need for mitigation of negative impacts. It's overall objective is to ensure reliable, affordable, quick and sustainable transportation access to its residents, and aims to achieve this objective by integrating land use, addressing issues of pollution, traffic management, providing rapid transit networks, and considering non-motorized mode infrastructure. At the conclusion, members of the U.S. delegation were able to participate in discussions regarding many of the transportation topics that had been addressed. Establishing a joint Indo-US working group to initiate and monitor activities under the MOC was also discussed.

Following the meeting, the delegation met with Mr. S. Jaipal Reddy, Minister for Urban Development. After informal discussions were exchanged between Mr. James Simpson and Mr. Reddy, some members of the delegation shared comments as well.

Delhi Metro Rail Corporation (DMRC)
September 22, 2008

The U.S. delegation continued the day with a tour of the Delhi Metro Rail system, hosted by Delhi Metro Rail Corporation. The system carries approximately 600,000 passengers per day. Construction of the system is being completed in phases. Construction of Phase I, which consists of three lines that total 40.3 miles of service, and cost approximately US$2.5 billion, provides transportation access in an east-west and north-south manner. Phase II, which is scheduled for completion in 2010, will provide an additional 77.7 miles of service and has an estimated cost of US$5 billion. By 2021 phases III and IV will be completed and will offer another 118 miles of rail lines. Following the tour, the U.S. delegation was able to visit the system control center and then met with DMRC officials to discuss the existing rail system and future plans.

Tour of Delhi Metro

Industry Roundtable
September 23, 2008

The U.S. delegation attended an industry roundtable discussion in the morning. Mr. James Simpson and Mr. Arthur Guzzetti, Vice President of the American Public Transportation Association (APTA), both participated in the panel at the roundtable along with Dr. M. Ramachandran and Mr. Harpal Singh, Deputy Chairman, Confederation of Indian Industries (CII) Northern Region. As a panel member, Mr. Guzzetti presented on the APTA Public Transportation Standards Program. Following his presentation, Mr. Simpson and other panel members discussed the importance of standards and the benefits that they provide to cities looking to implement new rapid transit modes, or other transportation related issues.

Mr. Arthur Guzzetti and panel

Mr. James Simpson and panel

Discussions regarding the importance of BRT and its viability as a reliable, rapid transit mode were discussed as well. There are numerous BRT projects in India, and the government has encouraged states to provide modern and efficient BRT systems, ensuring that public transportation is viewed as a premiere product. The opportunities for public private partnerships were also discussed, including the private sectors' ability to provide and assist in the implementation of successful transportation.

Visakhapatnam

International Seminar on Bus Rapid Transit Systems in India and Abroad
September 24, 2008

Once the delegation arrived in Visakhapatnam, members attended the BRT Workshop that was organized by the Indo-German Institute of Advanced Technology (IGIAT) and the Department of Civil Engineering, Gayatri Vidya Parishad College of Engineering. The purpose of the workshop was to provide the opportunity for interested professionals in the transit industry to learn about BRT systems that are being implemented or are currently in operation in India and other countries throughout the world.

Mr. James Simpson was asked to provide a keynote address in which he discussed the importance of public transportation and how it is about mobility, accessibility and freedom, as well as its economic implications. He also encouraged attendees to learn from the successes and mistakes of the U.S. and benefit from the lessons that the country has learned. Dr. Ramachandran also provided a keynote speech where he discussed the increase of auto use in India and the need to implement viable public transportation systems to mitigate the resulting congestion.

BRT Workshop in Visakhapatnam

Ms. Cheryl Thole, Senior Research Associate, National Bus Rapid Transit Institute (NBRTI) also participated in the workshop by moderating a session during which BRT in Curitiba, Brazil, and Visakhapatnam, as well the role of capacity building on sustainable transport were presented.

Meeting with Visakhapatnam City Officials
September 25, 2008

The Federal Transit Administration and a few members of the delegation met with Visakhapatnam City Officials at the Greater Visakhapatnam Municipal Corporation in the morning to discuss plans for the implementation of BRT in the city. Information that was provided regarding the eight corridors on which BRT will operate included the breakdown of funding for the projects, as well as some of the operational plans. The City has completed the feasibility study and is currently preparing for construction. Advertising efforts for the BRT have been quite extensive, with the city continually involving the public throughout the planning process.

Meeting with Visakhapatnam officials and consultants at the Greater Visakhapatnam Municipal Corporation

The need for more knowledge regarding the use of signal timing was also discussed, with city officials stating that there is a need to hear of other implementation of the technology throughout the industry. Two other areas in which the city needs assistance are in traffic safety and conducting before and after studies.

Meeting at the Indo-German Institute of Advanced Technology
September 25, 2008

The Indo-German Institute of Advanced Technology is a joint project of the Government of Andhra Pradesh, the Government of Germany, and Gayatri Vidya Parishad. The Institute has a number of objectives that it sets out to achieve:

Meeting at the Indo-German Institute of Advanced Technology

- Upgrading the skills of technical personnel working in the industry as dictated by the changing needs of the industry;
- Offering value added programs for students enrolled at technical institutions to increase their marketability;
- Providing vocational skills to students of lower socioeconomic groups.

Mr. James Simpson touring the Indo-German Institute of Advanced Technology

The U.S. delegation met with individuals at the Institute and learned about the objectives, the student base, and the types of technological training offered. There are four technologically advanced areas in which the Institute focuses its coursework. These include precision manufacturing, infrastructure and environmental engineering, computer technologies, and automation and industrial process control. Discussions regarding the sharing of information between the FTA and the Institute were held as well. Following the group discussion, the delegation toured the facility.

Hyderabad

Meeting with State of Andhra Pradesh Government and Hyderabad City Officials
September 26, 2008

The U.S. delegation attended a morning meeting at Andhra Pradesh State Road Transport Corporation (APSRTC) where the Hyderabad U.S. Consul General, Cornelis Keur was present. The meeting provided the opportunity for State Government officials to introduce APSRTCwhich provides inter city and intra city transportation services and regularly works to improve its services in order to provide premier bus transportation. APSRTC was established in 1932, when it was first established as NSR-RTD (Nizam State Rail & Road Transport Department). Throughout the years it has steadily grown and currently owns 19,270 buses, earning a place in the Guinness Book of World Records for the largest fleet owner in the world. It maintains 766 bus stations, 208 bus depots, and 1,880 bus shelters while employing over 150 employees. The Corporation's buses operate on 6.63 million km (approximately 4 million miles) and carry 127.87 million passengers. The entire network is under the administrative control of 23 Regional Managers in six zones, with the headquarters located in Hyderabad.

Mr. James Simpson being welcomed by V. Dinesh Reddy, Vice Chairman of the Andhra Pradesh State Road Transport Corporation

Following the introduction of ASPRTC, government officials presented on BRT systems that are being implemented throughout the state. Cities that are currently operating or are in the process of implementing BRT within the state are Hyderabad, Vijayawada, and Visakhapatnam. BRT systems are being implemented within the State to alleviate transport problems such as congestion. At present time, the percent breakdown of public and private vehicle use in Hyderabad is 23 and 77, respectively; the government has a benchmark of altering those percentages to 80 and 20. BRT in Hyderabad consists of three corridors, covering a total of 71.16 km (44 miles), with another five corridors currently planned. The BRT provides bicycle and pedestrian paths, ticket vending machines, real time information, closed circuit televisions, and bike racks and lockers. In Vijayawada, the state's third largest city, six BRT corridors are proposed, while eight corridors are proposed in Visakhapatnam.

Mr. Simpson, in reference to the world record for the largest fleet in the world, stated that he can relate the breadth of transportation operations to that of the City of New York, the largest transit system in the U.S. He also acknowledged the importance of providing quality transportation and accessibility to the State's citizens. In closing, Mr. Simpson quoted the Great Mahatma Gandhi, "there can be no result without a decision to move forward."

Mr. Venkat Pindiprolu, FTA, Mr. Reddy, Mr. Simpson, and US Consular Cornelis Keur

Before closing, members of the delegation were given the opportunity to ask questions regarding local transportation plans and operations. Some topics that were raised included the planning process used for BRT, the types of standards that will be implemented if public private partnership models are used, and the importance of providing accessibility to the elderly and disabled populations.

Industry Roundtable
September 26, 2008

During the afternoon, the delegation attended an industry roundtable during which Mr. Ron Boenau, Senior Transportation Systems Manager, International Mass Transportation Program, Federal Transit Administration provided a welcome to attendees and Mr. Arthur Guzzetti presented on the APTA Bus Standards Program. Another presentation topic included an overview of the Indian railways, provided by Mr. J N Jagannath, Chief Operations Manager of the South Central Railway.

Panel at the Industry Roundtable in Hyderabad

The South Central Railway is a 160 year old organization that has over 63,327 km (39,349 miles) of rail track. The system carries approximately 17 million passengers per day and 785 metric tons of freight among 8,984 trains. Passenger travel is highly subsidized by transported freight, which generally consists of eight major commodities, including cement, coal (almost 50 percent), fertilizer, iron ore, iron and steel, and others such as granite, salt, and sugar.

Meeting at the Institution of Engineers (India)
September 26, 2008

Meeting at IEI

The U.S. delegation also visited the Institution of Engineers of India (IEI). IEI started in 1920, with Calcutta housing the main headquarters. The state center where the delegation visited began in 1938 and consists of 40,000 members, with approximately 8,000 at the diplomate level. FTA Administrator James Simpson addressed the meeting, giving an overview of public transportation in the United States.

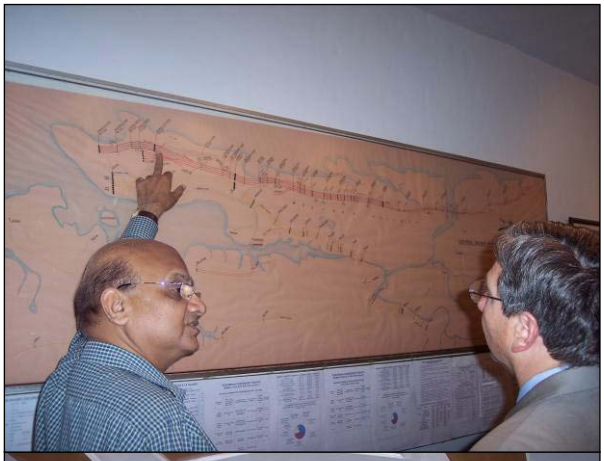
Meeting with City officials and Press Conference
September 27, 2008

Meeting with Hyderabad Officials

During the morning, delegation members attended a meeting with city officials to discuss transportation plans for the City of Hyderabad. Hyderabad is one of the fastest growing urban areas in India. It is also experiencing remarkable economic growth in the region as well. Approximately 40 percent of city traffic is currently dependent on buses for public transportation, but discussions were held regarding plans for BRT and the implementation of metro rail. The rail system is being constructed through public private partnerships, which allowed for discussion over the successful use of these relationships when providing public transportation and building the necessary infrastructure. Immediately following the close of the meeting, the press was invited to join the meeting, where they posed questions regarding the upcoming signing of the Memorandum of Cooperation. Mr. Jim Simpson elaborated on the purpose and benefit of the MOC to both countries in the fields of urban transportation science and technology. The Hyderabad Metro is proposed to be built as a public private partnership.

Mumbai

Meeting with Mumbai Metropolitan Region Development Authority (MMRDA)
September 29, 2008



As part of the agenda, the delegation spent the morning meeting with the Mumbai Metropolitan Region Development Authority, after briefly visiting a rail station during peak travel times. During the meeting with MMRDA, the delegation was provided with an overview of Mumbai and the transportation modes offered within the city. Mumbai, with a population of 21 million, encompasses 4,355 sq. km of which only 1,000 sq. km are urban areas. The MMRDA was established in 1975 with the purpose of preparing plans, policies and programs that assist in achieving balanced development within the city. The vision of MMRDA is "transforming Mumbai into a world class city with a vibrant economy and globally comparable quality of life".

In Mumbai, approximately 11 million travel by public transportation (66 percent by suburban rail; 34 percent by bus). One of MMRDA's initiatives to address the increasing need for transportation improvements, the Mumbai Transport Project (MUTP), includes benefits such as a decrease in train congestion by 30 percent, a 25 to 50 percent increase in the suburban rail system infrastructure, the expansion of pedestrian facilities, and the provision of east west corridor connections. Other MMRDA initiatives include the Mumbai Urban Infrastructure Project (MUIP), the Metrorail project, skywalks, and the implementation of a monorail.

The Metro Master Plan outlines nine corridors that will be implemented in three phases, covering a total of 146.5 km (91 miles). It is anticipated that by 2013, a total of 62 km (38.5 miles) will have been implemented. The monorail is expected to act as a feeder system to the suburban rail and metro systems. Approximately 20 km (12.4 miles) has been initiated as a pilot project, with another 80 km (49.7 miles) proposed through PPPs.

Meeting with State of Maharashtra Minister at Government of Maharashtra
September 29, 2008

Following the meeting with MMRDA, the U.S. delegation attended a meeting at the Government of Maharashtra where the Minister for Urban Development, General Administration, Urban Land Ceiling , Water Conservation, Parliamentary Affairs of the State of Maharashtra and his senior officials were present to discuss transit activities and projects in the State of Maharashtra and sign the Memorandum of Cooperation between the state government and the Federal Transit Administration. The Principal Secretary of the Minister of State Department of Urban Development provided opening remarks where he briefly discussed the challenges that the State faces in transportation, and the vision that the State has in the provision of the necessary infrastructure to continue and improve mobility in order to remain an upcoming competitor among Asian cities/regions. He also acknowledged that the MOC has rightly addressed these areas of concern and will a benefit to India. Mr. James Simpson also provided comments, discussing the benefits of the MOC to the U.S. and how it provides an opportunity for the country to learn what India is doing and to build relationships with Indian engineers and other transportation related professionals. Following these comments, a few short presentations were provided, as well as a brief opportunity for members of the delegation to participate in a discussion, where topics ranged from information exchange between the countries and how it will be facilitated, to the possibility of creating a national forum in India (similar to the FTA).

After discussions ceased, Mr. James Simpson and the Chief Minister of the State of Maharashtra signed copies of the MOC in the presence of the delegation members, senior state officials, and the press. The Chief Minister of the State of Maharashtra pre-signed the document.

Mr. James Simpson and the Chief Minister of the State of Maharashtra

Industry Roundtable
September 30, 2008

Prior to departing India, the delegation participated in a final event during which presentations were given on the status of India's infrastructure, Mumbai's railways, issues of urban mobility in India, and the shipping industry. Mr. Arthur Guzzetti also presented on the APTA transportation standards program as well. Mr. Mysore Nagaraja, an independent consultant and member of the U.S. delegation, provided opening remarks in which he emphasized the need for planning and proactive management and risk management. Mr. Nagaraja also expressed his thanks for having learned more about public transportation in India. Mr. Wes Irvin, Associate Administrator, Federal Transit Administration, also provided an address during which he expressed his gratitude for the opportunity to meet with Indian officials, as well as his positive outlook on the relationships that are being built between the two countries. In closing, Mr. Irvin quoted Mahatma Gandhi, "Democracy must in essence, therefore, mean the art and science of mobilizing the entire physical, economic, and spiritual resources, of all the various sections of the people in the service of the common good of all."

Industry Roundtable in Mumbai

Conclusion

The 2008 FTA Mission to India was successful in achieving a number of key objectives in the continued development of the relationship between the two countries. The U.S. delegation was impressed by the recent successes made in India in the field of Public Private Partnerships, which is the subject of a current U.S. initiative led by the Federal Highway Administration. India's National Urban Transport Policy is an excellent example of an integrated transport strategy, combining transportation planning and land use planning and recognizing the need to provide high quality, public transportation and non-motorized mode infrastructure. Both the United States and India can benefit from this type of approach when implementing new systems. The visit provided an opportunity to the business members of the delegation to meet high level officials of the Central and State Governments of India.

As established trade partners, it has been determined that the Memoranda of Cooperation in the field of public transportation, science and technology signed in Delhi in 2007 and in Mumbai of 2008 will be a benefit to both countries in terms of knowledge base exchange and industry collaboration. This growing relationship creates the ability for further collaboration in public transportation in relation to Bus Rapid Transit (BRT), the use of public private partnerships, Intelligent Transportation Systems (ITS), and infrastructure improvements.

In addition to learning about the current status of India's transportation infrastructure and planned improvements, the delegation was able to have an open dialogue with senior Indian transportation officials and ascertain possible involvement of the U.S. transit industry in the development of infrastructure as well as develop a network of contacts. Information regarding lessons learned in both the U.S. and India also was also exchanged.

Appendix I - Memorandum of Cooperation

MEMORANDUM OF COOPERATION

BETWEEN

THE FEDERAL TRANSIT ADMINISTRATION OF THE DEPARTMENT OF TRANSPORTATION OF THE UNITED STATES OF AMERICA

AND

THE GOVERNMENT OF STATE OF MAHARASHTRA OF THE REPUBLIC OF INDIA

ON COOPERATION

IN PUBLIC TRANSPORTATION SCIENCE AND TECHNOLOGY

The Federal Transit Administration of the Department of Transportation of the United States of America and the Government of State of Maharashtra of the Republic of India (hereinafter referred to as "the Participants"):

Recognizing that new developments in the field of transportation technology can make important contributions towards promoting, encouraging, and advancing safe, economical, efficient, and environmentally sound public transportation systems: and

Desiring to promote scientific and technological cooperation and collaboration in the field of public transportation have reached agreement as follows:

Article I

The Participants intend to undertake cooperation and collaboration in public transportation science and technology on the basis of equality, reciprocity and mutual benefit.

Article II

The Participants intend that the cooperation and collaboration may include the following fields:

1. Public transportation
2. Intermodal transportation
3. Transportation Safety
4. Transportation for Persons with Disabilities
5. Intelligent Transportation Systems (ITS)
6. Traffic and Transportation Information Centers
7. Capacity building and training in public transportation
8. Other fields of mutual interest

The Participants may identify specific projects for cooperation in public transportation science and technology within the above-mentioned fields. Identification of areas of cooperation and their implementation may be made while paying due attention to the state of art of technology regarding such projects.

Article III

The Participants may pursue cooperation through one of the following methods:

1. Exchange of scientific and technical information on subjects of mutual interest;
2. Exchange of specialists, delegations, and scientific and technical personnel;
3. Joint organization of symposia, seminars, training programs and other meetings;
4. Joint research in science and technology, urban transportation; and
5. Other forums of cooperation as mutually agreed.

Article IV

With regard to the cooperative activities under this Memorandum, the Participants may allow, as appropriate, the participation of other relevant governmental agencies, researchers and organizations from all sectors of the research establishment, including universities, national laboratories, and the private sector.

Article V

In order to coordinate the cooperative activities, each Participant may designate a representative to be responsible for determining the particular directions of cooperation and for ensuring the effectiveness of exchange. The representatives of the Participants or their designated coordinators should, by correspondence, consult with each other and define the cooperative activities and other related matters. When necessary, they may meet to consider matters related to the implementation of this Memorandum.

Article VI

The cooperation is subject to the availability of funds and personnel.

Article VII

Specific cooperative projects and activities may be embodied in separate memoranda or plans between the Participants, which may cover the subject, procedures, and terms of cooperation to be undertaken, the entities involved, funding, and other appropriate matters related to the conditions of such cooperation.

Article VIII

The Participants may consult, as appropriate, in respect of any matter that may arise from, or in connection with, the Memorandum.

Article IX

Scientific and technical information of a non-proprietary nature derived from the cooperative activities conducted under the Memorandum may be made available to the public through customary channels and, in accordance with, the normal procedures of the Participants and other governmental entities involved in the cooperative activities.

Article X

Information transmitted by one Participant to the other under this Memorandum should be accurate to the best knowledge and belief of the transmitting Participant, but the transmitting Participant does not intend to warrant the suitability of such information for any particular use or application by the receiving Participant.

Article XI

The activities under this Memorandum should commence on the date of signature below. Either Participant may end its cooperation under this Memorandum at any time, but should attempt to provide sixty (60) days prior written notification to the other Participant. The Participants should endeavor to complete or continue specific activities then underway, if they so choose.

FOR THE FEDERAL TRANSIT ADMINISTRATION OF THE DEPARTMENT OF TRANSPORTATION OF THE UNITED STATES OF AMERICA	FOR THE GOVERNMENT OF THE STATE OF MAHARASHTRA OF THE REPUBLIC OF INDIA
James S. Simpson James S. Simpson Administrator	Vilasrao Deshmukh Chief Minister

Date: 29 September 2008

Appendix II – National Urban Transport Policy

Background

1. India is poised for rapid economic growth. Such future growth will largely come from the secondary and tertiary sectors of the economy, i.e., the industrial and service sectors. Since economic activities in these sectors primarily take place in urban areas, the state of our towns and cities is crucial to India's future growth.

2. Further, India's urban population is currently around 30% of its total population. Experience across the world has been that as economies grow, rapid urbanization takes this proportion to over 60% before it begins to stabilize. As such, it is projected that India's urban population would grow to about 473 million in 2021 and 820 million by 2051, as against only 285 million in 2001. Hence, cities must not only meet the mobility needs of the current population but also provide for the needs of those yet to join the urban population. In this context, the Government of India has launched the National Urban Renewal Mission (NURM) that inter-alia seeks to bring about comprehensive improvements in urban infrastructure, committing substantial funds for this purpose and requiring a series of reforms that would make the investments sustainable.

3. For urban areas to be able to support the required level of economic activity, they must provide for the easy and sustainable flow of goods and people. Unfortunately, however, such flow of goods and people has been facing several problems. Most prominent among them have been the following:

- Accessing jobs, education, recreation and similar activities is becoming increasingly time consuming. Billions of man hours are lost with people "stuck in traffic". The primary reason for this has been the explosive growth in the number of motor vehicles, coupled with limitations on the amount of road space that can be provided. For example, on an average, while the population of India's six major metropolises increased by about 1.9 times during 1981 to 2001, the number of motor vehicles went up by over 7.75 times during the same period.

- The cost of travel, especially for the poor, has increased considerably. This is largely because the use of cheaper non-motorized modes like cycling and walking has become extremely risky, since these modes have to share the same right of way with motorized modes. Further, with population growth, cities have tended to sprawl and increased travel distances have made non-motorized modes impossible to use. This has made access to livelihoods, particularly for the poor, far more difficult.

Travel in the city has become more risky with accident rates having gone up from 1.6 lakh in 1981 to over 3.9 lakh in 2001. The number of persons killed in road accidents has also gone up from 28,400 to over 80,000 during the same period. This again has tended to impact the poor more severely as many of those killed or injured tend to be cyclists, pedestrians or pavement dwellers.

Increased use of personal vehicles has led to increased air pollution.

4. Unless the above problems are remedied, poor mobility can become a major dampener to economic growth and cause the quality of life to deteriorate. A policy is, therefore, needed on the approach to dealing with this rapidly growing problem as also offer a clear direction and a framework for future action.

Vision

- To recognize that people occupy center-stage in our cities and all plans would be for their common benefit and well being

- To make our cities the most livable in the world and enable them to become the "engines of economic growth" that power India's development in the 21st century

To allow our cities to evolve into an urban form that is best suited for the unique geography of their locations and is best placed to support the main social and economic activities that take place in the city.

Objectives

5. The objective of this policy is to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, recreation and such other needs within our cities. This is sought to be achieved by:

- Incorporating urban transportation as an important parameter at the urban planning stage rather than being a consequential requirement

- Encouraging integrated land use and transport planning in all cities so that travel distances are minimized and access to livelihoods, education, and other social needs, especially for the marginal segments of the urban population is improved

- Improving access of business to markets and the various factors of production
- Bringing about a more equitable allocation of road space with people, rather than vehicles, as its main focus
- Encourage greater use of public transport and non-motorized modes by offering Central financial assistance for this purpose
- Enabling the establishment of quality focused multi-modal public transport systems that are well integrated, providing seamless travel across modes
- Establishing effective regulatory and enforcement mechanisms that allow a level playing field for all operators of transport services and enhanced safety for the transport system users
- Establishing institutional mechanisms for enhanced coordination in the planning and management of transport systems
- Introducing Intelligent Transport Systems for traffic management
- Addressing concerns of road safety and trauma response
- Reducing pollution levels through changes in traveling practices, better enforcement, stricter norms, technological improvements, etc.
- Building capacity (institutional and manpower) to plan for sustainable urban transport and establishing knowledge management system that would service the needs of all urban transport professionals, such as planners, researchers, teachers, students, etc
- Promoting the use of cleaner technologies
- Raising finances, through innovative mechanisms that tap land as a resource, for investments in urban transport infrastructure
- Associating the private sector in activities where their strengths can be beneficially tapped

- Taking up pilot projects that demonstrate the potential of possible best practices in sustainable urban transport

Need for a National Policy

6. Although the responsibility for management of urban areas (and thus urban transport) rests with the State governments, a Central policy is considered necessary as:

- Several key agencies that would play an important role in urban transport planning work under the Central government, with no accountability to the State government

- Several Acts and Rules, which have important implications in dealing with urban transport issues, are administered by the Central Government

- A need exists to guide State level action plans within an overall framework.

- The launching of the NURM has provided a timely platform for providing significant financial support from the Central Government for investments in urban transport infrastructure. As such, this offers an opportunity for a meaningful national policy that would guide Central financial assistance towards improving urban mobility.

- A need exists to build capacity for urban transport planning and also develop it as a professional practice.

- A need exists to take up coordinated capacity building, research and information dissemination to raise the overall level of awareness and skills.

Realizing the Policy Objectives

7. The objectives of this policy would be achieved through a multi-pronged approach that would revolve around the measures highlighted in the previous section. These are further elaborated in the sections that follow.

Integrating land use and transport planning

8. Cities in India vary considerably in terms of their population, area, urban form, topography, economic activities, income levels, growth constraints, etc. Accordingly, the design of the transport system will have to depend on these city specific features.

Further, transport planning is intrinsically linked to land use planning and both need to be developed together in a manner that serves the entire population and yet minimizes travel needs. In short, an integrated master plan needs to internalize the features of sustainable transport systems. In developing such plans, attention should also be paid to channel the future growth of a city around a preplanned transport network rather than develop a transport system after uncontrolled sprawl has taken place. Transport plans should, therefore, enable a city to take an urban form that best suits the geographical constraints of its location and also one that best supports the key social and economic activities of its residents. Unfortunately, however, transport planning has not received the extent of attention it should have in drawing up strategic development and land use plans.

9. The Government of India would, therefore, promote the development of such integrated land use and transport plans for all cities. To enable this, all urban development and planning bodies in the States would be required to have in house transport planners as well as representation from transport authorities in their managements. The Government of India would extend support for the preparation of such integrated land use and transport plans, to the extent of 50% of the cost involved in developing such plans, provided the city also demonstrates its willingness to act in accordance with them. In order to create models for possible learning and replication, the Government of India would fully support pilot studies in a few sample cities, of different characteristics and in different regions of the country. As part of this exercise, each city would also be encouraged to identify potential corridors for future development and then establish a transport system that would encourage growth around itself. For example, radial corridors emerging from the city and extending up to 20-30 kms could be reserved for future development. Such corridors would have to be protected from encroachment by putting up physical barriers along such reserved corridors and physically constructing roads on short stretches even before settlements come up. This would imply that stretches of the corridor would come up first in order to guide the location of the settlements and not allow undue sprawl to take place.

10. A scheme already exists under which the Central Government provides partial financial support for traffic and transport studies in cities. This would be modified to enhance the extent of Central Government support and also make these studies more broad based to integrate transport planning with land use planning, keeping projected populations in mind.

Equitable allocation of road space

11. At present, road space gets allocated to whichever vehicle occupies it first. The focus is, therefore, the vehicle and not people. The result is that a bus carrying 40 people is allocated only two and a half times the road space that is allocated to a car carrying only one or two persons. In this process, the lower income groups have, effectively, ended up paying, in terms of higher travel time and higher travel costs, for

the disproportionate space allocated to personal vehicles. Users of non-motorized modes have tended to be squeezed out of the roads on account of serious threats to their safety. If the focus of the principles of road space allocation were to be the people, then much more space would need to be allocated to public transport systems than is allocated at present.

12. The Central Government would, therefore, encourage measures that allocate road space on a more equitable basis, with people as its focus. This can be achieved by reserving lanes and corridors exclusively for public transport and non-motorized modes of travel. Similarly lanes could be reserved for vehicles that carry more than three persons (popularly known as High Occupancy Vehicle Lanes). Past experience has been that such reserved lanes are not respected by motorists and therefore lose meaning. In order to facilitate better enforcement of such lane discipline, suitable provisions would be introduced in the Motor Vehicles Act and other instrumentalities to enable stringent penalties for violation.

Priority to the use of public transport

13. It is well known that public transport occupies less road space and causes less pollution per passenger-km than personal vehicles. As such, public transport is a more sustainable form of transport. Therefore, the central government would promote investments in public transport as well as measures that make its use more attractive than in the past. Towards this end, the Central government would encourage all State capitals as well as other cities with a population of more than one million to start planning for high capacity public transport systems. In doing so, they should look at various proven technologies around the world, including the use of available waterways, They should adopt a technology that would best suit the city requirements in the next 30 years. Comprehensive city wide plans should be drawn up comprising trunk and feeder corridors as well as good integration with personal modes, suburban traffic, etc. High cost trunk route systems should, through appropriate hub-spoke arrangements be integrated with feeder systems that enable higher ridership on such trunk systems.

14. In order to effectively promote such investments, the Central Government would:

- Provide 50% of the cost of preparing comprehensive city transport plans and detailed project reports
- Offer equity participation and/or viability gap funding to the extent of 20% of the capital cost of public transport systems
- Offer 50% of the cost of project development whenever such projects are sought to be taken up through public-private partnerships, so that a sound basis for attracting private partners can be established. The remaining cost of such project development would have to come from the city development authority/State government and a project developer.

15. Some allied issues that need to be addressed in this context are:

Quality and pricing of Public Transport

16. So far, fares for public transport have been set on the premise that this mode of travel is used by the poor, who have no other means of meeting their travel needs. As such, fares have been kept low as a measure of social equity. This has resulted in most public transport systems being unable to recover their operating costs. It has, in fact, encouraged poorly operated systems that have been financially sustainable only through serious compromises on the quality of the service they render. In the present day context, however, public transport serves another social purpose. It helps reduce congestion and air pollution, if users of personal vehicles can be persuaded to shift to public transport. Their needs are, however, for improved quality and not so much for low fares. It is, therefore, necessary to think of different types of public transport services for different segments of commuters. Those who place a premium on cost are the poorest sections of society and need to be given affordable prices. The cost of providing public transport for them needs to be subsidized by other sections of society. However, there is another segment that values time saved and comfort more than price. This segment is comparatively better off and would shift to public transport if high quality systems are available to them. The cost of providing public transport to them need not be subsidized and can be met from the fare revenues. As such, the Central Government would encourage the provision of different levels of services – a basic service, with subsidized fares and a premium service, which is of high quality but charges higher fares and involves no subsidy.

17. To facilitate this, the Central Government would offer support under the NURM for premium service infrastructure such as improved bus stations and terminals, improved passenger information systems, use of intelligent transport systems for monitoring and control, restructuring of State Transport Corporations, etc.

18. To ensure that the fares charged are fair and reasonable, the Central government would require that a regulatory authority be set up by the State Government to, inter-alia, regulate the prices to be charged by different types of public transport services.

Technologies for Public Transport

19. There is a wide spectrum of public transport technologies. At one end are high capacity, but high cost, technologies like underground metro systems and at the other are low capacity bus systems running on a shared right of way. Within these extremes are a range of intermediate possibilities, such as buses on dedicated rights of way, elevated sky bus and monorail systems, electric trolley buses, etc. While some of them are most effective over high density trunk corridors others prove useful as feeder systems or subsystems that serve limited subareas within a city. Similarly, there are examples of available waterways being taken advantage of for public transport as also systems like ropeways that suit hilly terrains. While the high capacity rail systems and buses on shared rights of way are the only ones tried out in India, several of the others have proved successful in other parts of the world.

Electric trolley buses have been running in San Francisco. New Bus Rapid Transit Systems (BRTS) have become very popular in cities like Bogota (Colombia) and Curitiba (Brazil).

20. Each of these technologies has its unique characteristics and is best suited to a specific situation. Factors such as the urban form, terrain, availability of waterways, level of demand, direction and extent of sprawl, projections for future growth, extent of population density etc. are major determinants of the technology that should be chosen. The table at Attachment – I highlights the advantages and disadvantages of some of the available public transport technologies also indicating the technologies that best suit different local situations. While rail based systems seem to suit dense cities with limited sprawl and only a few spinal corridors, bus systems seem better where urban densities are lower and the city has spread over a large area. Given the wide range of possibilities, it is not possible to prescribe a particular technology in a generic policy and such a choice will have to be made as a part of city specific land use and transport plans. It would also depend on the kind of city that would need to evolve at the particular location. The Central Government would, therefore, encourage all proven technologies and not promote any specific technology. In order to facilitate the proper evaluation of all the available technologies around the world, it would create a knowledge center that would provide the necessary information required for taking the right technological decisions for a specific city. Wherever necessary, support would be provided for techno-economic studies to be conducted by leading global consultants.

Integrated public transport systems

21. All cities have corridors that have varying densities of travel and hence need technologies that best match the level of demand on the corridor. This often requires different operators managing such systems. However, a good public transport system is one that is perceived by the user as a single system and allows seamless travel between one made and the other as also between systems managed by different operators. Such seamless interchange is possible if proper inter-change infrastructure is available and users are able to use a single ticket over all such systems. This also requires that a single agency takes responsibility for coordination so that there is a common approach to public transport planning and management.

22. Accordingly, the Central government would expect that investments in public transport systems would also seek to ensure that such systems are well integrated and offer a seamless system to the users. Central government's financial support would be contingent on appropriate authorities/entities being set up to ensure that a coordinated and integrated public transport system becomes available.

Financing

23. The Central Government would encourage high capacity public transport systems being set up through the mechanism of Special Purpose Vehicles (SPV) and would

offer financial support either in the form of equity or one time viability gap financing, subject to a ceiling of 20% of the capital cost of the project, after evaluating various parameters such as:

- Extent of resources mobilized by the State government through exploitation of its land resources
- Extent of resources likely from private participation
- Institutional mechanisms set up by the State government to ensure a well coordinated public transport system
- Willingness to divert funds from projects that add to road capacity towards public transit systems
- Initiatives taken to promote non-motorized transport and improve safe access to public transport.
- Willingness to introduce premium public transport systems that are priced high but offer better quality with a view to limit the subsidy requirements in normal services.
- Willingness to involve the private sector in operations under the overall supervision and coordination of a public agency
- Willingness to price public transport systems in such a manner as to be financially sustainable at the operating stage or depend only marginally on public budgets

24. The basic principle in financing such public transport systems would be that the government should provide the infrastructure but the users (direct and indirect beneficiaries within the city) must pay for the operating costs and the rolling stock.

25. The Central government's capital support would take the form of equity participation or one time viability gap funding and would be subject to a ceiling of 20% of the capital cost of the project. Preference will be given to those who are able to demonstrate additional resources for the project through dedicated taxes and innovative financing methods.

Role of para-transit

26. Para transit is normally expected to fulfill a need that neither public transport or personal vehicles are able to fulfill. They normally cater to a category of occasional trips such as trips to airports or rail stations with excessive baggage, or emergency

trips that have to be undertaken immediately and it is not possible to wait for public transport. Para transit would not normally be used for regular commute trips to work or school. However, when the quality of public transport deteriorates, para-transit tends to substitute for public transport. Unfortunately, this has started happening in many Indian cities. As such, this policy would seek to restore para-transit to its normal role by persuading the improvement of public transport.

Priority to non-motorized transport

27. With increasing urban sprawl and rising income levels, non-motorized transport has lost its earlier importance. Statistics show that the share of bicycle trips out of the total trips in Delhi has declined from 17% in 1981 to 7% in 1994. The longer trip lengths have made cycling more difficult. Further, non-motorized modes are also exposed to greater risk of accidents as they share a common right of way with motorized vehicles. However, non-motorized modes are environmentally friendly and have to be given their due share in the transport system of a city. The problems being faced by them would have to be mitigated.

28. First of all, the safety concerns of cyclists and pedestrians have to be addressed by encouraging the construction of segregated rights of way for bicycles and pedestrians. Apart from improving safety, the segregation of vehicles moving at different speeds would help improve traffic flow, increase the average speed of traffic and reduce emissions resulting from sub-optimal speeds. Such segregated paths would be useful not only along arterials, to enable full trips using NMT but also as a means of improving access to major public transport stations. Such access paths, coupled with safe bicycle parking places, would contribute towards increasing the use of public transport. Creative facilities like shade giving landscaping, provision of drinking water and resting stations along bicycle corridors would also be encouraged as they can mitigate, to a large extent, adverse weather conditions. The use of the central verge along many roads, along with innovatively designed road crossings, seems to offer promise for being developed as cycle tracks.

29. It has been the experience that many such cycle tracks and pedestrian paths do not get used as initially envisaged. However, a view has been that this is because these facilities are designed badly and without fully recognizing the limitations and problems faced by cyclists or pedestrians. It would, therefore, be essential that such facilities be constructed after an open debate on the designs with experts and the community that is expected to use them.

It is expected that such public appraisal would lead to designs that enable greater use by the potential beneficiaries. Encroachment of footpaths too affects pedestrian safety adversely and requires strict enforcement coupled with public participation. Pedestrian safety is also adversely affected by the lack of safe crossing facilities at busy intersections of even high traffic corridors.

30. The Central Government would give priority to the construction of cycle tracks and pedestrian paths in all cities, under the National Urban Renewal Mission (NURM), to enhance safety and thereby enhance use of non-motorized modes. Cities would also be encouraged to explore the possibility of a public bicycle program, where people can rent a bicycle for use in specially designated areas

31. The Central government would support the construction of safe pedestrian crossings at busy intersections and high traffic corridors.

32. The Central Government would support formulation and implementation of specific "Area Plans" in congested urban areas that propose appropriate mix of various modes of transport including exclusive zones for non-motorized transit.

33. The Central Government would also take up pilot projects, in a sample set of cities, to demonstrate the improvements that are possible through the enhanced used of cycling, for possible replication in other cities.

Parking

34. Land is valuable in all urban areas. Parking places occupy large portions of such land. This fact should be recognized in determining the principles for allocation of parking space.

35. Levy of a high parking fee, that truly represents the value of the land occupied, should be used as a means to make the use of public transport more attractive.

Preference in the allocation of parking space for public transport vehicles and non-motorized modes as well as easier access of work places to and from such spaces would go a long way in encouraging the use of sustainable transport systems. Park and ride facilities for bicycle users, with convenient inter-change, would be another useful measure. Simultaneously, a graded scale of parking fee, that recovers the economic cost of the land used in such parking, should be adopted. The objective would be to persuade people to use public transport to reach city centers. State governments would be required to amend building bye laws in all million plus cities so that adequate parking space is available for all residents / users of such buildings. To enable this, FAR norms would be made more liberal. Multi-level parking complexes should be made a mandatory requirement in city centers that have several high rise commercial complexes. Such complexes could even be constructed underground, including below areas declared as green belts in the master plan. Such complexes could come up through public-private partnerships in order to limit the impact on the public budget. All such parking complexes would be encouraged to go in for electronic metering so that is there is better realization of parking fees to make the investments viable and also a better recovery of the cost of using valuable urban space in the parking of personal motor vehicles. In residential areas too, appropriate changes in bye-laws would be considered to free the public carriage way from parked vehicles that impede the smooth flow of traffic. Proposals for parking complexes

would also be given priority under the National Urban Renewal Mission. Provisions would also be made in the appropriate legislation to prevent the use of the right of way on road systems for parking purposes.

Freight traffic

36. As economic activities in cities expand and city population grows, a substantial amount of freight traffic would be generated. The timely and smooth movement of such freight is crucial to the well being of the people and the viability of the economic activities they undertake. However, with limited capacity of the transport system, it is essential that freight traffic and passenger traffic are so staggered as to make optimum use of the transport infrastructure. It is a time honored and tested practice to use off-peak passenger travel times to move freight. Many cities have earmarked late night hours for the movement of freight and restricted the entry of heavy vehicles into cities during day time. Further, several cities have by-passes that enable through traffic to go around the city and not add to city traffic. These practices are sound and

would be encouraged in all cities. For this purpose, cities would be encouraged to build by-passes, through innovative and viable public – private partnerships. Similarly, facilities for the parking of freight vehicles outside city limits, such as truck terminals, would also be encouraged through public-private partnerships. Proposals for such facilities would be considered under the National Urban Renewal Mission.

Legal and Administrative Issues

37. The current structure of governance for the transport sector is not equipped to deal with the problems of urban transport. These structures were put in place well before the problems of urban transport began to surface in India and hence do not provide for the right co-ordination mechanisms to deal with urban transport. The Central Government will, therefore, recommend the setting up of Unified Metropolitan Transport Authorities (UMTA's) in all million plus cities, to facilitate more coordinated planning and implementation of urban transport programs and projects and an integrated management of urban transport systems. Such Metropolitan Transport Authorities would need statutory backing in order to be meaningful.

38. The Central Government would also encourage the setting up of professional bodies that have the capacity to make scientific assessment of the demand on various routes and contract services that can be properly monitored. Towards this end, it would encourage the setting up of umbrella bodies that regulate the overall performance of the public transport system and ensure that the city has a comprehensive public transport system. Such bodies would, inter-alia, design networks and routes, assess demand, contract services, monitor performance, manage common facilities like bus stations and terminals, etc. They would have representation from all the major operators and stakeholders.

39. Model legislation would be drafted for cities to consider and adopt, with such modifications as may be required to suit city specific requirements.

Capacity building

40. The responsibility for the planning and implementation of urban transport systems rests with the State governments and the municipal bodies. However, since the problems associated with urban transport are of relatively recent origin in India, having surfaced only from the early 1990s, the ability to fully understand and deal with these problems is yet to fully mature. This calls for concerted efforts at strengthening capabilities at the State and city level to address these issues and undertake the task of developing sustainable urban transport systems.

41. Capacity building will have to be addressed at two levels – institutional and individual. Institutional capacity would primarily involve creating a pool of knowledge and a knowledge management center that would sustain and enhance expertise as well as facilitate more informed planning. It would also sponsor regular research to help formulate the right mitigation strategies, without merely adopting what other countries have tried. The Institute of Urban Transport (India), an existing institute under the purview of the Ministry of Urban Development would be suitably strengthened to discharge this responsibility. It would be built up to serve as a national level facility to provide continuous advice and guidance on the principles of good urban transport planning as emerges from its research. Advice on new technologies would also be regularly available to implementing agencies from this institute. For this purpose, the institute would become a store house of information on the various public transport technologies being used in different parts of the world and would maintain the latest information and literature on the experience with such technologies. It would, in fact be a comprehensive repository of the best practices in the field.

42. The virtual lack of a database on urban transport statistics has severely constrained the ability to formulate sound urban transport plans and reliably assess the impact of the different initiatives that have been taken. The national level institute would build up a database for use in planning, research, training, etc in the field of urban transport.

43. The Central Government would also encourage the development of such institutional capacity at the State level through the platform of the National Urban Renewal Mission. A specific scheme would need to be formulated for this purpose.

44. At the individual level, a major exercise of training and skill development of the public officials and other public functionaries would be taken up to make such officials aware of the nuances of urban transport planning and the specific issues involved in managing city transport. This would be targeted at personnel belonging to the State transport departments, municipal corporations, metropolitan development authorities, traffic police, environmental authorities, State Transport Corporations, Public Works Departments, etc.

45. It is recognized that there are several proven technologies for public transport around the world that have yet to be adopted in India. In order to build up the necessary capacity to adopt such technologies within the country, the Central Government would facilitate joint ventures and collaboration agreements between such technology providers and suitable Indian companies. Necessary incentives would be provided to enable such technologies to get commercialized in India. This could be by way of financing customized prototypes, development of designs to suit Indian conditions, trial operations, training of the technical personnel, etc. The objective would be to ultimately build a level playing field for all proven technologies.

46. As part of the exercise of skill development, academic programs in urban transport, especially at the post-graduate level, would be strengthened so that a nucleus of qualified urban transport professionals becomes available in the country. Suitable collaborations, with leading institutes abroad, would be established to offer expertise to such programs in the initial years. An annual urban transport conference would also be institutionalized, to bring together the urban transport professionals in the country to share their experiences. International experts would be invited to such a conference so that Indian professionals are able to exchange information and learn from developments and experiences abroad. A well rated urban transport journal would also be started.

Use of cleaner technologies

47. While petroleum based fuels are by far the most commonly used today, other alternatives have been emerging, though slowly. CNG has been adopted in a big way for bus transport in Delhi. Electric trolley buses are also being proposed in the city. Electric vehicles have already entered the market for cars and auto rickshaws. Electric two wheelers are also under development. Such cleaner technologies need to be encouraged so that the problem of vehicular pollution can be more effectively dealt with.

Besides, renewable sources need to be tapped as a measure of sustainable development and in recognition of India's energy security concerns. The Central Government would, therefore, encourage the research, development and commercialization of cleaner technologies.

48. New technologies always find it difficult to enter an established market and new auto fuel technologies would also face this problem. However, in view of their many advantages, they would be offered suitable concessions and benefits that would enable them to make an entry and compete with established technologies on more equitable terms. It is expected that such competition will also encourage established technologies to improve their performance characteristics and compete with the emerging choices.

49. Several vehicles on our roads tend to be poorly maintained and are overly polluting. This is partly because the requirements of proper maintenance are not

stringent and are largely driven only by the owner's motivation to save on fuel cost. Even where such motivation exists, the lack of a widespread network of good quality repair facilities discourages them for the exertion of having their vehicles periodically tested.

50. In order to overcome these problems, the Central Government would, lay down a clear and time bound schedule of progressively tighter emission norms, with adequate lead-time, to allow the auto and oil industry to make the required investments. Measures would also be introduced to incentivize the use of fuel efficient (zero pollution) and small sized vehicles that use up little road space and also cause low pollution.

Statutory provisions would also be introduced requiring all in-use vehicles in a city, including personal motor vehicles, to undergo a periodic check up and obtain a specified certification. States would be encouraged to set up such certification facilities, in partnership with the private sector. The Central Government would also support the establishment of training centers for the staff of such certification establishments so that there are adequate skilled personnel, both for certification and for undertaking the required repairs. All of these would require that an effective regulatory body be set up to prescribe, monitor and enforce the adherence of emission and safety standards.

Innovative financing mechanisms using land as a resource

51. It is evident that huge capital investments will be required in dealing with the urban transport problems. Whether they are for constructing capital intensive mass transit systems or segregated rights-of-way for cycles and pedestrians, a substantial financial burden would devolve on the government. Most State governments and local bodies do not have the required resources and, therefore, alternative methods of financing would have to be explored.

52. The Central Government would encourage the levy of dedicated taxes to be credited to an urban transport fund and used exclusively to meet urban transport needs within the State. Such dedicated taxes could be in the form of a supplement to the petrol and diesel taxes, betterment levy on land owners or even an employment tax on employers. In fact, revenues from a betterment levy along new high capacity public transport corridors would be included as a component of the financing plan for such new public transport systems.

53. The Central Government would also encourage partnerships and greater use of private capital in areas where the private sector can competitively deliver urban transport services. More specifically, the greater use of private buses in city areas would be encouraged to reduce the dependence on public budgets. The commercial utilization of land resources, available with public transport service providers, is also recommended to raise additional resources.

Association of the private sector

54. There are several activities in which the private sector can be beneficially engaged, thereby saving financial resources for activities that only public agencies can best perform. However, these have to be done under conditions that strike a fair balance between the universal obligations of the government and the profit motive of the private operator. Accordingly, the Central Government would encourage a more liberal use of the private sector, especially in activities like the operation and maintenance of parking facilities, certification facilities, repair facilities, construction and management of terminal facilities, etc. Till the mid 1980s most public transport services were largely provided by publicly owned State Transport Corporations. Since then, however, some States have permitted privately run services. While public operations have tended to be high cost and most State Transport Corporations have run up heavy losses, the reliability and safety record of inadequately regulated private operators has been poor. On balance, the Central Government would encourage the State Governments to involve the private sector in providing public transport services, but under well structured procurement contracts.

Need for Public Awareness and Cooperation

55. Urban transport policies cannot succeed without the fullest cooperation of all the city residents. Such cooperation can be best secured if the objective of any initiative is made clearly known to them. It is, therefore, necessary to launch intensive awareness campaigns that educate people on the ill effects of the growing transport problems in urban areas - especially on their health and well being. The campaigns would seek their support for initiatives like greater use of public transport and non-motorized vehicles, the proper maintenance of their vehicles, safer driving practices, etc. Such campaigns would also encourage individuals, families and communities to adopt “Green Travel Habits” that would make travel less polluting and damaging. The Central Government would take up a major awareness campaign in this regard and seek the support of the State Government in its implementation. Particular emphasis would be laid on bringing about such awareness amongst children through inputs in their school curricula.

Pilot Projects

56. In order to demonstrate the potential benefits from the policy measures suggested herein, the Central Government would take up pilot projects in a sample set of cities drawn from different regions and different city types so that tested models of best practices can be established for replication in other cities.

Annex 1: Relative characteristics of available public transport technologies

Technology	Advantages	Disadvantages	Some cities where operating	Useful for
Heavy rail systems – underground, elevated or at grade	Very high carrying capacity High speed Very low pollution in Operations Needs very little urban space	Very high capital costs High per unit operating costs if capacity utilization is low Inflexible Long gestation period Needs extensive feeder network or very dense captive area Complex interconnectivity with feeder system Relatively complex technology requiring highly specialized manpower for O&M	Singapore, Tokyo, Hong Kong and several cities in Europe and North America	Very high density corridors, where road space is very limited. Well suited for densely populated cities that have low sprawl and few spinal, long haul corridors At grade systems are very good for sub-urban systems and the fringe areas of a city where space is more easily available
Light Rail Systems	Capital costs are less than for heavy rail systems Per unit operating costs are less than for heavy	Capital costs higher than for bus systems Inflexible Per unit operating costs higher than for bus systems if capacity utilization is low Needs substantial urban	Several cities in North America and Europe	Medium density corridors where space availability is adequate for supporting elevated structures or at grade tracks

	rail systems Low pollution levels Needs less urban space than bus based systems Needs limited urban space if elevated or underground (however capital costs go up)	space if at grade Carrying capacity is lower than for heavy rail systems though comparable to high capacity bus systems Needs extensive feeder network or dense captive area Complex interconnectivity with feeder system Relatively complex technology requiring specialized skills for O&M		Medium density cities with limited sprawl
High capacity bus systems on dedicated lanes	Capital costs lower than for rail based systems Low O&M costs Higher capacity than normal bus services More flexible than rail based systems Needs less extensive feeder network than rail based	Capacity not as high as heavy rail systems though comparable to light rail systems More polluting than rail based systems Needs imported fuel Needs urban space for dedicated corridor	Brazil, Colombia and several other cities in Latin America	Medium density corridors where space availability is adequate for supporting the dedicated right of way Medium density cities with limited sprawl

	systems Easy connectivity with feeder system Relatively simple technology with easy availability of manpower for O&M			
Sky bus	System is non-polluting Needs limited urban space for supporting elevated structures	Not yet proven anywhere on commercial operations Inflexible		Medium density corridors where space is limited Promising for dense city centers
Electric Trolley bus	Advantages / disadvantages of normal bus system but with a higher capital cost, though non-polluting. Relatively inflexible and impacts city aesthetics due to overhead clutter.		San Francisco	All routes suitable for buses but where local pollution has to be low
Normal buses on shared right of way	Very low capital cost Low operating costs Highly flexible Do not need feeder systems	Very low capacity Polluting Low speeds Poor social image	Most cities around the world	Low density corridors where local pollution is not a critical issue Feeder to higher capacity systems