

**PRE-REQUISITES FOR A  
DEDICATED MASS TRANSIT SYSTEM  
IN  
ISLAMABAD / RAWALPINDI**

NTRC - 272

100-100000

A MORE EXTENSIVE ONE  
WILL BE "CREATED" WITH INTERESTING  
INTERESTS

625.4  
NTRC  
2006

08556

Government of Pakistan  
Ministry of Communications  
National Transport Research Centre (NTRC)

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**PRE-REQUISITES FOR A  
DEDICATED MASS TRANSIT SYSTEM**

**IN  
ISLAMABAD / RAWALPINDI**

December, 2006

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## **INTRODUCTION**

Due to high growth in the number of private cars, reliance on small public transport vehicles (like wagons, etc), lack of investment in large size buses and under investment in urban road infrastructure, the congestion problem in urban cities of Islamabad - Rawalpindi has increased manifold over the past few years.

Faced with what appears to be insurmountable transport problems, there is frequently a temptation to turn to expensive infrastructure projects like the dedicated mass transit system (e.g. rapid rail transit) or expensive highway infrastructure to provide massive amount of new transport capacity to relieve the crowded roads. This temptation often ignores the essential ingredients of an urban transport system, which are extremely essential even in the presence of a dedicated mass transit system required on some major corridors in large urban cities.

## **II. THE PROBLEM STATEMENT**

The existing problem has the following components :

- (1) With an easy access to bank loans at low mark-up rates for cars, there has been an un-precedented increase in car ownership, which has resulted in severe congestion, parking problems, environmental implications, etc.
- (2) The lack of investment in urban infrastructure or the difference in time frames inherently existing between induction of new vehicles and the corresponding increase in infrastructure capacity have further made the problem acute.
- (3) A decent public bus transport system is almost non-existent and this too has provided a fillip to the growing trend of car ownership.
- (4) There is a considerable increase in both the population and area of the twin cities of Islamabad and Rawalpindi and the available land is being devoured in other uses with least regard for

meeting the urban land requirement for the present transport system (terminals, parking bays, etc) and for future mass transit system requirements. Even whatever little land was reserved (e.g. defunct PRTC Depot in Sector I-8, Islamabad) has been planned for conversion into a residential area. This change in land-use contrary to the Master Plan also creates problems.

- (5) The notion that the mass transit system has to be either elevated or underground further adds to complacency to reserving the land (on ground) eventually required for any decent public transport system to provide an efficient service and inter connections with other modes of transport.
- (6) There are a number of other issues like encroachments, ineffective enforcement, lack of parking facilities, etc which further compound the problem.

### III. SCOPE OF WORK

The scope of work of this Report is limited to identifying a few pre-requisites as are considered very essential in the context of introducing a dedicated mass transit system along the major corridor in the twin cities of Islamabad and Rawalpindi. Further course of action is critically dependent on an appreciation of these pre-requisites by all the concerned before concerted efforts can be initiated.

### IV. THE URBAN TRANSIT OPTIONS

There are a wide variety of technically feasible options to meet the growing urban transport demand. While in the higher forms of mass transit systems viz the dedicated systems, there may be options in the initial stage of selection, there are comparatively less choices that can be made for road-based modes operating in mixed traffic conditions throughout the city. The presence of each mode in the hierarchy of road based modes is, however, very essential with due regard to their distribution on primary, secondary and tertiary routes in what may be called as an 'optimum mix'.

For screening purposes, the main traffic corridors need to be identified alongwith the estimate of future demand. Based on demand forecast and cost estimates of each option, the flexibility, the ease of integration with the existing system, the environmental effects during and after implementation and the costs of operation and maintenance, that the appropriate options are identified. Detailed feasibility studies can then be undertaken to precisely determine the route alignment including economic and financial analysis to establish the affordability alongwith the most suitable institutional arrangements for efficient implementation, human resource development, operation and maintenance of the system.

The characteristics of various types of mass transit system are summarized below:

CHARACTERISTIC	BUSES AND TROLLY BUSES			LRT (SURFACE EXCLUSIVE)	RAPID RAIL		
	MIXED TRAFFIC	BUS ONLY LANE	SEGRE- GATED BUSWAYS		SURFACE	ELEVATED	UNDER- GROUND
Vehicle capacity	80 to 120	80 to 120	120	200 to 300	300 to 375	300 to 375	300 to 375
Lane / Track Capacity (Passengers per hour)	10,000 to 15000	15,000 to 20,000	30,000	20,000 to 36,000	50,000	70,000	70,000
Journey Speed (Km per hr.)	10 to 12	15 to 18	15 to 30	15 to 25	30, to 35	30 to 35	30 to 35
Capital Cost (US \$ million/km)	-	-	2 to 7	6 to 10	20 to 25	45 to 55	85 to 105

It may be seen that Buses are the most basic form of 'mass transit'. These can make the best use of the existing road infrastructure and are, therefore the most cost-effective and flexible mode capable of meeting most of the demand for urban transport at various levels of quality and quantity.

Standard-size buses, with a capacity of about 80 passengers, are able to carry upto 10,000 passengers per hour per lane in mixed traffic. Larger buses with a capacity of 120 or more and operating in mixed traffic conditions can carry upto 15,000 passengers per hour per lane. With bus priority measures and reserved bus lanes, peak-hour volumes of 23,000 passengers per hour have been achieved. Bus services serve the entire road network and can be routed to greatly reduce need for passengers to change between services.

The term "Light Rail Transit (LRT)" refers to a wide range of electrically powered rail systems. Examples include 'trams' which operate on tracks and share the roadway with other users, while 'pre-metro' systems are operated on exclusive rights-of-way and often designed for conversion to rapid rail systems.

Rapid rail transit (RRT) systems, often termed as the 'sub-way', the 'underground' or the 'metro', invariably operate on completely exclusive rights-of-way at high speeds and provide the highest transit capacity of about 60,000 passengers per hour in each direction. These usually require sophisticated signalling and control devices for maintaining high speeds and frequencies.

The major factor influencing the capital cost of a dedicated mass transit system are the infrastructure costs which are dependent on the degree of vertical segregation and the typical per km cost of a rail-line as per the experience of other countries is as follows:



	<u>US \$ Million</u>
At grade	8 - 27
Elevated	23 - 60
Mainly underground	50 - 167

These huge capital investments have to be seen in the light of the fact that modal shift from personalized modes of transport like car, motorcycle, etc is practically very little. Experience has shown that a road space made available by a mass transit system operating on a dedicated infrastructure is only of a very 'short-life' and quickly 'fills-up' with new generated traffic leaving traffic congestion much as before. Only when traffic restraint policies are implemented that traffic congestion, which is mainly caused by personal modes of transport, can be effectively reduced. As a matter of fact, the sequence of activities should be to cater for the supply of an adequate number of buses, assign bus priority, introduce 'restraint measures' on personal modes of transport in parallel with the detailed feasibility studies for the highly capital intensive option of an underground or an elevated system. Due priority, therefore, needs to be given to buses of suitable capacity alongwith traffic management techniques including parking controls and other restraint measures for safe, economical and efficient movement of passengers and goods in urban areas.

For dedicated mass transit systems (bus ways, LRT, RRT), creation of an exclusive right-of-way requires the acquisition of large amounts of land, demolition of buildings with environmental damage and social disturbances. It is, therefore, extremely important to reserve land and establish surface

rights-of-way in major cities as early as possible because the time frame for implementing even the main artery of such systems may take at least 7 – 10 years after completion of detailed feasibility study.

## V. THE STUDY AREA

The total estimated population of Islamabad and Rawalpindi is about 3 million with the population of Rawalpindi constituting about 60 per cent of the total population (Annex – I). As regards the estimated vehicular population, the total number is about 789,000 with the share of vehicles registered in Rawalpindi at about 73 per cent (Annex – II). The Study Area map may be seen in Annex-III.

Sample traffic surveys at 15 minute intervals were conducted at five points between Rawalpindi and Islamabad namely the Peshawar Road – Murree Road – Islamabad Highway to assess the maximum passenger movements in the morning. The summarized results are as under:

	Max: Passengers per hour	
	Time (AM)	Number*
Koh- e - Noor	7:00 – 8:00	24,000
AFIC	7:30 – 8:30	30,000
Committee Chowk	7:15 – 8:15	15,000
Shamsabad	7:15 – 8:15	37,000
Islamabad Highway	7:30 – 8:30	43,000

\*Rounded to the nearest thousand.

In terms of average vehicular composition, Buses and Mini-buses constituted about 4.6%, while cars (61%) and motor cycles (20.4%)

constituted more than 81 per cent of the total number of vehicles. It is this factor, which has created the congestion problem. The details may be seen in Annex - IV. The mobility pattern of twin cities is dictated by concentration of government jobs in Islamabad on the one hand and affordable housing in Rawalpindi on the other hand. The re-location of General Headquarters of Pakistan Armed Forces, which is one of the largest employers in Rawalpindi, is likely to raise the traffic on Islamabad roads to a considerable extent. However, due to the 7<sup>th</sup> and 9<sup>th</sup> Avenues presently under construction by the CDA, much of the additional mobility requirements would be adequately catered for.

The sample survey mentioned above, though limited in scope, suggests the need for mass transit system in the foreseeable future. Therefore, it is necessary to focus on land reservation for future development of infrastructure for the mass transit facility. The need has become extremely acute as the urban land is being eaten up in other land uses with no regard for an efficient urban public transport system.

As regards the number of equivalent buses, against the total requirement of 1,190 and 765 equivalent buses in Rawalpindi and Islamabad respectively, there is a shortfall of about 275 buses in Rawalpindi and 345 buses in Islamabad (Annex-V). If these standard size buses are inducted, the immediate commuter traffic problem will be resolved to a great extent.

The network requirement for an efficient dedicated mass transit system is about 100 Kms for a city like Karachi. For Islamabad-Rawalpindi,

the dedicated mass transit length may be in the neighborhood of 60-70 Kms with a maximum strip width of upto 30 meters. Besides, additional land for adequate interchanges, terminal facilities parking and other allied requirements need to be accurately determined by the concerned development authority (CDA/RDA) and other concerned agencies (like the Cantonment Board, City/District Government etc.) and reserved at this stage as the urban land is getting scarce and expensive day by day. This should also include the Chuhr Harpal Depot and the GTS Saddar Depot of the defunct PRTC, and places like the Flashman's Hotel, Old Pindi Club Ground, etc. In Islamabad, while the land use of I-8 Depot of the defunct PRTC is being converted into a residential area, there is a need to reserve the land presently available along major corridors, centers of business/commercial activity and centroids (preferably of each sector) for public transport, parking and mass transit facilities, etc.

From this, it is extremely necessary to explicitly incorporate the proposal for mass transit system in terms of land allocation in Islamabad Master Plan currently under preparation. Even if more land is allocated/reserved through this exercise, it would be worthwhile because of the much greater "trade-off potential" of land and its escalating prices. The major corridors reserved for mass transit facility should also be fenced with adequate openings for crossings with proper sign posts indicating that it has been 'Reserved for Mass Transit System' and should be regularly monitored. This will also prevent installing the utilities away from the reserved corridor.

## VI. THE LRMTS FEASIBILITY STUDY & THE DMRTS

The Lahore Rapid Mass Transit System (LRMTS) Feasibility Study has recently been completed by M/s MVA Asia Limited for the Government of Punjab. The salient features are as under :-

<u>LRMTS Length</u>	<u>Elevated</u>	<u>Underground</u>	<u>Total</u>
Total (Kms)	56 (69%)	25.5 (31%)	81.5
No: of Stations	36 (60%)	24 (40%)	60
Interchanges	1 (1.4%)	6 (85.6%)	7

### Priority Line

Green Line (Kms) (Ferozpur Road Corridor Queen Road & Mall Road in Tunnel)	16.5 (61%)	10.5 (39%)	27
No: of Stations	10 (45%)	12 (55%)	22

### Capital Cost of Priority Line (US \$ million)

• Civil Works	1,429
• System (Traction, Track etc)	663
• Rolling Stock	339
Total Cost	2,431
Cost per Km	90

(US \$ Million)

<u>Year</u>	<u>Economic Evaluation</u>		<u>Financial Evaluation</u>	
	<u>NPV</u>	<u>EIRR</u>	<u>NPV</u>	<u>FIRR</u>
2012 (Opening) – 2031	-815	6.1%	-1,290	1.0%

Proposed LRMTS Fares

	<u>Rs</u>
Up to 5 Kms	10
5 - 10	13
10 - 15	16
15 - 20	17
20 - 25	20
Over 25	22

Economic & Financial Evaluation

- The large investment made over several years before any returns are produced makes it difficult for the project to provide good returns economically or financially.
- Revenues cover operating costs but not capital cost
- Government to fund capital costs (US \$ 2.431 billion for 27 kms of Priority Line)
- Private sector involvement limited to operating the system

Proposed Time Frame

- 6 years after completion of Feasibility Study (August, 2006) – July, 2012

DMRTS

As regards Delhi Mass Rapid Transit System (DMRTS), Phase-I, comprises about 65 kms as under:-

<u>At ground</u>	<u>Elevated</u>	<u>Underground</u>	<u>Total</u>
4.5 (6.9%)	47.5 (73.1%)	13.0 (20.0%)	65.0

(Kms)

The capital cost of Phase-I in Indian Rupees was 60 billion (Pak Rs 84 billion) at April, 1996 price level. Taking into account the element of escalation during construction period of 7½ years (2003), the completion cost was estimated at Indian Rs 105.71 billion (Pak Rs 147.994 billion) i.e. Pak Rs 2.277 Billion/Km (US \$ 37.95 million per km).

- Fare: Min: Indian Rs 6 (i.e. Pak Rs 9.6)  
Max: Indian Rs 22 (i.e. Pak Rs 30.8)

Other important components include the human resource development and training of manpower for successful operations. An interesting feature for attracting the car owners to metro pertains to providing car parking facilities at about 18 stations on a line length of about 22 kms with the size of plot varying from a minimum of 1142 sq. meters to 10,122 sq. meters. Some related information may be seen in Annex-VI.

## **VII. THE IMMEDIATE MEASURES**

The time frame for actual implementation and operation of a dedicated mass transit system for Islamabad / Rawalpindi may take about 7 - 10 years after completion of the detailed feasibility study. As mentioned earlier, the congestion problem is getting worse day by day and immediate remedial measures may have to be taken during the intervening period. For this purpose, a comprehensive list of quick actions, as given below, are required to be implemented in Islamabad / Rawalpindi on a 'fast track'.

- (1) Buses are the most basic form of mass transit. These make use of the existing road infrastructure and are, therefore, the most cost-effective, flexible and feasible mode capable of meeting most of the demand for urban transport at various levels of quality and quantity. Based on the available data for Islamabad and

Rawalpindi, the shortfall in the number of equivalent buses is about 620.

Good quality public bus transport should be provided on the city road network. The bus bays and bus stops be used for as minimum a time as possible necessary to ensure safe embarking and dis-embarking of passengers only.

- (2) Reservation of available land along the major corridors for dedicated mass transit facility and allied facilities as mentioned in Section - V of the Report.
- (3) Immediate steps may be taken by the revived National Mass Transit Authority (NMTA) under the Ministry of Railways to initiate work on the detailed feasibility study for a dedicated Mass Transit System in Islamabad/Rawalpindi, as has been done in the case of Lahore, in collaboration with the CDA/RDA, District Government, Cantonment Board and other stakeholders, etc.
- (4) Other immediate measures required in this context are effective enforcement, grant of soft loan, traffic management techniques, etc. as may be seen in Annex-VII.

#### **VIII. RECOMMENDATIONS**

The recommendations are under:-

- (1) The sample survey regarding passenger movements, though limited in scope, suggests the need for the introduction of a dedicated mass transit system.
- (2) The time frame for actual operation of a dedicated mass transit system will take about 7 - 10 years after the completion of detailed feasibility study. Buses, which are the most basic form of mass transit system, should be introduced after a proper passenger O-D and route analysis. The present scheme of grant of soft loans for urban buses may be continued and a proper procedure in accordance with the decisions of the Supreme Court of Pakistan may be implemented.



- (3) Planning Commission should insist on "Twin PC-II/Is - one dealing with the introduction of urban buses and urban transport improvement measures along with the PC-II/I of a dedicated mass transit system because of the huge time frame involved in the actual implementation of the dedicated mass transit system. The dedicated mass transit system should ensure minimal modal changes to minimize financial and time penalties on the user.
- (4) Master Plan presently under revision by the CDA should explicitly reserve land and establish surface rights-of-way for dedicated mass transit system and its integration with the existing transport system. Similar action is warranted by the RDA. The land use of the Master Plan should be observed as far as possible.
- (5) In view of the huge capital investment required, it is essential that the financial participation of the Federal/Provincial and District/City Governments should be clearly defined at the outset. The Federal Government may share the 'one-off costs' or provide 'one-off concessions' and the provincial district/city governments should in addition to their share in capital costs bear the O&M shortfalls, if any.
- (6) The recently revived National Mass Transit Authority (NMTA) under the Ministry of Railways should constitute Working Group comprising members from CDA, RDA, Cantonment Boards, RTAs, City Government, Planning & Development Division, Ministry of Communications, NTRC and other stake-holders for initiating work on a detailed feasibility study for a dedicated mass rapid transit system in Islamabad and Rawalpindi.

### Population by Selected Age Groups and Sex, Rawalpindi

Year	Age Group		Male	Female	Both Sexs
1998	Under 5	No.	84810	79768	164578
		%age*	11.3	12.1	11.7
	5 and above	No.	665720	579470	1245190
		%age	88.7	87.9	88.3
<b>Total</b>			<b>750530</b>	<b>659238</b>	<b>1409768</b>
2006*	Under 5	No.	111076	104472	215548
		%age	11.3	12.1	11.7
	5 and above	No.	871894	758933	1630827
		%age	88.7	87.9	88.3
<b>Total</b>			<b>982970</b>	<b>863405</b>	<b>1846375</b>

\* @ 3.43 % per annum growth (census 1998)

\*\*District Census Report Rawalpindi 1998 P.48

### Population by Selected Age Groups and Sex, Islamabad

Year	Age Group		Male	Female	Both Sexs
1998	Under 5	No.**	49174	46895	96069
		%age	11.3	12.6	11.9
	5 and above	No.	385065	324101	709166
		%age	88.7	87.4	88.1
<b>Total</b>			<b>434239</b>	<b>370996</b>	<b>805235</b>
2006*	Under 5	No.	73711	70295	144005
		%age	11.3	12.6	11.9
	5 and above	No.	577204	485821	1063025
		%age	88.7	87.4	88.1
<b>Total</b>			<b>650915</b>	<b>556115</b>	<b>1207031</b>

\* @ 5.19 % per annum growth (census 1998)

\*\*District Census Report Islamabad 1998 P.66

### Population by Selected Age Groups and Sex, Rawalpindi / Islamabad combined

Year	Age Group		Male	Female	Both Sexs
1998	Under 5	No.	133984	126663	260647
		%age	11.3	12.3	11.8
	5 and above	No.	1050785	903571	1954356
		%age	88.7	87.7	88.2
<b>Total</b>			<b>1184769</b>	<b>1030234</b>	<b>2215003</b>
2006	Under 5	No.	184786	174767	359553
		%age	11.3	12.6	11.9
	5 and above	No.	1449099	1244753	2693852
		%age	88.7	87.4	88.1
<b>Total</b>			<b>1633885</b>	<b>1419520</b>	<b>3053405</b>

## Total No. Of Vehicles Registered In ICT

year	ambulances	Motorcars, jeeps and wagons	motorcars and taxis	Bus/ mini bus	Trucks	Motorcycles and scooters	Water tankers	Other veh. Pickups delivery vans.	Tractors	total	cumulative total
1981		141	84	24	17	1088				1354	1354
1982		1349	19	11	18	1031		61		2489	3843
1983		1663	19	38	14	1071		31		2836	6679
1984		3619	120	37	56	1065		71		4968	11647
1985		2735	74	42	64	1319		246		4480	16127
1986		2880	99	25	28	1190		61		4283	20410
1987		2620	17	33	5	624		260		3559	23969
1988	1	2678	41	103	41	638	6	192	7	3707	27676
1989	26	3395	70	105	50	700	8	248	7	4609	32285
1990	30	5373	40	195	2	1250	45	488	3	7426	39711
1991	32	4744	32	212	3	1345	50	501	1	6920	46631
1992	12	5630	520	30	19	1878		490	7	8586	55217
1993	18	6218	512	8	8	1912		611	4	9291	64508
1994	25	6304	620	11	10	2018		462	9	9459	73967
1995	25	5502	37	213	15	1544	2	592	30	7960	81927
1996	21	4848	22	1155	17	1835	6	547	22	8473	90400
1997	19	5613	31	430	170	2065	25	1127	30	9510	99910
1998	16	5836	35	414	70	1880		610	33	8894	108804
1999	2	5318	97	85	51	1632		173	9	7367	116171
2000	7	4910	107	86	48	1062		201	13	6434	122605
2001	4	5340	53	47	42	1685	3	202	12	7388	129993
2002	6	5687	35	15	19	1702	16	195	7	7682	137675
2003	8	13000	20	679	325	2000	0	1305	7	17344	155019
2004	11	16710		572	237	5046	3	861	69	23509	178528
2005	9	24703		665	279	5973	7	1522	35	33193	211721

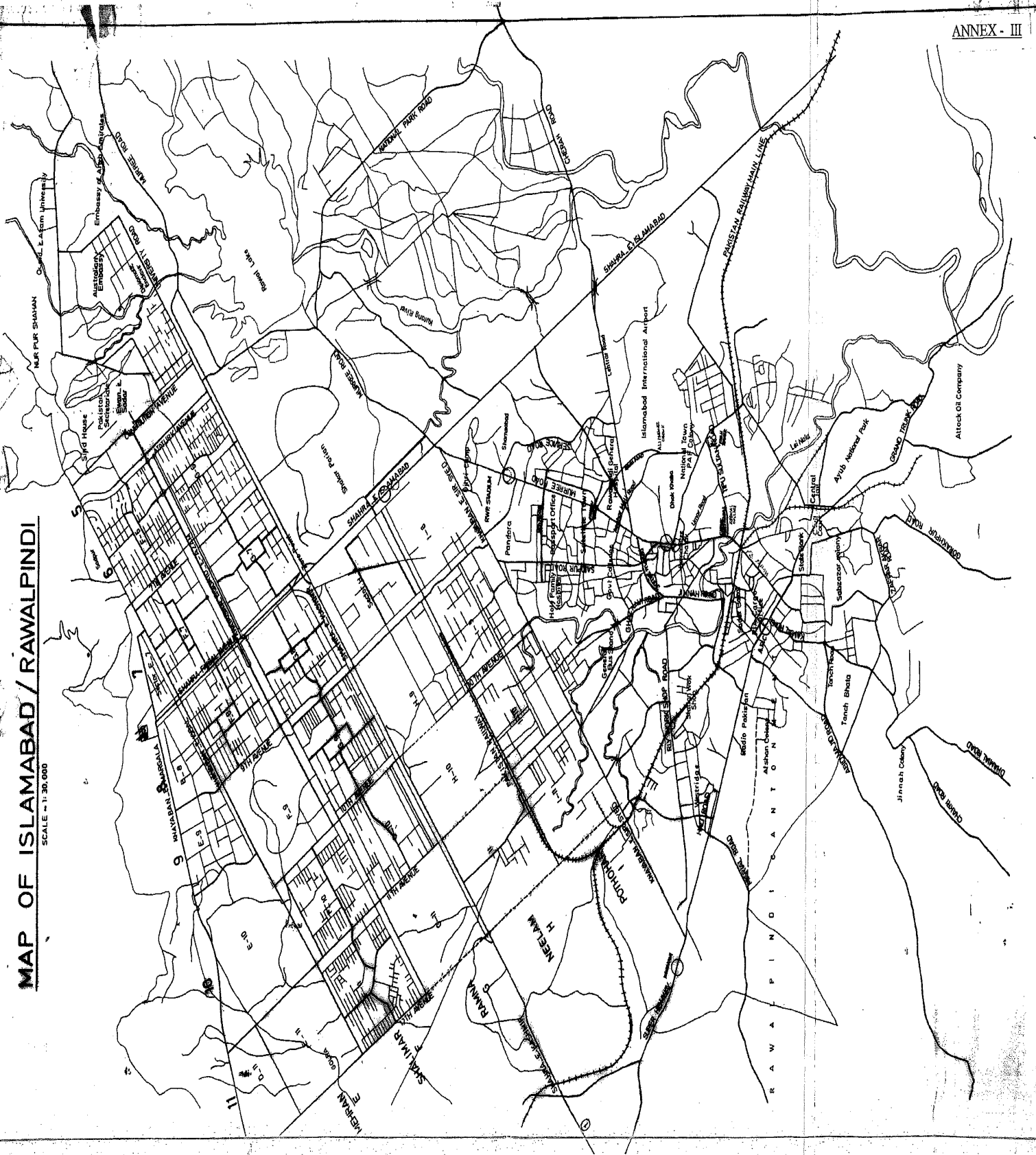
source: excise and taxation office Islamabad

## Vehicles on road Rawalpindi

year	MCY/Scooter	Motor Car	Jeep	STN. Wagon	tractor	M. Buses/Buses	M. Cab Taxi	Motor Rck	D. Van	Trucks	Pickup	Ambulance	tanker			total
													oil	water	others	
1991	59353	35797	3093	4012	9434	2993	4628	493	4887	5569	3391	137	169	107	354	134417
1992	79878	42111	3563	4830	16168	3307	5215	540	5725	6798	4182	181	174	113	362	173147
1993	102180	48619	4055	5664	23243	3622	5819	588	6590	8080	5002	226	179	121	370	214358
1994	125873	55271	4554	6502	30471	3942	6436	636	7465	9418	5825	273	184	131	378	257359
1995	127985	57342	4628	6565	30549	4101	6481	714	7591	9639	5950	273	184	131	378	262511
1996	130236	59208	4686	6629	30629	4178	6482	745	7618	9672	6114	274	184	131	378	267164
1997	132683	60513	4747	6654	30657	4248	6482	1026	7687	9699	6194	286	184	131	378	271569
1998	141307	63780	4872	9632	31863	5231	7192	1231	7891	9801	6411	286	184	141	378	290200
1999	151198	67607	4997	10501	33318	5842	8211	1320	8117	9987	6607	286	184	141	378	308694
2000	162085	72002	5122	12722	34983	6329	9602	1417	8722	10011	6791	301	211	153	4335	334786
2001	180725	80282	5247	14185	39006	7057	10706	1580	9725	11162	7572	336	235	171	4834	373286
2002	201508	89515	5372	15816	43492	7868	11937	1762	10843	12446	8443	374	262	190	5389	416214
2003	224682	99809	5497	17635	48493	8773	13310	1964	12090	13877	9414	417	292	212	6009	464079
2004	250520	111287	5622	19663	54070	9782	14841	2190	13481	15473	10496	465	326	236	6700	517448
2005	279330	124085	5747	21925	60288	10907	16548	2442	15031	17252	11703	519	364	264	7471	576955

# MAP OF ISLAMABAD / RAWALPINDI

SCALE = 1:30,000



5071

Attack Oil Company

Jinnah Colony

French Bhatta

Subsector

Radio Pakistan

Islamabad International Airport

Rawalpindi

Shahdada

Shahdada

Shahdada

Shahdada

Shahdada

Shahdada

Shahdada

Shahdada

**Summary of Traffic Volumes at Selected Locations**

Location	Max. Traffic Volume		Total traffic Volume from 7:00 to 10:00 AM	Composition of Traffic by Mode							
	Time A.M	Number		Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	
											No.
Peshawar Rd. near Koh-e-Noor	7:00	2,654	5,924	1180	464	154	163	271	66	356	
				44.46	17.48	5.80	6.14	10.21	2.49	13.41	
Peshawar Rd. Near AFIC	7:30	4,614	12,324	2961	522	82	118	36	11	884	
				64.17	11.31	1.78	2.56	0.78	0.24	19.16	
Murree Rd. Near Committee Chowk	7:15	2,971	8,489	1854	161	53	74	73	116	640	
				62.40	5.15	1.70	2.37	2.34	3.71	20.47	
Murree Rd. near Shamsabad	7:15	4,267	12,324	2646	517	92	134	42	12	824	
				62.01	12.12	2.16	3.14	0.98	0.28	19.31	
Islamabad Highway near Garden chowk	7:30	7,105	15,349	4426	742	217	144	34	0	1542	
				62.29	10.44	3.05	2.03	0.48	0.00	21.70	

**Summary of Passenger Volumes at Selected Locations**

Location	Max. Passenger Volume		Total Passenger Volume from 7:00 to 10:00 AM	composition of passengers by mode used							
	Time A.M	Number		Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	
											No.
Peshawar Rd. near Koh-e-Noor	7:00	23,849	48,256	3,304	7,888	3,989	5,575	2,412	112	570	
				13.85	33.07	16.72	23.37	10.11	0.47	2.39	
Peshawar Rd. Near AFIC	7:30	29,535	66,705	11548	9135	1443	5381	234	26	1768	
				39.10	30.93	4.89	18.22	0.79	0.09	5.99	
Murree Rd. Near Committee Chowk	7:15	14,725	36,679	6304	2737	1208	2405	548	371	1152	
				42.81	18.59	8.21	16.33	3.72	2.52	7.82	
Murree Rd. near Shamsabad	7:15	36,509	77,367	10,584	9,823	3,128	11,122	168	36	1,648	
				28.99	26.91	8.57	30.46	0.46	0.10	4.51	
Islamabad Highway near Garden chowk	7:30	43,357	88,987	14163	14246	6098	5774	299	0	2776	
				32.67	32.86	14.06	13.32	0.69	0.00	6.40	

**Traffic count at Koh-e-Noor, RWP**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Vehicles
7:00	268	110	30	38	56	24	72	598
7:15	245	125	53	51	75	24	101	674
7:30	364	110	36	43	67	7	88	715
7:45	303	119	35	31	73	11	95	667
8:00	280	84	22	24	51	5	70	536
8:15	143	64	10	6	22	9	27	281
8:30	225	84	9	12	22	13	20	385
8:45	205	79	13	14	35	6	58	410
9:00	180	73	12	13	44	4	60	386
9:15	258	67	14	15	45	3	48	450
9:30	244	61	13	15	48	5	46	432
9:45	225	53	12	11	37	5	47	390
<b>Total</b>	<b>2940</b>	<b>1029</b>	<b>259</b>	<b>273</b>	<b>575</b>	<b>116</b>	<b>732</b>	<b>5924</b>

**Passenger Volume at Peshawar Rd. near Koh-e-Noor (15 Min. Interval)**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	750	1870	777	1300	498	41	115	5351
7:15	686	2125	1373	1744	668	41	162	6798
7:30	1019	1870	932	1471	596	12	141	6041
7:45	848	2023	907	1060	650	19	152	5659
8:00	784	1428	570	821	454	9	112	4177
8:15	400	1088	259	205	196	15	43	2207
8:30	630	1428	233	410	196	22	32	2951
8:45	574	1343	337	479	312	10	93	3147
9:00	504	1241	311	445	392	7	96	2995
9:15	722	1139	363	513	401	5	77	3219
9:30	683	1037	337	513	427	9	74	3079
9:45	630	901	311	376	329	9	75	2631

**Passenger Volume at Peshawar Rd. near Koh-e-Noor (Hourly)**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	750	1870	777	1300	498	41	115	5351
7:15	686	2125	1373	1744	668	41	162	6798
7:30	1019	1870	932	1471	596	12	141	6041
7:45	848	2023	907	1060	650	19	152	5659
7:00	3304	7888	3989	5575	2412	112	570	23849
Percentages	13.85	33.07	16.72	23.37	10.11	0.47	2.39	100.00
8:00	784	1428	570	821	454	9	112	4177
8:15	400	1088	259	205	196	15	43	2207
8:30	630	1428	233	410	196	22	32	2951
8:45	574	1343	337	479	312	10	93	3147
8:00	2388	5287	1399	1915	1157	56	280	12482
Percentages	19.13	42.36	11.20	15.34	9.27	0.45	2.24	100.00
9:00	504	1241	311	445	392	7	96	2995
9:15	722	1139	363	513	401	5	77	3219
9:30	683	1037	337	513	427	9	74	3079
9:45	630	901	311	376	329	9	75	2631
9:00	2540	4318	1321	1847	1549	29	322	11924
Percentages	21.30	36.21	11.08	15.49	12.99	0.24	2.70	100.00
Grand Total	8232	17493	6708	9337	5118	197	1171	48256
Overall Percentage	17.06	36.25	13.90	19.35	10.60	0.41	2.43	100.00



**Traffic Count at AFIC Location, Peshawar Road Rawalpindi**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Vehicles
7:00	341	54	14	5	7	1	97	519
7:15	497	95	15	27	11	5	145	795
7:30	793	145	30	45	20	7	217	1257
7:45	613	147	25	37	10	0	177	1009
8:00	743	130	22	25	1	0	285	1206
8:15	812	100	5	11	5	4	205	1142
8:30	924	108	14	3	17	7	280	1353
8:45	737	68	9	2	7	10	287	1120
9:00	691	56	6	2	17	4	307	1083
9:15	687	56	3	1	27	10	245	1029
9:30	556	60	5	2	12	7	212	854
9:45	667	55	7	1	7	1	219	957

**Passenger Volume at Peshawar Rd. near AFIC (15 min. Interval)**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1330	945	246	228	46	2	194	2991
7:15	1938	1663	264	1231	72	12	290	5470
7:30	3093	2538	528	2052	130	17	434	8791
7:45	2891	2573	440	1687	65	0	354	7509
8:00	2398	2275	387	1140	7	0	570	7276
8:15	3167	1750	88	502	33	10	410	5959
8:30	3604	1890	246	137	111	17	560	6564
8:45	2874	1190	158	91	46	24	574	4957
9:00	2695	980	106	91	111	10	614	4606
9:15	2679	980	53	46	176	24	480	4447
9:30	2168	1050	88	91	78	17	424	3916
9:45	2601	963	123	46	46	2	438	4219

**Passenger Volume at Peshawar Rd. near AFIC (Hourly)**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1330	945	246	228	46	2	194	2991
7:15	1938	1663	264	1231	72	12	290	5470
7:30	3268	2608	510	1459	117	14	484	8461
Percentages	38.63	30.82	6.03	17.25	1.38	0.17	5.72	100.00
7:30	3093	2538	528	2052	130	17	434	8791
7:45	2391	2573	440	1687	65	0	354	7509
8:00	2898	2275	387	1140	7	0	570	7276
8:15	3167	1750	88	502	33	10	410	5959
8:30	11548	9135	1443	5381	234	26	1768	29535
Percentages	39.10	30.93	4.89	18.22	0.79	0.09	5.99	100.00
8:30	3604	1890	246	137	111	17	560	6564
8:45	2874	1190	158	91	46	24	574	4957
9:00	2695	980	106	91	111	10	614	4606
9:15	2679	980	53	46	176	24	480	4447
9:30	11852	5040	563	365	442	74	2238	20575
Percentages	57.60	24.50	2.74	1.77	2.15	0.36	10.88	100.00
9:30	2168	1050	88	91	78	17	424	3916
9:45	2601	963	123	46	46	2	438	4219
9:30	4770	2013	211	137	124	19	862	8135
Percentages	58.63	24.74	2.60	1.68	1.52	0.24	10.60	100.00
Grand Total	31438	18795	2728	7342	917	134	5352	66705
Overall Percentage	47.13	28.18	4.09	11.01	1.37	0.20	8.02	100.00

**Traffic Count at Committee Chowk, Rwp.**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Vehicle
7:00	325	37	17	8	14	29	78	508
7:15	412	48	15	20	19	19	127	660
7:30	451	45	21	30	17	26	172	762
7:45	499	39	12	20	18	32	195	815
8:00	492	29	5	4	19	39	146	734
8:15	545	41	6	1	11	34	177	815
8:30	540	27	3	1	9	29	140	749
8:45	525	40	4	1	12	40	185	807
9:00	460	35	4	1	25	41	145	711
9:15	455	25	7	0	10	39	115	651
9:30	425	14	4	0	10	25	60	538
9:45	579	11	4	0	8	47	90	739

Passenger Volumes at Murree Road near Committee Chowk (15 Min. Interval)

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1105	629	388	260	105	93	140	2720
7:15	1401	816	342	650	143	61	229	3641
7:30	1533	765	479	975	128	83	310	4273
7:45	1697	663	274	650	135	102	351	3872
8:00	1673	493	114	130	143	125	263	2940
8:15	1853	697	137	33	83	109	319	3229
8:30	1836	459	68	33	68	93	252	2808
8:45	1785	680	91	33	90	128	333	3140
9:00	1564	595	91	33	188	131	261	2862
9:15	1547	425	160	0	75	125	207	2538
9:30	1445	238	91	0	75	80	108	2037
9:45	1969	187	91	0	60	150	162	2619

Passenger Volumes at Murree Road near Committee Chowk (Hourly)

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1105	629	388	260	105	93	140	2720
7:15	1105	629	388	260	105	93	140	2720
Percentages	40.63	23.13	14.25	9.56	3.86	3.41	5.16	100.00
7:30	1401	816	342	650	143	61	229	3641
7:45	1533	765	479	975	128	83	310	4273
7:45	1697	663	274	650	135	102	351	3872
8:00	1673	493	114	130	143	125	263	2940
7:15	6304	2737	1208	2405	548	371	1152	14725
Percentages	42.81	18.59	8.21	16.33	3.72	2.52	7.82	100.00
8:15	1853	697	137	33	83	109	319	3229
8:30	1836	459	68	33	68	93	252	2808
8:45	1785	680	91	33	90	128	333	3140
9:00	1564	595	91	33	188	131	261	2862
8:15	7038	2431	388	130	428	461	1165	12040
Percentages	58.46	20.19	3.22	1.08	3.55	3.83	9.67	100.00
9:15	1547	425	160	0	75	125	207	2538
9:30	1445	238	91	0	75	80	108	2037
9:45	1969	187	91	0	60	150	162	2619
9:15	4961	850	342	0	210	355	477	7195
Percentages	68.95	11.81	4.75	0.00	2.92	4.94	6.63	100.00
Grand Total	19407	6647	2326	2795	1290	1280	2934	36679
Overall Percentage	52.91	18.12	6.34	7.62	3.52	3.49	8.00	100.00

## Traffic Count at Shamsabad

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Vehicles
7:00	341	54	14	5	7	1	97	519
7:15	497	95	15	27	11	5	145	795
7:30	793	145	30	45	20	7	217	1257
7:45	613	147	25	37	10	0	177	1009
8:00	743	130	22	25	1	0	285	1206
8:15	812	100	5	11	5	4	205	1142
8:30	924	108	14	3	17	7	280	1353
8:45	737	68	9	2	7	10	287	1120
9:00	691	56	6	2	17	4	307	1083
9:15	687	56	3	1	27	10	245	1029
9:30	556	60	5	2	12	7	212	854
9:45	667	55	7	1	7	1	219	957
<b>Total</b>	<b>8061</b>	<b>1074</b>	<b>155</b>	<b>161</b>	<b>141</b>	<b>56</b>	<b>2676</b>	<b>12324</b>

**Passenger Volumes at Murree Rd. near Shamsabad (15 Min. Interval)**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1364	1026	476	415	28	3	194	3506
7:15	1988	1805	510	2241	44	15	290	6893
7:30	3172	2755	1020	3735	80	21	434	11217
7:45	2452	2793	850	3071	40	0	354	9560
8:00	2972	2470	748	2075	4	0	570	8839
8:15	3248	1900	170	249	20	12	410	6673
8:30	3696	2052	476	249	68	21	560	7122
8:45	2948	1292	306	166	28	30	574	5344
9:00	2764	1064	204	166	68	12	614	4892
9:15	2748	1064	102	83	108	30	490	4625
9:30	2224	1140	170	166	48	21	424	4193
9:45	2668	1045	238	83	28	3	438	4503

**Passenger Volumes at Murree Rd. near Shamsabad (Hourly)**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1,364	1,026	476	415	28	3	194	3,506
7:00	1,364	1,026	476	415	28	3	194	3,506
Percentages	38.90	29.26	13.58	11.84	0.80	0.09	5.53	100.00
7:15	1,988	1,805	510	2,241	44	15	290	6,893
7:30	3,172	2,755	1,020	3,735	80	21	434	11,217
7:45	2,452	2,793	850	3,071	40	0	354	9,560
8:00	2,972	2,470	748	2,075	4	0	570	8,839
7:15	10,584	9,823	3,128	11,122	168	36	1,648	36,509
Percentages	28.99	26.91	8.57	30.46	0.46	0.10	4.51	100.00
8:15	3,248	1,900	170	913	20	12	410	6,673
8:30	3,696	2,052	476	249	68	21	560	7,122
8:45	2,948	1,292	306	166	28	30	574	5,344
9:00	2,764	1,064	204	166	68	12	614	4,892
8:15	12,656	6,308	1,156	1,494	184	75	2,158	24,031
Percentages	52.67	26.25	4.81	6.22	0.77	0.31	8.98	100.00
9:15	2,748	1,064	102	83	108	30	490	4,625
9:30	2,224	1,140	170	166	48	21	424	4,193
9:45	2,668	1,045	238	83	28	3	438	4,503
9:15	7,640	3,249	510	332	184	54	1,352	13,321
Percentages	57.35	24.39	3.83	2.49	1.38	0.41	10.15	100.00
Grand Total	32,244	20,406	5,270	13,363	564	168	5,352	77,367
Overall Percentage	41.68	26.38	6.81	17.27	0.73	0.22	6.92	100.00

**Traffic count at Islamabad Highway near Garden Chowk**

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Vehicles
7:00	449	119	38	25	11	0	177	819
7:15	730	124	38	21	7	0	90	1010
7:30	998	156	49	31	7	0	332	1573
7:45	911	193	65	44	4	0	464	1681
8:00	1521	172	48	27	10	0	325	2103
8:15	996	221	55	42	13	0	421	1748
8:30	1070	111	31	15	15	0	375	1617
8:45	537	92	21	6	18	0	393	1067
9:00	503	87	27	4	8	0	201	830
9:15	704	82	15	14	28	0	254	1097
9:30	713	78	17	6	25	0	142	981
9:45	584	75	17	7	17	0	123	823

Passenger Volumes at Isamabad Highway Near Garden Chowk( 15 Min. Interval )

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1437	2285	1068	1003	97	0	319	6207
7:15	2336	2381	1068	842	62	0	162	6850
7:30	3194	2995	1377	1243	62	0	598	9468
7:45	2915	3706	1827	1764	35	0	835	11082
8:00	4867	3302	1349	1083	88	0	585	11274
8:15	3187	4243	1546	1684	114	0	758	11532
8:30	3424	2131	871	602	132	0	675	7835
8:45	1718	1766	590	241	158	0	707	5181
9:00	1610	1670	759	160	70	0	362	4631
9:15	2253	1574	422	561	246	0	457	5514
9:30	2282	1498	478	241	220	0	256	4973
9:45	1869	1440	478	281	150	0	221	4438

Passenger Volumes at Isamabad Highway Near Garden Chowk( Hourly )

Time	Cars	Wagon	Mini Bus Upto 26 Seats	Bus Greater than 26 Seats	Suzuki Pickup	Rickshaw / Chingchi	Motorcycle / Scooter	Total Passengers
7:00	1437	2285	1068	1003	97	0	319	6207
7:15	2336	2381	1068	842	62	0	162	6850
7:30	3773	4666	2136	1845	158	0	481	13058
Percentages	28.89	35.73	16.35	14.13	1.21	0.00	3.68	100.00
7:30	3194	2995	1377	1243	62	0	598	9468
7:45	2915	3706	1827	1764	35	0	835	11082
8:00	4867	3302	1349	1083	88	0	585	11274
8:15	3187	4243	1546	1684	114	0	758	11532
8:30	14163	14246	6098	5774	299	0	2776	43357
Percentages	32.67	32.86	14.06	13.32	0.69	0.00	6.40	100.00
8:30	3424	2131	871	602	132	0	675	7835
8:45	1718	1766	590	241	158	0	707	5181
9:00	1610	1670	759	160	70	0	362	4631
9:15	2253	1574	422	561	246	0	457	5514
8:30	9005	7142	2641	1564	607	0	2201	23161
Percentages	38.88	30.84	11.40	6.75	2.62	0.00	9.50	100.00
9:30	2282	1498	478	241	220	0	256	4973
9:45	1869	1440	478	281	150	0	221	4438
9:30	4150	2938	955	521	370	0	477	9411
Percentages	44.10	31.21	10.15	5.54	3.93	0.00	5.07	100.00
Grand Total	31091	28992	11830	9704	1434	0	5935	88987
Overall Percentage	34.94	32.58	13.29	10.91	1.61	0.00	6.67	100.00



TABLE SHOWING NO. OF EQUIVALENT BUSES AND SHORT FALL IN RAWALPINDI / ISLAMABAD

CITY	Population in 1998	Growth Rate	Projected Pop. In 2005	Required Buses in 2005	Existing Eq. No. of Buses	Short Fall
Rawalpindi	1,409,768	3.43	1,785,144	1,190	914	276
Islamabad	805,235	5.19	1,147,476	765	411	345
Total	2,215,003		2,932,620	1,955	1,325	621

TABLE SHOWING NO. OF EQUIVALENT BUSES AND SHORT FALL IN RAWALPINDI / ISLAMABAD

CITY	Population in 1998	Growth Rate	Projected Pop. In 2005	Required Buses in 2004	Existing Eq. No. of Buses	Short Fall
Rawalpindi	1,409,768	3.43	1,725,944	1,151	914	251
Islamabad	805,235	5.19	1,090,861	727	411	326
Total	2,215,003		2,816,805	1,878	1,325	577

TABLE SHOWING NO. OF EQUIVALENT BUSES BY MODE IN RAWALPINDI

YEAR	TYPE OF PSV														
	BUS		MINI BUS		WAGON		SUZUKI		MOTOR CAB		MOTOR CYCLE				
	TOTAL NO.	AVG. NO. OF SEATS	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses			
00-01	NIL		0	0	0	0	830	155	338	19	2345	219	13	1	395
2002	106	45-62-ID	149	65	133	34	776	145	311	17	2916	273	21	2	642
2003	127		218	96	86	22	569	106	463	26	3214	300	496	56	733
2004	118		249	109	306	77	692	129	687	39	3913	366	548	61	900
2005(E)	120		255	112	310	78	700	131	700	39	3945	369	575	64	914

ID= Including Driver

TABLE SHOWING NO. OF EQUIVALENT BUSES BY MODE IN ISLAMABD

YEAR	TYPE OF PSV												
	BUS		MINI BUS		WAGON		SUZUKI		WAGON		SUZUKI		Total Eq. Buses
	TOTAL NO.	AVG. NO. OF SEATS	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	TOTAL NO.	equ. Buses	
00-01	NIL		212	93	948	239	146	27	360				
2002	-		215	94	974	246	148	28	368				
2003	-		217	95	1062	268	149	28	391				
2004	-		237	104	1065	269	153	29	401				
2005(E)			250	110	1075	271	160	30	411				

(Estimated)

## DELHI MASS RAPID TRANSIT SYSTEM (DMRTS)

### History

- National Capital Territory of Delhi today covers an area of 1,486 sq.kms and is a Union Territory with all powers of State Government. The history of planning a Metro Project for Delhi dates back to '70s. The Central Road Research Institute (CRRI) undertook the first exhaustive study on traffic and travel characteristics of Delhi in 1969-70. Since CRRI proposal was based on transport demand projection up to the year 1981, it was assigned to Country Planning Organization, the work of further projection of demand to the year 2001. Delhi Development Authority (DDA) prepared a perspective plan for Delhi (MPD - 2001) in 1984.
- A study Group was appointed by the Ministry of Railways, Government of India to recommend a precise alignment for the East West Corridor and in 1987 further appointed a Task Force to assess the choice of exact construction technology.

### Need for a Metro

- As cities grow in size, the number of vehicular trips on road system goes up. This necessitates a pragmatic policy shift to discourage private modes & encourage public transport once the level of traffic along any travel corridor in one direction exceeds 20,000 persons per hour.
- Rail-based Mass Rapid Transit System (MRTS) is called for. These are capital intensive and have long gestation period. It has been observed that in developing countries, planning for mass transit system starts when city population size exceeds 1 million, the system is in position by the time, the city population is 2 to 3 million & once the population exceeds 4 million or so, planned extension to the Mass Rapid Transit systems is vigorously taken up. In developing countries including India, because of paucity of funds, planning and implementation of rail-based Mass Rapid Transit System has been lagging far behind the requirements.
- The City of Delhi with a population of around 12 million should have had an MRTS network of at least 100 kms by this time, whereas actually it is still at the take-off stage. Delhi has all the ideal draw-up for an excellent Mass Rapid Transit System to be brought in. It has wide roads (roads cover 23% of the city area) where road possession for construction is not difficult (except in the old city area). Implementation will also not involve demolition of large scale private properties. Most of the land required is under Government control and thus can be easily acquired.
- The citizens are enlightened & would eagerly welcome introduction of people friendly MRTS though they may face some difficulties during the implementation phase. Added to this, Delhi has an unassailable advantage in its excellent railway network, comprising two rings and six spurs totaling about 120 kms within the urban area. Unfortunately, the rail assets are not being presently fully utilized as its share of commuter traffic is only a mere 2%.

- Delhi has experienced phenomenal growth in population in the last few decades. Population of 5.7 million in 1981 increased to 12.0 million in 1998 with 13.2 million in 2001. The number of motor vehicles has increased from 0.54 million in 1981, 3.0 million in 1998 and 4.0 million in 2001.
- The number of motor vehicles in Delhi is now more than that of Mumbai, Calcutta, Chennai put together. The result is extreme congestion on Delhi roads, ever slowing speeds, increase in road accidents, fuel wastage and environmental pollution with motorized vehicles alone contributing to about two thirds of the atmosphere pollution.
- The traffic on roads of Delhi is a heterogeneous mix of cycles, scooters, buses, cars and rickshaws resulting in a chaotic situation so much so that due to road accidents, the average number of persons killed per day has increased to 5 and of those injured to 13. The position is expected to deteriorate further in the years to come.
- TO RECTIFY THE SITUATION, the Government of India (GOI) and the Government of National Capital Territory of Delhi (GNCTD), in equal partnership have set up a Company named Delhi Metro Rail Corporation Ltd. under the Companies Act, 1956 which has now been given a mandate to construct 65.11 kms of Metro Rail in Delhi.

### **Delhi MRTS**

- For implementation & subsequent operation of Delhi MRTS, a company under the name DELHI METRO RAIL CORPORATION was registered on 3<sup>rd</sup> May, 1995 under the Companies Act, 1956. DMRC has equal equity participation from GOI (Government of India) and GNCTD.

### **Structure**

- Chairman 1
- Managing Director (MD) 1
- Directors 14
- Nominee Government of India 5
- Nominee Government of NCTD (Including MD) 5
- No: of full-time functional Directors at present Including MD 5

### **Mission**

- To cover the whole of Delhi with a Metro Network by the year 2021.
- To be of world class standards in safety, reliability, punctuality, comfort and construction satisfaction.
- Metro to operate on sound commercial lines obviating the need for government support.

- The first phase of the network, now under execution comprises 65 kms of route length with 13 kms underground called Metro corridor and 52 kms surface/elevated (4.5 kms – surface and 47.5 kms – Elevated) called Rail corridor.

<u>Phase I</u>	<u>Network</u>	<u>Delhi Metro Rail</u>
Line No: 1	22.06 km	18 Stations
Line No: 2	10.84 km	10 Stations
Line No: 3	32.10 km	31 Stations
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	65.00 km	59 Stations
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Capital cost of Phase – I is Indian Rs 60 billion (i.e. Pak Rs 84 billion) on April' 96 price level. However, taking into account the element of escalation during construction period of 7½ years, the completion cost was estimated at Indian Rs 105.71 billion (Pak Rs 148 billion) with the per km cost at US \$ 37.95 million.

- The ridership has been estimated at 1.5 million passenger trips per day. The system is capable of running trains at 2- minute intervals.

• **Present status**

- Line – 1 Shahdara – Pithala was made operational for commercial services in three stages. Section-I w.e.f 25-12-2002
  - II “ 04-10-2003
  - III “ 01-04-2004
- Line – II Vishwarvidya laya – Central Secretariat
  - A 4 – Km Section w.e.f 20-12-2004
  - A 7 – km “ “ 03-07-2005  
(with this Line II is complete).
- Line – III (Indraprastha – Barakhanka Road – Dwarka Sub City)
  - A 22 – kms Section commenced commercial operation w.e.f. 31-12-2005
  - Extn: of Line III
    - 6.5 kms w.e.f 01-04-2006
    - Barakhanka Road – Indraprastha

**Rolling Stock**

- The train services are being operated on entire Line – I (Shahdara – Pithala) at four minutes frequency during peak hours with twenty train sets at max. Permissible speed of 80 kms per hour for four – car metro train.

- For Line II, underground corridor between Vishwavidyalaya Central Secretariat Section, eleven trains operate on regular basis with two additional trains acting as a reserve.

### **Training School**

- A Training School for Metro Operating and Maintenance Staff has been set-up at Shorten Park. Under an agreement with Hong Kong Metro Railway, 60 employees of DMRC have been trained on their system. These employees after completing their training have returned and have trained the staff locally recruited for Delhi Metro. Regular training is held for new recruits through induction programmes apart from refresher training for experienced employees in all categories of staff including train operators. Station controllers, maintenance staff, etc.
- To ensure reliability and safety in train operations, it is equipped with the most modern communications and train control system.
- Air-conditioned.
- Ticketing & Passenger control are through Automotive Fare collection System.
- Trains available at 3 minutes frequency
- Entries & exits to metro stations are controlled by flap-doors operated by 'smart cards' and contact less tokens. Adequate number of escalators are installed at metro stations.
- Unique Feature of Delhi Metro is its integration with other modes of public transport, enabling the commuters to conveniently inter change from one mode to another. To increase ridership of Delhi Metro, feeder buses for metro stations are operating.
- Fare Chart: Indian Rs 6 (minimum) to Indian Rs 22 (maximum)
- Travel Card: Available in denomination of Rs 100, 200 & 500
- Validity: One year
- For un-limited travel:
  - Value of 1-Day Card: Rs 70
  - Value of 3-Day Card: Rs 200
- Metro Timings 6 AM to 10 PM
- Trains on the elevated section between Shahdara & Ritala cover a distance of 22.08 kms in about 39 minutes. Freq: varies from 4 minutes (peak) to 6 minutes (off-peak).
- The 11 kms underground section between Vishwavidyalaya and Central Sectts is covered in 18 minutes & 30 seconds approx: Train freq: varies from 4 minutes at peak time to 6 minutes in non-peak hours.

- Line III (Barabhamba – Dwarke Section 9) cover a district of 29.29 kms. Freq: varies from 4 minutes in non-peak hours. It is covered in 55 minutes and 30 seconds approx:

**Feeder Bus & Parking**

- For cars, parking facility is available at all stations of Line I (Shahdara – Pithala) and Vishwavidyalya Metro station.
- 18 stations with Parking Area in square meters varying from 1142 to 10,122, (4108, 6960, 4302, 3500, 2000, 2420, 2253.25, 1142, 1032, 6810, 10121.45, 1075, 3081.75, 4478.75, 2300, 2328.20, 3355, 3563.85).
- Parking facility is also available at Vishwavidyalya underground Station – 1008 Sq:meters).

## LIST OF 'QUICK ACTIONS' REQUIRED

### **(1) Effective Enforcement**

The foremost requirement is to have an effective, well-equipped, highly trained and motivated traffic police for which a beginning has been made in Islamabad. While such a traffic police can ensure proper discipline, there is a definite need to reduce the 'traffic pressure', specially during the interim period, which may be required for necessary infrastructure development.

### **(2) Time Staggering**

Through time staggering, it would be possible to spread the morning and evening peak periods effectively. This would mean that the School timings, Government office timings and private business timings should be so staggered that there is a difference of at least one hour in their opening times e.g. school opening time may be kept at 7:00 A.M, office timing, as at present, at 8:00 AM and the business timings from 9:00 AM onwards. Strict compliance of these timings would be essential and for that the school/office administration and the traffic police can play an important role. This can be seen from the improvement in road traffic conditions on a 'Saturday' vis-à-vis other working days when some of the private schools are closed.

### **(3) Parking Fee**

Parking fees may be introduced at all parking lots including offices, business places, etc. To begin with, all cars whether belonging to shopkeepers/business community, etc. should be charged the parking fee. This may be gradually increased to Rs 50 per day, Rs 15 per hour and Rs 30 per peak hour. The timings may be clearly specified to avoid any ambiguity. It should serve as a good source of earnings. CDA/RDA should prepare a comprehensive plan to deal with this problem on a regular footing and also provide for on-street and off-street parking facilities. As far as traffic police is concerned, it can at the best introduce discipline but it cannot reduce number of vehicles on its own.

### **(4) Removal of Encroachments**

All kinds of encroachments whether temporary or of a permanent nature on footpaths etc should be removed.



**(5) Shifting of schools, motels, etc from residential streets/areas**

All commercial activity in residential areas should be shifted to its allocated places. It should be made incumbent on all schools and colleges with combined teaching/school staff and enrollment of 100 and above to have their own buses for picking and dropping the staff/children. The pick and drop facility by the schools/colleges in their buses may be gradually increased to achieve suitable target of at least 50 per cent.

**(6) Emulation of Diplomatic Enclave Transport Model**

This 'park and ride' model can be emulated for well-defined zones, whereby the motorist parks his car in the parking lot and then uses the public transport facility to go to and come back to the Diplomatic Enclave. For this, a Shuttle Bus Service and adequate parking facility needs to be provided at the desired entry points in well-defined zones.

**(7) Pedestrian facilities and Pedestrianization**

Safe pedestrian moving facilities (zebra, pelican, overhead, underground, etc.) need to be provided and strictly enforced. Besides, pedestrianization should be introduced in busy shopping / market places.

**(8) Freight Movement**

All truck movements inside Islamabad city should be restricted between 10:00 PM to 6:00 AM. Delivery vans like the Suzuki Pick-ups may be allowed and treated at par with the policy for car usage.

**(9) Traffic Engineering Units**

Besides, the above-mentioned measures, which need to be regularly monitored for improvement, CDA/RDA should establish full-fledged Traffic Engineering Units, manned with properly qualified professionals, in the field of Traffic Engineering / Planning duly supported with adequate number of field staff. Adequate urban road infrastructure facilities including interchanges, under-passes, improvement of intersection geometry, traffic channelization, adequate size of kerb stone, road markings, signs, latest demand responsive synchronized signaling systems, safe pedestrian crossing facilities, etc should be implemented.