

2.2 SOCIOECONOMIC FEATURES BY H.I.S.

Various socioeconomic characteristics in the LMA were obtained by area, as one of the results of HIS, in conjunction with trip information. Though these characteristics were the results expanded from the sample data of HIS, the total figures were compared with the authorized figures and adjusted. Therefore, these results are very useful indicators, especially by zone, as the basic data for the analysis on trip characteristics.

The data obtained by HIS are roughly listed as follows:

- 1) Population(5 yrs. & above) by gender
- 2) Daytime population
- 3) Number of household
- 4) Population by occupation
- 5) Employment by industry sector
- 6) Household income
- 7) Vehicle ownership, etc.

Major socioeconomic features by zone (18-zone system) are tabulated in Table 2.2.1, and some of them are illustrated in the following section.

2.2.1. Population and Population Density

Figure 2.2.1. and 2.2.2 show the basic demographic features. The LMA is divided into the inner area and outer area. The population density differs significantly, as the inner area, which is mainly composed of MCL and Lahore Cantonment, has only 17% of the total area with 3.6 million population, equivalent to 78% of the total. The population density, therefore, is 90 persons/ha in the inner area and only 5 persons/ha in the rest of LMA.

The zones which have the population density of more than 200 persons/ha are Walled City, Shad Bagh and Krishan Nager.

Figure 2.2.1 Population by Zone, 1990

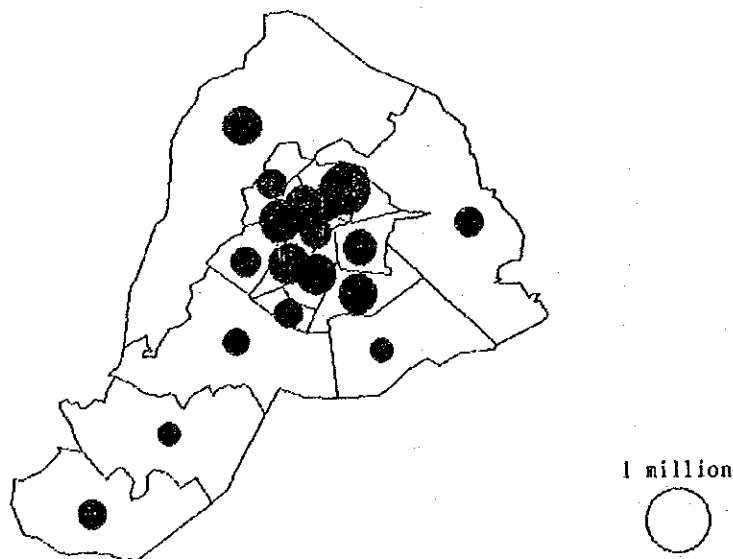
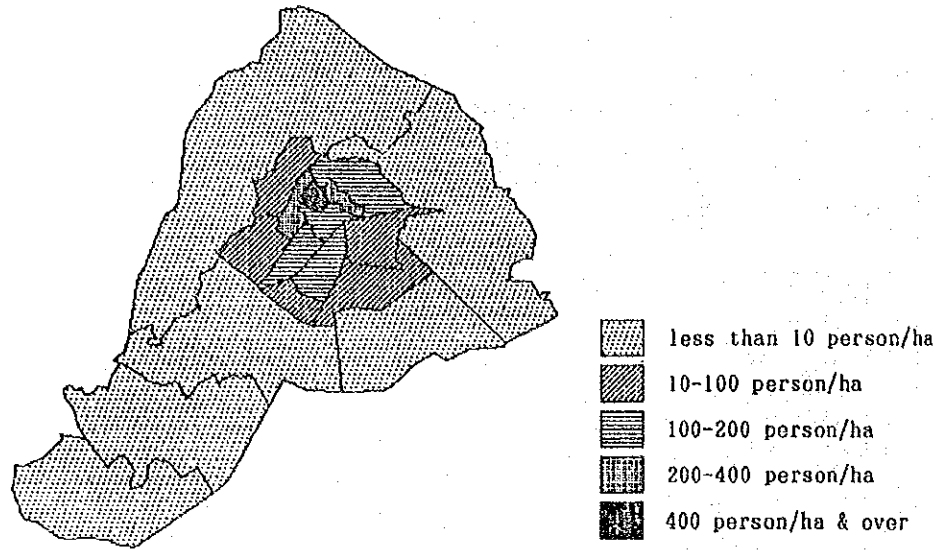


Table 2.2.1 Socioeconomic Indicators by Zone, 1990

NO.	ZONE NAME	AREA (ha)	POPULATION (5 YEARS AND ABOVE)			POP. DENSITY (POP./ha)	HOUSEHOLD
			TOTAL	MALE	FEMALE		
1	WALLED CITY	853	226,843	126,157	100,686	266	40,583
2	GOVERNMENT HOUSE	1,889	148,876	83,289	65,587	79	27,107
3	IQBAL TOWN/NEW CAMPUS	3,095	374,170	207,255	166,915	121	73,232
4	SHAD BAGH	891	223,009	120,691	102,318	250	35,697
5	KRISHAN NAGAR	1,826	433,727	243,940	189,787	238	92,766
6	NAZ BEG	4,152	211,713	116,358	95,355	51	37,398
7	BAGHBANPURA	5,372	614,494	345,449	269,045	114	111,883
8	SHAHARA	4,657	150,877	84,621	66,256	32	29,378
9	MAIN GULBERG/MODEL TOWN	3,454	346,114	193,128	152,986	100	65,651
10	TOWNSHIP	2,522	190,117	103,079	87,038	75	32,295
11	CANTONMENT-NORTH	4,999	283,126	156,720	126,406	62	54,842
12	CANTONMENT-SOUTH	6,364	365,587	200,518	165,069	57	74,781
13	WAGHA	39,969	179,086	99,325	79,761	5	38,216
14	MOTA SINGHWALA	15,892	92,088	52,591	39,557	6	18,972
15	BHOPATTIAN(SOUTHERN SUB-CORE)	25,165	146,073	82,068	64,005	6	26,493
16	BHAIPHERU	30,355	167,574	93,497	74,137	6	30,424
17	SHEIKHUPURA	66,075	302,111	163,602	138,509	5	58,558
18	WARGA/RAIWIND	21,259	122,098	71,819	50,279	6	20,289
	TOTAL	232,389	4,577,683	2,543,987	2,033,696	20	868,665

NO.	TOTAL	OCCUPATION				H. H. INCOME (RS/MONTH)	CAR OWNERSHIP	
		WORKER	HOUSEWIFE	STUDENT	OTHERS		2-WHEEL (%)	4-WHEEL (%)
1	226,843	75,196	56,488	71,950	23,209	3,412	62.8	10.7
2	148,876	47,592	37,545	50,256	13,483	4,424	84.0	26.8
3	374,170	124,219	106,360	116,681	26,910	6,792	97.3	52.0
4	223,009	65,838	59,740	77,531	19,900	3,554	100.0	11.0
5	433,727	137,643	120,013	121,605	54,466	3,143	80.8	15.5
6	211,713	64,120	46,618	79,504	21,471	3,514	78.1	16.3
7	614,494	182,858	144,890	203,794	82,952	3,131	92.1	9.2
8	150,877	44,595	42,192	47,291	16,999	3,039	90.2	5.0
9	346,114	120,573	91,651	96,511	37,379	8,017	82.9	63.0
10	190,117	51,205	39,981	76,496	22,435	4,832	100.0	32.0
11	283,126	82,674	62,761	105,051	32,640	3,047	95.5	139.0
12	365,587	110,193	94,462	123,130	37,802	4,444	68.9	35.1
13	179,086	60,650	58,119	43,034	17,283	2,249	53.9	9.9
14	92,088	30,899	26,906	26,315	7,968	2,356	47.3	8.0
15	146,073	53,967	40,239	35,659	16,208	2,475	52.7	16.5
16	167,574	55,369	43,126	52,787	16,292	2,835	46.0	11.7
17	302,111	97,285	83,730	92,703	28,393	2,294	43.3	8.3
18	122,098	37,976	32,108	38,079	13,935	2,405	49.6	8.5
	4,577,683	1,442,652	1,186,929	1,458,377	489,723	3,906	77.5	22.0

Figure 2.2.2 Population Density by Zone, 1990

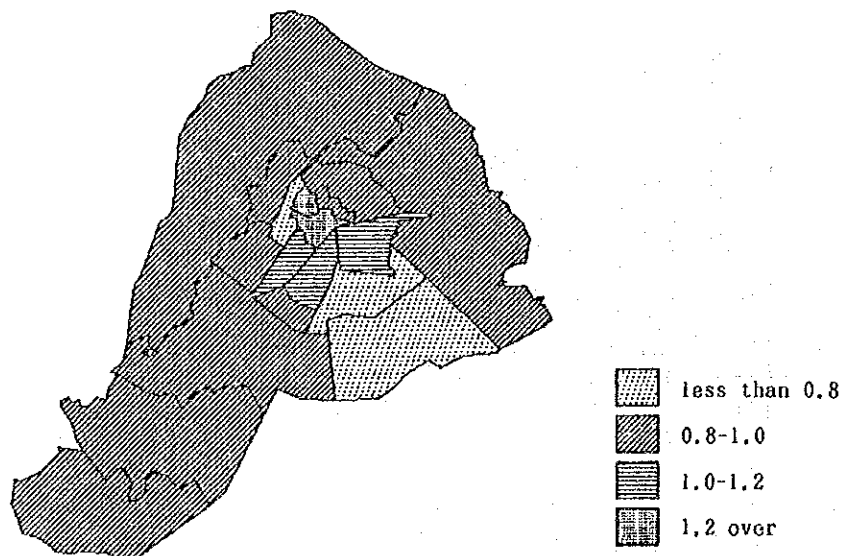


2.2.2. Daytime Population

Apart from the population by residence, HIS gives very interesting information about daytime population. Daytime population is calculated working/school address basis by the answers in household members information.

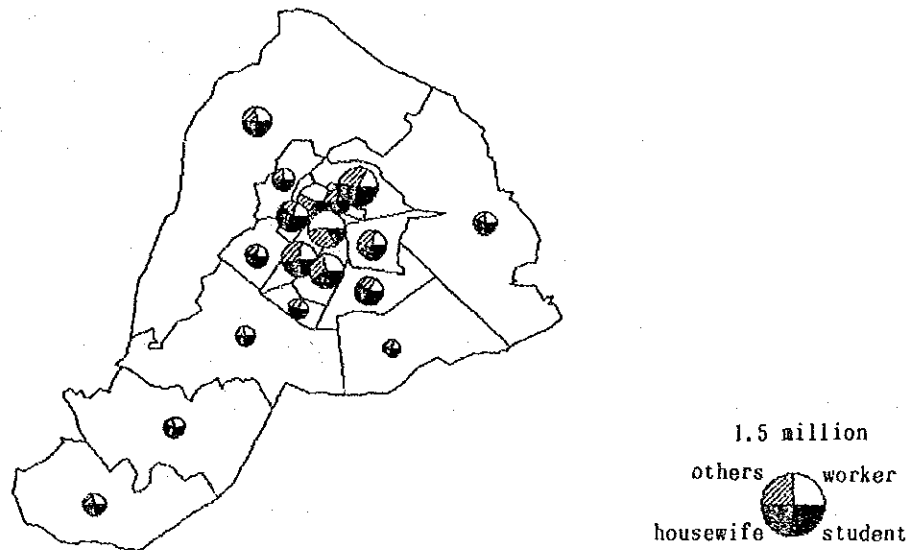
Figure 2.2.3 shows the ratio of daytime population to night population by zone. The zones with these indicators exceeding 1.0 has certain features as working place/school. Zones of Walled City and Government House indicate very high ratios, while both Cantonment North and South show low rate.

Figure 2.2.3 Daytime and Night Population Rate, 1990



Daytime employment by sector/ daytime population by occupation are also analyzed, and the summary, size of daytime population with composition by four categories of occupation, is illustrated in Figure 2.2.4.

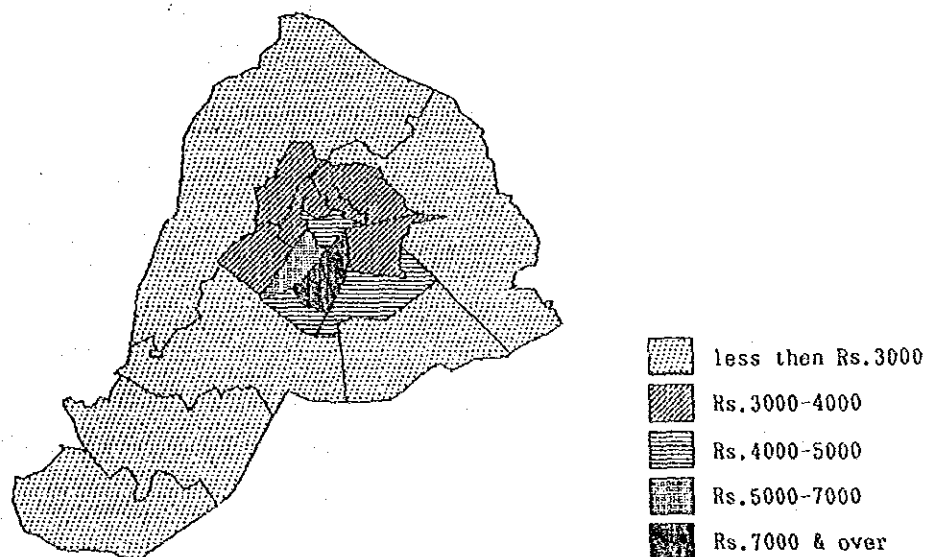
Figure 2.2.4 Daytime Population with Composition by Occupation, 1990



2.2.3. Household Income Level

Average household income in LMA is Rs. 3,900 per month. Higher income levels (more than Rs. 6,500) are shown in the zones such as Iqbal Town/New Campus and Main Gulberg/Model Town, which are well-planned/developed areas located in the southwestern part of the inner area of the LMA.

Figure 2.2.5 Average Household Income by Zone, 1990

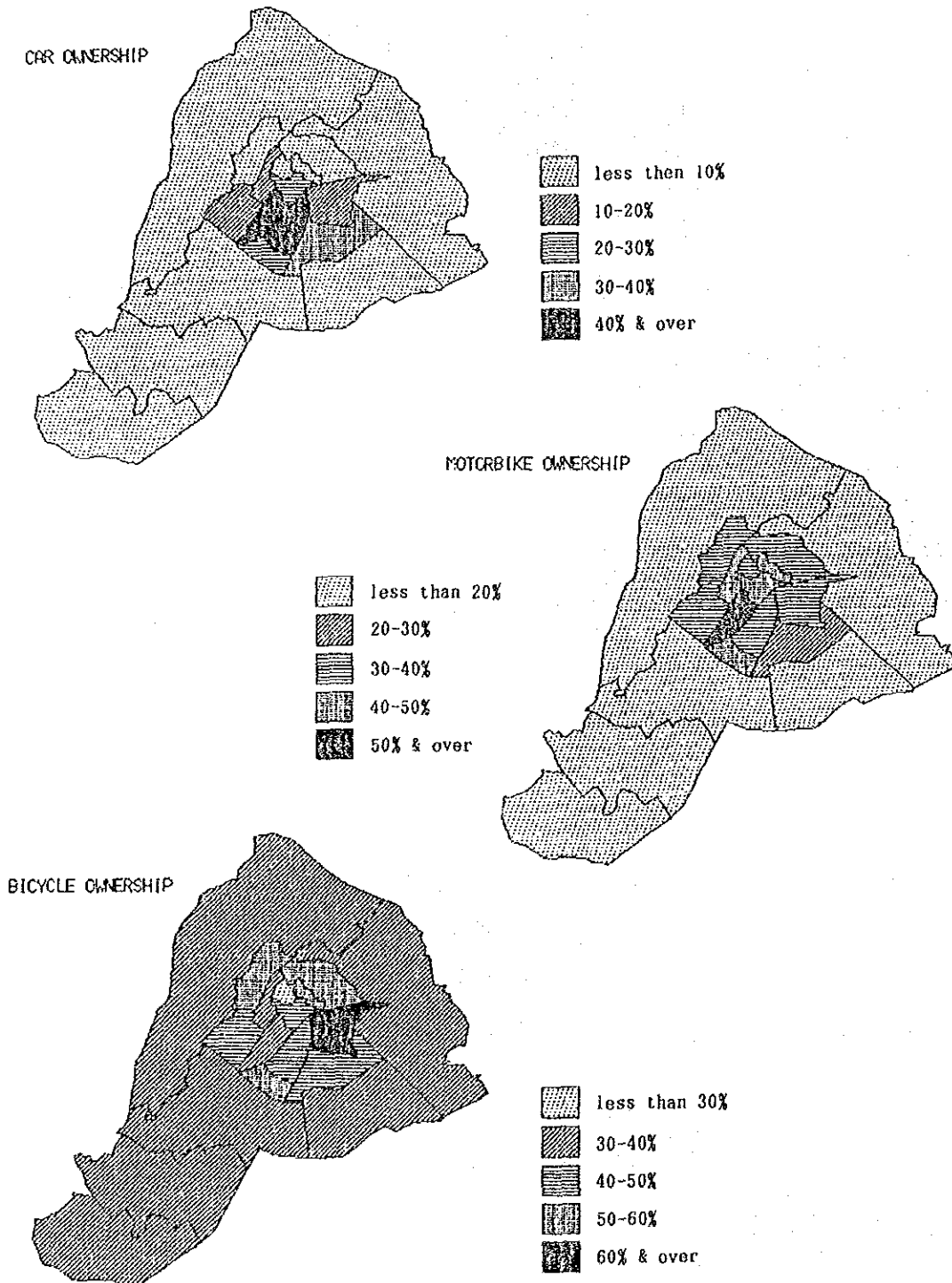


2.2.4 Vehicle Ownership

The vehicle ownership, in terms of the vehicle owning household ratio, is estimated by type of vehicle.

The higher car owning household ratio is found in the zones of Iqbal Town/New Campus and Main Gulberg/Model Town, where over 50% of households have their own cars. (21% in whole LMA)

Figure 2.2.6 Vehicle Ownership by Zone, 1990

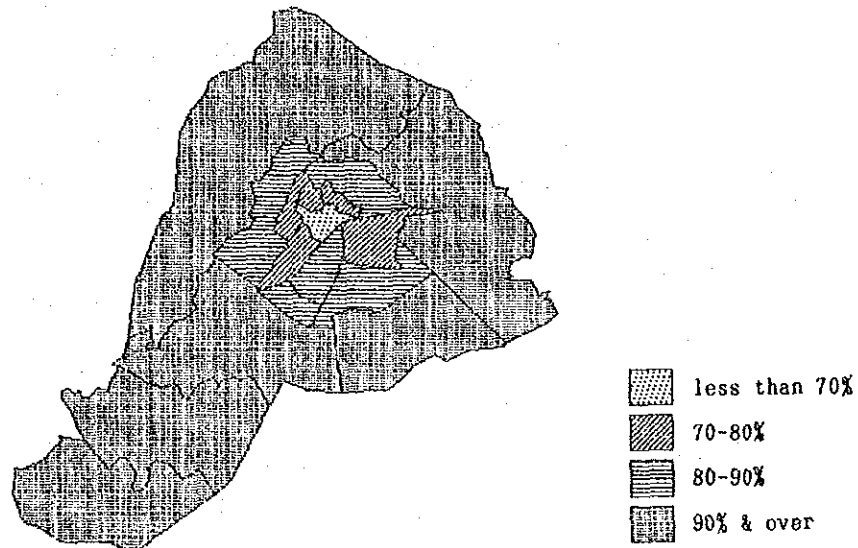


2.2.5. Housing Condition

The tenure condition of residence by the LMA people is also observed from the result of HIS.

Figure 2.2.6 shows residence owners ratio by area. It indicates that most of the residents in the outer area have their own houses, while lesser ownership in the central area of LMA.

Figure 2.2.6 Residence Ownership, 1990



2.3 TRIP CHARACTERISTICS BY LMA RESIDENTS

2.3.1 Total Number of Trips

1) Total Number of Trips

About 10.25 million person trips were made by all transport modes in the LMA on a typical weekday in 1990. These person trips have been classified into three categories in terms of major trip flows as follows:

- Internal trips : trips with both origin and destination inside LMA
- External trips : trips with one end inside and other end outside LMA
- Through trips : trips passing through LMA with both ends outside LMA

Table 2.3.1 shows a general classification of all person trips related to the LMA. Of the total number of 10.25 million trips, 9.78 million trips were made by LMA residents and 470 thousand trips by non-residents of LMA.

A classification of trips shows 95.6% for internal trips, 4.2% for external trips, and 0.2% for through trips.

Table 2.3.1 Person Trips Related to LMA
on a Typical Weekday, 1990

Classification of Major Person Trip Flow	Number of Daily Trips	Percent
Internal Person Trips	9800000	95.6
- by LMA Residents	9706000	94.7
- by Non-Residents of LMA	94000	0.9
External Person Trips	428000	4.2
- by LMA Residents	73000	0.7
- by Non-Residents of LMA	355000	3.5
Through Person Trips	21000	0.2
- by LMA Residents	-	0.0
- by Non-Residents of LMA	21000	0.2
Total - All Person Trips	10249000	100.0

Source: CSTS Person Trip Survey, 1990

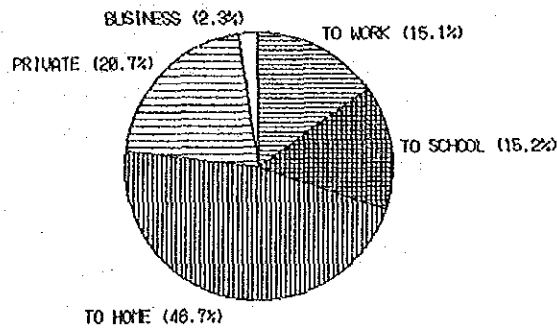
2) Composition by Trip Purpose

Figure 2.3.1 shows the composition of trip purposes for person trips made by LMA residents.

About 1,466,000 "to work" trips occur on a typical weekday, accounting for 15.1% of the total daily trips. While, 1,483,000 "to school" trips are made by LMA residents, accounting for 15.2% of the total trips.

The "to home" trips represent the largest proportion of all trips, accounting for 46.7%. However, this high proportion is not so significant, because "to home" trips are linked with other trips as return trips.

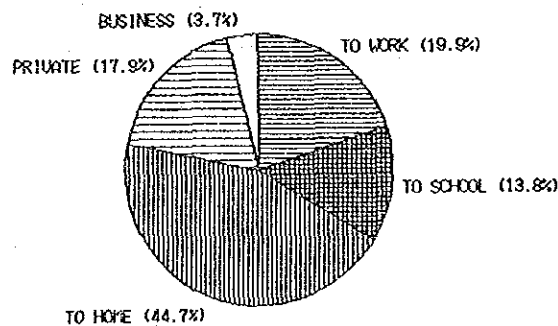
Figure 2.3.1 Trip Purpose Composition (All Modes)



"Private" trips account for about 20.7%. This may at first seem high when compared to "to work", "to school" and "business" trips, but "private" trips include all the trip purposes not covered by the other four main trip purposes. "Private" trips include, among others, shopping trips, social trips, eating trips recreational trips and religious trips (mosque/church). "Business" trips comprise only 2.3% of all the trips made by LMA residents.

For reference, Figure 2.3.2 shows the composition of trip purpose excluding walking trips. The share of "to school" and "private" is smaller than the composition by purpose of all modes, while the shares of "to work" and "business" trips are larger. This seems to indicate that vehicular transport (including bicycle) predominates for work and business, while LMA residents often walk on "to school" and "private" trips.

Figure 2.3.2 Trip Purpose Composition (excluding Walk Trips)



3) Modal Composition

The modal composition of person trips by LMA residents is shown in Table 2.3.2.

Significantly, 52.6% of all the trips are made by walking. Among the other non-motorized modes of transport, bicycle and tonga account for 7.2% and 1.1% of all the transport modes. These figures indicate that bicycle is a popular mode for LMA residents.

About 30% of all the trips made by motorized transport modes are made by buses. On the contrary, railway is unimportant transport mode at present, as it accounts for only 1.5% of all the trips made by motorized transport.

Next, of all trips made by motorized transport modes, 35% are made by private cars, and 30.8% by motorcycles. These statistics clearly indicate that not only private passenger cars, but also motorcycles are significant as modes of private transport for LMA residents.

Table 2.3.2 Distribution by Transport Mode

Transport Mode	Number of Trips*	Percent of All Modes	Percent of Motorized Transport
Motorized Transport	3811431	39.12	100.00
Private Transport	2511802	25.78	65.90
Motorcycle	1172110	12.03	30.75
Car/Jeep	1072625	11.01	28.14
Van/Pick-up	262413	2.69	6.88
Large Truck	4654	0.05	0.12
Public Transport	1299629	13.34	34.10
Taxi	7062	0.07	0.19
Rickshaw	63064	0.65	1.65
Institutional Bus	125390	1.29	3.29
Suzuki	8708	0.09	0.23
Minibus	561255	5.76	14.73
Bus	478306	4.91	12.55
Railway	55844	0.57	1.47
Non-Motorized Transport	5930915	60.88	
Walk	5121626	52.57	
Bicycle	698681	7.17	
Tonga	110608	1.14	
Total	9742346	100.00	

Source: CSTS Household Interview Survey, 1980

Note: *Trips made by LMA residents.

4) Trip Purpose and Transport Mode

Figure 2.3.3 illustrates that modal composition varies widely by trip purpose.

(1) "To Work" Trips

About 16.4% of "to work" trips are made by bus passengers, and "to work" trips by bicycle, motorcycles and cars account for 11.5%, 15.0%, and 15.0% respectively. The total of these three private transport modes account for 41.5% of all "to work" trips.

(2) "Business" Trips

Compared with the modal composition of "to work" trips, it is noteworthy that "business" trips are more dependent on private transport modes.

Motorcycles and cars account for 28.2% and 28.2% of all the "business" trips.

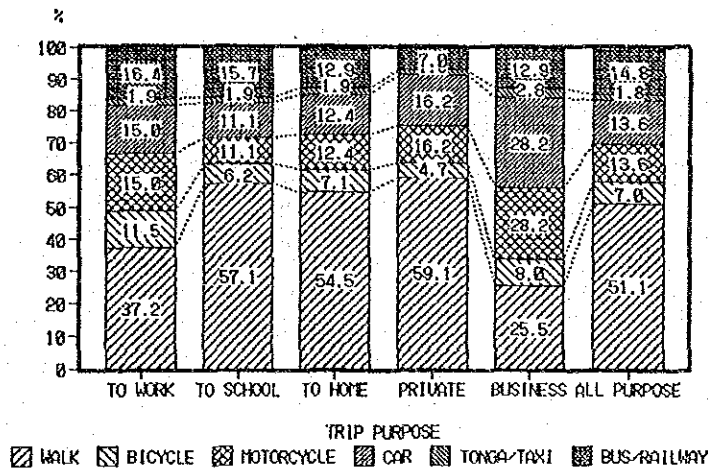
(3) "To School" Trips

In contrast, 57.1% of "to school" trips made on foot, followed by trips by bus which accounts for 15.7%.

(4) "Private" Trips

Modal composition of "private" trips is similar to that of "to school" trips in terms of the majority being walk trips.

Figure 2.3.3 Trip Composition by Trip Purpose and Transport Mode (Trip Productions)



Source : CSTS Household Interview Survey, 1990

Notes : Trips made by LMA residents

Car includes car/jeep, van/pick-up/micro-truck and large truck for private use.

Tonga and taxi include rickshaw.

2.3.2 Trip Generation Rate

The trip generation rate is defined as the number of trips made by a person in a day. There are two types of trip generation rates: gross rate for the population (consisting of those age 5 and above), and net rate which is only for people who made at least on trip. The trip generation rate is dependent on such household/individual characteristics as sex, age, occupation, car ownership and so on.

In this section the effect of the household/individual characteristics on trip generation is discussed using the indicators of gross/net generation rates as well as outdoor rate.

The gross trip generation rate in LMA is 2.14, and the outdoor rate is 72.2%.

1) Trip Generation Rate by Sex, Age Group

As shown in Table 2.3.3, the 2.57 gross trip rate of males is 61% higher than that of females. It is clear that the mobility of males is much higher than females, especially for the groups aged 20 years and over. Above age 25 or so, the gross trip rate by males shows a gradual increase. On the contrary, the rate by females above age 20 or so shows a sharp decrease. The male groups aged 5-9, 40-44, and 45-49 show higher gross trip generation rates than the other groups, accounting for 2.90, 2.85 and 2.90 respectively.

Figure 2.3.4 shows the breakdown of the gross trip generation rate by trip purpose. "To work" and "business" trips are made more by males aged 25-59 than other age groups. The trip generation rates of "to work" and "business" for females ages 25-59 range from one fourth to one third of that for males in the same age group.

Table 2.3.3 Number of Person Trips by Sex/Age Group

Sex	Age Group	Number of Persons (A)	Number of Persons with Trips (%) (B)	Total* Trips (C)	Gross Trip Generation Rate (D)	Net Trip Generation Rate (E)	Outdoor Rate (%) (F)
Male	0-4	-	-	-	-	-	-
	5-9	196323	7.7	179630	569380	2.90	3.17
	10-14	315579	12.4	300198	828636	2.63	2.76
	15-19	372368	14.6	341804	933105	2.51	2.73
	20-24	335501	13.2	300999	822756	2.45	2.73
	25-29	249130	9.8	225685	602859	2.42	2.67
	30-34	191187	7.5	177624	478657	2.50	2.69
	35-39	159078	6.3	152819	415893	2.61	2.72
	40-44	166808	6.6	155648	474904	2.85	3.05
	45-49	156482	6.2	145809	454078	2.90	3.11
	50-54	138836	5.5	124976	372656	2.68	2.98
	55-59	89048	3.5	78647	233129	2.62	2.96
	60-64	77693	3.1	63506	185329	2.39	2.92
	65-69	42765	1.7	29053	82030	1.92	2.82
70-74	27536	1.1	16651	59564	2.16	3.58	
75-	25653	1.0	13061	34374	1.34	2.63	
Total	2543987	100.0	2306110	6547350	2.57	2.84	90.6
Female	0-4	-	-	-	-	-	-
	5-9	200440	9.9	176740	379796	1.89	2.15
	10-14	256017	12.6	226422	658920	2.57	2.91
	15-19	236676	11.6	152974	524333	2.22	3.43
	20-24	203982	10.0	88750	337833	1.66	3.81
	25-29	193428	9.5	69802	268708	1.39	3.85
	30-34	169841	8.4	59528	233323	1.37	3.92
	35-39	181654	8.9	57023	230475	1.27	4.04
	40-44	183947	9.0	58961	197792	1.08	3.35
	45-49	148292	7.3	44707	136002	0.92	3.04
	50-54	107006	5.3	30433	115193	1.08	3.79
	55-59	57843	2.8	14987	57360	0.99	3.83
	60-64	47686	2.3	9811	44510	0.93	4.54
	65-69	18380	0.9	4455	24707	1.34	5.55
70-74	16180	0.8	2354	8409	0.52	3.57	
75-	12224	0.6	1275	13877	1.14	10.88	
Total	2033696	100.0	998222	3231238	1.59	3.24	49.1
Total	4577683	100.0	3304332	9778588	2.14	2.96	72.2

Source: CSTS Household Interview Survey, 1990

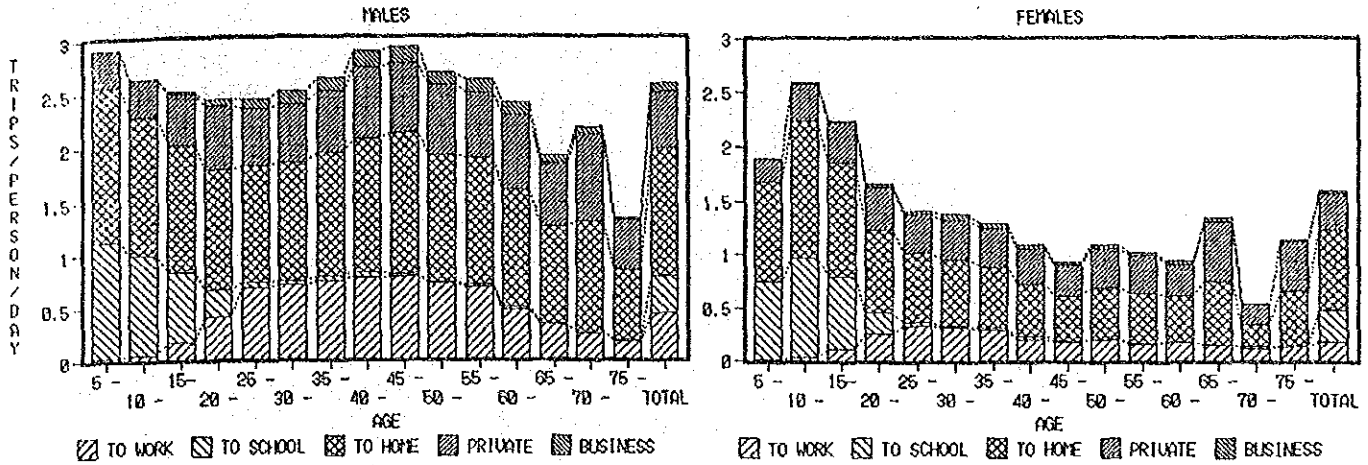
Note: D = C/A

E = C/B

F = B/A*100

* Trips made by LMA residents.

Figure 2.3.4 Trip Generation Rate by Sex/Age Group



2) Trip Generation Rate by Occupation

The trip generation rate by occupation is shown in Table 2.3.4 and Figure 2.3.5 reveals that more than 2.4 are made by administrative, sales/services, production workers and students, and that a low rate is found among housewives/others.

In general, it can be concluded that the higher the status of occupation, the higher the mobility is. The housewife/others trip rate is 1.65, which is about two-third of the employed person's rate. Students have a higher trip rate, 2.40, than persons and housewives/others, but slightly lower than employed persons.

Table 2.3.4 Number of Person Trips by Occupation

Occupation	Number of Persons (A)	Number of Persons with (%) Trips (B)	Total* Trips (C)	Gross Trip Generation Rate (D)	Net Trip Generation Rate (E)	Outdoor Rate (%) (F)	
Administrative Workers 1)	532394	11.6	503893	1306220	2.45	2.59	94.6
Sales/Services Workers	679115	14.8	632526	1659745	2.44	2.62	93.1
Agricultural Workers 2)	103766	2.3	95413	230285	2.22	2.41	92.0
Production Workers 3)	114104	2.5	105772	274788	2.41	2.60	92.7
Total of Employed Persons	1429379	31.2	1337604	3471038	2.43	2.59	93.6
Students	1458377	31.9	1370388	3503203	2.40	2.56	94.0
Housewives/Others 4)	1679457	36.7	591846	2779214	1.65	4.70	35.2
Unknown	10470	0.2	4493	25133	2.40	5.59	42.9
Total	4577683	100.0	3304332	9778588	2.14	2.96	72.2

Source: CSTS Household Interview Survey, 1990

Note: D = C/A

E = C/B

F = B/A*100

* Trips made by LMA residents.

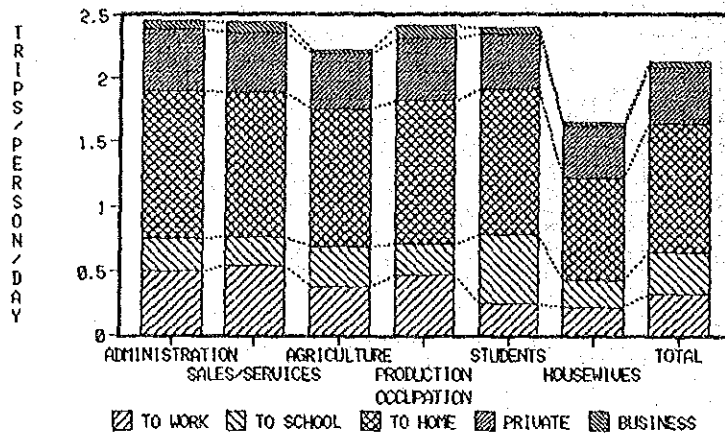
1) include professional/technical/related workers, administrative/ managerial workers, clerical/related workers.

2) include agricultural/animal husbandary and forestry workers, fishermen and hunters.

3) include production/transport and communications.

4) include housewives, not classifiable workers and jobless.

Figure 2.3.5 Trip Generation Rate by Occupation



3) Trip Generation Rate by Employment Sector

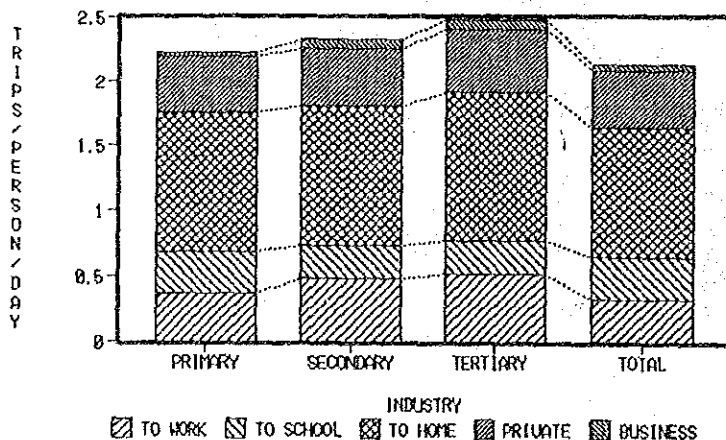
As shown in Table 2.3.5 and Figure 2.3.6, the trip generation rate of persons occupied in tertiary sector, is considerably high, accounting for 2.47. The trip rate for primary sector is low when compared with other sectors.

Table 2.3.5 Number of Person Trips by Industry Sector

Industry	Number of Persons (A)	Number of Persons with (%) Trips (B)	Total* Trips (C)	Gross Trip Generation Rate (D)	Net Trip Generation Rate (E)	Outdoor Rate (%) (F)	
Primary Sector	102448	2.2	94287	227246	2.22	2.41	92.0
Secondary Sector	207366	4.5	195406	484633	2.34	2.48	94.2
Tertiary Sector	1003259	21.9	938205	2482699	2.47	2.65	93.5
Total of Employed Persons	1313073	28.7	1227898	3194578	2.43	2.60	93.5
Not in Employment	3264303	71.3	2076344	6583622	2.02	3.17	63.6
Unknown	307	0.0	90	388	1.26	4.31	29.3
Total	4577683	100.0	3304332	9778588	2.14	2.96	72.2

Source: CSTS Household Interview Survey, 1990 Note: D = C/A
E = C/B
F = B/A*100
* Trips made by LMA residents.

Table 2.3.6 Trip Generation Rate by Industry Sector



4) Trip Generation Rate by Household Income Level

Table 2.3.6 and Figure 2.3.7 shows the trip generation rate by household income level. The trend is that high income earners have a high trip generation rate. The purpose composition shows that the higher the income, the higher the trip rate for "business" and "private" purposes.

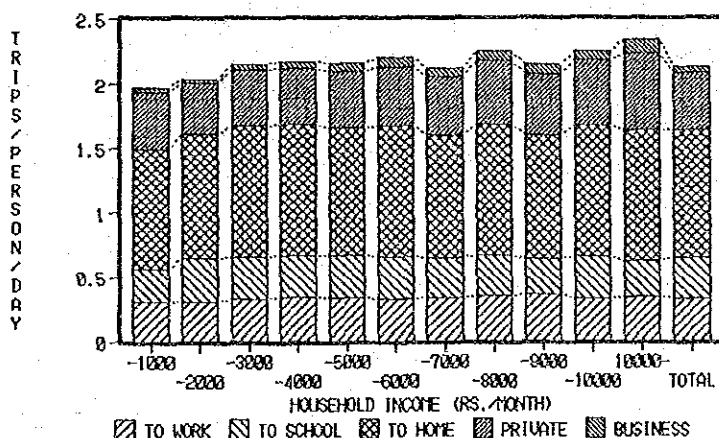
Table 2.3.6 Number of Person Trips by Household Income Level

Monthly Income Rs.	Number of Persons (A)	(%)	Number of Persons with Trips (B)	Total* Trips (C)	Gross Trip Generation Rate (D)	Net Trip Generation Rate (E)	Outdoor Rate (%) (F)
-1000	164674	3.6	111614	324317	1.97	2.91	67.8
-2000	1260803	27.5	884925	2574748	2.04	2.91	70.2
-3000	1049527	22.9	757193	2258473	2.15	2.98	72.1
-4000	603117	13.2	444131	1308880	2.17	2.95	73.6
-5000	415647	9.1	302961	888900	2.14	2.93	72.9
-6000	258707	5.7	192067	568200	2.20	2.96	74.2
-7000	149303	3.3	107790	313940	2.10	2.91	72.2
-8000	142281	3.1	107320	317490	2.23	2.96	75.4
-9000	64380	1.4	47490	137877	2.14	2.90	73.8
-10000	144928	3.2	106829	324326	2.24	3.04	73.7
10000-	318466	7.0	237623	747126	2.35	3.14	74.6
Unknown	5850	0.1	4389	14311	2.45	3.26	75.0
Total	4577683	100.0	3304332	9778588	2.14	2.96	72.2

Source: CSTS Household Interview Survey, 1990

Note: D = C/A
E = C/B
F = B/A*100
* Trips made by LMA residents.

Figure 2.3.7 Trip Generation Rate by Household Income Level



5) Trip Generation by Vehicle Ownership

Table 2.3.7 and Figure 2.3.8 summarizes trip production rate by vehicle ownership by vehicle type. The trip generation rate is 2.28 for household members owning both car and motorcycle, while 2.04 for non-car owning household members. This shows that the possibility of using transportation such as cars and motorcycles is closely related to the trip generation rate.

Table 2.3.7 Number of Person Trips by Vehicle Ownership

Car Ownership	Number of Persons		Number of Persons with Trips (B)	Total* Trips (C)	Gross Trip Generation Rate (D)	Net Trip Generation Rate (E)	Outdoor Rate (%) (F)
	(A)	(%)					
Non-Car	1128632	24.7	792238	2298401	2.04	2.90	70.2
Bicycle	1242918	27.2	882808	2602401	2.09	2.91	71.8
M. Cycle	1217629	26.6	890592	2645751	2.17	2.87	73.1
Car	581533	12.7	427635	1305887	2.25	3.05	73.5
Car+M. Cycle	406970	8.9	300959	926148	2.28	3.08	74.0
Total	4577683	100.0	3304332	9778588	2.14	2.96	72.2

Source: CSTS Household Interview Survey, 1990

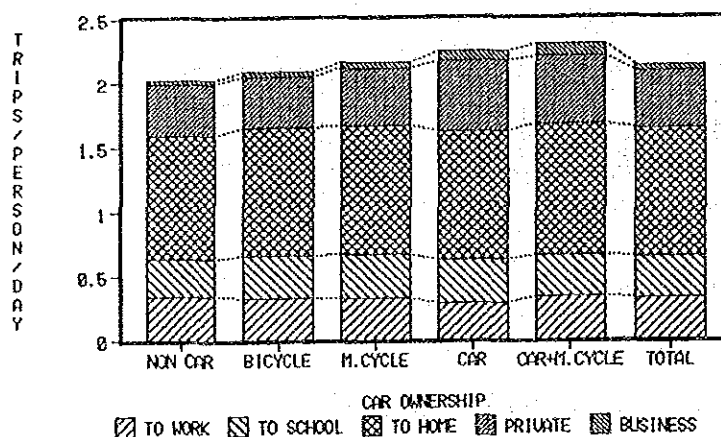
Note: D = C/A

E = C/B

F = B/A*100

* Trips made by LMA residents.

Figure 2.3.8 Trip Generation Rate by Vehicle Ownership



Note : * includes private passenger car, van/pick-up/ micro-truck and large truck.

2.3.3 Household Characteristics and Modal Share

1) Modal Share by Vehicle Ownership

Table 2.3.8 and Figure 2.3.9 show the person trips by transport mode travelled by people of each vehicle ownership category. Usage of bus transport is dependent on vehicle ownership level. Looking at the use of transport modes other than bus, about 78% of car owning households use their own cars. On the other than, 70% of non car owning households use bus.

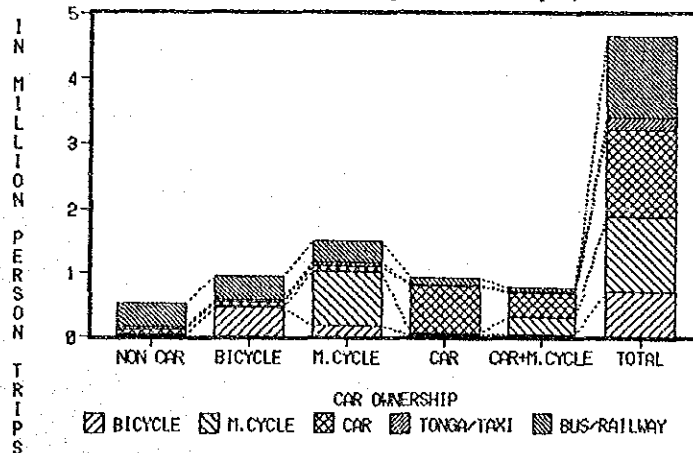
Table 2.3.8 Modal Share by Car Ownership (excluding Walk Trips)

Transport Mode	Number of Person Trips by Car Ownership*					Total
	Non Car	Bicycle	M.Cycle	Car	Car+M.Cycle	
Private Transport	117151	537038	1004550	802817	670765	3222321
	3.6	16.7	34.0	24.9	20.8	100.0
	22.0	56.1	74.2	85.0	89.8	69.2
Bicycle	21050	441182	164815	30130	32903	689080
	3.0	63.1	23.6	5.6	4.7	100.0
	4.0	46.1	11.2	4.1	4.4	15.0
M.Cycle	24182	27497	845582	22667	254059	1173987
	2.1	2.3	72.0	1.0	21.6	100.0
	4.5	2.0	57.3	2.4	34.0	25.2
Car	71918	68359	84153	741020	383803	1349254
	5.3	5.1	6.2	54.9	28.4	100.0
	13.5	7.1	5.7	78.5	51.4	29.0
Public Transport	415306	419866	380652	141519	76091	1433434
	20.0	20.3	26.6	9.0	5.3	100.0
	78.0	43.9	25.8	15.0	10.2	30.8
Tonga/Taxi	45296	41899	51628	25949	16261	181033
	25.0	23.1	28.5	14.3	9.0	100.0
	8.5	4.4	3.5	2.7	2.2	3.9
Bus/Railway	370010	377967	329024	115570	59830	1252401
	29.5	30.2	26.3	9.2	4.8	100.0
	69.5	39.5	22.3	12.2	8.0	26.9
Total	532457	956904	1475202	944336	746856	4655755
	11.4	20.6	31.7	20.3	16.0	100.0
	100.0	100.0	100.0	100.0	100.0	100.0

Source: CSTS Household Interview Survey, 1990

Note: * Trips made by LMA residents.

Figure 2.3.9 Modal Share by Vehicle Ownership (excluding Walk Trips)

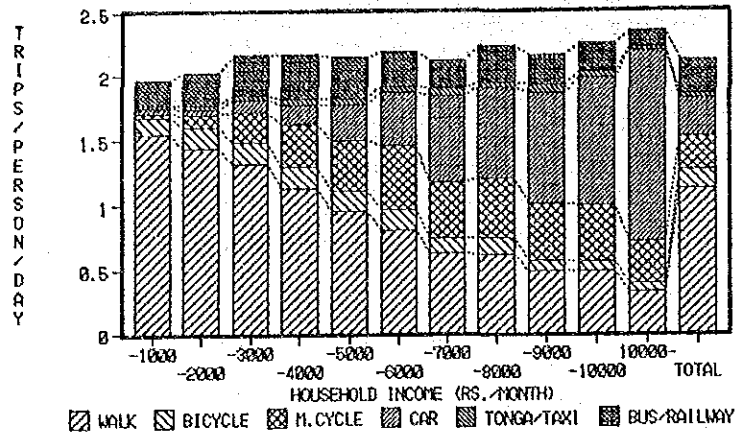


2) Trip Generation Rate by Household Income Level

Figure 2.3.10 shows the trip generation rate by household income and by transport mode. Use of private cars increases as the income increases. Use of motorcycle increases to a certain degree as the income increases, but declines for higher income earner. This trend is based on the relationship between the household income and car ownership.

The generation rate for bus appears to remain relatively constant as the income increases, but declines for higher income earners.

Figure 2.3.10 Trip Generation Rate by Household Income Level and Transport Mode



2.3.4 Hourly Distribution of Person Trips

1) Time of Travel

The hourly distributions of person trip by trip purpose and by transport mode are shown in Figure 2.3.11 and Figure 2.3.12. The distribution pattern of trips was based on the departure and the arrival time of each trip. In other words each trip in the survey appears on the curve for trip productions and for trip attractions.

Three combined peak periods for daily person trips were observed. The morning peak period (7:00-9:00) accounts for 21.9% of the origination trips and 23.0% of the terminating, the daytime peak (12:00-14:00) account for 17.4% and 15.9%, and evening peak (17:00-19:00) account for 14.3% and 14.7%. Combined the five hours comprised by the peak periods account for 47.8% of the total trips produced and 44.9% of total trips attracted. The other 18 off-peak hours account for half of the total daily travel demand.

2) Trip Purpose and Time of Departure/Arrival

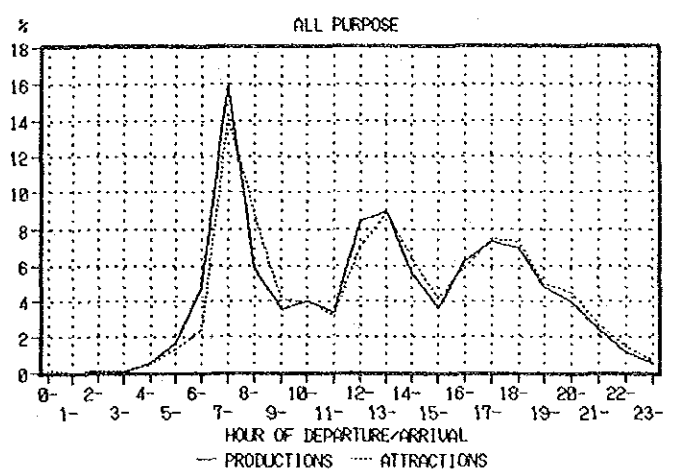
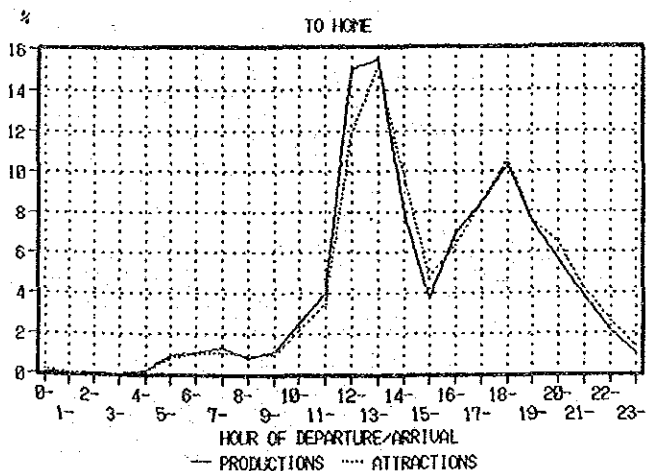
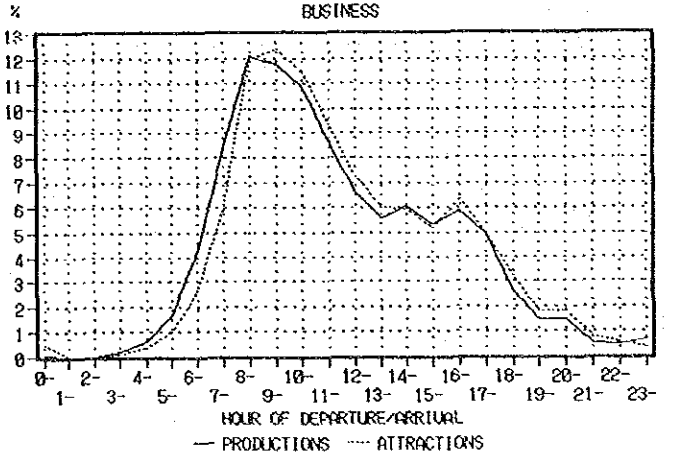
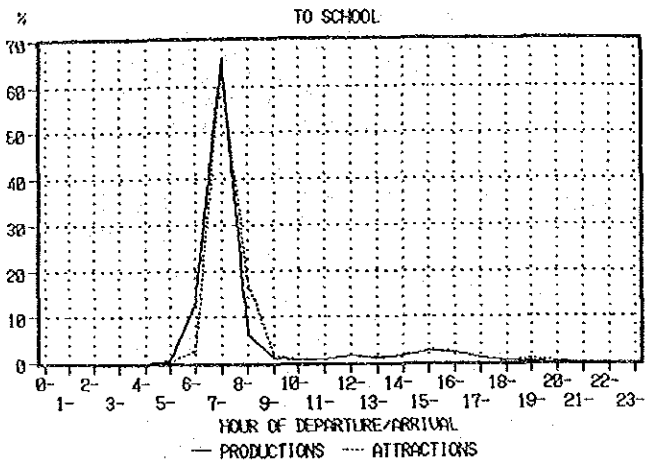
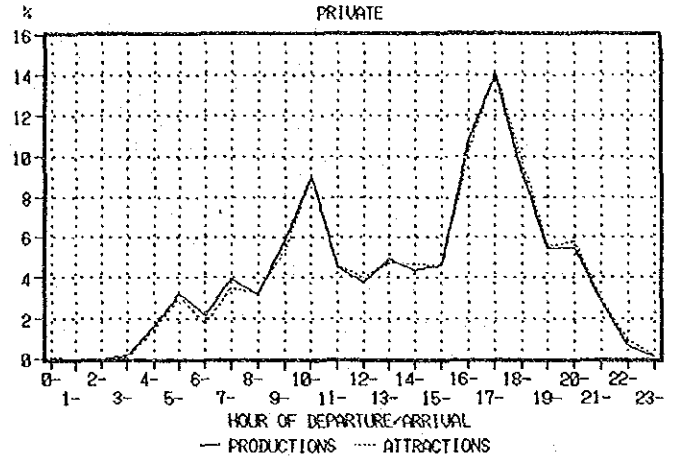
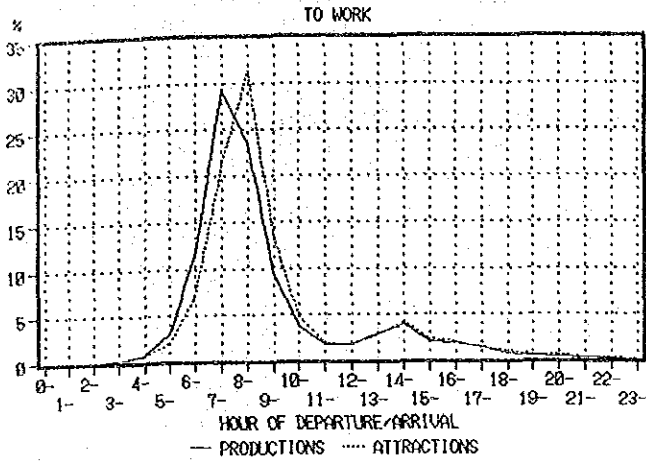
Figure 2.3.11 shows the hour of departure/arrival variations in the daily trip purpose composition of total trip production and attraction by LMA residents. The trip purpose proportion obviously varies according to the hour departure and arrival. Whereas 21.9% of total trip generation and 23% of total trip attraction terminate during the morning peak hours (7:00-9:00), about 52% of these morning peak period trips are "to work" trips. The morning peak hours for trips "to school" are earlier than "to work" trips. "To school" trips terminating between 7:00 a.m. and 8:00 a.m. account for 68.4% of all purpose trips in this period.

The noon peak period mainly consists of "to home" trips, reflecting the school hours and the working hours of the government sectors adopted in Pakistan. "To home" trips are predominant in the noon and evening period, with a less conspicuous peak than the morning period.

Private trips, mainly terminating between 4:00 p.m. and 6:00 p.m. The hourly distribution of business trips are not as pronounced as the other

four trip purpose.

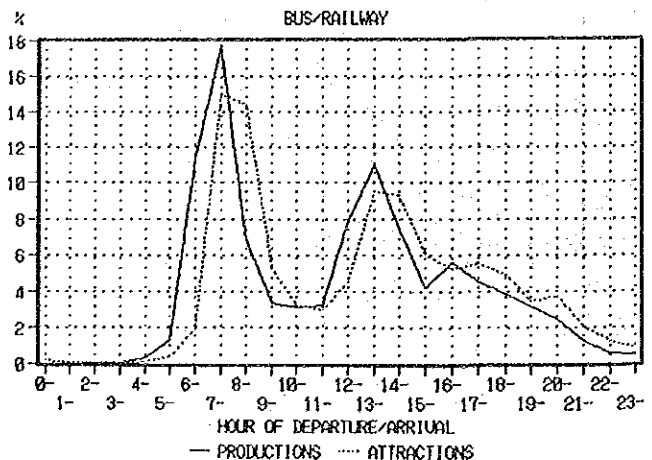
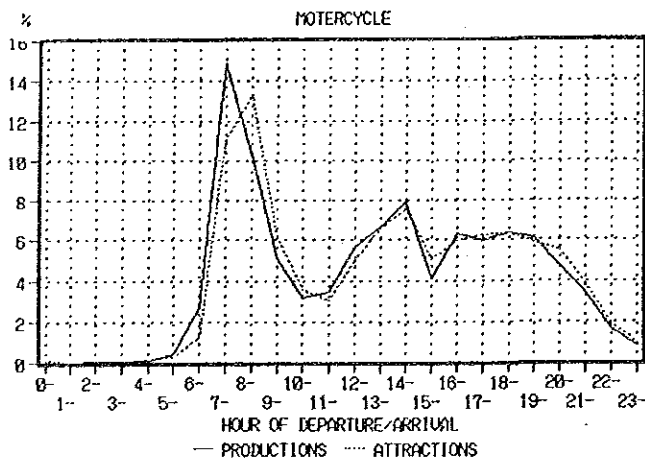
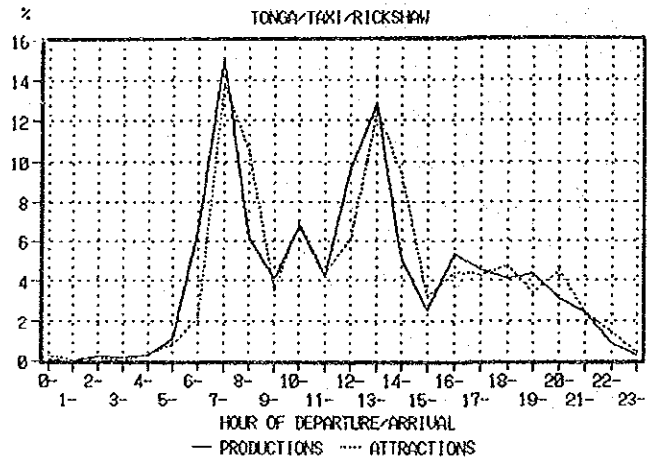
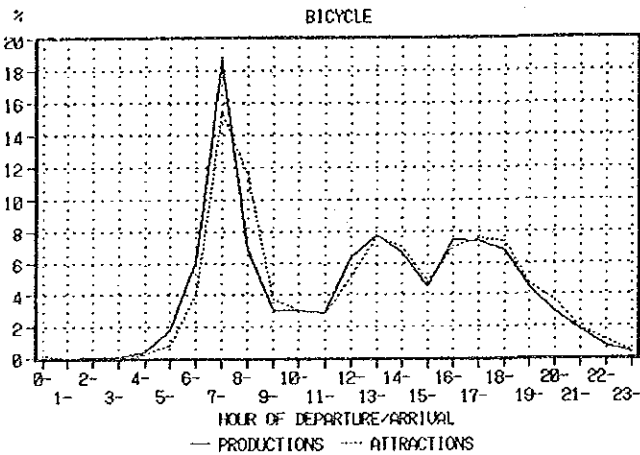
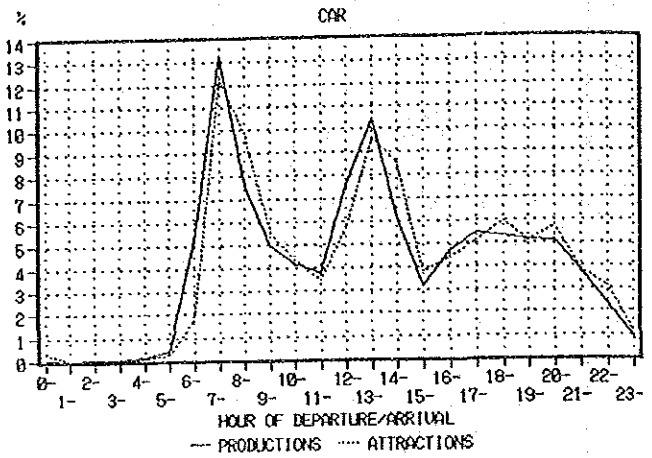
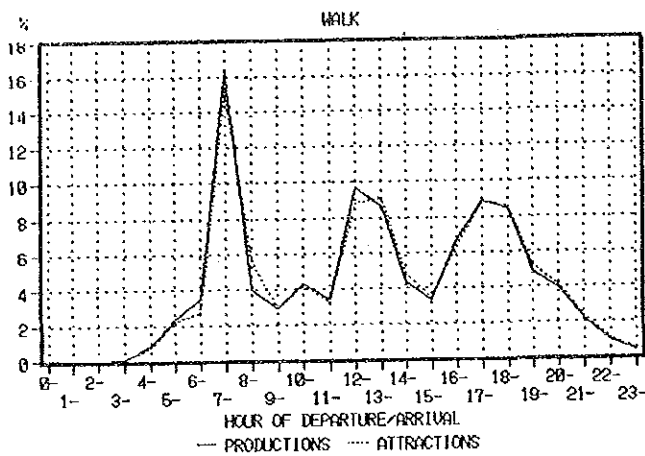
Figure 2.3.11 Hourly Distribution of Person Trips by Purpose at Origins/ Destinations



3) Transport Mode and Time of Departure/Arrival

Figure 2.3.12 shows the hourly distribution of all person trips by all transport modes. The shares of the all modes are nearly constant throughout the day.

Figure 2.3.12 Hourly Distribution of Person Trips by Transport Mode at Origin/Destinations



2.3.5 Trip Length

1) Trip Purpose and Trip Length

Table 2.3.9 indicates the average travel time by trip purpose. The trip length distribution by trip purpose is shown in Figure 2.3.13.

The trip length of "to school" and "private" are shorter than those of other trip purposes, with average travel times of 18.4 minutes and 15.0 minutes. Over two-thirds of these trips are less than 20 minutes, whereas about half of "to work" and "business" trips fall in this range. In fact, the trip length of "to work" and "business" trips are rather long, with average travel times of 25.4 minutes and 26.4 minutes.

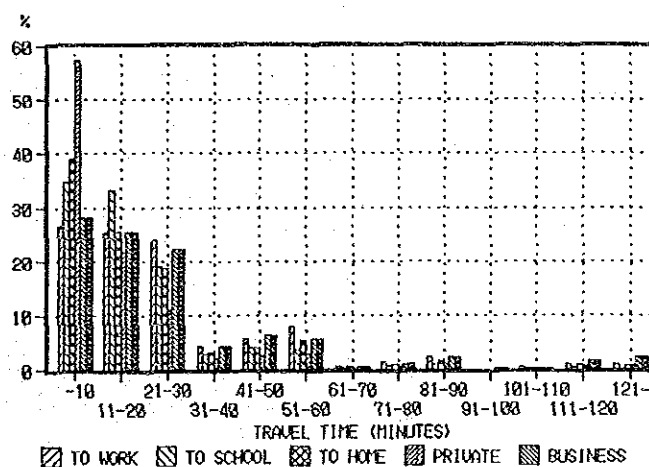
Table 2.3.9 Trip Length (Travel Time) by Trip Purpose

Trip Purpose	Average Travel Time* (Minute)
To Work	25.4
To School	18.4
To Home	20.4
Private	15.0
Business	26.4
Total	19.9

Source: CSTS Household Interview Survey, 1990

Note: *Average travel time including walk trips.

Figure 2.3.13 Trip Length (Travel Time) Distribution by Trip Purpose



2) Transport Mode and Trip Length

As shown in Table 2.3.10, wide variations in trip length were observed among the different transport modes. The trip length by transport is shown in Figure 2.3.14. Trips made by walking are naturally short, with average travel time of 10.8 minutes. Of trips made by walking, 61.8% are made

within 10 minutes.

The trip length distribution by bicycle, motorcycle and private car are very similar, indicating bicycle and motorcycle usage is almost the same as private car.

The trip length distribution of railway is quite different from other motorized transport modes. The average travel time of railway passenger is the longest at 76.4 minutes.

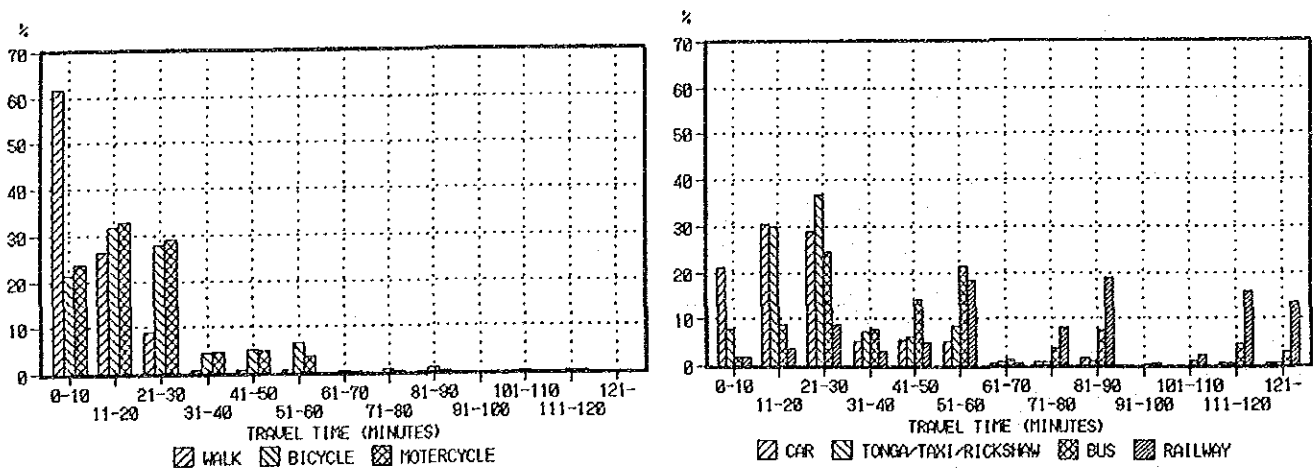
The travel time of tonga/taxi/rickshaw passenger are longer than those of bicycle, motorcycle and private car.

Table 2.3.10 Trip Length (Travel Time) by Transport Mode

Representive Transport Mode	Average Travel Time (Minute)
Walk	10.8
Private Transport	22.1
Bicycle	22.7
M. Cycle	20.3
Car	23.4
Public Transport	47.3
Tonga/Taxi	27.3
Bus	48.9
Railway	76.4
Total	29.9 (19.9)*

Source: CSTS Household Interview Survey, 1990
 Note: *including walk trips.

Figure 2.3.13 Trip Length (Travel Time) Distribution by Transport Mode



2.4 TRAVEL DEMAND CHARACTERISTICS BY AREA

2.4.1 Trip Production and Attraction

The total daily trip demand of 10.03 million trips by LMA residents, including trips made by the non-residents of LMA, is zonally disaggregated and shown in Tables 2.4.1 and 2.4.2. Nearly 50% of the total private transport trip demand is produced in and attracted to Government House, Iqbal Town/New Campus, and Main Gulberg, while over 30% of the public transport trip demand is produced in and attracted to the Walled City, Government House, and Baghbanpura.

2.4.2 Trip Production and Attraction by Trip Purpose

Figures 2.4.1 and 2.4.2, which is worked out based on Tables 2.4.3 and 2.4.4 show trip production and attraction by areas (integrated zone) and trip purpose. Characteristics of trips by purpose are as follows:

(1) "To Work" Trip

Many trips with "to work" trips originate from residential areas because they are proportional to the population size. Many of them are attracted to the business areas, Walled City and Government House.

(2) "To School" Trip

There are over 100,000 school trips attracted daily to the Walled City, Government House, Iqbal Town/New Campus, Baghbanpura, Main Gulberg/Model Town and Cantonment-North. This can be accounted for by the numerous schools facilities in these areas.

(3) "Private" Trip

The private trip attraction is not as simple as the other purpose. It is dependent on various complex urban functions. It is pointed out that the concentration of commercial functions, those having over 100,000 trip attraction, is in the areas of Walled City, Government House, Iqbal Town/New Campus, Krishan Nager, Baghbanpura, Main Gulberg/Model Town, Cantonment-North and South and Sheikhpura.

(4) "Business" Trip

The same tendency for "business" trips, such as "to work" trips, is observed for the same areas, Walled City and Government House.

Table 2.4.1 Trip Productions by Area*

B-Zone No.	Name of Zone	Trip Productions							
		Walk	(%)	Private	(%)	Public	(%)	Total	(%)
1	Walled City	320715	6.3	250496	7.7	197650	11.8	768861	7.7
2	Government House	164582	3.2	475679	14.6	220876	13.3	861137	8.6
3	Iqbal Town/New Campus	148366	2.8	414606	12.8	132170	8.0	695142	6.9
4	Shad Bagh	213962	4.2	145303	4.5	71634	4.3	430899	4.3
5	Krishan Nagar	633452	12.4	215835	6.6	101713	6.1	851000	8.5
6	Niaz Beg	235848	4.6	95948	3.0	81040	4.9	412836	4.1
7	Baghbanpura	673934	13.2	267347	8.2	158052	9.5	1099333	11.0
8	Shahdara	171209	3.3	75451	2.3	52443	3.2	299103	3.0
9	Main Gulberg/Model Town	164121	3.2	591308	18.2	98929	6.0	855358	8.5
10	Township	157333	3.1	130333	4.0	54980	3.3	342646	3.4
11	Cantonment-North	303374	5.9	215596	6.6	108759	6.5	627729	6.3
12	Cantonment-South	322113	6.3	233038	7.2	92053	5.5	647204	6.5
13	Wagha	262863	5.1	37190	1.1	33935	2.0	333988	3.3
14	Beidan Road	170729	3.3	14246	0.4	30049	1.8	215024	2.1
15	Bhopattian	193236	3.8	21299	0.7	41053	2.5	255588	2.5
16	Bhaiphuru	299917	5.9	15242	0.5	43930	2.6	359089	3.6
17	Shiekhupura	488960	9.5	33747	1.0	93865	5.6	616572	6.1
18	Wahga/Raiwind	196053	3.8	14301	0.4	47912	2.8	258266	2.6
Total		5120767	100.0	3246965	100.0	1662043	100.0	10029775	100.0

Source: CSTS Person Trip Survey, 1990

Note: *including trips made by the non-residents of LMA.

Table 2.4.2 Trip Attraction by Area*

B-Zone No.	Name of Zone	Trip Attractions							
		Walk	(%)	Private	(%)	Public	(%)	Total	(%)
1	Walled City	318820	6.2	251733	7.8	200876	12.3	771429	7.7
2	Government House	162875	3.2	480912	14.8	216378	13.2	860165	8.6
3	Iqbal Town/New Campus	147067	2.9	414484	12.8	130590	8.0	692151	6.9
4	Shad Bagh	214437	4.2	144853	4.5	72202	4.4	431492	4.3
5	Krishan Nagar	634316	12.4	218809	6.7	94643	5.8	947768	9.5
6	Niaz Beg	236303	4.6	93553	2.9	81983	5.0	411839	4.1
7	Baghbanpura	675600	13.2	265015	8.2	158741	9.8	1100356	11.0
8	Shahdara	171213	3.3	74650	2.3	53728	3.3	299591	3.0
9	Main Gulberg/Model Town	164003	3.2	593052	18.3	96902	5.9	853957	8.5
10	Township	157917	3.1	128235	4.0	55953	3.4	342105	3.4
11	Cantonment-North	304288	5.9	215892	6.7	108209	6.6	628389	6.3
12	Cantonment-South	322566	6.3	230013	7.1	92376	5.7	644955	6.5
13	Wagha	263041	5.1	38102	1.2	38429	2.4	339572	3.4
14	Beidan Road	170303	3.3	14993	0.5	33832	2.1	219128	2.2
15	Bhopattian	193384	3.8	20827	0.6	37437	2.3	251648	2.5
16	Bhaiphuru	299687	5.9	14047	0.4	41381	2.5	355115	3.6
17	Shiekhupura	489093	9.6	28835	0.9	74789	4.6	592717	5.9
18	Wahga/Raiwind	195854	3.8	14573	0.4	44751	2.7	255178	2.6
Total		5120767	100.0	3242588	100.0	1634200	100.0	9997555	100.0

Source: CSTS Person Trip Survey, 1990

Note: *including trips made by the non-residents of LMA.

Figure 2.4.1 Zonal Trip Productions by Trip Purpose

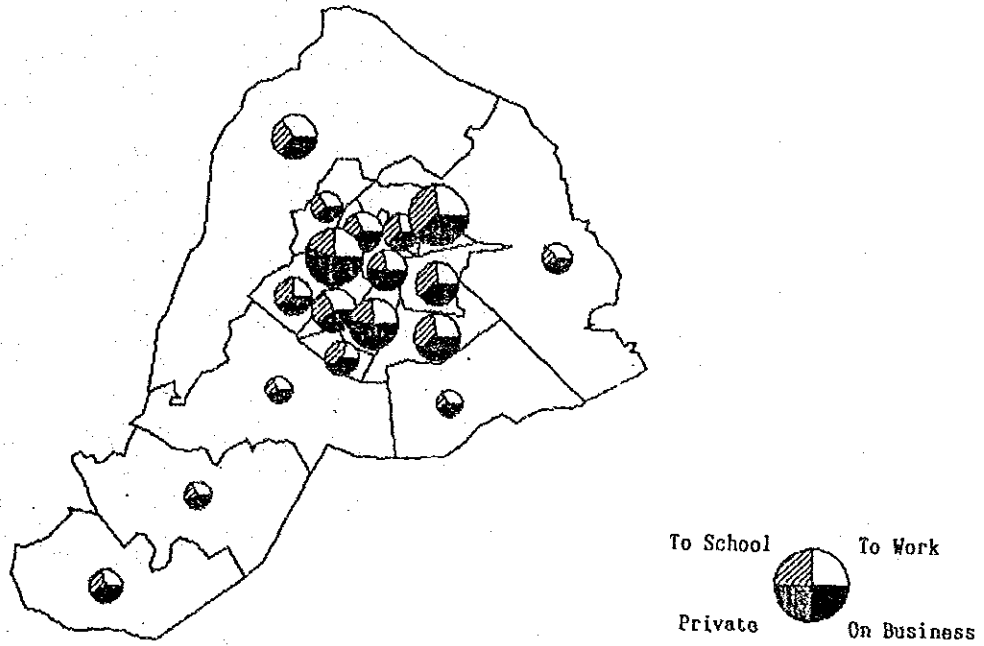


Figure 2.4.2 Zonal Trip Attractions by Trip Purpose

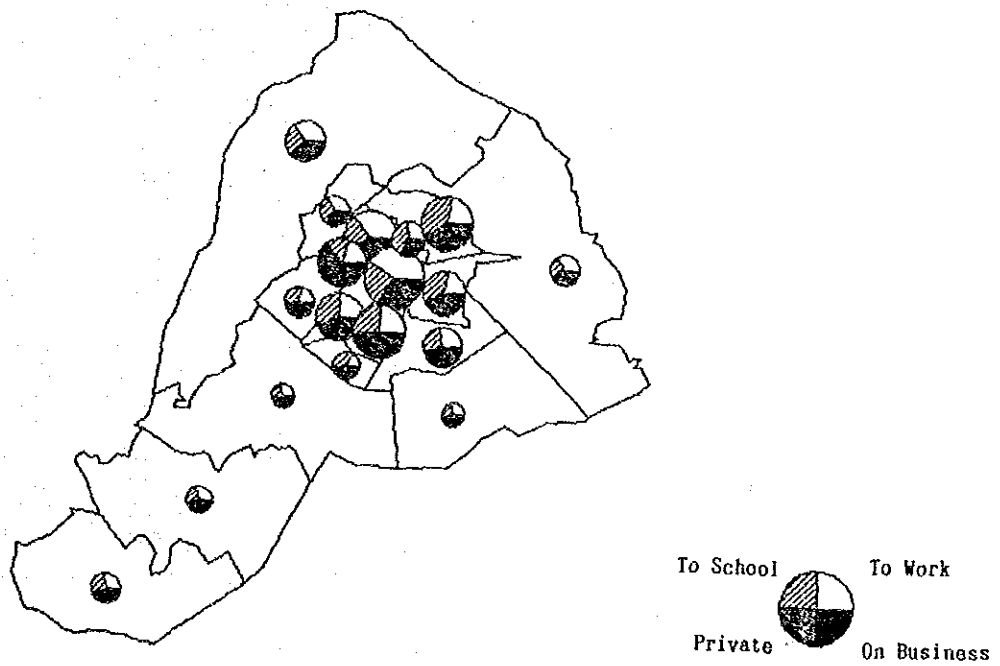


Table 2.4.3 Trip Productions by Area*

B-Zone No.	Name of Zone	Trip Productions					Total
		To Work	To School	To Home	Private	Business	
1	Walled City	98240	79295	456127	104924	30275	768861
2	Government House	87215	60832	554594	126921	31575	861137
3	Iqbal Town/New Campus	116616	103718	331133	124519	18156	695142
4	Shad Bagh	60356	83567	201074	75393	10509	430899
5	Krishan Nagar	140062	117992	384126	291507	17313	951000
6	Niaz Beg	61074	81730	163858	95810	10364	412836
7	Baghbanpura	175035	212953	457309	227621	26415	1099333
8	Shahdara	49462	49286	146185	47618	6552	299103
9	Main Gulberg/Model Town	115168	99161	413309	200901	26819	855358
10	Township	46260	74238	133980	79955	8213	342646
11	Cantonment-North	87506	111237	292534	122855	13597	627729
12	Cantonment-South	116536	118498	245708	152196	14266	647204
13	Wagha	68663	43899	150650	64469	6307	333988
14	Beidan Road	43995	27976	88993	49930	4130	215024
15	Bhopattian	48723	35171	110671	56992	4031	255588
16	Bhaipheru	55476	55330	162472	77229	8582	359089
17	Shiekhupura	122392	94826	279626	113319	6409	616572
18	Wahga/Raiwind	43167	39751	115686	52700	6962	258266
	Total	1535946	1489460	4688035	2064859	251475	10029775

Source: CSTS Person Trip Survey, 1990

Note: *including trips made by the non-residnets of LMA.

Table 2.4.4 Trip Attractions by Area*

B-Zone No.	Name of Zone	Trip Attractions					Total
		To Work	To School	To Home	Private	Business	
1	Walled City	200579	112766	228624	184284	45176	771429
2	Government House	291863	169691	162084	189536	46991	860165
3	Iqbal Town/New Campus	99119	124213	302668	146096	20055	692151
4	Shad Bagh	59267	87687	210703	65025	8810	431482
5	Krishan Nagar	80971	70411	521863	260781	13742	947768
6	Niaz Beg	41095	51629	232621	77127	9367	411839
7	Baghbanpura	110043	181029	601105	180335	17844	1100356
8	Shahdara	50697	51373	142322	48684	6515	299591
9	Main Gulberg/Model Town	124983	136831	350757	217931	23455	853957
10	Township	28286	49361	196831	61427	6200	342105
11	Cantonment-North	73527	112731	301753	129284	11094	628389
12	Cantonment-South	74323	73016	371661	115236	10719	644955
13	Wagha	57943	39442	172696	62080	7411	338572
14	Beidan Road	32391	24438	111805	47239	3255	219128
15	Bhopattian	33988	30590	136770	48285	2015	251648
16	Bhaipheru	48743	52503	176062	69435	8372	355115
17	Shiekhupura	105686	86927	291149	103831	5124	592717
18	Wahga/Raiwind	38228	34544	126096	50344	5966	255178
	Total	1551732	1489182	4637570	2066060	252111	9997555

Source: CSTS Person Trip Survey, 1990

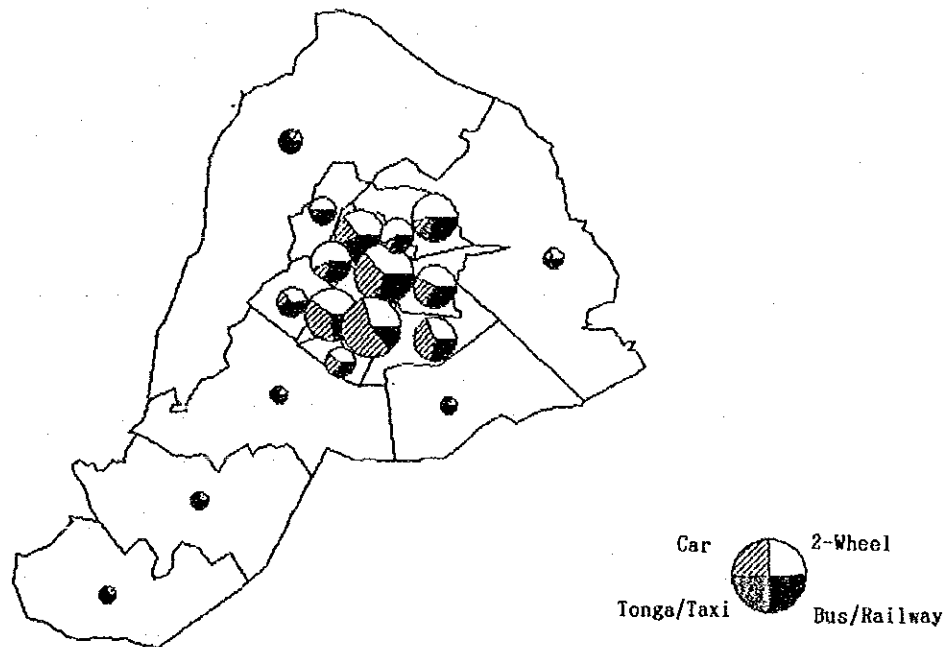
Note: *including trips made by the non-residnets of LMA.

2.4.3 Trip Productions and Attractions by Transport Mode

Figure 2.4.3 shows trip productions and attractions by area and transport mode. The characteristics are summarized as follows:

- Krishan Nager and Baghbanpura has a large share of bicycle and motorcycle trips, exceeding 50% of total trip demand in these areas.
- The number of private car trips is large in Main Gulberg/Model Town, Cantonment-North, Government House and Iqbal Town/New Campus.
- The share of tonga/taxi/rickshaw is the smallest proportion of total trip demand in LMA, accounting for 3.7%.
- Bus trips constitutes a large share of total trip demand.

Figure 2.4.3 Zonal Trip Productions and Attractions by Transport Mode



2.5 O-D DISTRIBUTION AND TRAFFIC FLOW

2.5.1 Trip Distribution by Trip Purpose

Distribution of trips made by LMA residents and non-residents for all purpose and by all modes is shown in Figure 2.5.1. There is a large movement within the inner area of LMA.

(1) "To Work" Trip

The desire lines for "to work" trip shows that there is heavy traffic between heavily populated areas and business and commercial centers, within the inner area of LMA. The work places and residential area do not appear to be located to each other, therefore trip length (travel time) seems to be fairly long.

(2) "To School" Trip

"To school" trips shown by desire lines can be considered as the movement of students of middle school or higher level. Compared with "to work" trips trip length between residences and is shorter.

(3) "Private" Trips

Of private trips attracting the inner area, 80% are shopping, social activities and recreation.

(4) "Business Trips"

"Business" trips are made around Walled City, Government and Main Gulberg/Model Town where there are business and commercial centers.

Figure 2.5.1 Person Trip Flow related to LMA

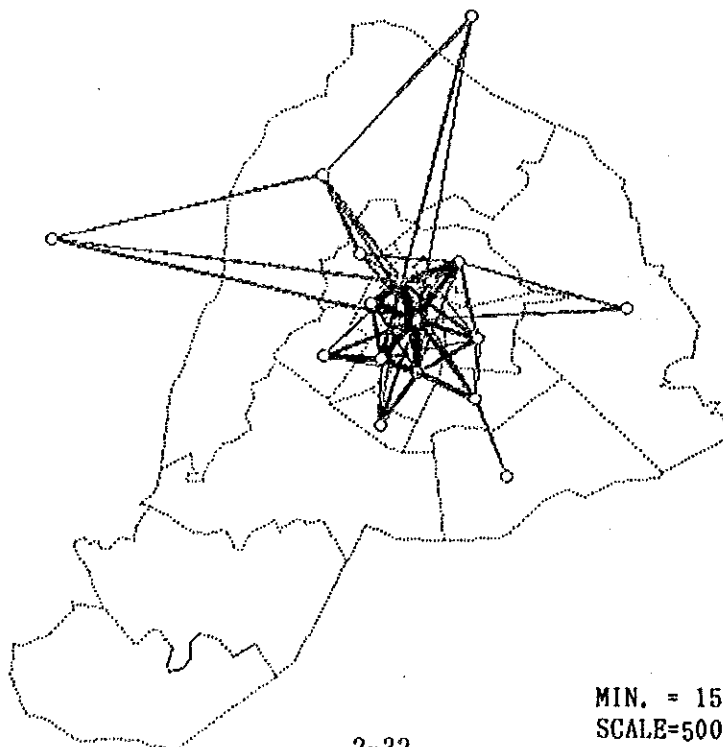


Figure 2.5.2 Person Trip Flow (To Work Trips)

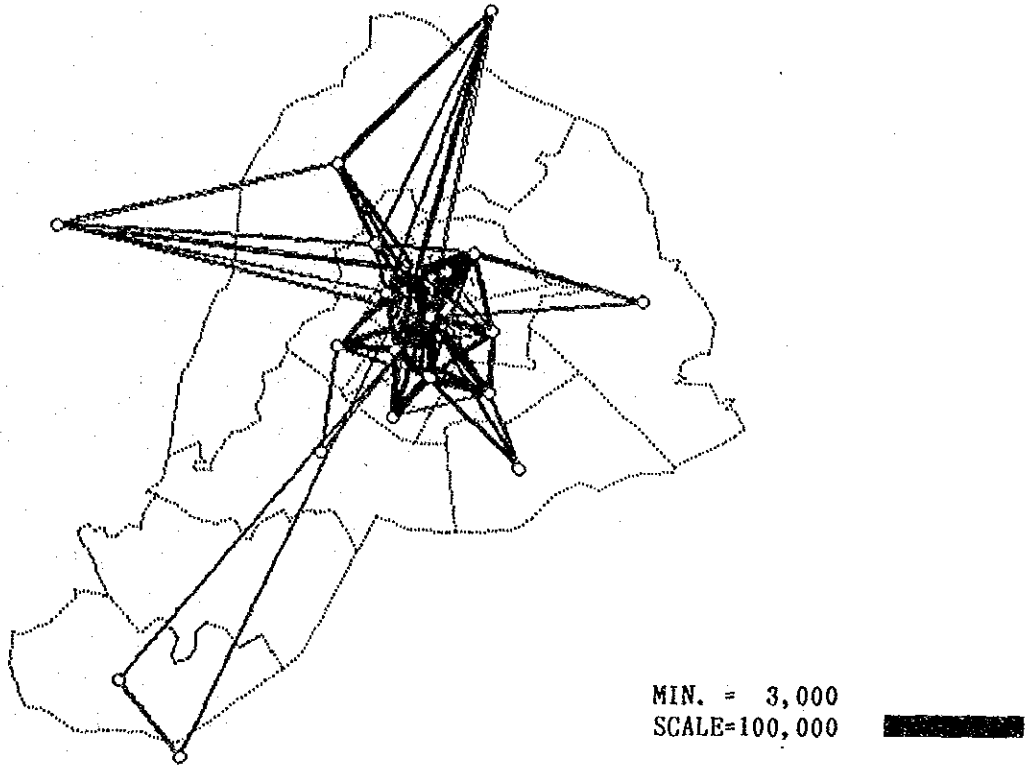


Figure 2.5.3 Person Trip Flow (School Trips)

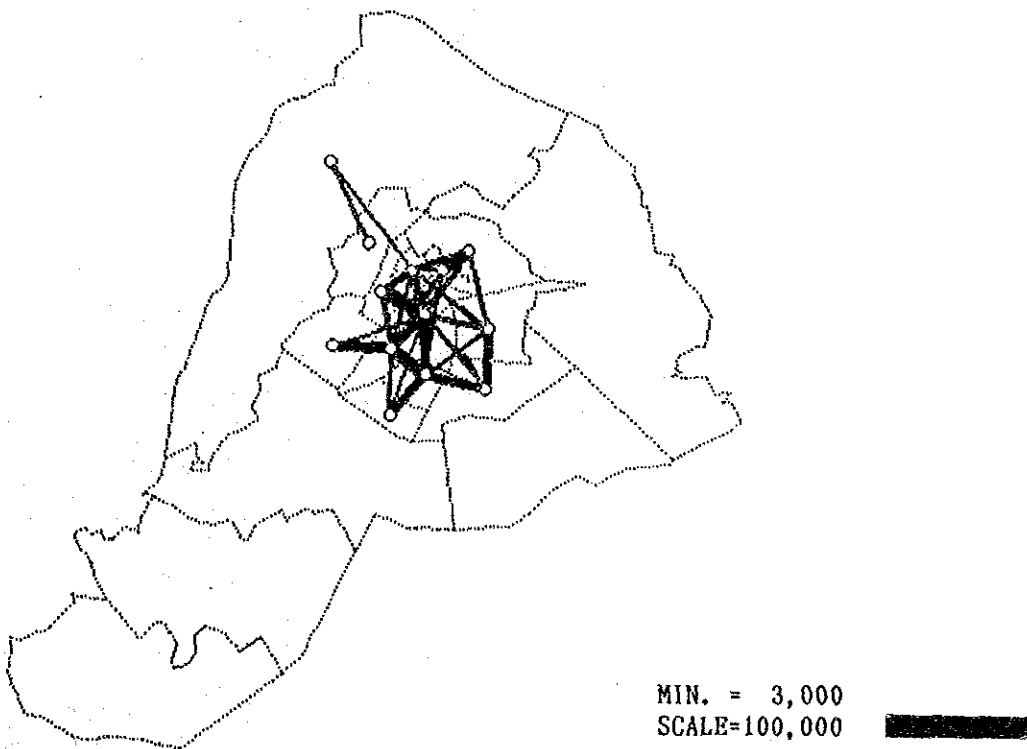


Figure 2.5.4 Person Trip Flow (Private Trips)

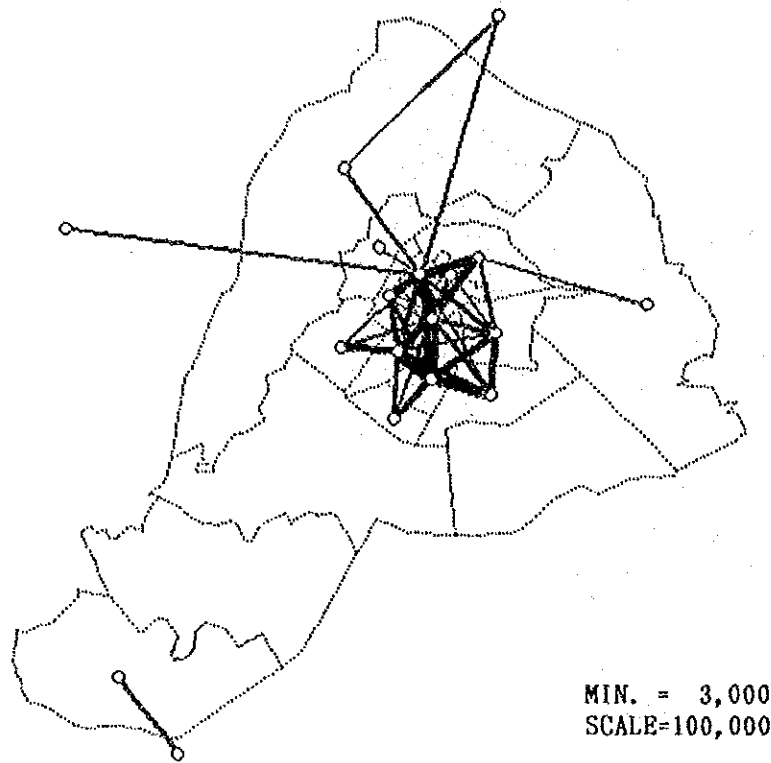
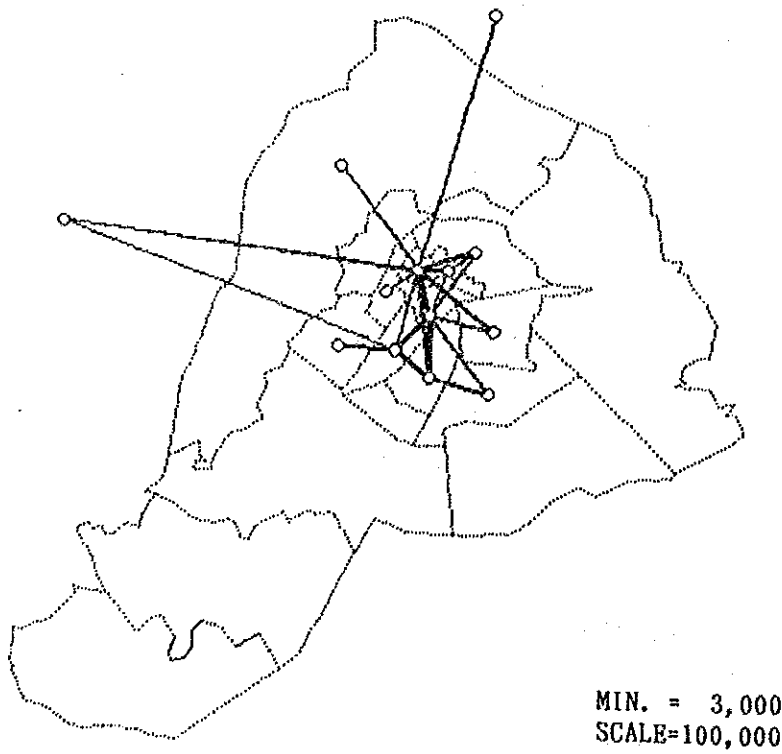


Figure 2.5.5 Person Trip Flow (Business Trips)



2.5.2 Trip Distribution by Transport Mode

Figures 2.5.6 to 2.5.9 show desire lines by transport mode and by integrated zones.

Basically, motorcycles are used for short trips, but they may also be used for fairly long trips. Many trips by motorcycle are produced around the business areas.

Private cars are frequently used among the business areas. Complicated desire lines of private cars connect all zones, and no distinct directional patterns are apparent.

Buses which are a dominant mode of public transport in Lahore, are used for trips that radiate from the inner area and for south-to-north connection in the southern part, and south-to-north and east-to-west connections in the northern part.

Figure 2.5.6 Person Trip Flow (Public Transport)

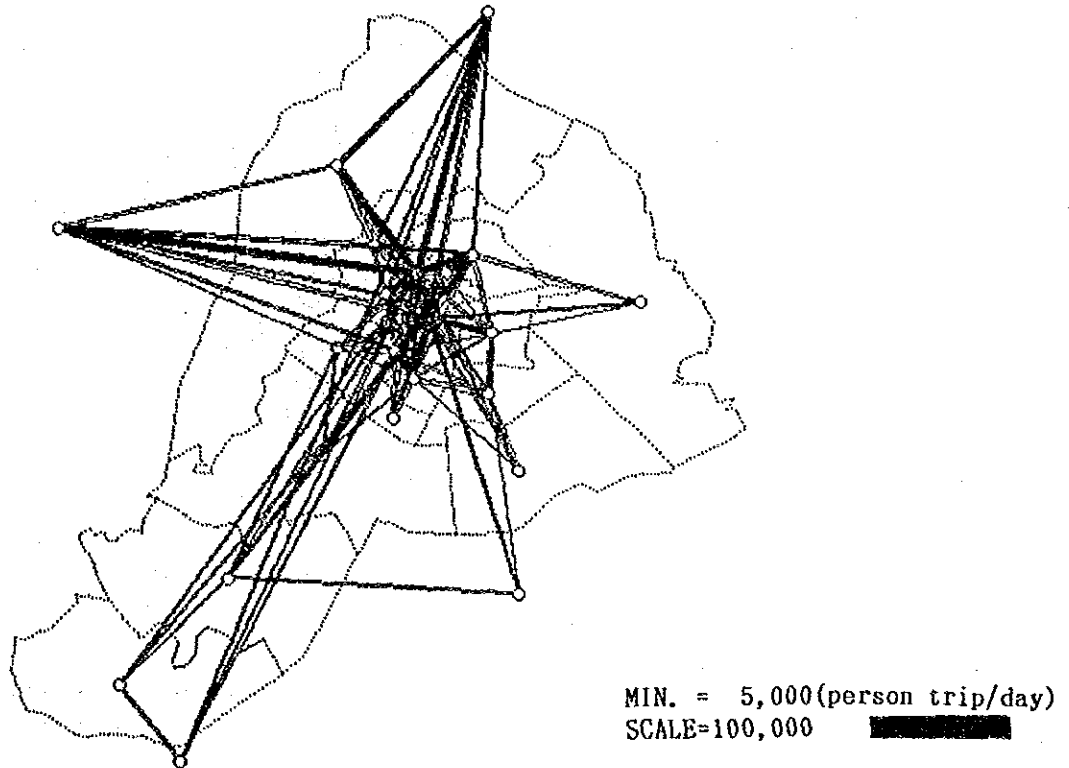


Figure 2.5.7 Person Trip Flow (Private Transport)

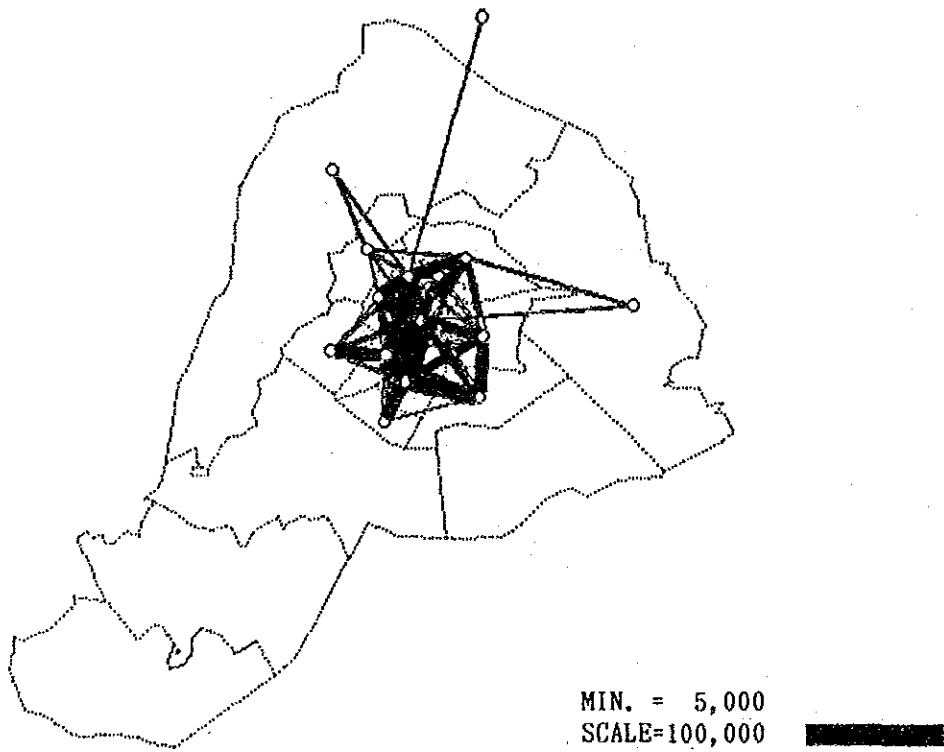


Figure 2.5.8 Person Trip Flow (Car)

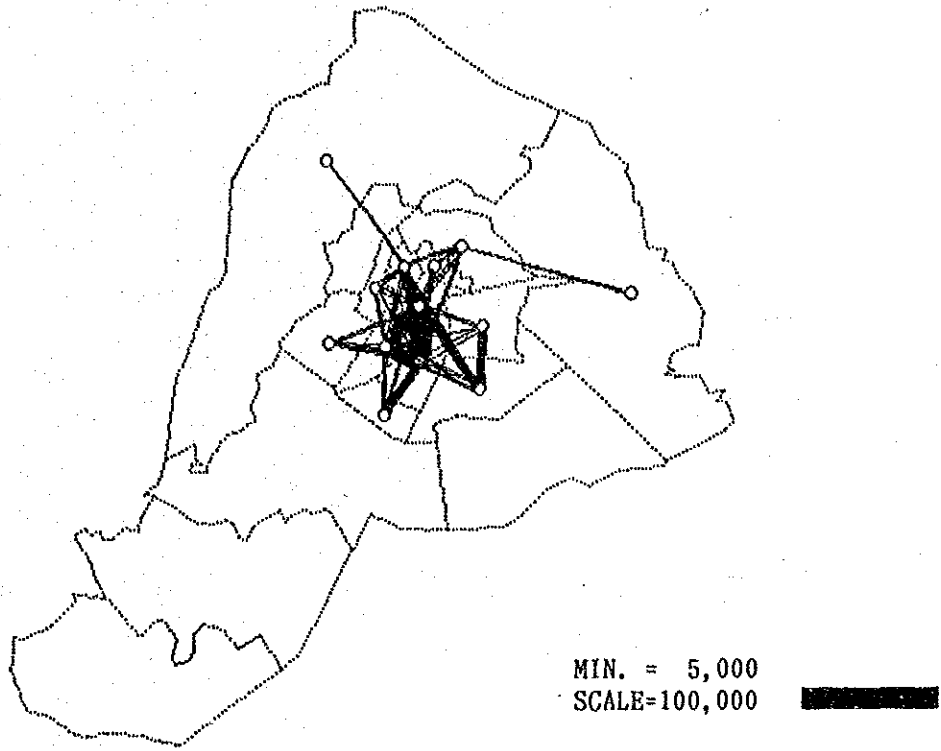
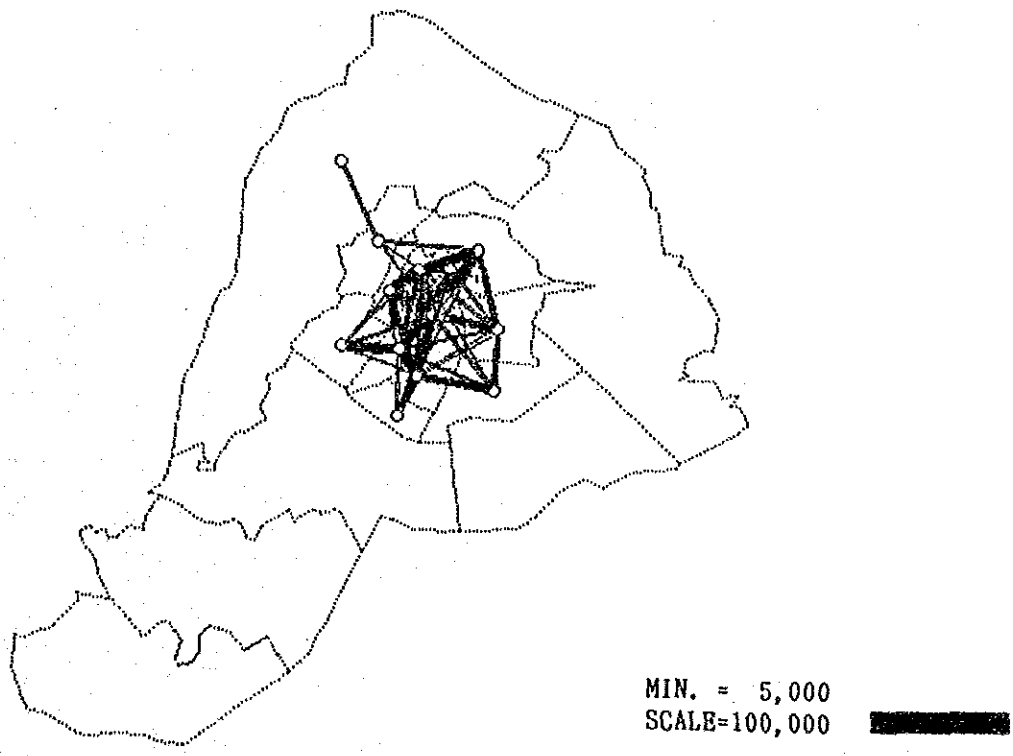


Figure 2.5.9 Person Trip Flow (2-Wheel Vehicles)



CHAPTER 3. ROAD NETWORK AND TRAFFIC

CHAPTER 3 ROAD NETWORK AND TRAFFIC

3.1 DEVELOPMENT OF ROAD NETWORK IN LMA

Lahore the history of dates back to the 8th Century A.D. The city was built on the banks of the Ravi River and walls were built for its protection. From the very beginning, roads were built spreading radially from the city nucleus. Over the centuries, the provincial capital was connected with other cities in the surrounding Indian subcontinent. One of these radial roads was Multan Road, built to the southwest leading to Multan and Karachi. To the south was Ferozepur Road connecting Lahore to Bangalore and Bombay. To the east was the Grand Trunk Road leading to Amritsar, the home of the Sikh Golden Temple. The northern radial road crosses Ravi River and leads to Rawalpindi, and the new capital city of Islamabad.

During their occupation of Lahore, the British built the army cantonment to the southeast of the city with its prominent rectangular grid network. The army base was linked to the city and the important Lahore Rail Station by the wide ceremonial promenade known then and even now as the Mall. Additional roads were built by the British to develop the intervening spaces between the Cantonment, the south and the southwest of the city. Densely populated areas of Krishan Nagar and Shad Bagh grew outside the Walled City.

Special growth of modern Lahore has consequently been to the south and southwest since that was really the only direction which was untouched by earlier investment and not bounded by the Ravi River.

3.2 ROAD NETWORK

The CSTS study team has simplified the Lahore network and a functional classification of the links are determined and shown in Figure 3.2.1. The classification is simple and dichotomizes roads as either arterials or collectors. Figure 3.2.2 on the following page shows the number of lanes on each link in the CSTS network. An inventory of the arterial and collector roads and their characteristics is then found in Table 3.2.1.

Figure 3.2.1 Existing Road Network
(Arterial and Collector Roads)

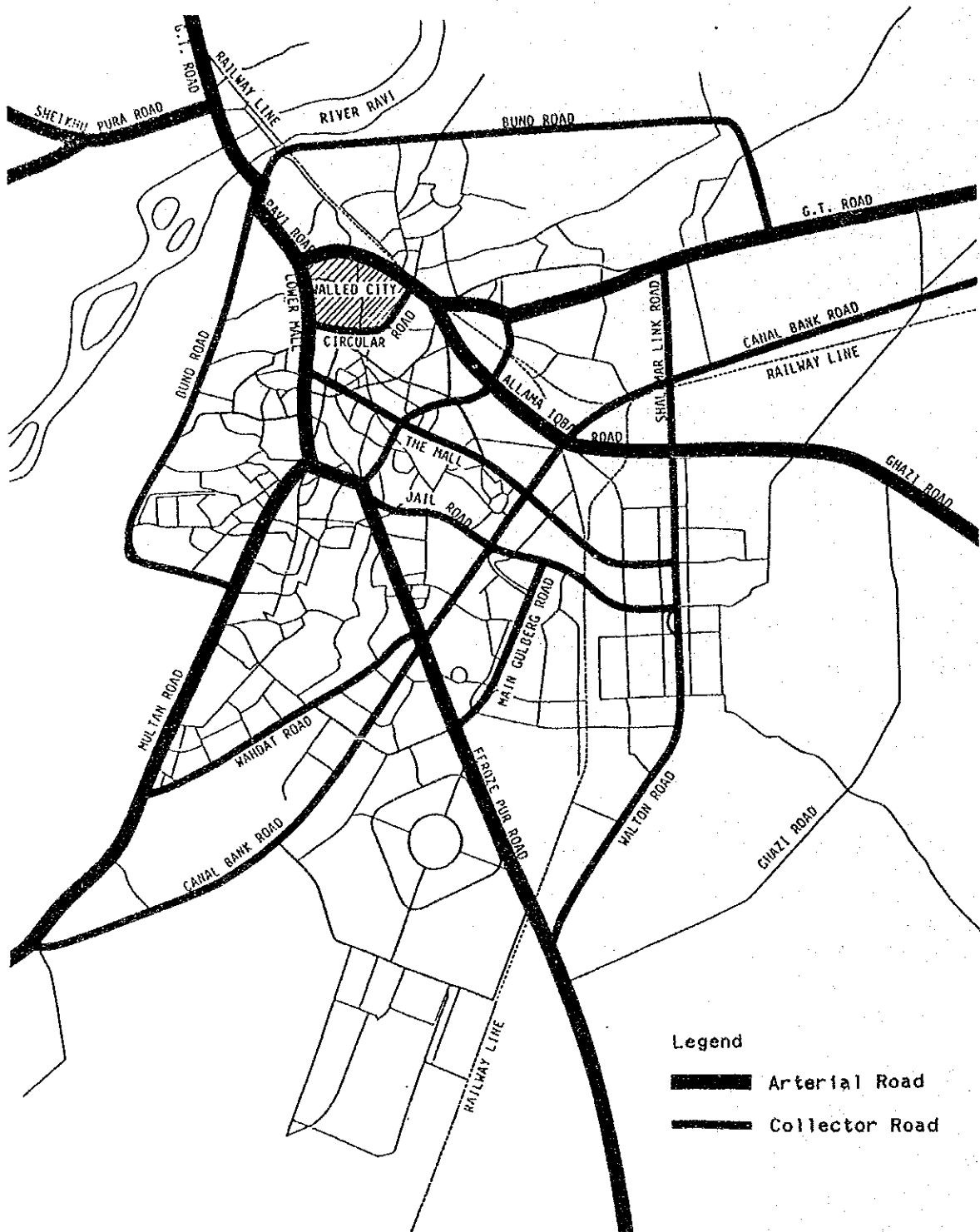


Figure 3.2.2 Number of Lanes of Major Roads

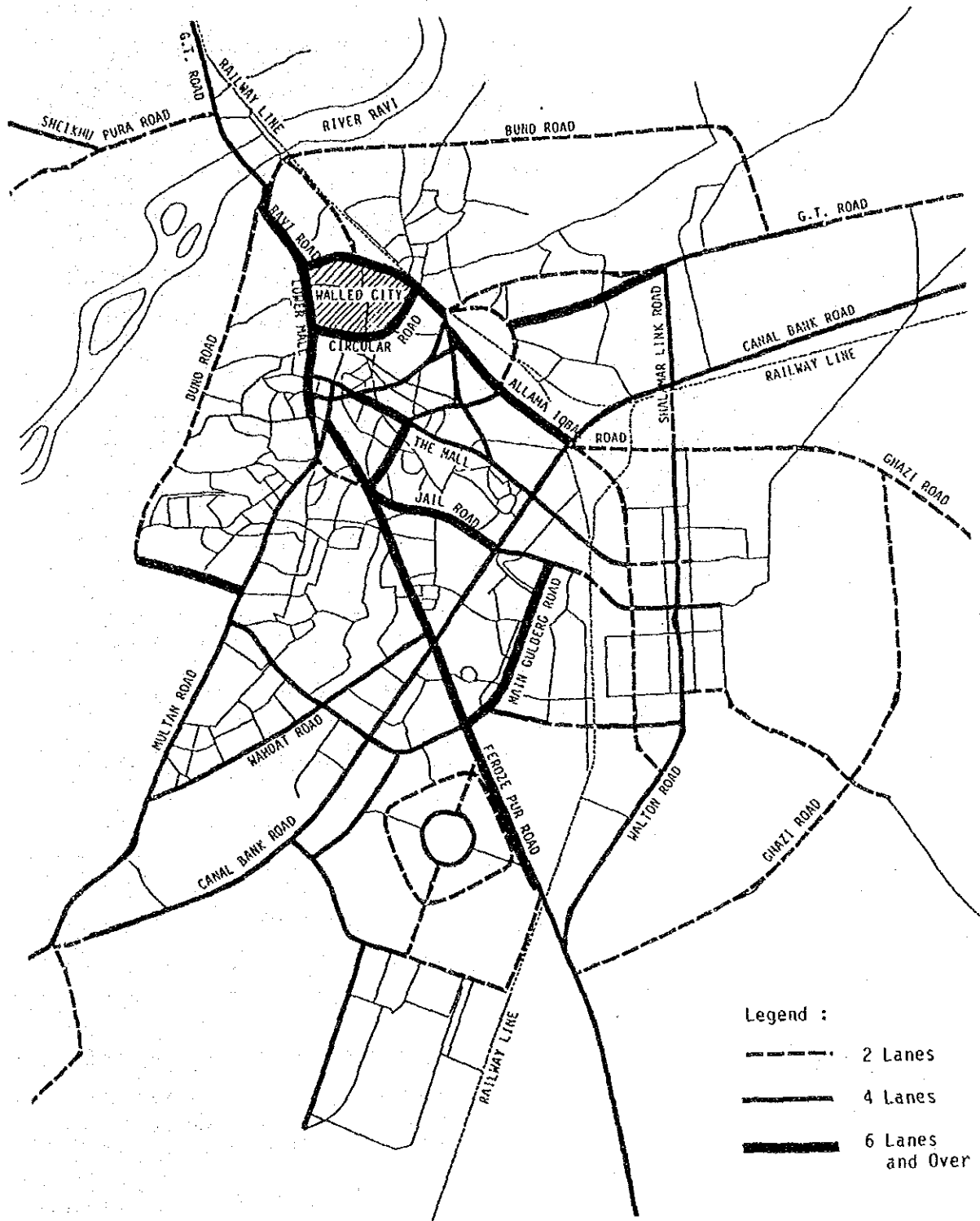


Table 3.2.1 Road Inventory Data

Road Name	Section		Length (km)	Lanes Ac. Exp	Carrigeway		Med lan	Sidewalk		Service		Total (m)	Pavement Condition	
	From	To			L	R		L	R	L	R			
Ferozpur Road	Qartaba Chowk	- Shama Chowk	1.10	D6	28.0	14.0	14.0	0.5	2.0	2.0	-	32.5	Fair	
	Shama Chowk	- Canal Bank Road	2.60	D8	42.0	21.0	21.0	0.4	2.0	2.0	-	46.4	Fair	
	Canal Bank Road	- Railway line	5.25	D6	22.0	11.0	11.0	2.0	-	-	3.0	3.0	30.0	Good/Fair
	Railway Line	- Kahna Police Sta.	12.40	2	12.0	-	-	-	-	-	-	-	12.0	Fair
G.T. Road	Mandi Chowk	- Shahi Qila (Fort)	2.70	2	13.0	-	-	-	-	-	-	-	13.0	Poor
	Shahi Qila (Fort)	- Domesia Pull	1.80	D6	28.0	14.0	14.0	0.5	2.0	2.0	4.0	4.0	40.5	Fair
	Domesia Pull	- Cooperative store	1.88	2	13.0	-	-	0.5	1.5	-	-	-	15.0	Fair
	Cooperative store	- Shalimar Link Road	3.32	6	25.0	-	-	-	2.0	-	-	-	27.0	Fair
	Shalimar Link Road	- Sartaj Steel Mills	3.60	4	15.0	-	-	-	-	-	-	-	15.0	Fair
	Sartaj Steel Mills	- Mahgha Border	15.05	2	10.0	-	-	-	-	-	-	-	10.0	Fair
	Naylakha	- Domesia Pull	0.75	4	18.3	-	-	-	1.7	-	-	-	20.0	Fair
	Batiwala Chowk	- Muridke	25.00	D4	15.0	7.5	7.5	0.5	-	-	3.0	-	18.5	Poor
Multan Road	Niaz Baig	- Subzazar Housing	7.55	4	15.0	-	-	-	-	-	-	-	15.0	Very poor
	Subzazar Housing	- Samanabad Turning	2.65	D4	18.0	9.0	9.0	0.5	2.0	-	-	-	20.5	Very poor
	Samanabad Turning	- Venus Cinema	1.25	4	15.0	-	-	0.5	2.0	-	-	-	17.5	Very poor
	Venus Cinema	- Sand Road	1.20	D4	18.0	9.0	9.0	-	-	-	3.0	-	21.0	Very poor
	Sand Road	- Secretariate	0.60	8	27.0	-	-	-	2.0	2.0	-	-	31.0	Poor to fair
	Niaz Baig	- Hudiara Bridge	11.90	2	12.0	-	-	-	-	-	-	-	12.0	Good
Lower Mall Road	Secretariate	- Islamia Chowk	1.55	D6	22.0	11.0	11.0	-	2.0	2.0	-	-	26.0	Fair
Ravi Road	Islamia Chowk	- Batiwal Chowk	2.75	D6	22.0	11.0	11.0	5.0	-	-	3.0	3.0	33.0	Fair
Bund Road	Yatima Khana Chowk	- New Bridge	2.10	D6	24.0	12.0	12.0	0.5	1.5	1.5	-	-	27.5	Very poor
	New Bridge	- Railway Line	9.30	2	12.0	-	-	-	-	-	-	-	12.0	Very poor
	Railway Line	- Darogha Wala Chowk	11.50	2	7.5	-	-	-	-	-	-	-	7.5	Very poor
Sheikhupura Road	Shahdra Turning	- Jaranwala Road	2.40	2	10.0	-	-	-	-	-	-	-	10.0	Poor
	Jaranwala Road	- Steel Rolling Mills	12.85	D4	15.0	7.5	7.5	12.0	-	-	-	-	27.0	Very poor
Jaranwala Road	Sheikhupura Road	- Main Road	25.30	2	6.7	-	-	-	-	-	-	-	6.7	Poor
Harike Road	Sadar	- BRB Link	15.10	2	7.5	-	-	-	-	-	-	-	7.5	Very poor
	BRB Link	- Chovidy Border	9.90	1	4.0	-	-	-	-	-	-	-	4.0	Fair
Bedian Road	Nadoen Chowk	- Walton Road	2.30	2	10.0	-	-	-	-	-	-	-	10.0	Fair
	Walton Road	- Kot Karim Khan	3.30	2	6.0	-	-	-	-	-	-	-	6.0	Fair to poor
	Kot Karim Khan	- Bedian Bus Stop	22.40	1	3.9	-	-	-	-	-	-	-	3.9	Fair to poor
Canal Bank Road	Niaz Baig	- Bridge	1.05	2	11.0	-	-	-	-	-	-	-	11.0	Poor
	Bridge	- Jallo Park	26.95	D4	15.0	7.5	7.5	18.0	2.0	2.0	3.0	-	40.0	Fair
	Jallo Park	- Jallo Village	2.00	1	4.0	-	-	-	-	-	-	-	4.0	Poor
The Mall Road	Sarroz Ratiqi	- Main Mir Bridge	0.05	2	7.0	-	-	-	-	-	-	-	7.0	Good
	Main Mir Bridge	- Chairing Cross	5.10	D4	18.7	10.7	8.0	6.0	-	-	3.0	-	27.7	Good
	Chairing Cross	- G.P.O.	1.38	D6	27.0	-	-	10.0	5.5	5.5	-	-	48.0	Good
	G.P.O.	- Town Hall	0.80	4	19.5	-	-	-	4.0	4.0	-	-	27.5	Good
	Town Hall	- Lower Mall	0.20	D4	18.7	9.3	9.4	2.5	2.5	2.5	3.0	3.0	32.2	Good
Allama Iqbal Road	Ghazi Road	- Mian Mir Turning	1.95	2	12.0	-	-	-	-	-	-	-	12.0	Fair
	Mian Mir Turning	- Bohar Wala Chowk	3.30	D6	28.0	10.0	10.0	2.0	2.0	2.0	-	-	26.0	Fair
Shalimar Link Road	Sadar	- UBD Canal	1.40	2	7.6	-	-	-	-	-	-	-	7.6	Fair
	UBD Canal	- G.T. Road	2.45	D4	15.0	7.5	7.5	4.0	2.5	2.2	-	-	23.7	Fair
Sultan Pura Road	G.T. Road	- Nat'l Bank Chowk	2.80	2	9.0	-	-	-	1.5	1.5	-	-	12.0	Very poor
	Nat'l Bank Chowk	- G.T. Road	1.70	2	5.5	-	-	-	-	-	-	-	5.5	Very poor
Circular Road	Rhathi Gate	- G.T. Road	2.75	D8	30.0	15.0	15.0	0.5	2.0	2.0	-	-	34.5	Poor
Queens Road	Shahrah -e- Qaid	- Qartaba Chowk	1.60	6	23.0	-	-	-	2.0	2.0	-	-	27.0	Poor to fair
Bahawalpur Road	Chuharji	- Lake Road	1.75	2	12.5	-	-	-	1.5	1.5	-	-	15.5	Fair
Jail Road	Ferozpur Road	- Canal Bank Road	2.00	D6	21.0	10.5	10.5	1.0	-	-	-	3.0	25.0	Fair
	Canal Bank Road	- Fovara Chowk	2.20	4	14.5	-	-	-	-	-	3.0	3.0	20.5	Fair
Wahdal Road	Multan Road	- Ferozpur Road	6.90	2	12.0	-	-	-	-	-	3.0	3.0	18.0	Poor
Main Gulberg Road	Favara Chowk	- Zahoor Elahi Road	1.40	D6	20.0	10.0	10.0	10.0	-	-	3.0	3.0	36.0	Fair
	Zahoor Elahi Road	- Ferozpur Road	2.50	D6	20.0	10.0	10.0	31.0	-	-	-	-	51.0	Fair
Bairwind Road	Canal Bank Road	- Hudiara Drain	9.98	2	7.5	-	-	-	-	-	-	-	7.5	Poor
Harowal Road	G.T. Road	- Fateh Behan	17.00	2	6.0	-	-	-	-	-	-	-	6.0	Very poor

Source : Study and preparation of Report for Rehabilitation and Maintenance of R pads, Related Storm Water Drainage and Street Lighting in Lahore by NESPAK

3.3 CURRENT ROAD TRAFFIC

3.3.1 Traffic Volumes

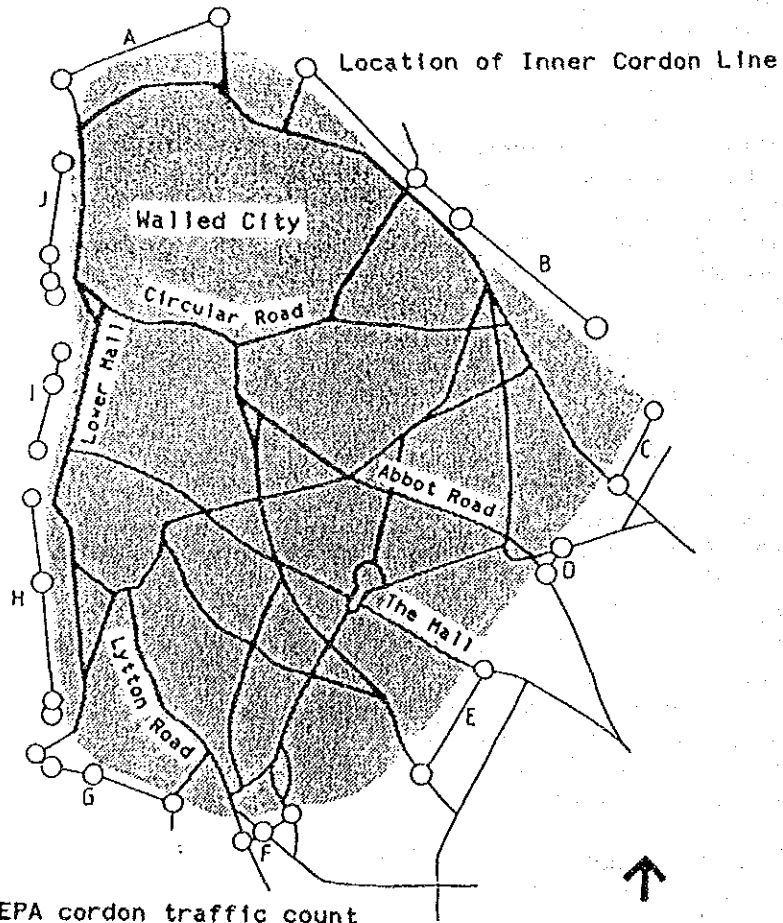
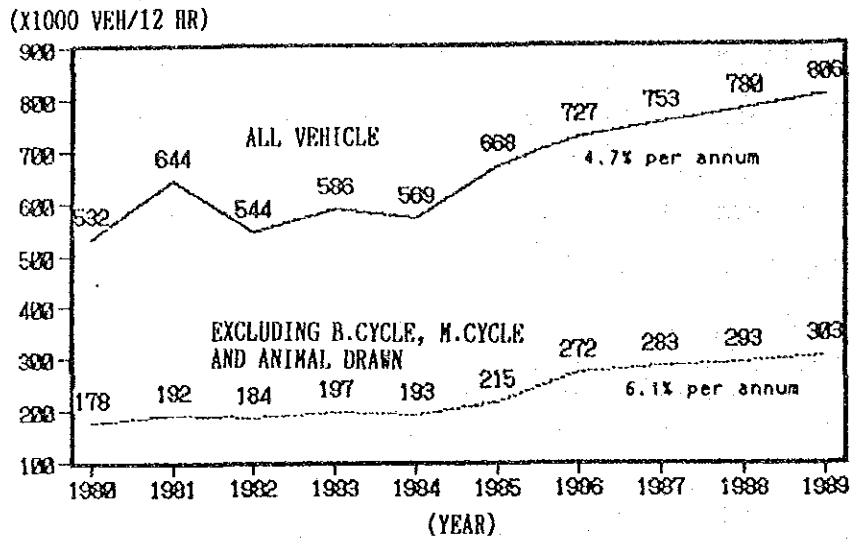
Traffic volume data are available from the following two sources:

1. TEPA inner cordon traffic count and intersection traffic count (1979 - 1989)
2. Screen and cordon line traffic count by CSTS JICA study in 1990

The following can be observed from these sets of data.

- 1) The increase of total traffic on the inner cordon line is 4.7% per annum for the period for the period from 1980 to 1989. Moreover, the increase of the motorized traffic excluding motorcycle is 6.1% per annum as shown in Figure 3.3.1.
- 2) The adjusted traffic volumes on the arterial roads and collectors in the inner LMA range from 5,000 to 140,000 vehicles per day as shown in Figure 3.3.2 and Table 3.3.1. The road section with the heaviest traffic, at approximately 143,000 vehicles per day, is observed along Multan road near Chauburji Chowk. The Mall has the second heaviest traffic at approximately 110,000 veh/day near Canal Bank Road. Almost all arterial roads and collectors have more than 50,000 veh/day in the inner LMA.
- 3) Traffic across the screen lines along the Canal Bank, railway line, and the Ravi river is shown in Figure 3.3.3. The total daily traffic is 512,000, 443,000, and 81,000 respectively. The western section of Canal Bank screen line is crossed by 440,000 veh/day, making it the greatest of the five screen lines, of which 230,000 veh/day, equivalent to 52% of the total traffic across this section, is motorized traffic excluding motorcycles. The mixture of motorized vehicle traffic is low on the screen lines located in the northern part of Lahore.
- 4) The traffic volume across the cordon lines is shown in Figure 3.3.4. total traffic across the outer cordon is 68,000 veh/day with 121,000 across the inner LMA cordon. The heaviest transport corridor is the northern corridor along G.T. road across both cordon lines. Next is the western corridor consisting of Sheikhpura Road and Sharaqpur road. The share of motorized vehicles on the outer cordon at 64% is higher than the inner LMA cordon which has 54% of motorized vehicles.
- 5) Traffic count data from various provincial highways and National Highway 5 outside Lahore is shown in Table 3.3.2. The average compound growth rates are based on the first and last years' data as shown in the table.
 - a) Larger annual percentage increases of about 8-15% are found on roads to the south such as Bedian, Ferozepur, Raiwind, and Multan roads.
 - b) Motorized traffic on the New Ravi Bridge have increased at 6.1% annually and are approaching 56,000 vehicles per day in 1990.

Figure 3.3.1 Trend of Inner Cordon Traffic



Source : TEPA cordon traffic count

Figure 3.3.2 Traffic Volume along the Major Roads

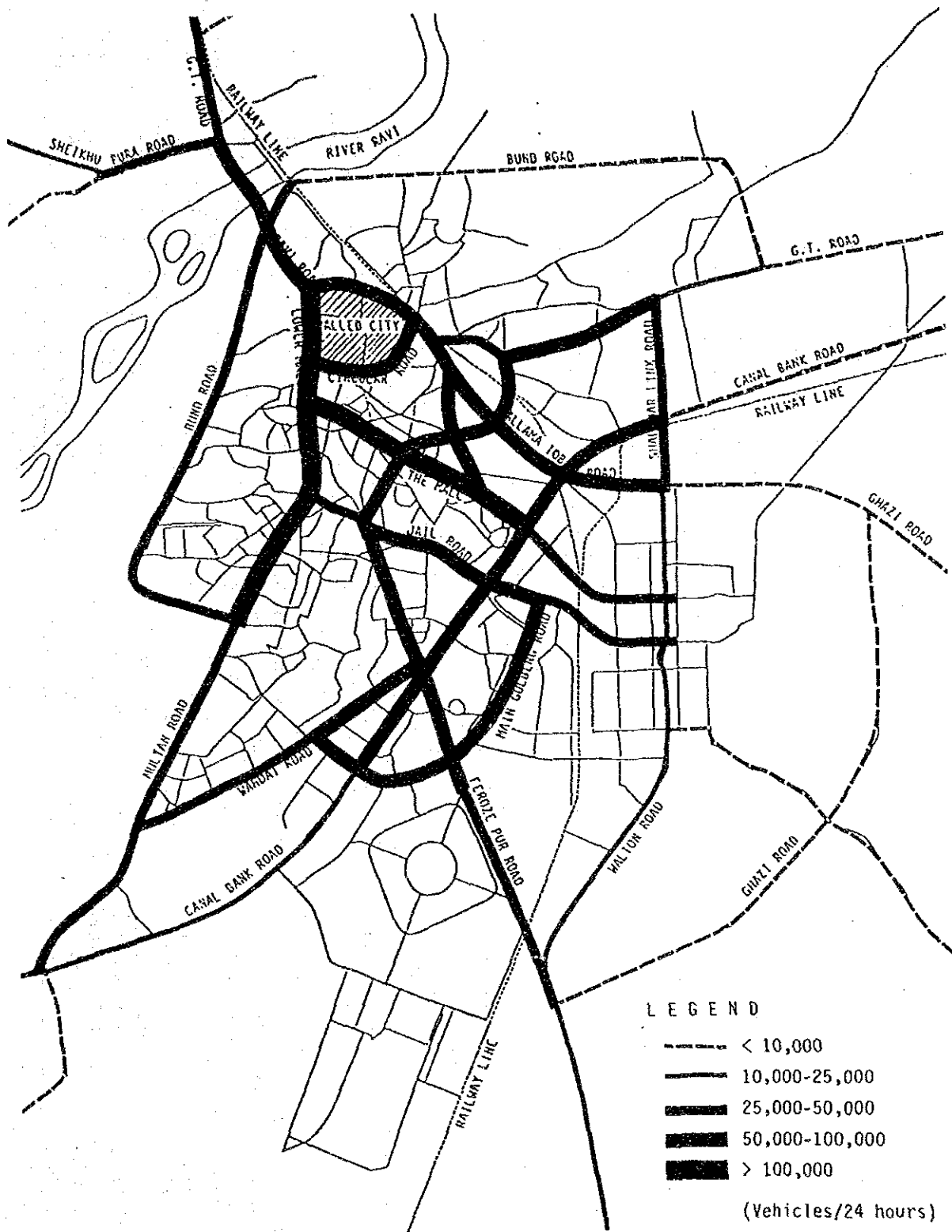


Table 3.3.1 Traffic Volume along Major Roads

Road Name	Section		24 Hours		Hourly		Ratio (%)		Data
	From	To	Vehicle	pcu	Vehicle	pcu	Peak	Large Veh.	
Ferozepur Road	Qartaba Chowk	Model Town	99,891	81,207	8,890	7,272	8.9	2.4	CSTS
	Model Town	Defence Road	45,112	43,287	4,703	4,415	10.2	5.3	CSTS
	Defence Road	Kahna Police Sta.	16,615	16,954	1,811	1,849	10.9	9.7	CSTS
G. T. Road	Domorrria Pull	Cooperative Store	44,610	37,049	4,907	4,075	11.0	1.2	CSTS
	Cooperative Store	Shalimar Link Road	65,137	48,368	5,537	4,111	8.5	1.7	CSTS
	Shalimar Link Road	Wahgha Border	9,408	10,733	903	1,030	9.6	16.5	CSTS
	Batiwala Chowk	Shadara Chowk	70,150	76,878	5,893	6,458	8.4	14.4	CSTS
	Shadara Chowk	Muridke	28,485	38,578	1,937	2,623	6.8	19.4	CSTS
Multan Road	Niaz Baig	Yatim Khana	45,096	58,893	4,379	5,595	9.5	13.2	TEPA
	Yatim Khana	Chauburgi	142,526	124,498	13,540	11,827	9.5	3.9	TEPA
	Niaz Baig	Hudaira Bridge	14,824	25,072	1,023	1,730	5.9	36.8	CSTS
Ravi Road	Islamia Chowk	Batiwala Chowk	70,150	76,878	5,893	6,458	8.4	14.4	CSTS
Bund Road	Yatim Khana	Railway Line	37,059	54,885	2,965	4,391	8.0	22.3	TEPA
	Railway Line	Dorogha Wala Chowk	8,504	13,348	580	1,068	8.0	22.2	CSTS
Sheikhu Pura Road	Jaranwala Road	Steel Rolling Mills	17,629	25,213	1,393	1,992	7.9	22.9	CSTS
Jaranwala Road	Sheikhu Pura Road	Main Road	8,937	12,194	858	1,171	9.6	17.4	CSTS
Harike Road	Sadara	BRB Line	5,799	7,075	586	715	10.1	19.0	CSTS
	BRB Line	Chovidy Border	4,095	4,765	438	510	10.7	18.6	CSTS
Bedian Road	Nadoem Chowk	Kot Karim Khan	4,996	4,705	884	833	17.7	12.4	CSTS
	Kot Karim Khan	Bedian Bus Stop	4,208	3,758	757	676	18.0	8.4	CSTS
Canal Bank Road	New Campus	The Mall Road	54,456	42,186	4,030	3,122	7.4	0.6	TEPA
	The Mall Road	Shahamar Link Road	49,847	34,843	3,689	2,578	7.4	1.9	CSTS
	Shahamar Link Road	Jallo Village	6,527	5,907	614	555	9.4	9.8	CSTS
The Mall Road	Sarfriz Ratiqi Road	Canal Bank Road	41,154	34,366	2,757	2,303	6.7	1.5	CSTS
	Canal Bank Road	Lower Mall Road	110,557	91,351	11,719	9,683	10.6	1.0	CSTS
Allama Iqbal Road	Ghazi road	Bohar Wala Chowk	56,669	43,782	7,650	5,911	18.5	3.9	CSTS
Shahamar Link Road	Sadara	G. T. Road	43,325	37,140	3,986	3,417	9.2	3.3	CSTS
Shahamar Road	Garhi Shahu	Shimalla Hill Chowk	65,131	48,350	5,535	4,110	8.5	1.7	CSTS
Davis Road	The Mall Road	Qartaba Chowk	52,605	37,706	4,471	3,205	8.5	1.1	TEPA
Queens Road	The Mall Road	Fowara Chowk	52,075	48,023	4,426	4,082	8.5	2.5	TEPA
Jail Road	Ferozepur Road	Fowara Chowk	64,658	54,225	4,849	4,067	7.5	0.9	CSTS
	Fowara Chowk	Sarfriz Ratiqi Road	29,505	26,292	2,242	1,998	7.6	0.9	CSTS
Main Gulberg Road	Fowara Chowk	Ferozepur Road	51,491	47,452	3,862	3,559	7.5	0.9	TEPA
	Ferozepur Road	Wahadat Road	53,840	46,381	4,038	3,479	7.5	3.0	CSTS
Raiwind Road	Canal Bank Road	Hudaira Drain	5,749	5,619	563	551	9.8	8.0	CSTS
Narowal Road	G. T. Road	Fateh Rehan	2,936	3,585	302	369	10.3	16.7	CSTS

Figure 3.3.3 Result of Screen Line Traffic Count

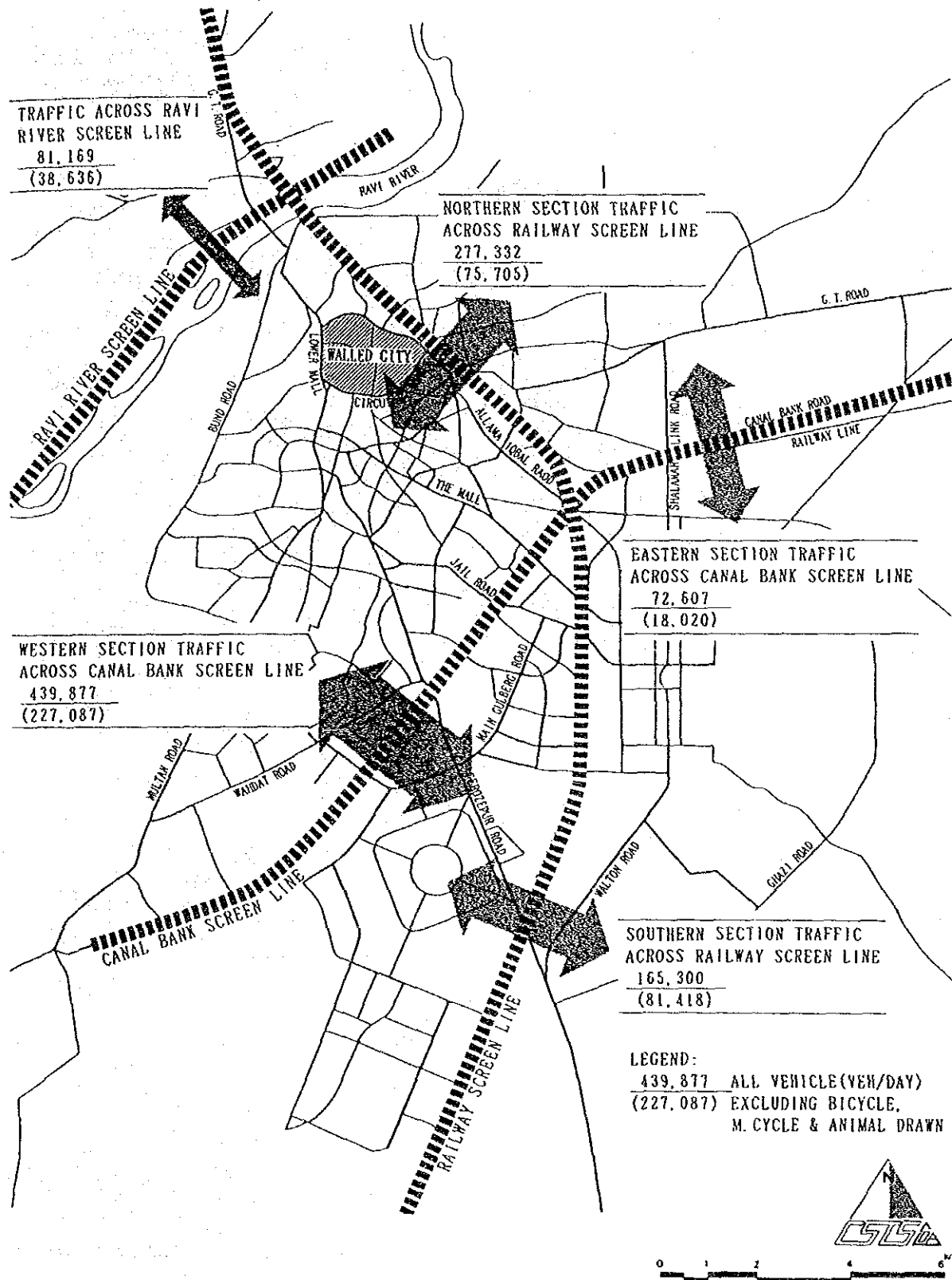
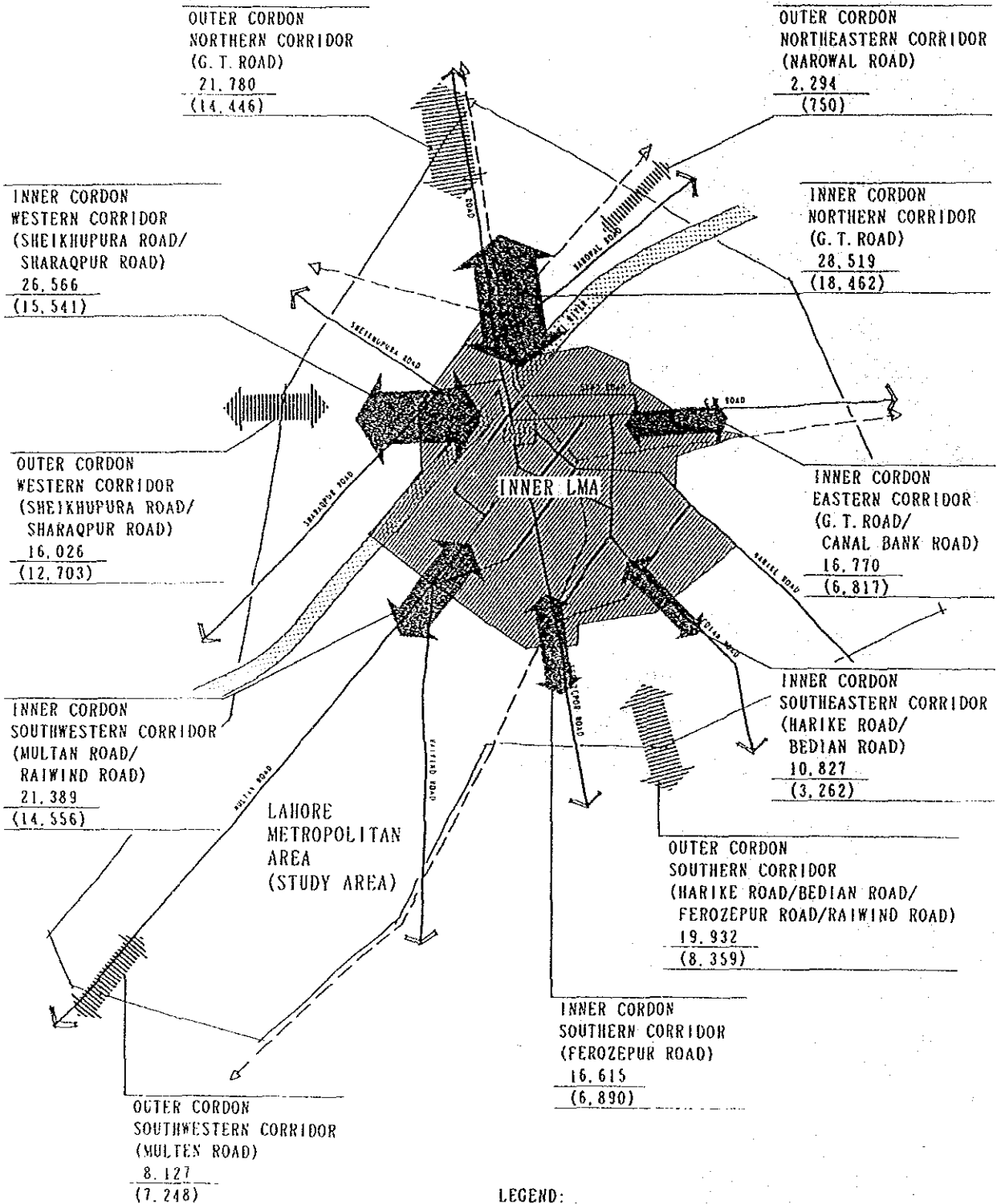


Figure 3.3.4 Result of Cordon Line Traffic Count



LEGEND:
 19,932 ALL VEHICLE (VEH/DAY)
 (8,359) EXCLUDING BICYCLE, M. CYCLE & ANIMAL DRAWN

- c) Volumes are larger on roads on Sheikhpura and Gujranwala than those on the south side, and average annual growth rates are between 5 and 11% which is slightly less than in the south.
- d) Eastbound Wagah Road is affected by Lahore urban traffic. Harike Road, close to the border with India, has a traffic volume of only around 1700 vehicles per day.

Table 3.3.2 Traffic Volume on Road, 1983-1990

Items		1983	1984	1985	1986	1987	1988	1989	1990	Growth p.a.(%)
Provincia Roads 1)										
232401	K.A.Malik	MT	7108	8062	8149	10184	12845	12880	13524	11.1
	-Sheikhpura	NM	384	512	393	452	535	605	560	6.5
	Total		7492	8574	8542	10646	13380	13485	14084	11.1
232405	Shahdara	MT	2531	2580	3000	3204	3435	3452	4359	9.5
	-Sheikhpura	NM	403	410	365	333	399	496	473	2.7
	Total		2934	2990	3365	3537	3834	3948	4832	8.7
232501	Shahdara	MT	1150	1310	1554	1532	1626	1743	1784	7.6
	-Mughalpur	NM	206	263	198	253	258	270	280	5.2
	Total		1356	1573	1752	1785	1884	2013	2064	7.3
231401	Lahore	MT	7846	9165	10155	10646	11532	13208	13234	9.1
	-Wagah	NM	991	1132	1603	1668	1403	1547	1389	5.8
	Total		8837	10297	11758	12314	12935	14755	14623	8.8
231502	Lahore	MT	1178	1506	1513	1513	1564	1490	1748	6.8
	-Harike	NM	266	278	147	251	256	230	265	0
	Total		1444	1784	1660	1764	1820	1720	2013	5.7
231501	Lahore	MT	1484	1759	1824	2148	2286	2335	3142	13.3
	-Bedian	NM	258	258	233	261	277	292	311	3.1
	Total		1743	2017	2057	2409	2563	2627	3453	12.1
233401	Kahna-Kasur	MT			2173	2567	2655	2709	3562	13.2
	(Ferozpur)	NM			54	80	124	120	152	29.5
	Total				2227	2647	2779	2829	3714	13.6
233503	Raiwind	MT	571	599	545	518	668	674	881	7.5
	-Kasur	NM	106	136	123	116	155	154	195	10.7
	Total		677	735	668	634	823	828	1076	8
National Highways 2)										
526	Gujranwala	MV						13830	14808	7.1
	-Muriduke	NM						299	481	60.1
	Total							14129	15289	8.2
527	Muriduke	MV			15316		16395	16121	18324	4.6
	-Shahdara	NM			324		285	182	262	-5.5
	Total				15640		16680	16303	18586	4.4
528	New Ravi Bridge	MV			44033		51230	46400	55796	6.1
		NM			7599		5977	3703	5352	-9.2
	Total				51632		57207	50103	61148	4.3
529	Lahore	MV			5223		5295	7826	10661	19.5
	-Patoki	NM			900		378	339	209	-44.1
	Total				6123		5673	8265	10870	15.4
530	Patoki	MV			4770		5154	5723	8619	15.9
	-Okara	NM			525		196	340	538	0.6
	Total				5295		5350	6063	9157	14.7

Source: 1) Planning and Design Directorate, Punjab Highway Dept. Lahore, 1990

2) NHB and NTRC, 1990

Notes: MV: motorized vehicles

NM: non-motorized vehicles

3.3.2 Traffic Volume by Type

1) Present Traffic Volume

Vehicles were classified into 14 types in the screen line and cordon line surveys conducted for the CSTS. These were grouped into 7 categories.

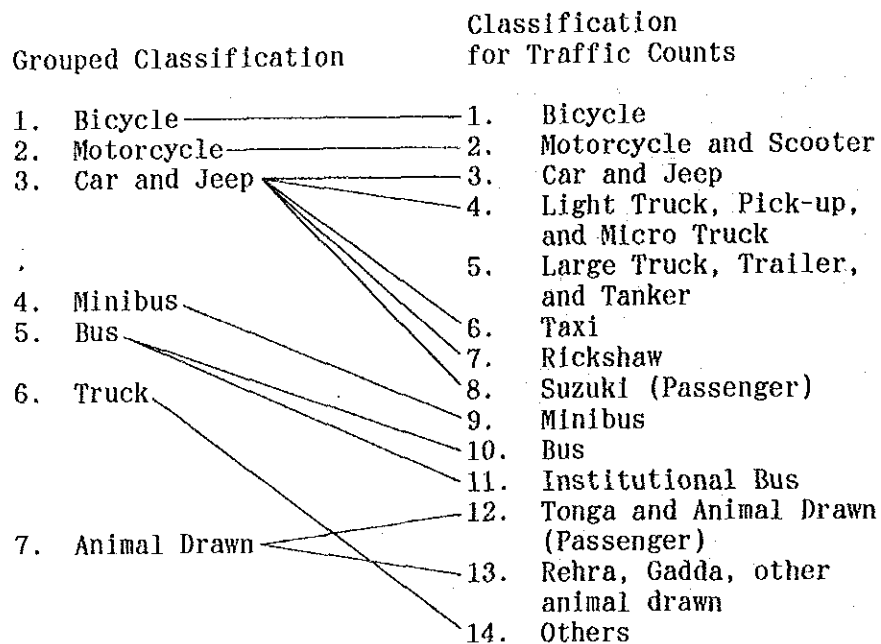


Figure 3.3.5 shows the vehicle composition of traffic at the screen lines and the cordon line.

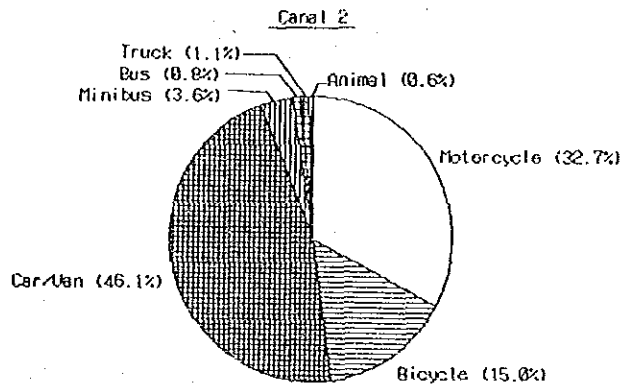
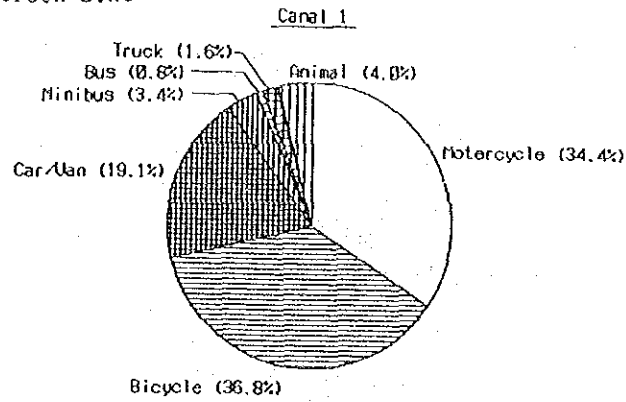
Screen Lines in Lahore

Traffic volumes of two-wheeled vehicles including bicycle and motorcycles represent the largest share in Lahore, accounting for approximately 50% of all vehicles. Two-wheeled vehicular traffic crossing the eastern part of the Canal Bank screen line and the northern part of the Railway screen line is remarkably high, accounting for 71% and 65% of the total traffic respectively.

Buses and minibuses combined account for less than 5% of the total traffic volume crossing the screen lines within Lahore.

Figure 3.3.5 Traffic Composition at the Screen and Cordon Lines (1)

Canal Bank Screen Line



Railway Screen Line

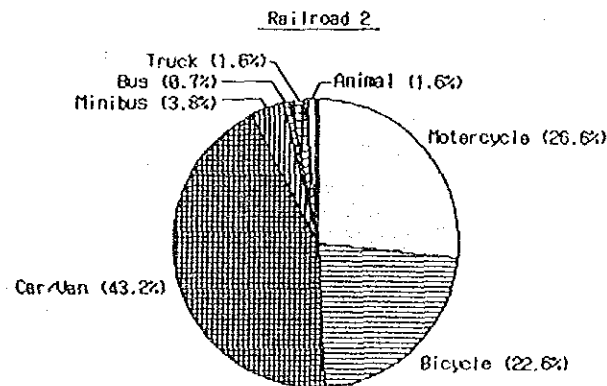
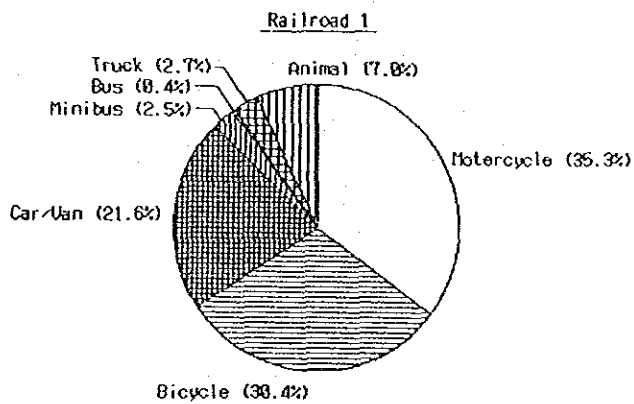
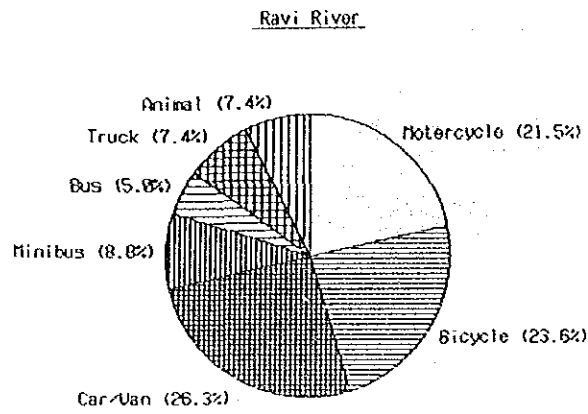


Figure 3.3.5 Traffic Composition at the Screen and Cordon Lines (2)

Ravi River Screen Line



Inner Cordon Line
(Screen Line at the Boundary of Lahore Inner Area)

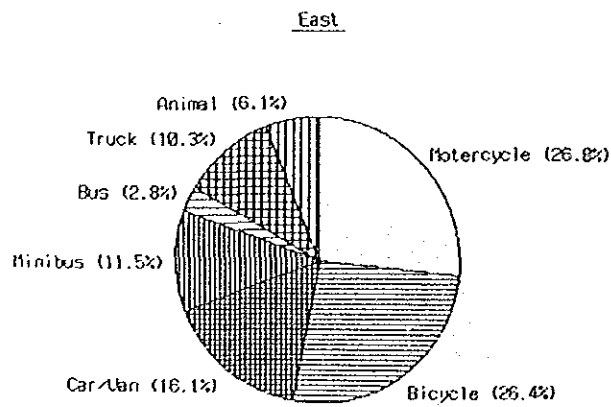
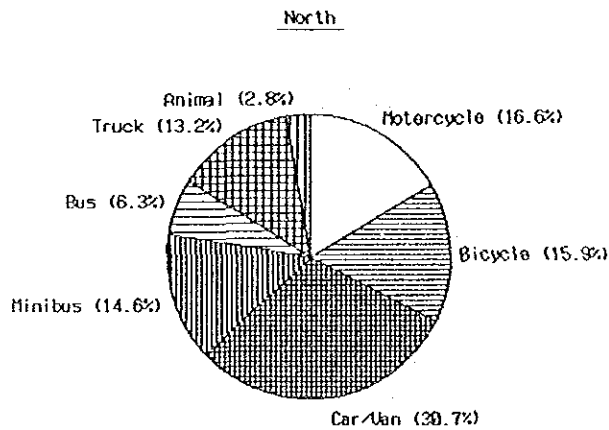


Figure 3.3.5 Traffic Composition at the Screen and Cordon Lines (3)

Inner Cordon Line
(Screen Line at the Boundary of Lahore Inner Area)

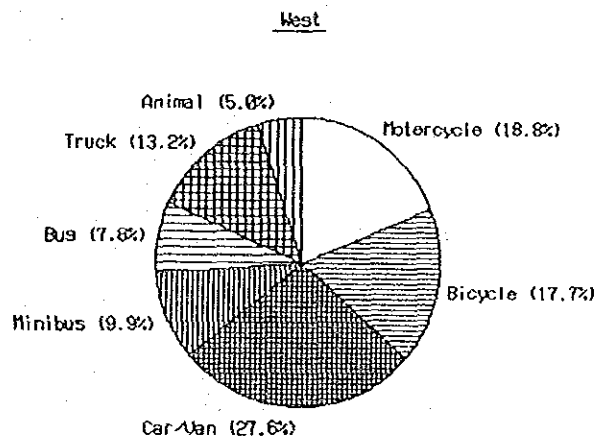
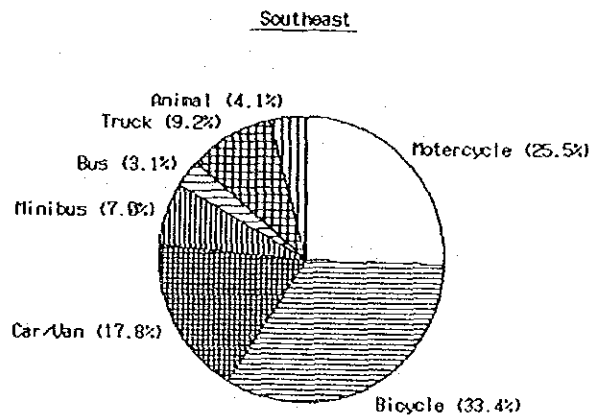
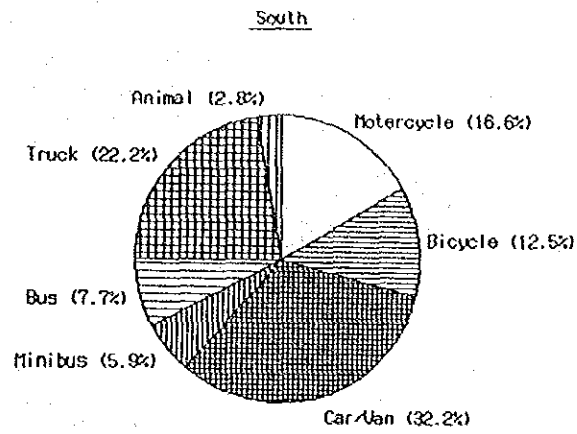
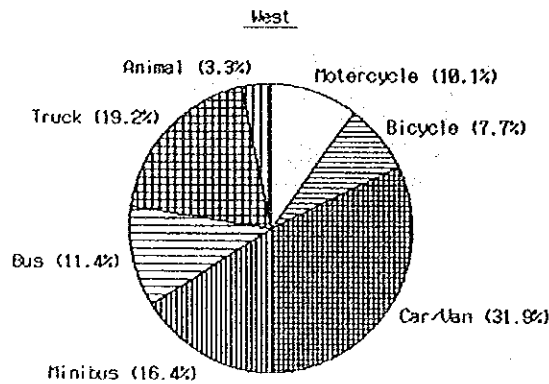
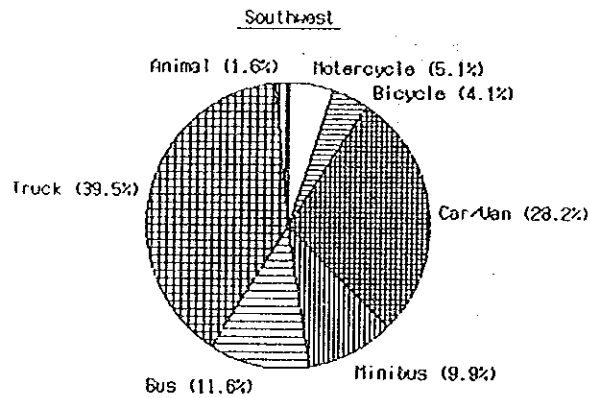
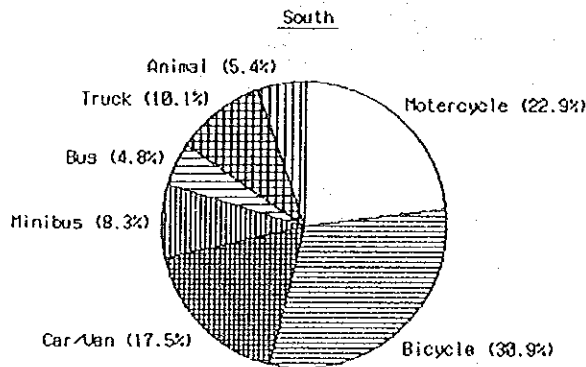
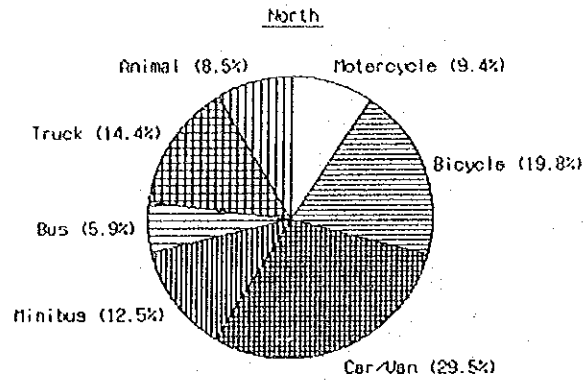


Figure 3.3.5 Traffic Composition at the Screen and Cordon Lines (4)

Outer Cordon Line



Inner Cordon Line (Screen Line at the Boundary of the Lahore Inner Area)

The volume of two-wheeled vehicles crossing the screen line on the boundary of the Lahore inner area also represent the largest share of all vehicles at 41%.

Outer Cordon Line (At the boundary of the LMA)

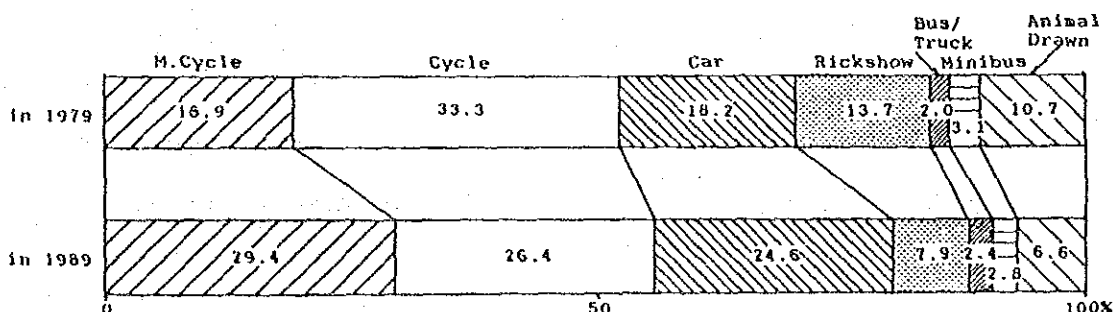
Truck traffic on the southwestern corridor is high compared with other corridors, accounting for nearly 40%. Multan Road connects Lahore and major cities in the southern part of Pakistan as an inter-regional trunk road. It is the most important trucking route for commodity shipments between Lahore and cities to the south.

2) Traffic Volume Trends by Type

As shown in Figure 3.3.6, in 1989 motorcycles represented the largest share of all vehicles crossing the inner cordon accounting for 29.4%. In 1989, there were 236,702 motorcycles/day, an increase of 140,502 veh/day from 1979, cars also represent the third largest share of 24.6% in all vehicles after motorcycles and bicycles.

- Buses and minibuses combined account for less than 5% of the total traffic volume crossing the screen lines within Lahore City.

Figure 3.3.6 Composition Share of Traffic Volume at Inner Cordon, in 1979 and 1989



Source : Inception Report of Lahore Traffic and Transport Component of the Punjab Urban Development Project, December 1989

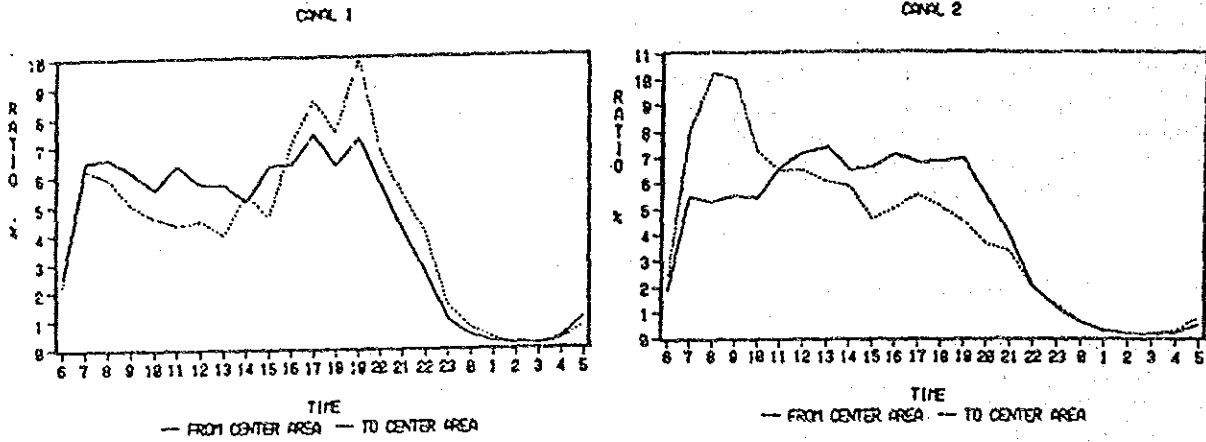
3.3.3 Traffic Fluctuation

The hourly fluctuations of traffic flow measured at the screen lines in Lahore are shown in Figure 3.3.7.

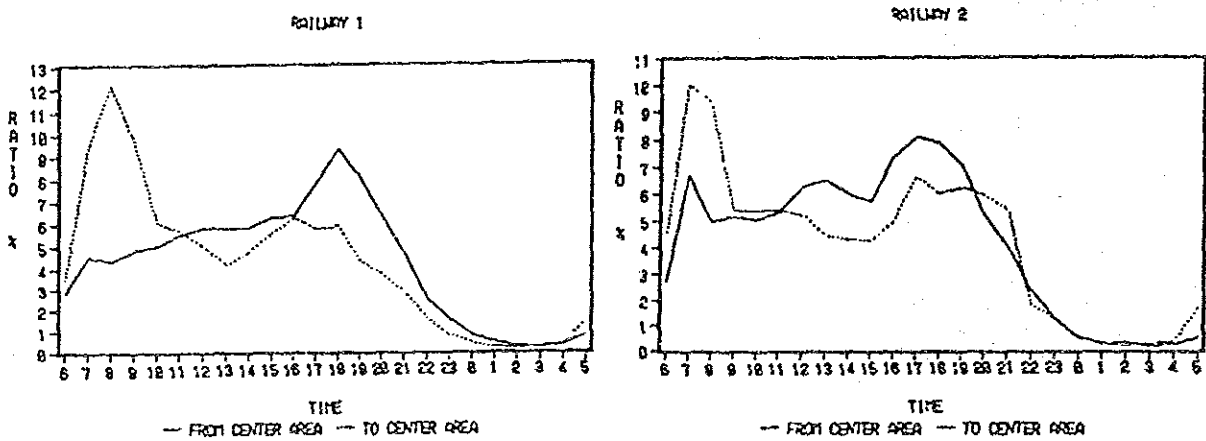
In general, traffic crossing the screen lines have two peak periods: 7:00 - 9:00 and 17:00 - 19.00. They remain fairly constant throughout the daytime and fall off gradually after 20:00. The peak hour to daily traffic ratios at the screen lines vary from 5.5% to 16.8%.

Figure 3.3.7 Hourly Traffic Fluctuation at Screen and Cordon Lines (1)

Canal Bank Screen Line



Railway Screen Line



Ravi River Screen Line

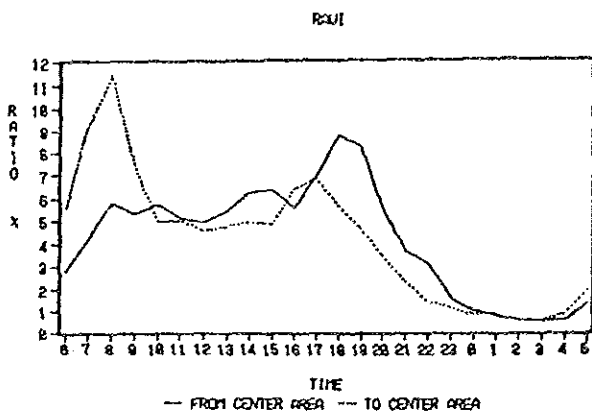
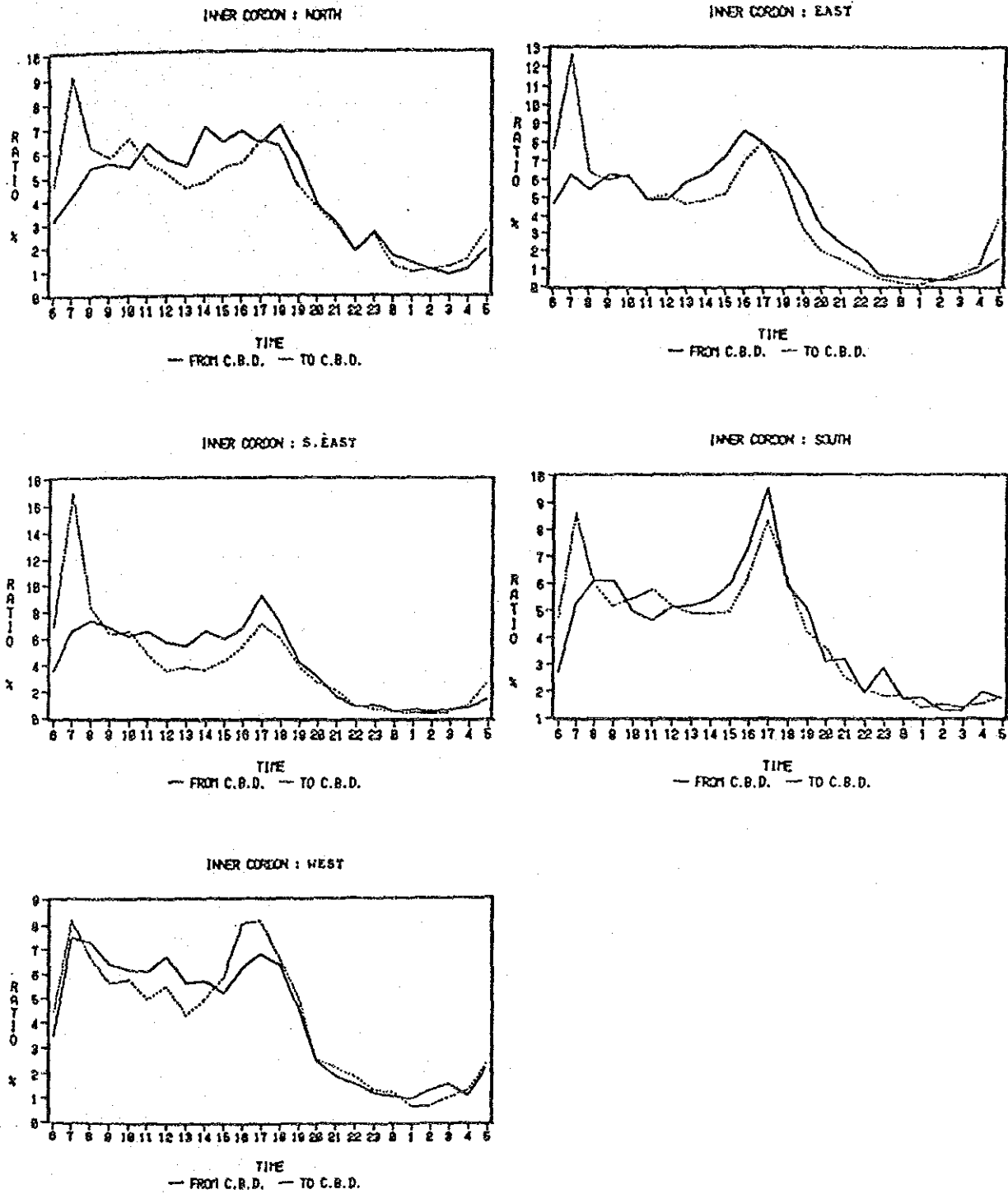


Figure 3.3.7 Hourly Traffic Fluctuation at Screen and Cordon Lines (2)

Inner Cordon Line



3.3.4. Travel Speed along Major Roads

The travel speed survey shows that the average running speed by car along most of the arterial roads within urbanized area of the LMA is less than 30 kilometers per hour from morning until evening.

The congested sections are:

Less than 10 km/hr

- Circular Road: Shahalam Gate - Darbar Chowk (evening)
- Bund Road: Railway crossing - Ravi Batiwala Chowk (daytime)

10 to 20 km/hr

(morning)

- Bund Road: Railway crossing - Ravi Batiwala Chowk, Sultan Mahmood Road - G.T. Road
- Lower Mall: Circular Road - Mall Road
- Mall Road: Assembly Hall - Lower Mall
- Alama Iqbal: Durand Road - Lahore Station
- Mughalpura: Railway fly-over
- Durand Road: At Egerton Road
- Circular Road
- Ferozepur: Canal Bank Road - Wahdat Road

(daytime)

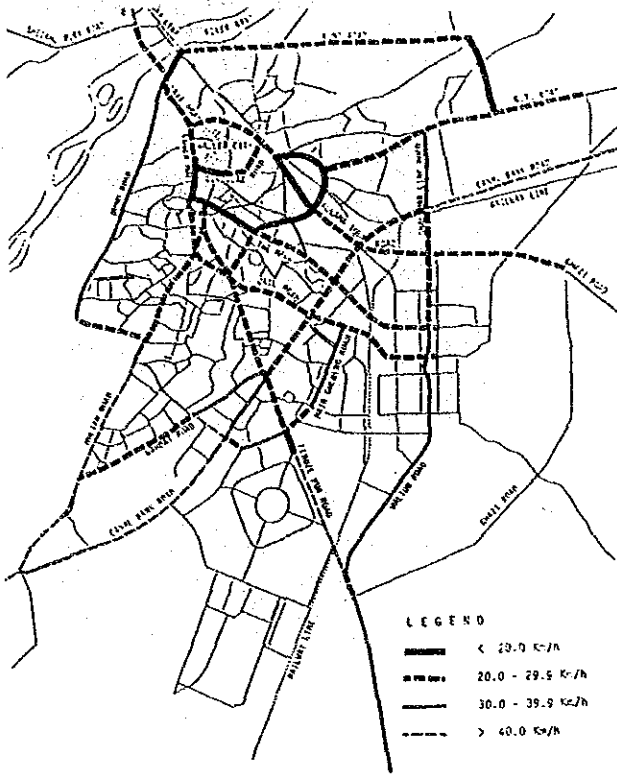
- Bund Road: Same section as in the morning, near Yateemkhana Chowk
- Lower Mall: Same as in the morning
- Circular Road
- Old Anarkali
- Bahawalpur: Chauburji chowk - Canal Bank Road
- Jail Road:
- Shalamar Link Road: G.T. Road - Shahrah e Aziz Bhatti

(evening)

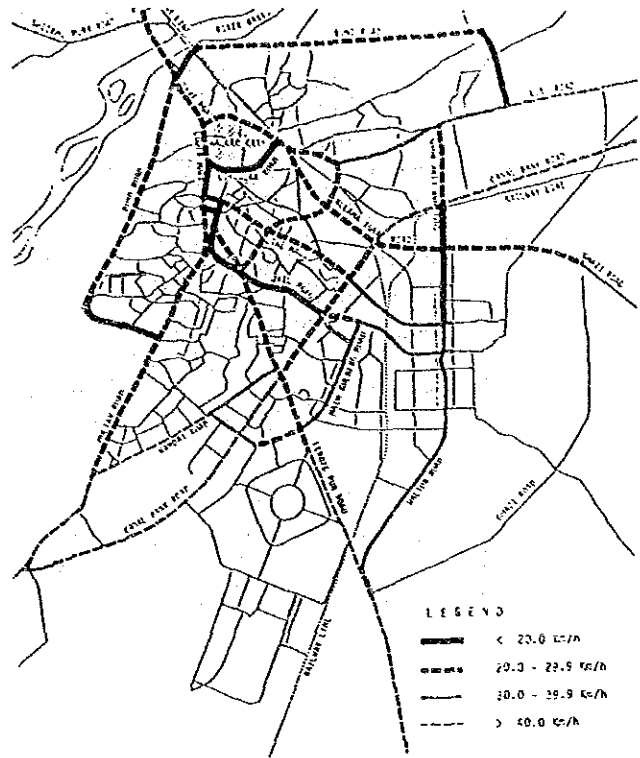
- Ravi Road: New Ravi Bridge
- Bund Road: Same as in daytime
- Circular Road
- Lower Mall
- Mall Road: Lower Mall - Regal Chowk
- Bahawalpur:
- Main Gulberg: Liberty Chowk - Ferozepur Road

These problem sections are illustrated in Figure 3.3.8.

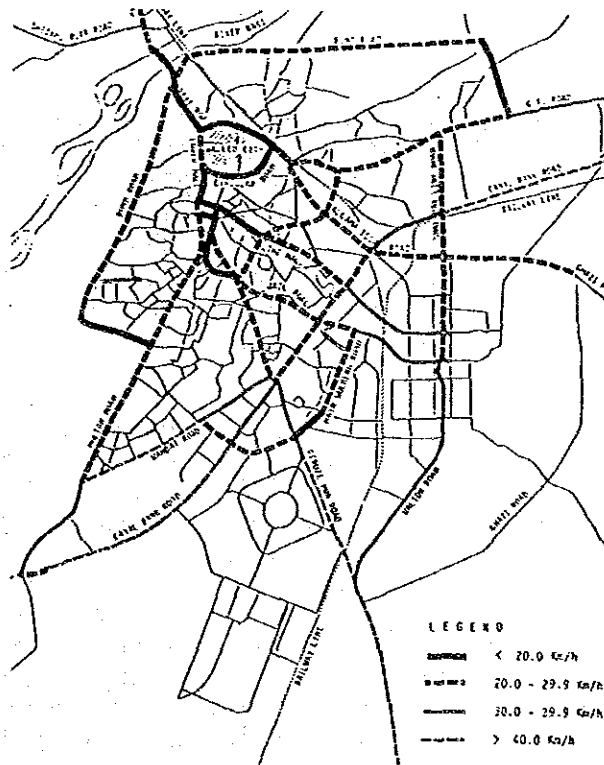
Figure 3.3.8 Travel Speeds along Trunk Roads



Morning(07-08)



Daytime(13-14)



Evening(17-18)

Several reasons can be found for the low speeds. Noteworthy are:

- Narrow road or bridge width;
 - Ravi Bridge
 - Mughalpura Fly-over
 - Shalamar Link Road
- Deteriorated road surface;
 - Bund Road
- Mixed traffic of animal-drawn and motorized vehicles;
 - Circular Road
 - Allama Iqbal Road
- Illegal parking near schools;
 - Jail Road
 - Durand Road
 - Mall Road
- Inadequate roundabouts or signals;
 - Ferozpur Road
 - Main Gulberg Road
- On road market;
 - Shalamar Link Road

3.3.5 Major Intersections

There are a number of roundabout intersections in Lahore, some were constructed in years before World War II. Generally the roundabout is located at main intersections, occupying relatively large area. It provides a greenery spot, monument, water pond, and others which contributes to the scenery of the city. However, continued development of traffic has exceeded the capacity of the roundabout intersection. Among these intersections, normal and roundabout, some are with inadequate engineering design reducing the capacity.

Figures 3.3.9 and 3.3.10 show the types and locations of main intersections. The traffic volumes at each intersection are in Table 3.3.3. Currently intersections of F-3, Q-6, R-3, and T-4 are programmed to be improved by the World Bank Project. The railway crossings I-1 and I-2, the less traffic volume intersections M-2 and Q-4, and the above World Bank Projects are not included in the following analysis.

Table 3.3.3 shows traffic volumes at those intersections are in the range of 5,000-13,000 pcu/hr. Those with motorized traffic more than 9,000 pcu/hr are Qartaba Chowk, Jail Rd/Canal Rd, Chouburji Chowk, Ferozpur Rd/Canal Rd, Kalma Chowk and The Mall/Canal Rd. They are located in main corridors of Lahore. Peak hours are found in the morning hours between 7.00 and 9.00 AM.

A characteristic point is the large number of two wheelers (bicycles and motorcycles). Most of those intersections register more than 50 % for two wheel vehicles. The largest share is found at GT Rd/Shalimar Link Rd, which is 73 % of total traffic volume in PCU.

Crossing over the railways are already grade-separated on main corridors, except on two roads; Shalimar Link Road and Park Road (Gulberg-Cantonment connection).

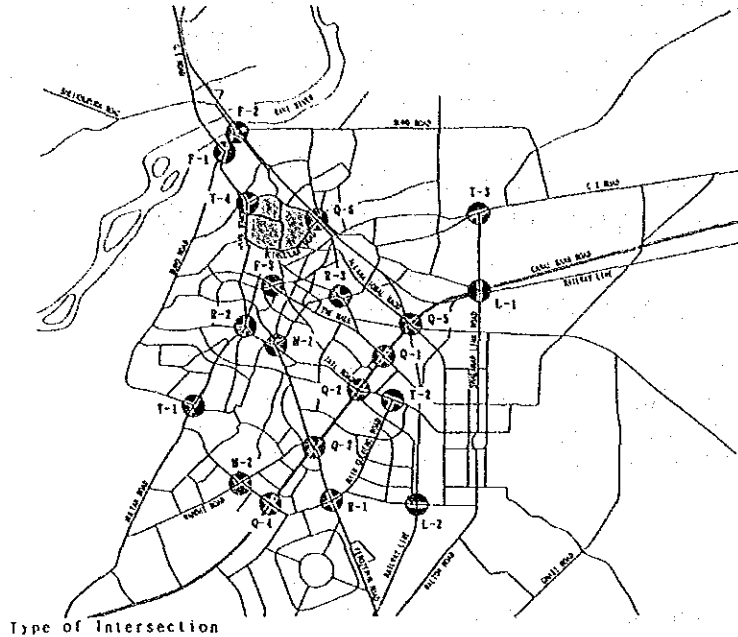
* Shalimar Link Road = Railways

The railways are used for cargo trains going to the Dry Port and interfere the road traffic at the crossing. The roadway is narrowed to a two lane width at the crossing. Heavy trucks to/from the Dry Port use the crossing, increasing the road traffic congestion at the crossing.

* Park Road = Railways

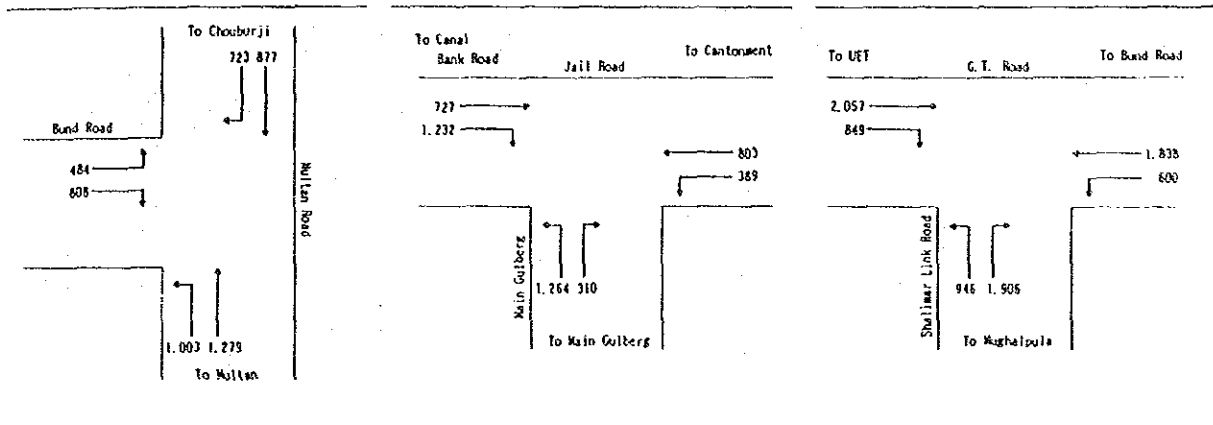
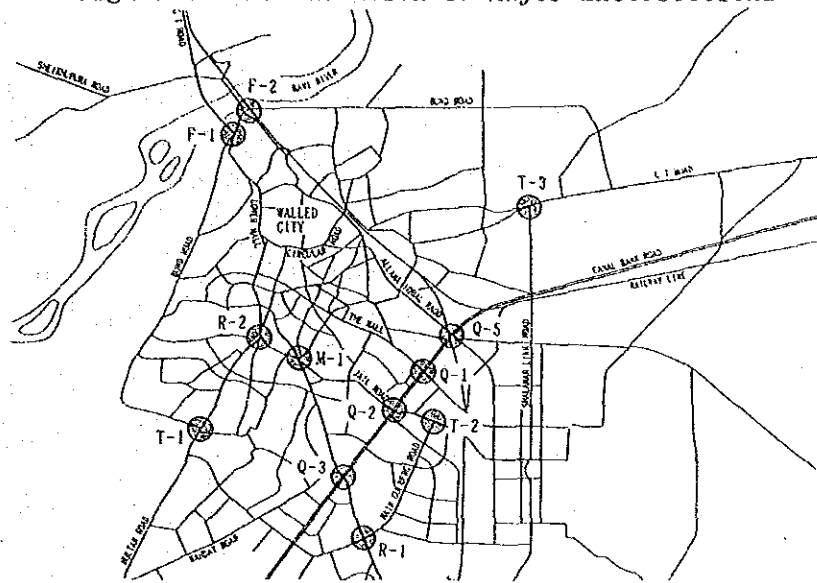
The road connects Gurberg and Cantonment areas by crossing the railways. Recent urbanization in the cantonment area has increased the traffic on this road. Accident possibility at the crossing increases together with the increases of traffic.

Figure 3.3.9 Classified Types of Intersections



Type	Name of Intersection	Location
T-Leg 	-Yatin Khana	T-1
	-Fawala Chowk	T-2
	-GT Road/Shalimar Link Rd	T-3
	-Ravi Road/Circular Rd	T-4
4-Leg 	-GT Road/Bund Road	F-1
	-Old Ravi Bridge	F-2
	-The Mall/Mcleod Road	F-3
Multi-Leg 	-Muzang Chungi	M-1
	-Wahdat Rd/Allama Iqbal Rd	M-2
Roundabout 	-Kalma Chowk	R-1
	-Chouburji	R-2
	-Shimia Hill	R-3
Quasi-roundabout 	-The Mall/Canal Bank Rd	Q-1
	-Jail Rd/Canal Bank Rd	Q-2
	-Ferozepur Rd/Canal Bank Rd	Q-3
	-Campus Rd/Canal Bank Rd	Q-4
	-Allama Iqbal Rd/Canal Bank Rd	Q-5
	-Eikhoria	Q-6
Level Crossing 	-Shalimar Link Rd/Railway	L-1
	-Park Road/Railway	L-2

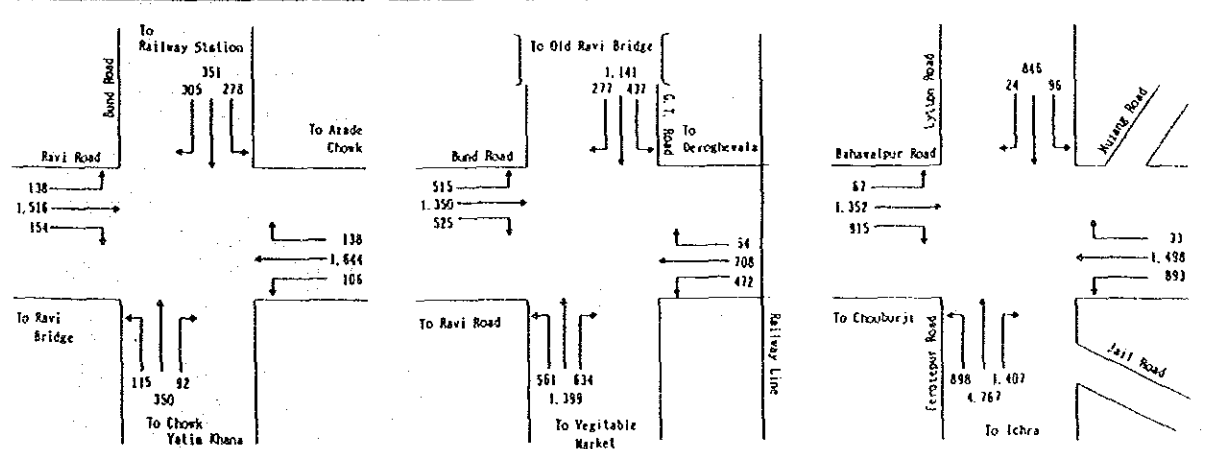
Figure 3.3.10 Location of Major Intersections



No. : T-1
 Name of Intersection : Yatin Khana chowk
 Time : 8:00-9:00
 Unit : pcu/hour, All vehicles

No. : T-2
 Name of Intersection : Fawala Chowk
 Time : 7:00-8:00
 Unit : pcu/hour, All vehicles

No. : T-3
 Name of Intersection : G.T. Road/Shalimar Link Road
 Time : 7:00-8:00
 Unit : pcu/hour, All vehicles



No. : F-1
 Name of Intersection : Batiwara Chowk
 Time : 8:00-9:00
 Unit : pcu/hour, All vehicles

No. : F-2
 Name of Intersection : Old Ravi Bridge
 Time : 8:00-9:00
 Unit : pcu/hour, All vehicles

No. : M-1
 Name of Intersection : Kartaba Chowk (Muzang Chungi)
 Time : 7:00-8:00
 Unit : pcu/hour, All vehicles

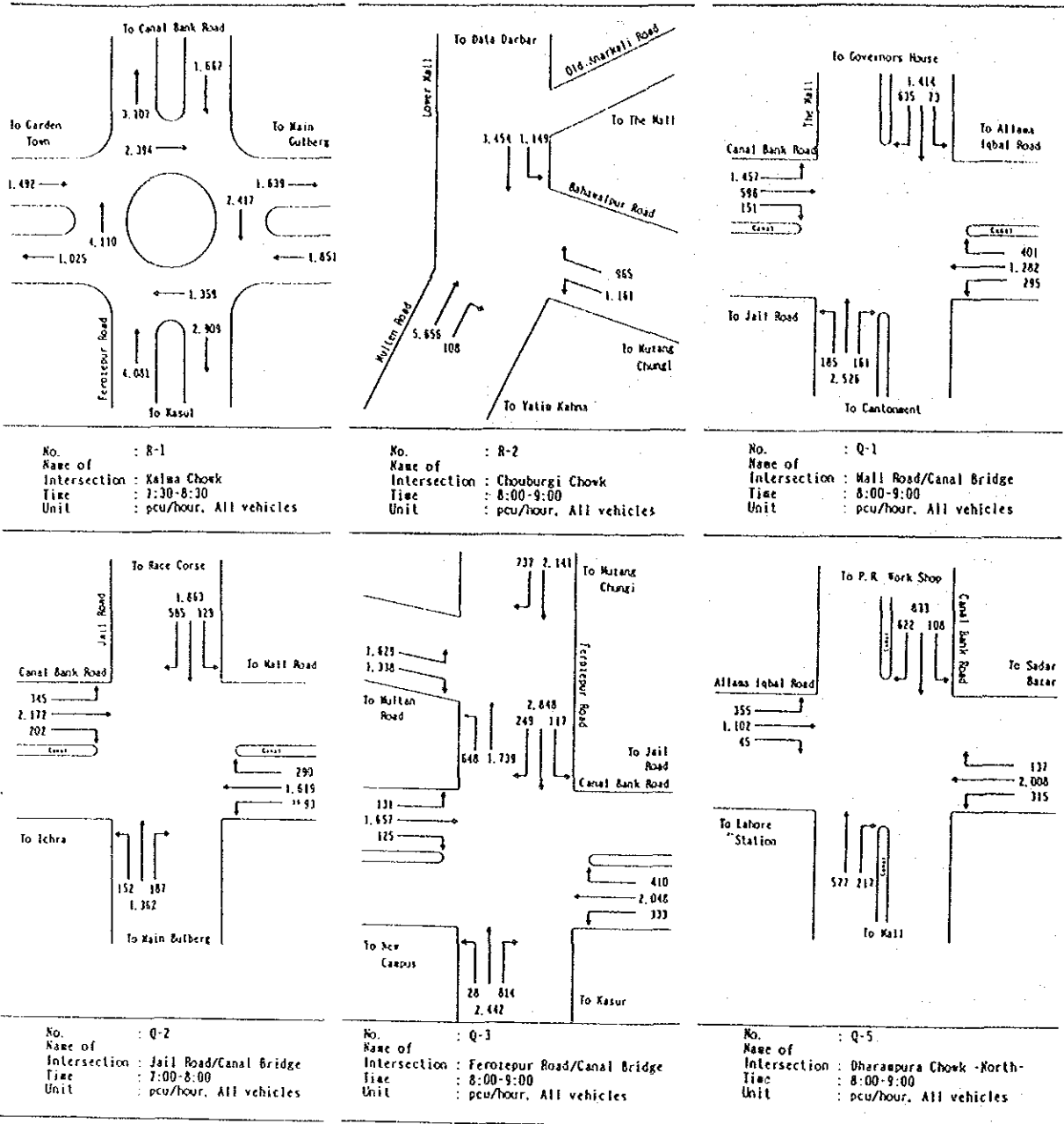


Table 3.3.3 Hourly Traffic Volume at Major Intersections

No.	Name of intersection	Period	Total hourly inflow traffic		Excluding animal drawn vehicles				
			(veh)	(pcu)	(veh)	(pcu)	% of 2-wheel vehicles	% of heavy vehicles	pcu per lane
M-1	Kartaba Chowk I	7:00-8:00	15427	12796	15300	12288	56.0	3.6	1120
F-2	Old Ravi Bridge	8:00-9:00	3983	8073	2764	3197	56.0	24.2	400
Q-5	Dharampura Chowk	8:00-9:00	8584	6319	8440	5743	68.0	3.0	570
T-1	Yatin Khana Chowk	8:00-9:00	4560	5174	4282	4062	53.8	11.0	410
F-1	Batiwara Chowk	8:00-9:00	4510	5187	4394	4723	51.9	17.6	470
T-2	Fawala Chowk	7:00-8:00	5651	4725	5646	4705	35.4	0.8	670
Q-2	Jail Rd./Canal Bridge	7:00-8:00	11671	8998	11666	8978	46.2	1.1	900
R-2	Chouburji Chowk	8:00-9:00	15870	12493	15649	11609	60.2	3.0	1160
Q-3	Ferozpur Rd./Canal Bridge	8:00-9:00	14836	11202	14802	11066	55.6	2.3	1110
Q-3	Ferozpur Rd./Wahdat Rd.	8:00-9:00	10264	8232	10175	7876	55.9	2.3	980
R-1	Kalma Chowk	7:30-8:30	12551	9958	12457	9582	51.7	3.4	870
T-3	G. T. Rd./Shalimar Link Rd.	7:00-8:00	7438	8196	6458	4276	73.1	3.2	610
Q-1	Mall Road/Canal Bridge	8:00-9:00	12478	9176	12478	9176	50.4	0.7	920

3.3.6 Road Encroachment

It is quite common, not only in Lahore but also other urban areas in Pakistan and the Southeast Asian Countries, the central part of the city is the cluster of traffic and economic activities. The economic activities expand on the roadway space in the mixture of vehicle traffic. Fig 3.3.11 shows major road sections having those mixed usage. (Encroached road sections).

Activities other than vehicle traffic are structures, shops, buildings, parking, buses waiting for passengers, open market and street vendors. They are unauthorized and illegal. At those sections, the right of way is occupied by non-traffic activities and the roadway for traffic is reduced substantially.

In 1990-91, Metropolitan Corporation Lahore (MCL) has conducted a cleanup campaign for the 16 sections where non-traffic activities expand on the roadway. The campaign is well enforced and the roads after the cleanup can restore its ROW to the full width.

However there remain a number of road sections which is occupied by non-traffic activities. The campaign should be extended to those sections in order to restore the original space for road traffic. Those sections are described in Figure 3.3.12.

Figure 3.3.11 Location of Major Road Encroachment

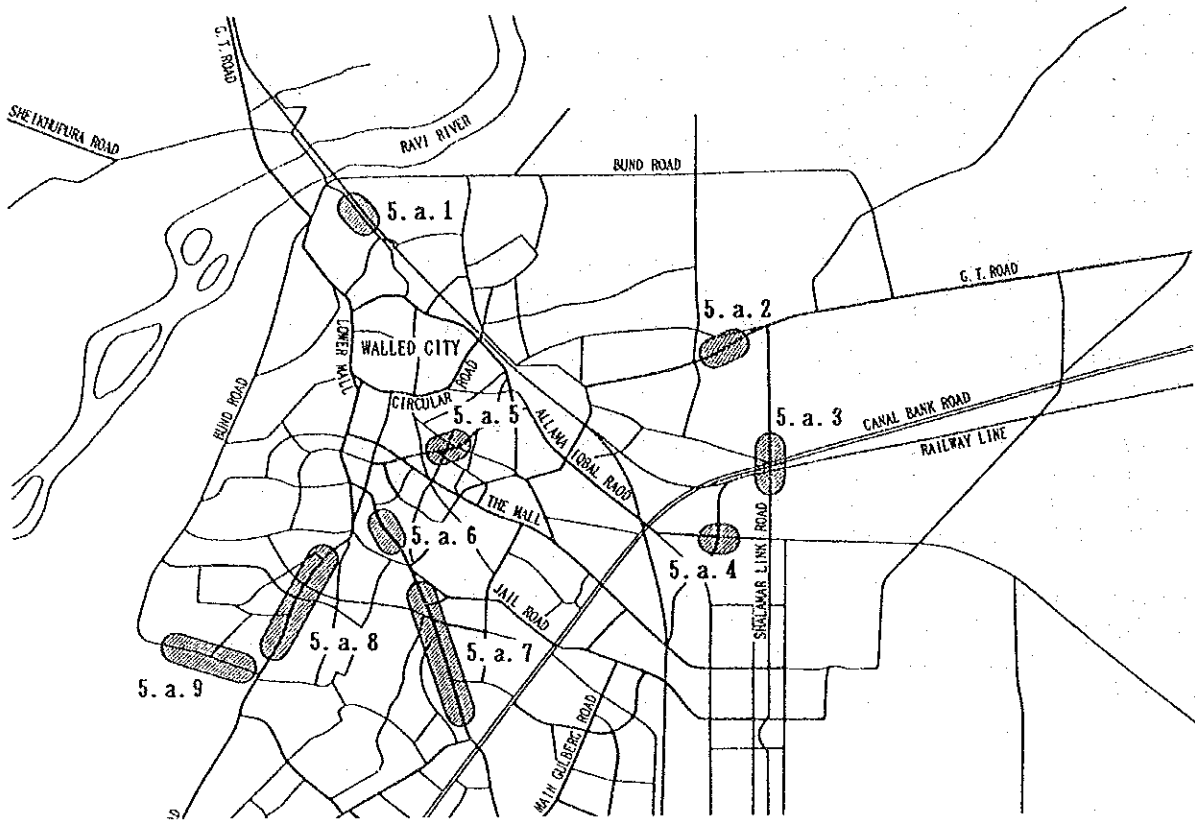
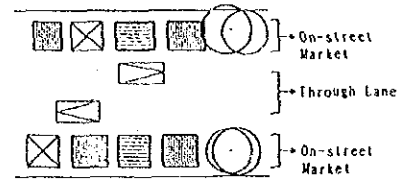


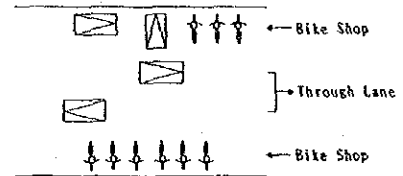
Figure 3.3.12 Encroached Road Sections

<p>No. : 5. a. 1 Name of Road: G. T. Road Section: Old Ravi Bridge - Bdami Bagh Bus Stand No. of Lanes: 2 → 4 Function: Access to the Badami Bagh Intercity Bus Terminal Type of Encroachment: Truck Stand</p>	<p>Truck Stand Through Lane Truck Stand</p>
<p>No. : 5. a. 2 Name of Road: G. T. Road Section: UET - Shalimar Link Road No. of Lanes: 2 → 6~8 Type of Encroachment: On-street Market</p>	<p>On-street Market Through Lane Through Lane On-street Market</p>
<p>No. : 5. a. 3 Name of Road: Shalimar Link Road Section: Allama Iqbal Road - Canal Bank Road No. of Lanes: 2 → 2 Function: Access Road Between North and South in the Eastern Part of the City Type of Encroachment: Freight Truck Stand</p>	<p>Freight Truck Stand for the Dry Port Through Lane Freight Truck Stand for the Dry Port</p>

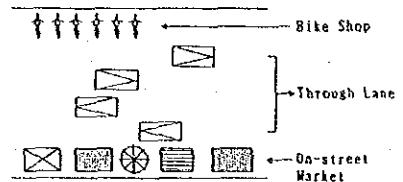
No. : 5. a. 4
 Name of Road: Allama Iqbal Road
 Section: Canal Bank Road - Shalimar Link Road
 No. of Lanes: 2 → 6
 Type of
 Encroachment: On-street Market



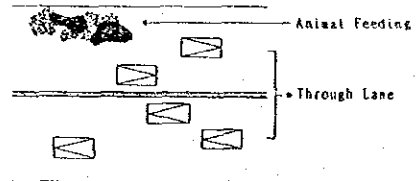
No. : 5. a. 5
 Name of Road: Meleod Road
 Section: The Mall - Railway Station Area
 No. of Lanes: 2 → 4
 Type of
 Encroachment: Bike Shop



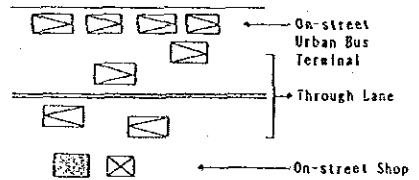
No. : 5. a. 6
 Name of Road: Lytton Road
 Section: Muzang Chungi - Anarkali
 No. of Lanes: 4 → 6
 Type of
 Encroachment: Bike Shop and On-street Market



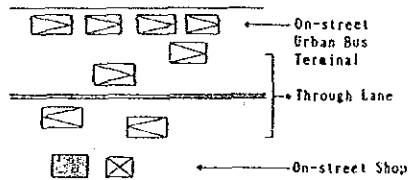
No. : 5. a. 7
 Name of Road: Ferozepur Road
 Section: Muzang Chungi - Canal Bank Road
 No. of Lanes: 6~8 → 10
 Type of
 Encroachment: On-street Market, Animal Feeding



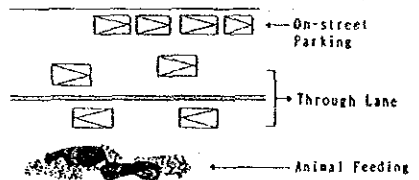
No. : 5. a. 8 (1)
 Name of Road: Multan Road
 Section: Choubruji - Bund Road
 No. of Lanes: 4 → 6
 Type of
 Encroachment: On-street Shop, On-street Bus Terminal



No. : 5. a. 8 (2)
 Name of Road: Multan Road
 Section: Choubruji - Bund Road
 No. of Lanes: 4 → 6
 Type of
 Encroachment: On-street Shop, On-street Bus Terminal



No. : 5. a. 9
 Name of Road: Bund Road
 Section: Yatim Khana - New Bridge
 No. of Lanes: 6 → 8
 Type of
 Encroachment: On-street Parking, Animal Feeding



3.4 ROAD TRAFFIC CONTROL AND MANAGEMENT

3.4.1. Overview

In order to simplify traffic engineering and management decisions, the LDA established the Traffic Engineering and Transport Planning Unit (TEPU) in 1980. Due to its success and due to its increased work load, the unit was expanded to a full agency level and renamed as TEPA in 1988. This agency has worked not only with its own staff, but with consultants and foreign agency consultants as well in numerous traffic improvement projects throughout its ten year history.

3.4.2 Roadways

Roadways within the Lahore network suffer from numerous problems as would normally be expected in a old city whose road network was developed long before the introduction of the automobile. IN the older central parts of the city, road suffer from poor alignment and insufficient road width, often too narrow for two vehicles to pass one another. In the newer areas of less intensive land use, roads are often too wide and ill-defined, leading to dangerous vehicle movements. Even these wide roads, however often suffer from narrow choke-points which cause congestion problems and increase dangerous maneuvering. The pavement itself is often in poor condition causing slow traffic, high vehicle maintenance costs, and unsafe driving conditions throughout the network.

Throughout the road network, but particularly in central Lahore, roadways suffer from encroachment by both temporary and permanent structures. Although strong efforts have been made in the last year to clear these problems, many more remain. In addition to this is traffic friction due to the wide variety of vehicle types that is found in Lahore. Separation of traffic by mode is practiced in some areas: sidewalks are found in many areas, there are prohibitions against animal drawn vehicles in some areas, and large vehicles are prohibited from travelling on city streets during the daytime. More of this sort of separation is needed, however.

Almost all road suffer from poor signing and pavement marking, as there is very little to be found in the city. Inadequate drainage poses congestion problems in the rainy season and maintenance problems year round. Poor drainage also poses a health problem due to the prevalence of animal drawn vehicles.

3.4.3 Intersections

Major intersections suffer from poor geometric layout, as they are too large and ill-defined, causing severe congestion and safety problems. Few intersections have traffic control signs, and there is a strong need for more signalized intersections. Not only is there this need for more signals, but the ones which do have signals are generally poorly designed and maintained.

The signal lights, if they work at all, usually give confusing or inadequate information to the driver. Roundabout intersections are generally better, but do not function as well as they should due to poor

driver discipline. In addition, the capacity of roundabouts may soon be exceeded throughout the city as the level of traffic is expected to grow significantly in the next few years.

Insufficient parking space is a growing problem that must be addressed very soon as traffic grows. In addition to the lack of parking spaces is the problem that chaotic parking and parking maneuvers causes obstacle to vehicular flow on the roads.

The most urgent problem, in the opinion of this observer is the lack of discipline and very dangerous and aggressive driving habits on the part of drivers in Lahore. Although it is certain that part of this is caused by frustration with the inadequacies of the road network, it is certain that other forces are at work as well. This problem has recently become highlighted on a national level as the new government has instituted Islamic Shariah requiring the payment of a large restitution by drivers convicted of neglect and causing a traffic fatality to members of the victim's family.

3.5 EXISTING ROAD / ROAD TRANSPORT IMPROVEMENT PROJECTS

As discussed in a general way in the preceding pages, the Lahore Metropolitan Area has been the subject of intensive transport study over the past twelve years. The Punjab Urban Development Project (PUDP) is a large scale development project undertaken by the government of Pakistan, and financed by the World Bank. The overall project included improvement of three elements of the urban infrastructure: water supply, sanitary sewerage, and transport.

The transport component of the PUDP is under the authority TEPA (originally TEPU), formed in 1980 specifically to address the problems of transportation in the city. TEPA has been involved in many projects since 1980 to improve bus transit, intersection improvement, road paving and geometric improvements, safety, and vehicle registration. Since TEPA is staffed with engineers and since it has been dealing with numerous traffic engineering consultants, both foreign and domestic, it has since its inception been involved essentially all traffic management plans and programs over the past decade. A list of the current projects and proposals for Lahore can be found in the Appendix. Due to the many on-going projects, this report will not describe them here.

It is however, important for the reader to have a basic understanding of the magnitude of traffic management work which is already underway. For an understanding of the scope of the existing projects, the map in Figure 3.5.1 is shown. A complete listing is given in the appendix along with information on all known projects or plans whether they are road improvement, signalling, signing, or striping.

Figure 3.5.1 On-going Road Improvement Projects



CHAPTER 4. PUBLIC TRANSPORT SYSTEM

CHAPTER 4 PUBLIC TRANSPORT SYSTEM

4.1 GENERAL

4.1.1 Service System

The public service system in the transport sector of Lahore Metropolitan Area is summarized here. Lahore covers 2250 Km² and had a population of 5.4 million in 1990. Public transport is divided into several modes: buses, railways, aviation, etc. Buses may be either intercity or urban, while railways and aviation are mostly concerned with intercity movements.

Operators are both private and public, where "private" means private persons or enterprises who operate after securing a route permit, and "public" means those having route permit but are owned by the provincial or national government. The Punjab Road Transport Corporation (PRTC) which is under the administration of the Secretary Transport of Punjab is a public operator in the Lahore Metropolitan Area. The Federal Government manages Pakistan Railways (PR) and the Civil Aviation Authority (CAA). Lahore airport serves Pakistan International Airway for domestic and international flights along with Air India and others for international flights. The air force also uses the airport at present.

The administration of public service on roads is summarized in Figure 4.1.1. Fares for passenger service are regulated and a route permit is issued when the application fulfills certain conditions.

4.1.2 Notes on the Current Development Programmes

(1) PRTC

PRTC is a public corporation operating both intercity and urban routes competing with private operators. Its most critical problems are:

- Dilapidated buses and mechanical troubles.
- Shortages of spare parts and poor performance of repair work.
- Financial deficit.

In order to improve the operation of PRTC, BCEOM experts in financial system, training, and mechanics have been in Lahore for 18 months since August, 1990. They are part of a study team engaged in the Punjab Transport Project of World Bank to study the current situation. They will recommend means to improve the operation of PRTC.

(2) Airport

Development and improvement plans of airport facilities are handled by the Civil Aviation Authority (CAA). It is found they have plans to extend the runway so that a Jumbo 747 can use the airport for long range international routes and to improve the terminal facilities. However, the

actual implementation plan of these improvement programmes has not been confirmed yet.

(3) Railways

Pakistan Railways (PR) operates the national railway system and has no specific policy to meet the demand of urban transport in Lahore. The reason is that most of the railway lines do not match the main corridors of urban transport demand, that there is not enough rolling stock to supply the service of commuting and shuttling. Moreover, the financial position of PR is so severe they cannot procure new rolling stock for urban service.

This JICA study may discuss the possibility to develop and incorporate some of the existing railway lines into urban service when alternative plans of mass transit are discussed in latter part of the report.

(4) Bus Stands

There are two main bus stands in the centre of Lahore: Badami Bagh General Bus Stand and GTS Bus Stand near Railway Station. Although bus stand activities are states later in this document, it should be mentioned that their facilities need to be improved. However, the HFA group, engaged in "Lahore Traffic and Transport Component of the Punjab Urban Development Project" in TEPA of LDA under the World Bank Loan is preparing a conceptual

plan to restructure each bus stand. If it is agreed by agencies concerned, they will draw a preliminary design of improvement plan. Consequently the JICA study will not propose another conceptual plan of the existing bus stands, but may discuss locations of new bus terminals based on a long term planning.

(5) Study of Urban Public Service on Roads

The main subject of the public transport study is related to the public passenger transport service in Lahore Metropolitan Area, while some reference will be made for cargo transport when the need arises.

Remarks: In discussion with other modes, "bus" is used covering all types: bus, minibus, medium bus, flying coach, and suzuki. In discussion of different bus types, "bus" means a large and regular sized bus with the seats of 40-50 persons. For example, bus, medium bus, minibus, suzuki are different in seat capacity.