

CHAPTER - 3 TRAFFIC SURVEY AND ANALYSIS

3.1 Homogenous Sections

Based on the project road features settlements along the road, traffic volume etc. the project road has been divided only in one homogenous section as given in **Table 3.1 below**:

Table 3.1: Homogenous Sections

Homogenous Section	Chainage (Km-Km)	Length (km)
HS-1	0.000 - 31.000 (Bhawi - Sathin)	31
HS-2	Km. 31-55(Sathin to Bhopalgarh)	24
HS-3	Km. 55-71(Bhopalgarh to Palri)	16
HS-4	Km. 75-97(Lawari Piou to Khimsar)	22

Based on the above mentioned homogenous section, traffic surveys were conducted at following location and as per schedule given below in **Table 3.2**:

Table 3.2: Traffic Survey locations and Schedule

Survey details	Chainage Location	Period of Survey	Remarks (Duration)
Classified Traffic 7 days	SH-86C KM-1+500	12.12.14 – 18.12.14	7 days
	SH-86C -KM-55-500	10.12.14 – 16.12.14	7 days
	SH-86C Mangeria (Km.87)	09.12.14 – 15.12.14	7 days
	SH-86C Ghana Magra (Km.6)	16.12.14 – 22.12.14	7 days
Turning Movement	Bhopalgarh Chowk	09.12.14	1 day
	Lawari Chowk	04.12.14	1 day
	SH-86C KM-1.300	15.12.14	1 day
	Palri	04.12.14	1 day
Axle load survey	SH-86C KM-55+500	11.12.14	1 day
	SH-86C KM-02	12.12.14	1 day

These locations are shown in **fig 3.1**.

3.2 Classified Traffic Volume Count

The classified traffic volume counts were carried out at 3 locations along the project road for 7 days. The vehicle classification was done as per IRC: SP 19-1991 and IRC: 9-1972

guidelines and vehicle category added / revised as per toll policy. The seven day count will give average Daily Traffic (ADT). The value is then converted to passenger car units (PCUs) for capacity Analysis. The vehicle type and PCU factors adopted are presented in **Table 3.3** below:

Table 3.3: Classification of vehicle for Traffic Surveys

Motorized Vehicles	
Vehicle Type	PCU Factor
Car / Jeep / Taxi	1.00
2-Wheeler	0.50
3-Wheeler	1.00
Bus	3.00
Mini Bus	1.50
LCV	1.50
2-Axle Truck	3.00
3-Axle Truck	3.00
MAV (4-6 Axle	4.50
MAV > 6 Axle	4.50
EME / HCM	4.50
Tractor Without Trailer	1.50
Tractor with Trailer	4.50
Non Motorised Vehicle	
Cycle	0.50
Cycle Riskshaw	2.00
Animal drawn	4.00

The traffic count data would be used to interpret the existing trends regarding traffic flow at mid blocks to determine average daily traffic, peak hour traffic, traffic composition and variation of hourly traffic / day wise.

3.3 Mid Block Volume Analysis

The magnitude of traffic at each mid block (7 days) is represented in **Table 3.4:**

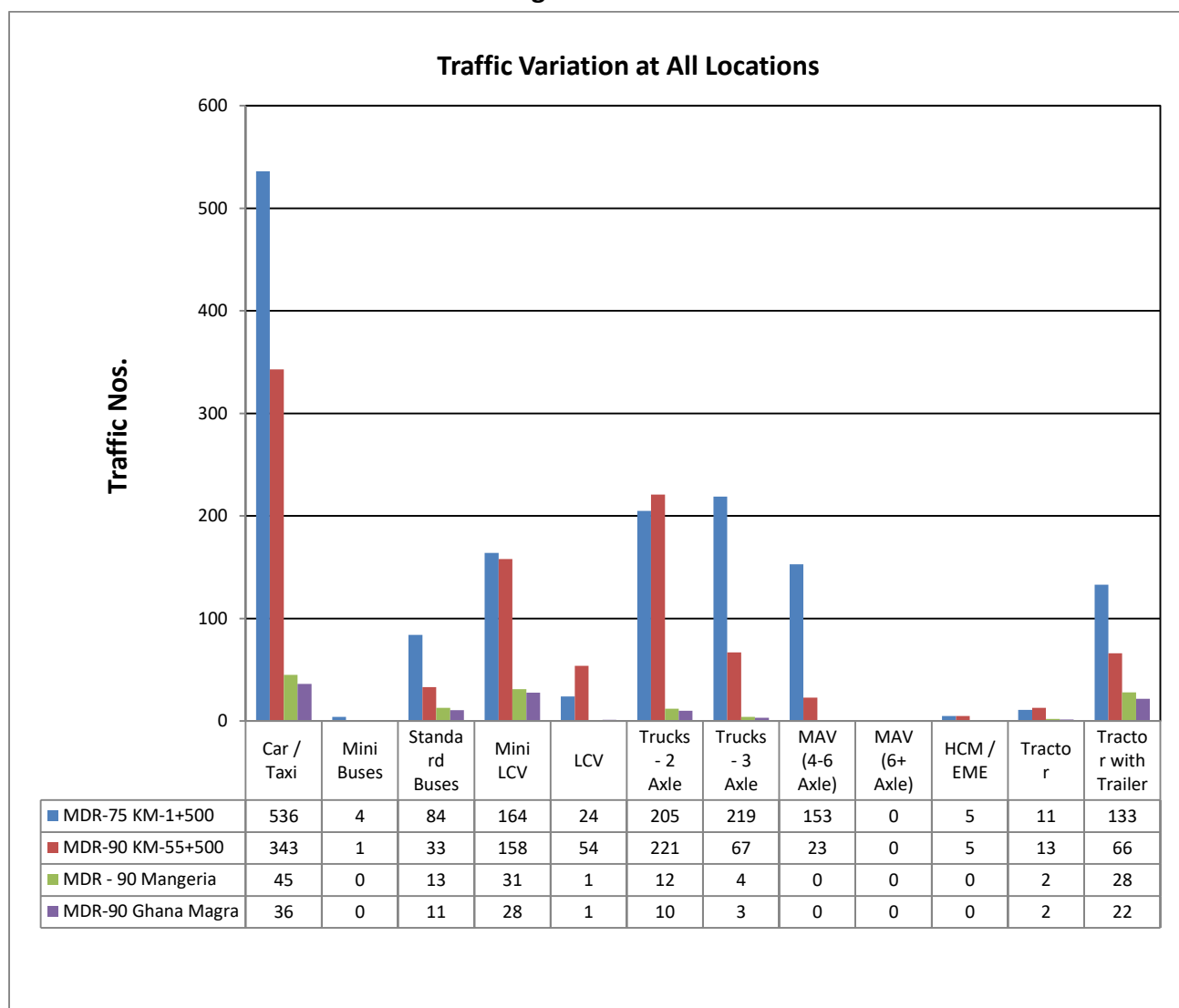
Table 3.4– ADT
Average Daily Traffic (ADT)

Vehicle Type	PCU Factor	SH-86C KM-1+500		SH-86C KM-55+500		SH-86C Mangeria (Km. 87.000)		SH-86C Ghana Magra (Km. 6.000)	
		ADT	PCU	ADT	PCU	ADT	PCU	ADT	PCU
Tolled									
Car / Jeep / Taxi / Van / utility	1.0	536	536	343	306	45	45	36	36
Mini Buses	1.5	4	6	1	1	0	0	0	0
Standard Buses	3.0	84	252	33	80	13	39	11	32
Mini LCV	1.5	164	246	158	211	31	47	28	41
LCV	1.5	24	36	54	66	1	2	1	2
Trucks - 2 Axle	3.0	205	615	221	544	12	36	10	31
Trucks - 3 Axle	3.0	219	657	67	164	4	12	3	10
MAV (4-6 Axle)	4.5	153	689	23	86	0	0	0	0
MAV (6+ Axle)	4.5	0	0	0	2	0	0	0	0
HCM / EME	4.5	5	23	5	19	0	0	0	0
Tractor	1.5	11	17	13	17	2	3	2	2
Tractor with Trailer	4.5	133	599	66	244	28	126	22	97
Total		1538	3674	984	1739	136	309	112	251
Exempted									
2-Wheeler	0.5	1776	888	1762	787	224	112	118	59
3-Wheeler	1.0	31	31	2	2	1	1	1	1
Cycle	0.5	48	24	13	6	15	8	11	6
Cycle Rickshaw	2.0	0	0	0	0	1	2	1	1
Animal Cart	6.0	0	0	0	1	1	6	1	3
Total		1855	943	1777	797	242	129	131	70

Exempted									
Car / Jeep / Van	1.0	7	7	3	3	1	1	1	1
Ambulance / Fire Tenders / Funeral Vans	1.0	0	0	0	0	0	0	0	0
Bus	3.0	1	3	1	2	0	0	0	0
LCV	1.5	0	0	0	0	0	0	0	0
Truck	3.0	0	0	0	0	0	0	0	0
Total		8	10	4	5	1	1	1	2
Grand Total (Tolled+Exempted)		3401	4627	2765	2541	379	439	245	323

The traffic variations at all locations are given in **fig. 3.2:**

Fig.: 3.2



Tollable traffic compositions at all locations are given in **fig 3.3 to 3.5**:

Fig.: 3.3

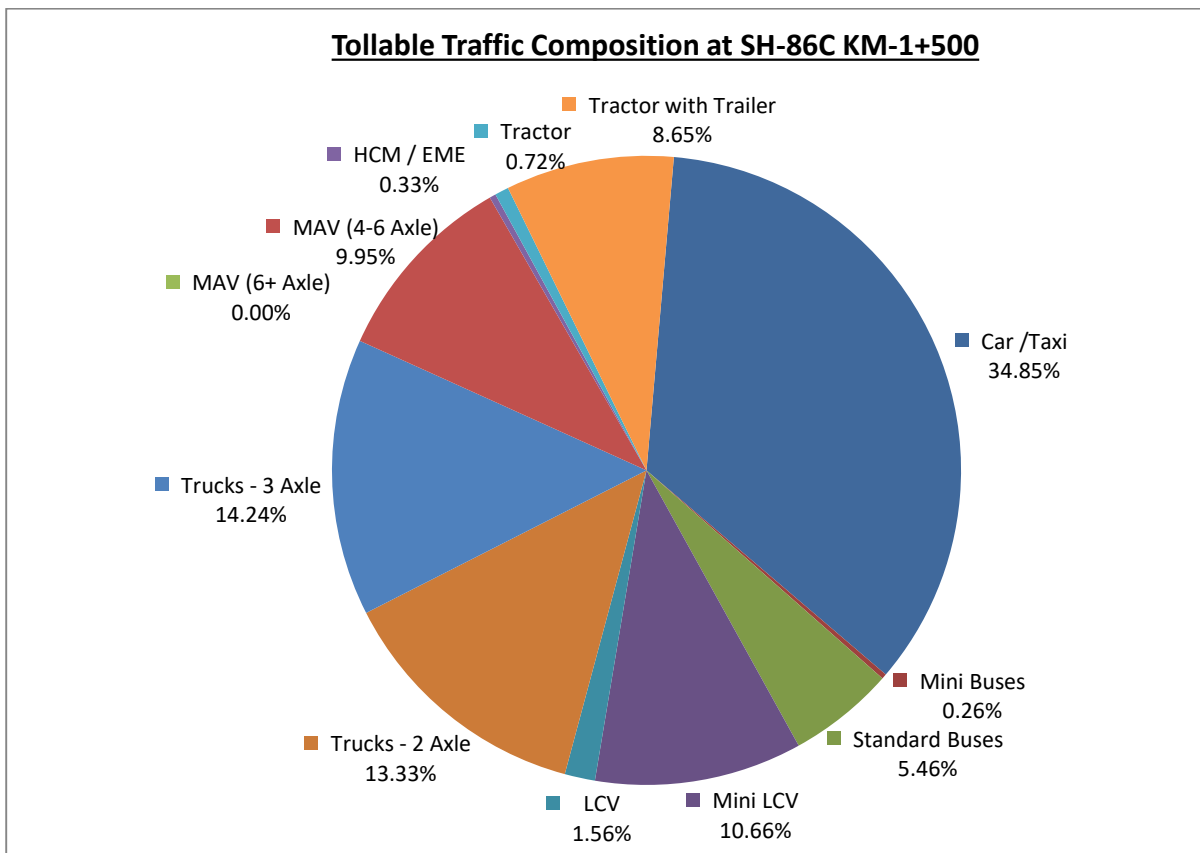


Fig.: 3.4

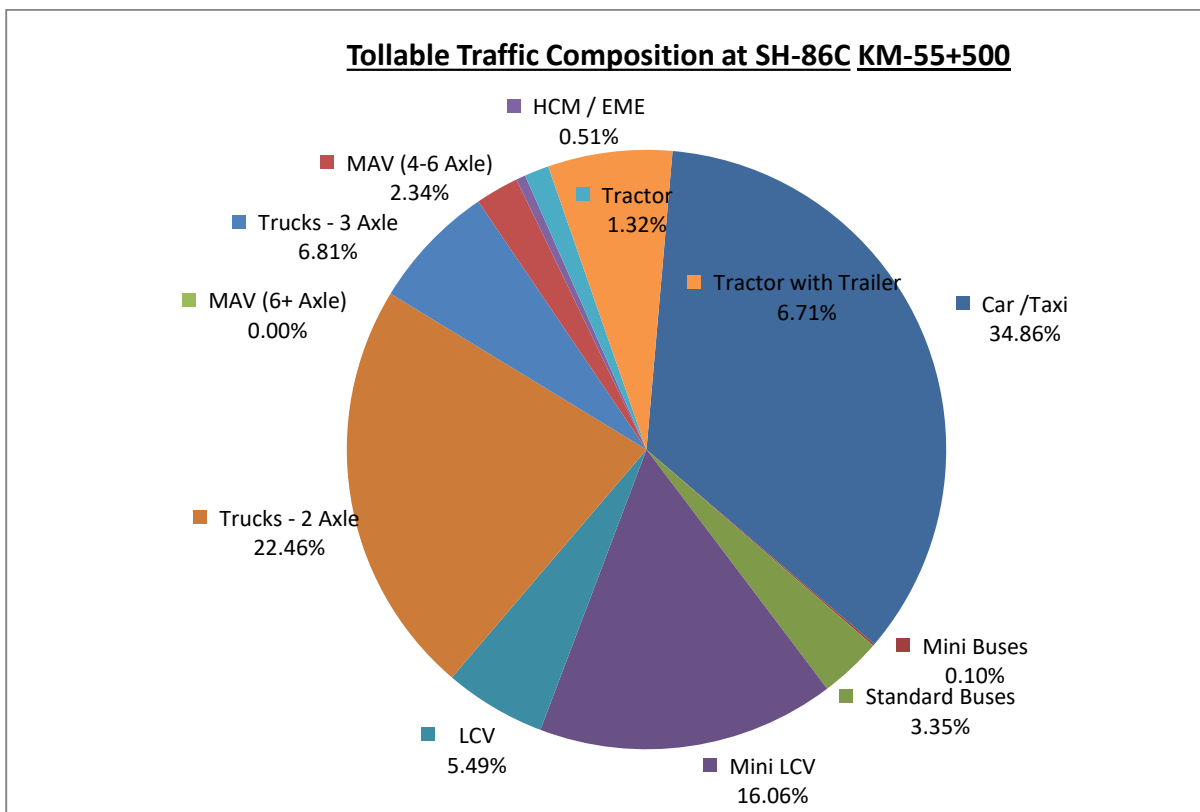
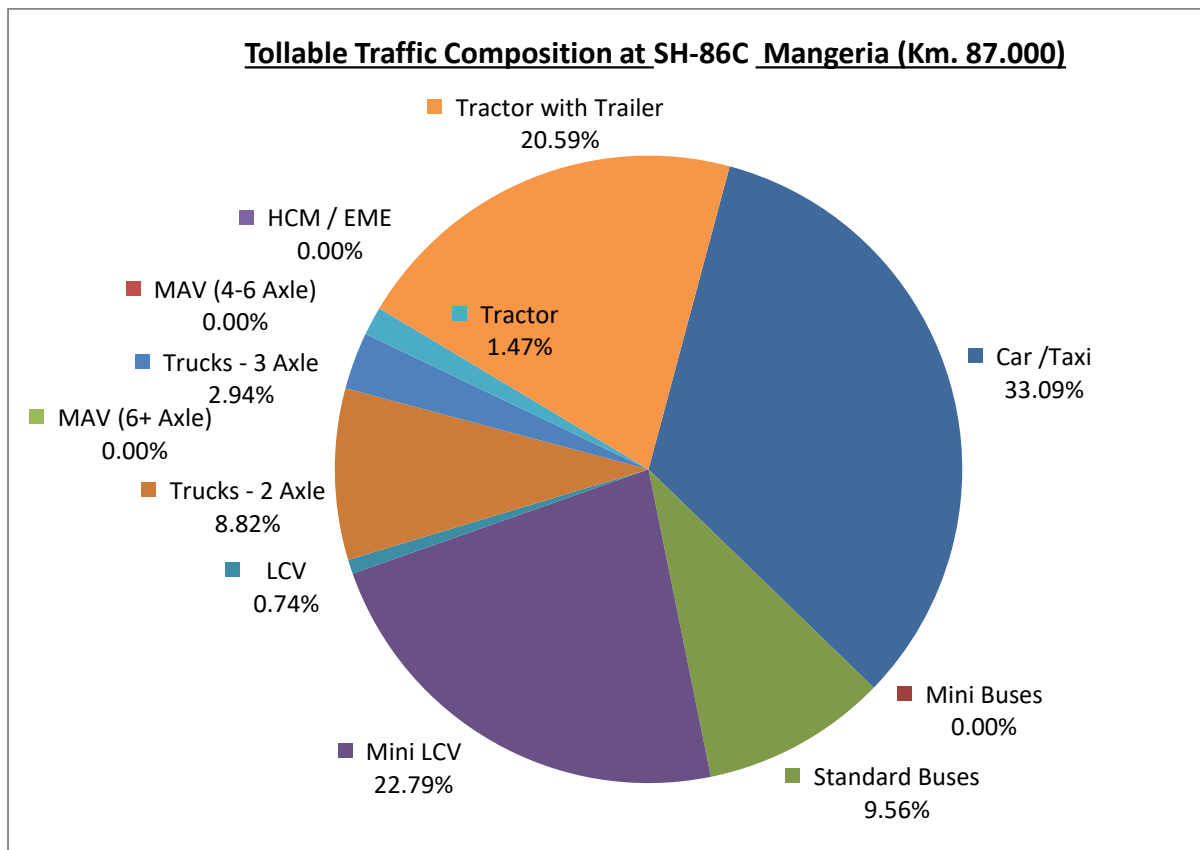


Fig.: 3.5



Average Day Hourly variation of traffic / daywise variation of Traffic / Average Day Traffic Composition of all locations are shown in **Fig. 3.6to3.14**

Fig.: 3.6

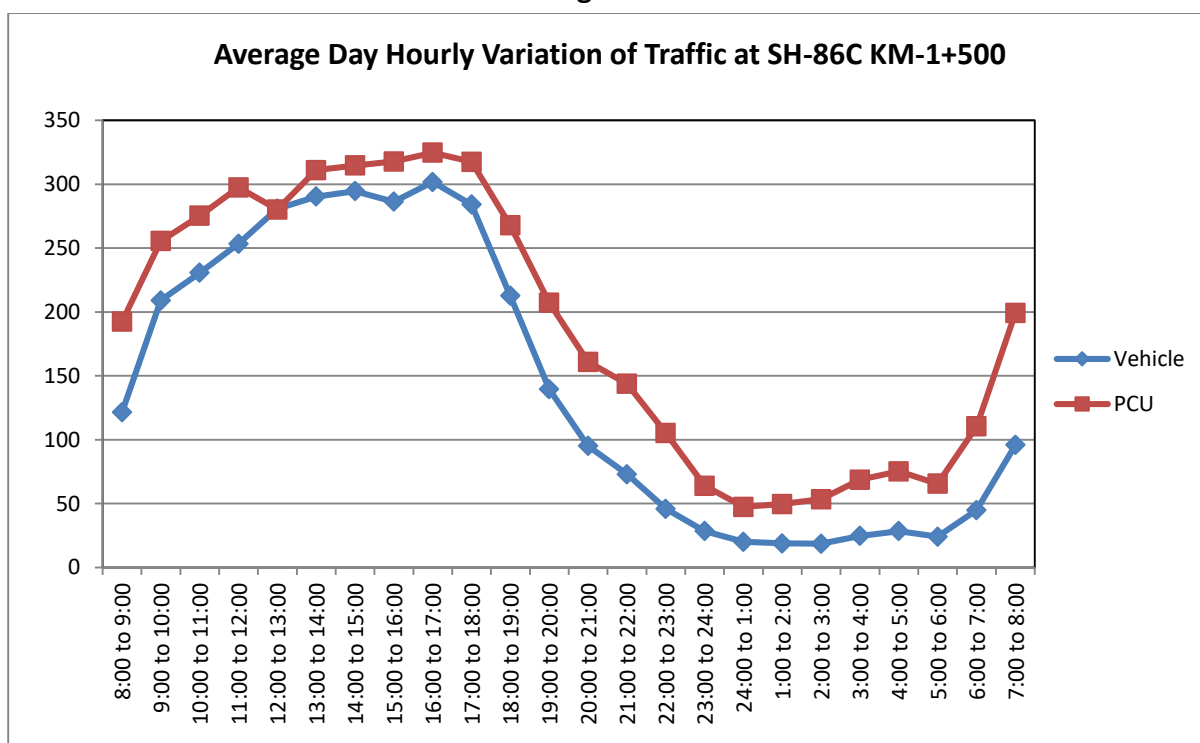


Fig.: 3.7

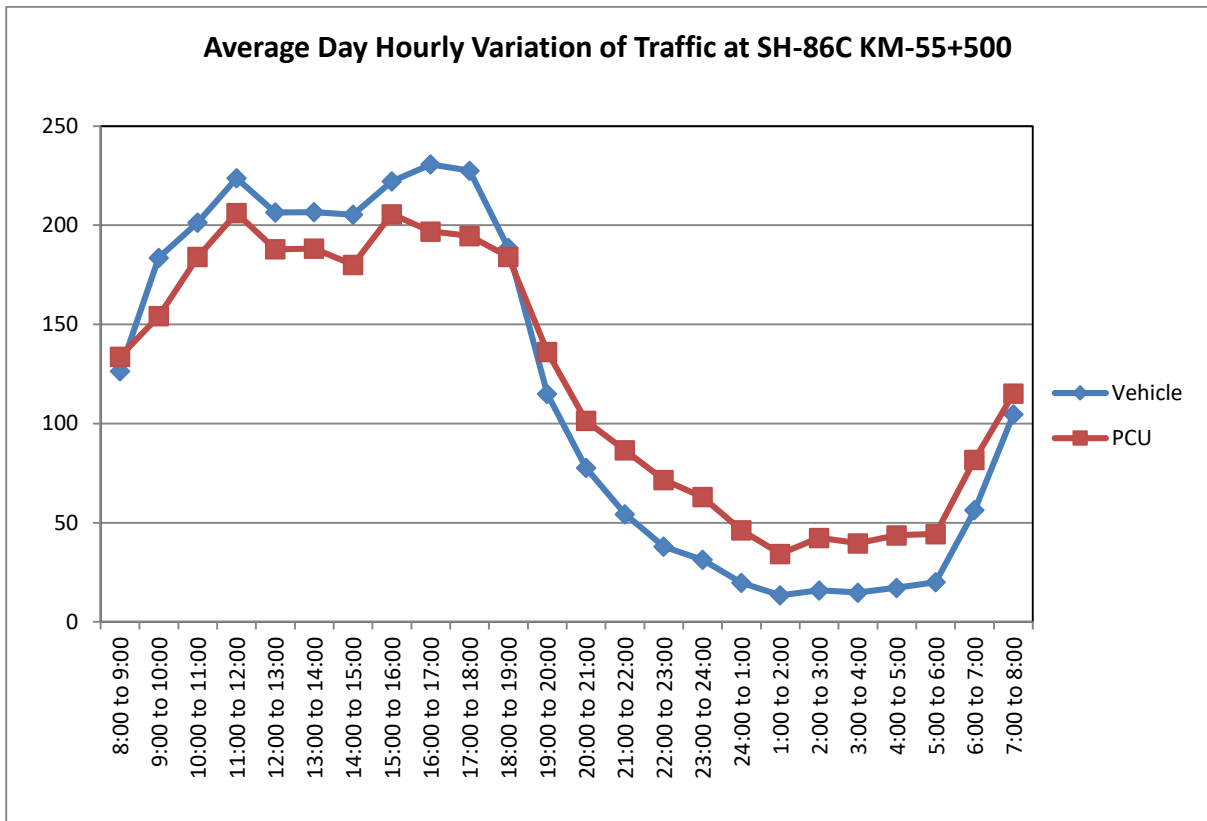


Fig.: 3.8

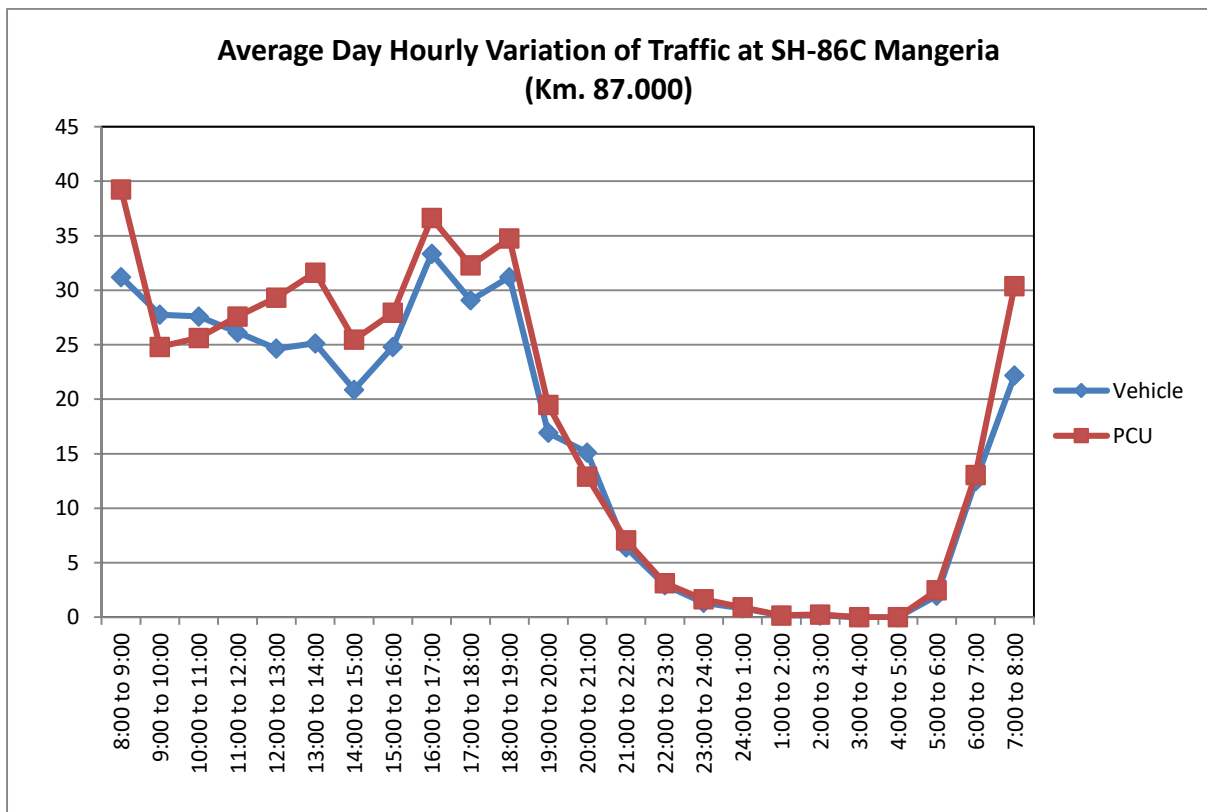


Fig.: 3.9

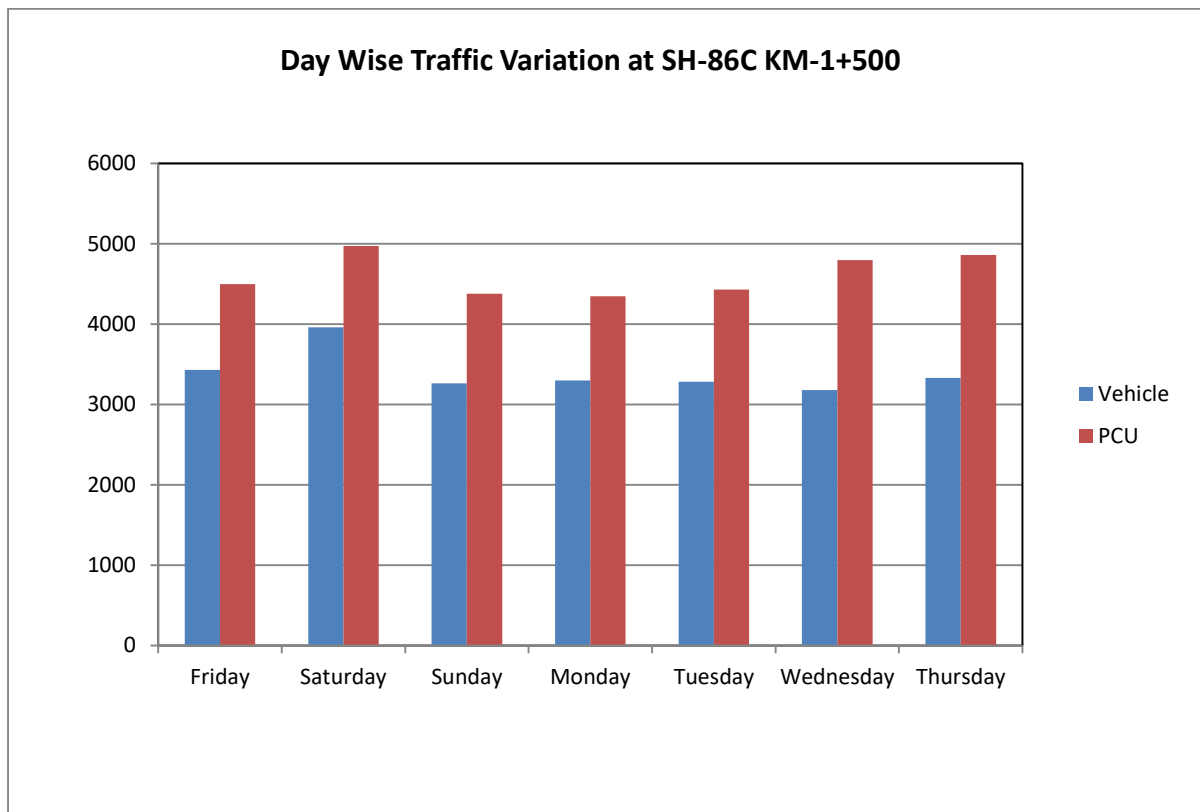


Fig.: 3.10

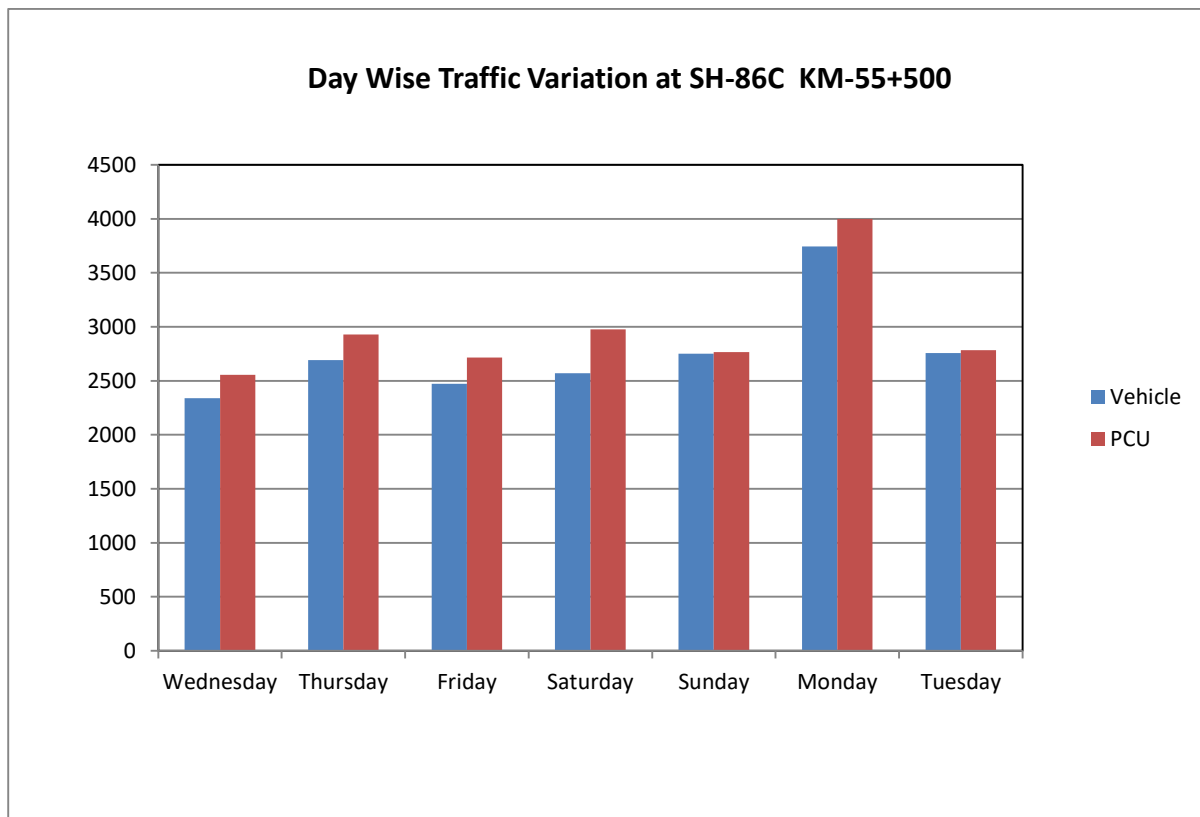


Fig.: 3.11

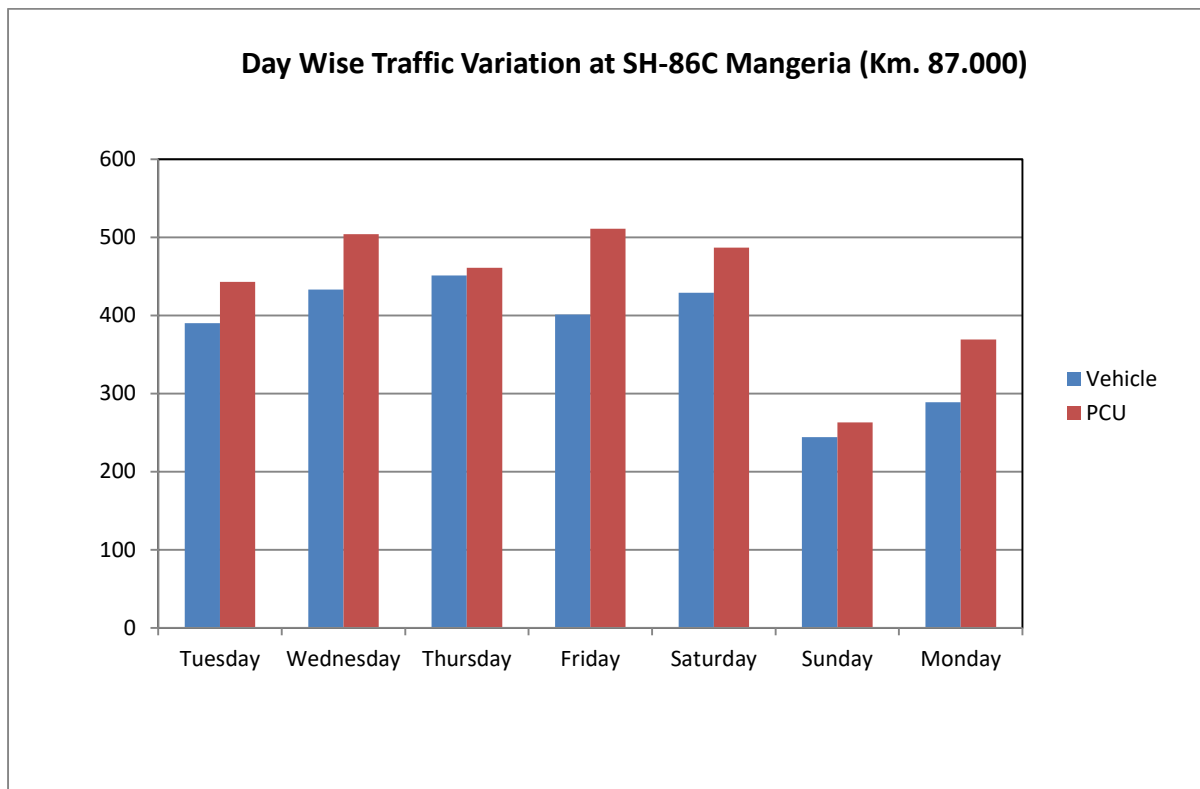


Fig.: 3.12

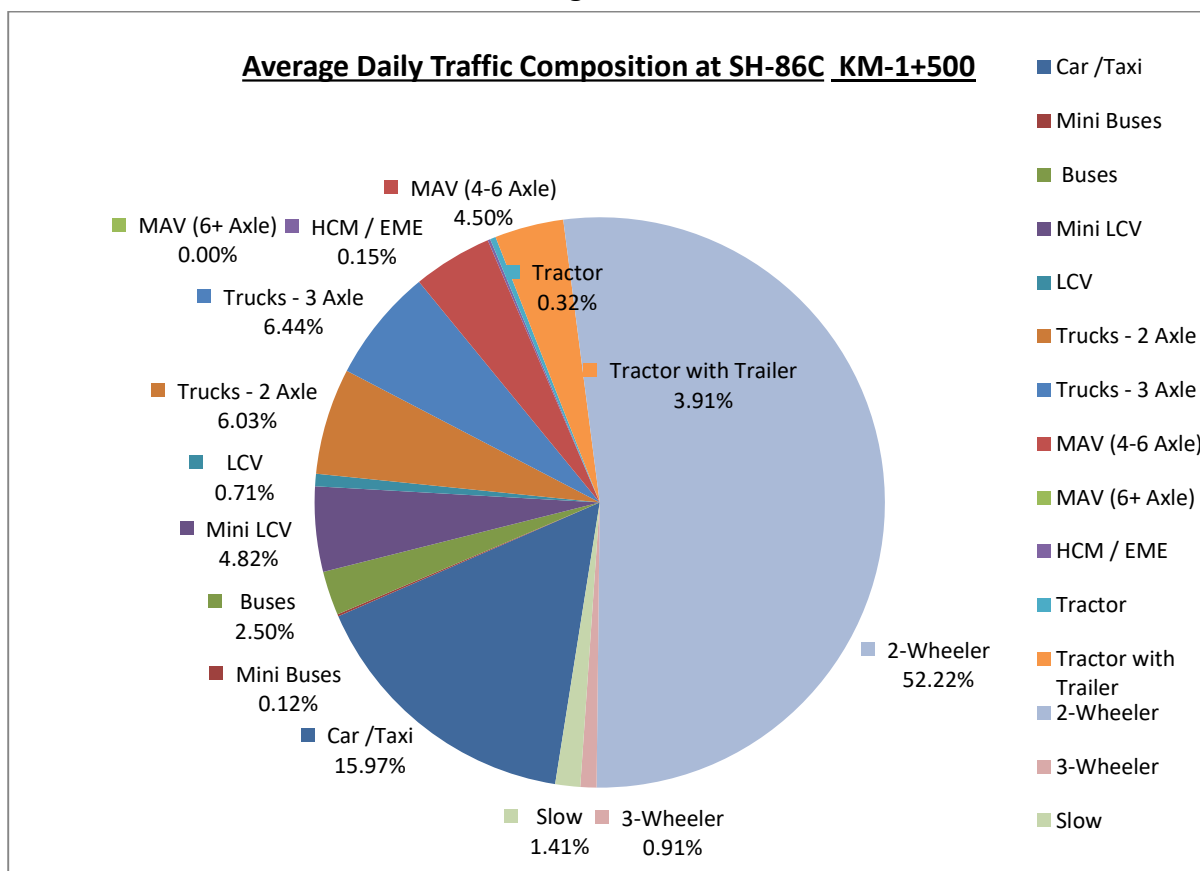


Fig.: 3.13

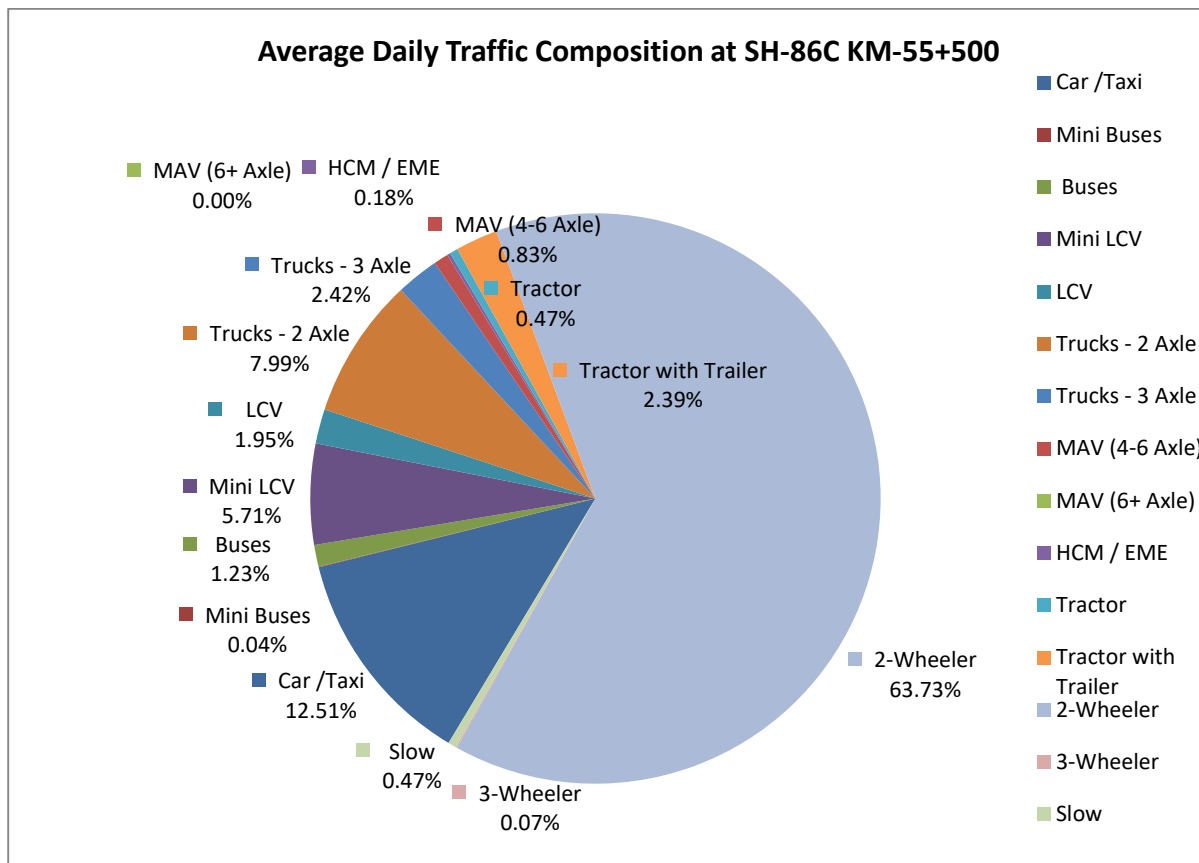
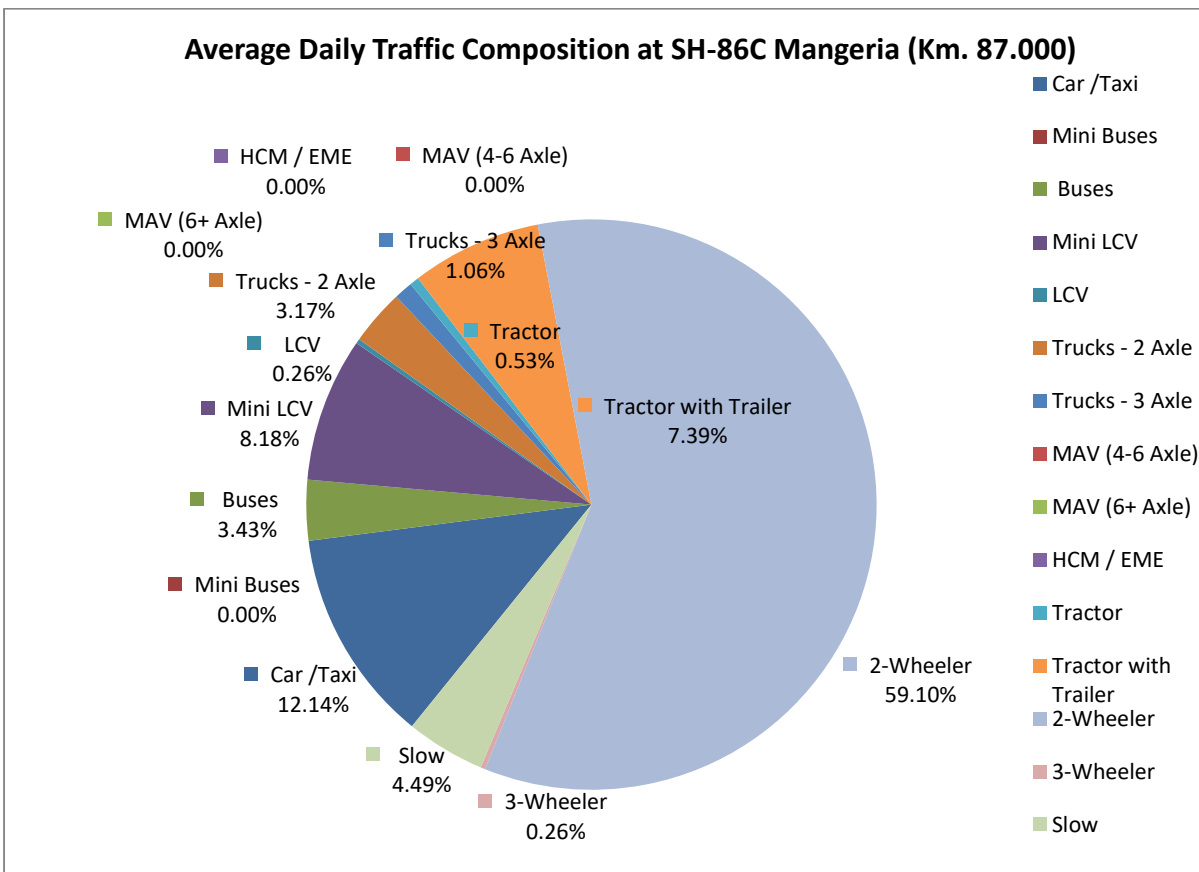


Fig.: 3.14



3.4 Average Annual Daily Traffic (AADT)

For the analysis, traffic data in terms of Average Annual Daily Traffic (AADT) is needed. This is obtained by applying Seasonal Correction Factor (SCF) to ADT. The SCF has been calculated based on Petrol / Diesel Sales Data as collected from the Petrol pumps along the Project Road. This data and the working out of SCF is given in **Table 3.5** calculation of SCF based on Diesel / Petrol sales date:

Table 3.5A Calculation of SCF based on Diesel / Petrol Data

Month	Year	IOCL Pump At Pipar City(Km.21.000)			Seasonal Correction Factor (SCF)	
		Diesel (in KL)	Petrol (in KL)	Total Fuel Sale in (KL)	Diesel	Petrol
April	2013	139	28	167	1.07	1.17
May	2013	147	30	177	1.02	1.09
June	2013	163	35	198	0.92	0.94
July	2013	137	20	157	1.09	1.64
August	2013	112	29	141	1.33	1.13
September	2013	135	40	175	1.11	0.82
October	2013	261	37	298	0.57	0.89
November	2013	184	38	222	0.81	0.86
December	2013	115	35	150	1.30	0.94
January	2014	147	36	183	1.02	0.91
February	2014	112	34	146	1.33	0.97
March	2014	140	32	172	1.07	1.03
Total		1792	394			
Average		149	33			

Table 3.5B Calculation of SCF based on Diesel / Petrol Data

Month	Year	Indian oil Petrol Pump At Bhopalgarh(Km54.400)			Seasonal Correction Factor(SCF)	
		Diesel (in KL)	Petrol (in KL)	Total Fuel Sale in (KL)	Diesel	Petrol
April	2013	138	38	176	1.01	1.16
May	2013	148	49	197	0.94	0.90

June	2013	162	47	209	0.86	0.94
July	2013	138	57	195	1.01	0.77
August	2013	122	50	172	1.14	0.88
September	2013	135	48	183	1.03	0.92
October	2013	160	43	203	0.87	1.02
November	2013	170	42	212	0.82	1.05
December	2013	132	25	157	1.05	1.76
January	2014	115	42	157	1.21	1.05
February	2014	113	44	157	1.23	1.00
March	2014	138	43	181	1.01	1.02
Total		1671	528			
Average		139	44			

Table 3.5C Calculation of SCF based on Diesel / Petrol Data

Month	Year	IOCLI Pump at Lavarl (km 64.250)			Seasonal Correction Factor(SCF)	
		Diesel (in KL)	Petrol (in KL)	Total Fuel Sale in KL	Diesel	Petrol
April	2013	28	8	36	1.07	1.01
May	2013	24	10	34	1.25	0.81
June	2013	45	8	53	0.66	1.01
July	2013	22	5	27	1.36	1.62
August	2013	21	8	29	1.42	1.01
September	2013	25	10	35	1.20	0.81
October	2013	65	9	74	0.46	0.90
November	2013	36	8	44	0.83	1.01
December	2013	26	9	35	1.15	0.90
January	2014	22	8	30	1.36	1.01
February	2014	15	6	21	1.99	1.35
March	2014	30	8	38	1.00	1.01
Total		359	97			
Average		30	8			

Since the consultant conducted the survey in Dec. 2014, the SCF and consequently the AADT have been calculated based on the sale in the month of Nov. The values of AADT (at all locations) thus calculated are given in the **Table 3.6:**

Table 3.6: AADT**Average Annual Daily Traffic (AADT)**

Vehicle Type	PCU Factor	SH-86C KM-1+500			SH-86C KM-55+500			SH-86C Mangeria (Km. 87.000)			SH-86C Ghana Magra (Km. 6.000)		
		SCF	AADT	PCU	SCF	AADT	PCU	SCF	AADT	PCU	SCF	AADT	PCU
Tolled													
Car / Jeep / Taxi	1.00	1.03	552	552	1.02	350	350	1.01	45	45	1.03	37	37
Mini Buses	1.50	1.07	4	6	1.01	1	2	1.00	0	0	1.07	0	0
Standard Buses	3.00	1.07	90	270	1.01	33	100	1.00	13	39	1.07	11	34
Mini LCV	1.50	1.03	169	253	1.02	161	242	1.01	31	47	1.03	28	43
LCV	1.50	1.07	26	39	1.01	55	82	1.00	1	2	1.07	1	2
Trucks - 2 Axle	3.00	1.07	219	658	1.01	223	670	1.00	12	36	1.07	11	33
Trucks - 3 Axle	3.00	1.07	234	703	1.01	68	203	1.00	4	12	1.07	3	10
MAV (4-6 Axle)	4.50	1.07	164	737	1.01	23	105	1.00	0	0	1.07	0	0
MAV (6+ Axle)	4.50	1.07	0	0	1.01	0	0	1.00	0	0	1.07	0	0
HCM / EME	4.50	1.07	5	24	1.01	5	23	1.00	0	0	1.07	0	0
Tractor	1.50	1.07	12	18	1.01	13	20	1.00	2	3	1.07	2	3
Tractor with Trailer	4.50	1.07	142	640	1.01	67	300	1.00	28	126	1.07	23	104
Total			1618	3900		999	2094		137	310		118	266
Non Tolled													
2-Wheeler	0.5	1.03	1829	915	1.02	1797	899	1.01	226	113	1.03	122	61
3-Wheeler	1.0	1.03	32	32	1.02	2	2	1.01	1	1	1.03	1	1
Cycle	0.5		48	24		13	7		15	8		15	8
Cycle Rickshaw	2.0		0	0		0	0		1	2		1	2
Animal Cart	6.0		0	0		0	0		1	6		1	6
Total			1909	971		1812	907		244	130		139	77

Exempted													
Car / Jeep / Van	1.0	1.03	7	7	1.02	3	3	1.01	1	1	1.03	1	1
Ambulance / Fire Tenders / Funeral Vans	1.0	1.03	0	0	1.02	0	0	1.01	0	0	1.03	0	0
Bus	3.0	1.07	1	3	1.01	1	3	1.00	0	0	1.07	0	0
LCV	1.5	1.07	0	0	1.01	0	0	1.00	0	0	1.07	0	0
Truck	3.0	1.07	0	0	1.01	0	0	1.00	0	0	1.07	0	0
Total			8	10		4	6		1	1		2	2
Grand Total (Tolled+Non Tolled+Exempted)			3535	4881		2815	3008		382	441		259	345

3.5 Intersection Data Analysis

3.5 Approach Traffic

The location wise traffic at sathin intersection is presented in **Table 3.7**. The traffic flow diagram at intersection location is presented in **figure 3.15 – 3.18** below.

Table 3.7 : Location wise traffic at each intersection

S. No.	Location	Location Name	Approach Roads	Total Vehicles	Total PCU	Approach Traffic
1	INT – 01	Bhopalgarh	Sathin	1130	1316	8905
			Asop	2860	3690	
			Palri	3025	3899	
2	INT – 02	Palri	Bhopalgarh	433	539	3396
			Gotan	838	1107	
			Ratri	1073	1431	
			Asanda	374	320	
3	INT - 03	Lawari Piou	Palri	635	719	1627
			Asop	596	708	
			Gaj Singh pura	216	200	
4	INT – 04	Pipar Bypass	Sathin	1500	1918	6301
			Merta City	942	1488	
			Jodhpur	2055	2895	

3.6 Axle Load Survey

Axle load Survey was conducted at the same location where TVC was done i.e. at MDR-75 KM-37+500. The Axle load Spectrum is generated by preparing a frequency distribution of axle loads. By multiplying the respective axle load with the equivalent factor, the vehicle damage factor (VDF) is estimated. The VDF so calculated are tabulated in **table 3.8** below:

Table 3.8 Axle Load Survey

Location	Vehicle Type						
	Bus	Mini Bus	Mini LCV	LCV	2-Axle truck	3-Axle Truck	4-6 Axle vehicle
SH-86C KM-1+500	1.27	0.28	0.045	1.61	8.87	6.64	4.83
SH-86C KM-55+500	1.11	-	0.055	1.86	11.62	9.72	6.50

3.7 Million Standard Axle (MSA)

The design traffic is considered in terms and cumulative number of standard Axle to be carried out during the design life of the road.

Design traffic in Million Standard Axle for 10 years and 15 years (post construction) is given below in **table 3.9**:

Table 3.9 Million Standard Axle (MSA)

Homogenous Section Km. 0.00 –Km. 31.000	Length (Km.)	10 years (Design traffic) into MSA	15 years Design traffic in MSA
SH-86C KM-1+500	31	12.173	20.270
SH-86C KM-55+500	41	10.220	17.018

3.8 Traffic Projections

7 days classified traffic survey has been carried out at 3 locations. The traffic (AADT) at these locations has been projected adopting growth rate of 5%.

The projection of traffic, vehicle / location wise is shown in **Table 3.12 to 3.15** and the projection in total AADT / PCU (all Traffic & tollable Traffic) are shown in **Table 3.10 & 3.11**.