Traffic Analysis and Parking Survey

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Abstract: **This paper presents an overview on traffic analysis and parking survey.**

Keywords: **Accumulation percentage, Bike, Cars, Vehicle.**

1. Introduction

A. General

According to the survey which is carried in India. In a year on an average the car runs only 400 hours out of 8760 hours and the rest of 8360 the car remains parked and the user will park his vehicle near his destination such that he can reduce his walking distance. This has increased the demand of parking space in the area where the business activities are carried out.

This study is to analyses the traffic flow of a road by dividing the road network into zones. The study network comprises of a road stretch from Double Road Raja Rajeshwari Nagar to Ganesh temple Raja Rajeshwari Nagar.

B. Objective

- To study the existing parking conditions.
- To carry out parking studies.
- Manage and improve the existing parking spaces based on the result.

C. Scope of present study

This includes the study of road network from Double Road Raja Rajeshwari Nagar to Ganesh temple Raja Rajeshwari Nagar a stretch of 1.2 km approximately. Since the road consists of many restaurants and shopping complexes, the vehicles which are parked on road which lead reduced width at some parts of the stretch which is the main cause of increased conjunction and delay during peak hours.

2. Methodology

A. Site Selection

The site selected for the study is a road stretch of 1.2km which has 2 intersections namely kempegowda road and Gokhale road which is having high traffic volume in peak hours. Most of the restaurants, Govt. offices and temple are located in this area which causes dense traffic volume during the peak hours.

B. Details of Route

Starts from: Double road, Raja Rajeshwari Nagar Ends at : Ganesh temple, Raja Rajeshwari Nagar Length of Road: 1.2km
Two Intersections: at 1) KempeGowda road
Gokhale road
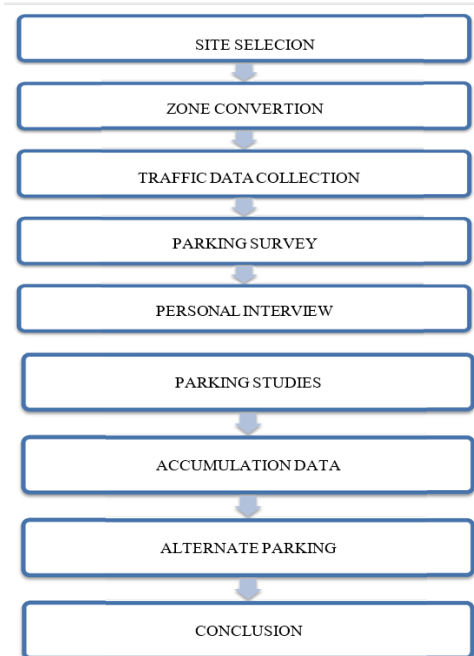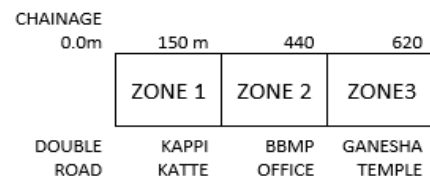Main road is Jawaharlal Nehru road connecting Channasandra.

Fig. 1. Methodology

C. Variations of Volume Count and Peak Hour Factor

Variations of volume counts can further sub divided into daily, weekly and seasonal variations. For studying the daily variations, the flow in each hour has been expressed as percentage of daily flow. Weekdays, Saturday and Sundays usually show different pattern. That's why comparing day to

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day is much more useful. Peak hour volume is very important factor in the design of roads and control of traffic, and its usually 2-2.5 times the average hourly volume. Apart from this there is one additional feature of this variations: two dominant peaks hours (morning and evening peaks hours), especially in urban areas. These mainly include work trips and not dependent on weather and other travel conditions similar to daily variations, weekly variation gives volume expressed as a percentage of total flow for the week. Weekdays flows are approximately constant but weekend flows vary a lot depending upon the season.

D. Zone conversion

The total road stretch of 1.2 kms is divided into zones that helps us to collect the data accurately in an uncomplicated manner.

The three zones are:

Zone 1: Double road, Raja Rajeshwari Nagar to Kappi Katte.
Zone 2: kaapi katte to BBMP office.
Zone 3: BBMP office to Ganesh temple.

Table 1
Details of the road stretch

	ZONE1	ZONE 2	ZONE 3
LENGTH OF EACH ZONE (m)	150	290	180
AREA AVALIABLE FOR PARKING m^2	300	580	360
40% OF AREA OCCUPIED BY ROAD SIDE SHOPPERS (m^2)	120	232	144
FINAL AREA AVALIABLE FOR PARKING (m^2)	180	348	216

E. Traffic data collection and extraction

Table 2
Traffic flow data collection on Monday
Traffic flow data collection and extraction from double road to Ganesh temple on 04/11/2019 (Monday)

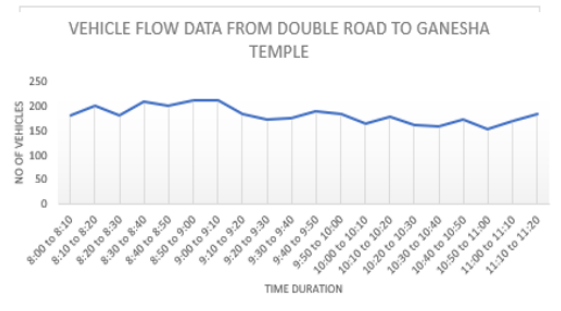| VEHICLE FLOW FROM DOUBLE ROAD TO GANESHA TEMPLE						
TIME DURATION	2-WHEELER	3 WHELLER	CAR	BUS/TRUCK	CYCLE	TOTAL
8:00 to 8:10	120	11	40	8	0	179
8:10 to 8:20	110	12	45	11	1	179
8:20 to 8:30	135	10	50	8	4	207
8:30 to 8:40	190	13	65	6	4	278
8:40 to 8:50	175	27	78	5	0	285
8:50 to 9:00	185	13	50	10	2	260
9:00 to 9:10	155	17	70	8	1	251
9:10 to 9:20	150	16	46	10	1	223
9:20 to 9:30	140	21	48	2	0	211
9:30 to 9:40	145	18	55	7	0	225
9:40 to 9:50	160	22	47	5	0	234
9:50 to 10:00	150	16	52	6	0	224
10:00 to 10:10	145	18	58	5	0	226
10:10 to 10:20	165	16	54	6	1	242
10:20 to 10:30	155	19	49	5	0	228
10:30 to 10:40	150	22	47	4	0	223
10:40 to 10:50	145	15	45	4	0	209
10:50 to 11:00	135	20	48	3	0	206
11:00 to 11:10	100	22	48	3	0	173
11:10 to 11:20	110	18	37	3	0	168
11:20 to 11:30	130	17	40	4	0	191

Fig. 2. Variation of traffic flow on Monday

Table 3
Traffic flow data collection on Monday
Traffic flow data collection and extraction from Ganesh temple to double road on 04/11/2019 (Monday)

| VEHICLE FLOW DATA FROM GANESHA TEMPLE TO DOUBLE ROAD						
TIME DURATION	2-WHEELER	3 WHELLER	CAR	BUS/TRUCK	CYCLE	TOTAL
8:00 to 8:10	120	20	31	9	1	181
8:10 to 8:20	145	17	29	6	3	200
8:20 to 8:30	125	10	35	8	3	181
8:30 to 8:40	155	13	32	7	1	208
8:40 to 8:50	150	16	24	9	1	200
8:50 to 9:00	145	24	31	12	0	212
9:00 to 9:10	150	13	41	7	0	211
9:10 to 9:20	130	23	27	3	0	183
9:20 to 9:30	125	10	24	12	0	171
9:30 to 9:40	130	13	26	6	0	175
9:40 to 9:50	138	16	28	8	0	190
9:50 to 10:00	140	18	22	4	0	184
10:00 to 10:10	128	8	19	8	1	164
10:10 to 10:20	147	7	16	7	0	177
10:20 to 10:30	116	6	28	10	0	160
10:30 to 10:40	120	6	23	9	0	158
10:40 to 10:50	120	18	23	12	0	173
10:50 to 11:00	105	16	26	4	0	151
11:00 to 11:10	105	21	32	12	0	170
11:10 to 11:20	110	26	36	10	0	182
11:20 to 11:30	110	19	33	11	0	173
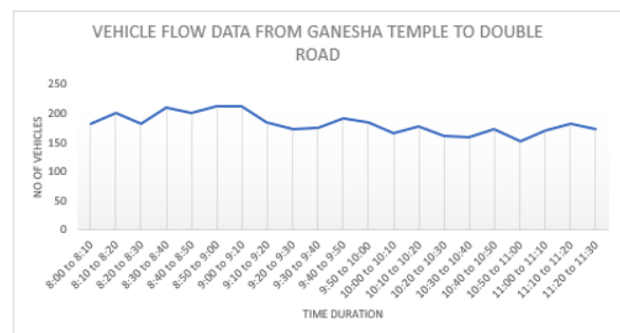
Fig. 3. Variation of traffic flow on Monday

F. Parking requirement

There is some minimum parking requirement for different types of building,

- For residential plotless than 300Sq.m only community parking space is required.
- For residential plot area from 500 to 1000Sq.m, minimum one fourth of the open area should be reserved for parking.

- Offices may require at least one space for every 70Sq.m Parking area.
- One parking space is enough for 10 seats in a restaurant.
- Whereas theatres and cinema halls need to keep only one parking space for 20 seats.

Table 4
Parking area for bike and car

Vehicle	Area (m^2)
Bike	0.8x2.5=2
Car	2.5x5=12.5

Table 5
Parking accumulation data on Monday in Zone 1
Parking accumulation data on 4/11/2019 (Monday)

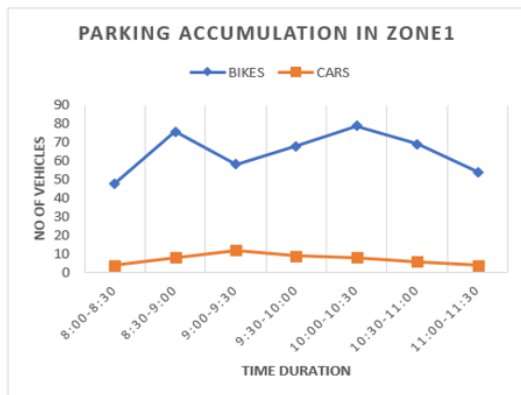| PARKING ACCUMULATION IN ZONE 1				
SL.NO	TIME	BIKES	CARS	AREA OCCUPIED m^2
1	8:00-8:30	48	4	146
2	8:30-9:00	76	8	252
3	9:00-9:30	58	12	266
4	9:30-10:00	68	9	249
5	10:00-10:30	79	8	258
6	10:30-11:00	69	6	213
7	11:00-11:30	54	4	158

Fig. 4. Vehicle accumulation WRT on Monday in Zone 1

From the above data in zone1 the maximum area occupied by the bikes and cars during the peak hour is 266m^2 and the parking space available for the cars and bikes is 180m^2 hence the area of 86m^2 is required to accommodate these vehicles. The extra parking space has to be created to these vehicles so that the road conjunction can be reduced.

Table 6
Parking accumulation data on Monday in Zone 2

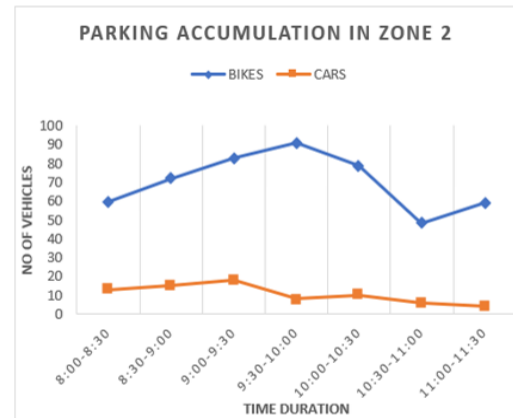| PARKING ACCUMULATION IN ZONE 2				
SL.NO	TIME	BIKES	CARS	AREA OCCUPIED m^2
1	8:00-8:30	60	13	283
2	8:30-9:00	72	15	332
3	9:00-9:30	83	18	391
4	9:30-10:00	91	8	282
5	10:00-10:30	79	10	283
6	10:30-11:00	48	6	171
7	11:00-11:30	59	4	168

Fig. 5. Vehicle accumulation WRT on Monday in Zone 2

From the above data in zone 2 the maximum area occupied by the bikes and cars during the peak hour is 391m^2 and the parking space available for the cars and bikes is 348 m^2 hence the area of 43m^2 is required to accommodate these vehicles. The extra parking space has to be created to these vehicles so that the road conjunction can be reduced.

Table 7
Parking accumulation data on Monday in Zone 3

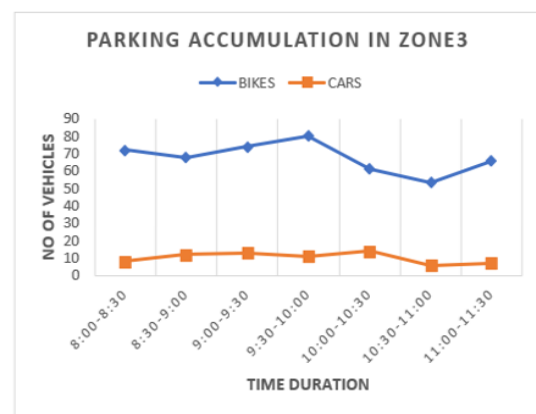| PARKING ACCUMULATION IN ZONE 3				
SL.NO	TIME	BIKES	CARS	AREA OCCUPIED m^2
1	8:00-8:30	72	8	244
2	8:30-9:00	68	12	286
3	9:00-9:30	74	13	311
4	9:30-10:00	80	11	298
5	10:00-10:30	61	14	297
6	10:30-11:00	53	6	181
7	11:00-11:30	66	7	220

Fig. 6. Vehicle accumulation WRT on Monday in Zone 3

From the above data in zone 3 the maximum area occupied by the bikes and cars during the peak hour is 311m^2 and the parking space available for the cars and bikes is 216m^2 hence the area of 95m^2 is required to accommodate these vehicles. The extra parking space has to be created to these vehicles so that the road conjunction can be reduced.

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Table 3.7.1: Percentage of Vehicle Accumulation Data on Monday In Zone1

TIME DURATION (min)	4-WHEELER	2-WHEELER	3-WHEELER	BICYCLE	TOTAL PARKED VEHICLES	PERCENTAGE
15	18	121	3	1	212	77.94%
30	11	54	4	0		
45	4	18	0	0		
60	6	12	0	0		
01:15	1	6	0	0	50	18.38%
01:30	0	3	0	0		
01:45	2	0	0	0		
02:00	0	1	0	0		
02:15	0	2	0	0	10	3.68%
02:30	1	1	0	0		
02:45	0	0	0	0		
03:00	0	2	0	0		

TOTAL PARKED VEHICLES 272

Table 3.7.1: Percentage of Vehicle Accumulation Data on Monday In Zone1

Figure 3.7.1: Pie Chart on Percentage of Vehicle Accumulation on Monday in Zone1

1. Vehicles parked for less than 30 min.
2. Vehicles parked for 45 hr to 1:30 hr.
3. Vehicles parked for 1:45hr to 3:00 hr

Figure 3.7.1: Pie Chart on Percentage of Vehicle Accumulation on Monday in Zone2

1. Vehicles parked for less than 30 min.
2. Vehicles parked for 45 hr to 1:30 hr.
3. Vehicles parked for 1:45hr to 3:00 hr

Table 3.7.1: Percentage of Vehicle Accumulation Data on Monday In Zone2

TIME DURATION (min)	4-WHEELER	2-WHEELER	3-WHEELER	BICYCLE	TOTAL PARKED VEHICLES	PERCENTAGE
15	24	278	1	3	389	85.49%
30	6	75	2	0		
45	8	19	0	0		
60	5	12	0	0		
01:15	1	8	0	0	53	11.65%
01:30	0	0	0	0		
01:45	1	6	0	0		
02:00	0	0	0	0		
02:15	0	3	0	0	13	2.86%
02:30	0	1	0	0		
02:45	1	0	0	0		
03:00	1	0	0	0		

TOTAL PARKED VEHICLES 455

Table 3.7.1: Percentage of Vehicle Accumulation Data on Monday In Zone2
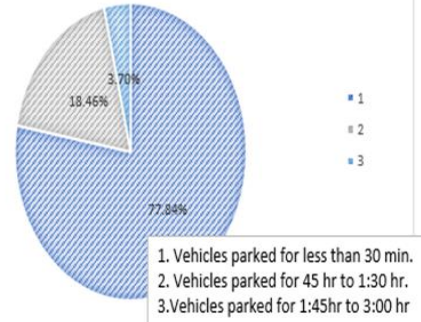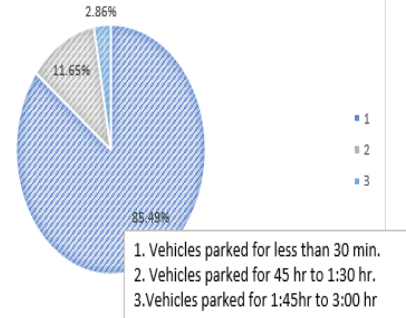
Table 3.7.1: Percentage of Vehicle Accumulation Data on Monday In Zone3

TIME DURATION (min)	4-WHEELER	2-WHEELER	3-WHEELER	BICYCLE	TOTAL PARKED VEHICLES	PERCENTAGE
15	8	154	6	0	278	70.03%
30	15	93	2	0		
45	6	46	1	0		
60	2	28	0	0		
01:15	1	15	1	0		
01:30	1	4	0	0	105	26.45%
01:45	0	1	1	0		
02:00	0	0	0	0		
02:15	2	3	0	0	14	3.53%
02:30	1	6	0	0		
02:45	0	0	0	0		
03:00	0	0	0	0		

TOTAL PARKED VEHICLES 397

Table 3.7.1: Percentage of Vehicle Accumulation Data on Monday In Zone3

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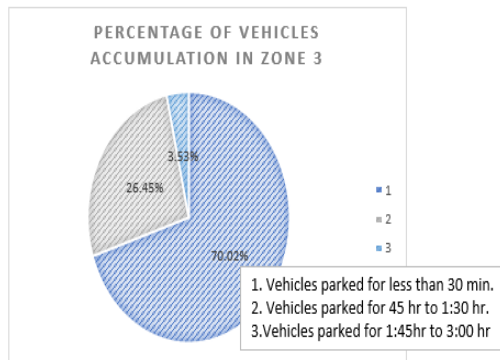**journals.resaim.com/ijresm | RESAIM Publishers**

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Figure 3.7.1: Pie Chart on Percentage of Vehicle Accumulation on Monday in Zone3

3. Conclusions and Improvement Measures

A. Conclusions

- Parking takes considerable street space leading to the lowering of the road capacity. Hence, speed will be reduced, Journey time and delay will also subsequently increase. The operational cost of the vehicle increases leading great economical loss to the community.
- Vehicles accumulation in zone 1 and zone 3 is very high due to the presence of commercial building and government offices as people park their vehicles near to their destination to reduce walking distance.
- Maximum no of vehicles have been parked for the time duration of 15 min to 30 min in zone 1 and 30 min to 60 min in zone 3.

B. Improvement measures

- 45-degree parking is adopted for the two-wheeler such that the road width will be increased, so that traffic congestion is reduced.
- Increase in the number of spaces for parking in existing parking facilities by using currently wasted areas which are occupied by road side shopkeepers.
- Encouraging long term parkers to use of off-site or fringe parking facilities by providing information on remote parking availability.
- Limit on on-street parking of large vehicles to ease traffic flow during peak hours.
- Regulating on-street parking during the peak hours of traffic flow.

References

[1] IRC-SP:19-2001 Manual for Survey, Investigation and Preparation of Road Projects.
[2] Jaydpisinh. P. Chudasama and L. B. Zala, "Parking Evaluation: A case study of Amul dairy road Anand."