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Analyzing the Diamond Park Area's Traffic Volume

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Abstract

The traffic volume survey is essential for determining the present traffic, which includes the types, numbers, and routes used by vehicles. Two further applications for it are traffic volume prediction and road width estimation. Trends in traffic volume, such as the busiest and slowest hours of the day, may be studied. Studying variations in vehicle percentages and traffic flow is possible. Planning for traffic management strategies, intersection designs, signal timings, pavement designs, geometric designs, and required highway capacity will be aided by the study's findings.

The current study looks at traffic patterns at one priority junction in Visakhapatnam. Three roads in Visakhapatnam city were studied for traffic volume in this study: Diamond Park to Sankaramatham Road, Railway New Colony Road, and Complex Road. Primary traffic flow studies were carried out along each of these routes. The research of traffic flow is done using manual procedures.

For a duration of six hours, we quantify the flow of traffic. It is possible to observe traffic trends throughout different time periods. The main points of this study are the vehicle's kind, composition, maximum flow rate, and minimum flow rate. Also, you need to think about how traffic is flowing through that junction. The study found that the busiest hours on all routes were between 10 and 11 AM and 1 and 2 PM in the afternoon.

Keywords: *Traffic Volume, Passenger car equivalency, vehicle composition*

1. Introduction

2. In order to learn more about traffic, researchers conduct surveys. In order to acquire traffic statistics, it is necessary to gather data that should be analysed methodically. Researchers, planners, and designers of traffic systems and pavement extensions may all benefit from the gathered data. In order to accomplish these goals, traffic surveys primarily collect data for the purposes of monitoring, controlling, and predicting traffic conditions.

   The amount of traffic changes during the day, the week, the months, and the seasons. Vehicles per hour is the unit of measurement. Converting the flow of many vehicle classes into a common vehicle class called the passenger car unit is important for expressing the traffic flow on a road per unit of time. In order to estimate and coming to terms with the features of traffic volume. The traffic volume in a specific location in Visakhapatnam city is the main focus of the current research.

3. LITERATURE REVIEW

The correlation between rural highway traffic-to-capacity ratios and hourly accident rates was investigated by Hall & Pendleton (1990) [1]. Their research showed that when traffic volumes rise, so does the frequency of accidents on certain route segments. Unfortunately, there was a lack of cohesion in the data that would have been necessary to back up this association. Passenger Car Equivalency (PCE) was investigated by Basu D. and Maitra S.R. (2006) [2] in relation to traffic volume and its composition. According to the research, PCE is influenced by the kind and amount of traffic. An increase in traffic volume is observed to raise PCE values for all vehicle

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categories, with heavy trucks being the most affected. The percentage of traffic that consists of two-wheelers has little effect on their PCE. Arkatkar (2011) investigated the impact on PCU value of changes in traffic volume, road width, upgrade magnitude, and upgrade duration using traffic-flow simulation mode [3]. The simulation model is calibrated and validated using field data obtained on traffic flow parameters. Results for various vehicle types show that the validated simulation model can satisfactorily reproduce the heterogeneous traffic flow on mid-block parts of intercity highways under varying roadway conditions. Researchers Bhavneet Singh and Tripta Goyal (2015) examined the Punjab University Campus in Chandigarh for information on traffic and service levels. An analysis of the campus's traffic characteristics revealed a level of service of C.

4. Objectives

The main objectives of the study are

- To determine the traffic volume on three different roads in Visakhapatnam.
- To determine the volume count for a period of six hours in a day for three days oneach road.
- To determine the vehicle composition and percentage of vehicles moving in andout on each road.
- To determine the maximum and minimum flow rate.

5. Results and Discussion

The diamond park crossroads in Visakhapatnam city was the site of the traffic volume research, which included three separate roadways. The research included the following dates and locations: 15–17 March 2021, 18–20 March 2021, and 21–23 March 2021 on the diamond park road to Sankaramatham road, the diamond park road to railway colony road, and the complex road.
Each route had data taken for three days, six hours each day. Data collection was carried out utilising both manual and video camera methods. Every day, the sky was clear and the sun was shining. The number of vehicles using the route between Diamond Park and Sankarmatam Road on March 15, 2021, is shown in Table 1. In Table 2, you can see the cars that are coming and going from Sankaramatham road to diamond park. On Monday, March 15, 2021, Fig. 1 shows the proportion of vehicles that were 2 wheelers, 3 wheelers, 4 wheelers, and heavy trucks. There were more two-wheeler vehicles than any other kind of vehicle. On the first day, there were 76.1 wheelers, 8.5 three-wheelers, 15.2 four-wheelers, and 0.19 heavy trucks. The highest possible throughput of vehicles, as shown in Table 3, Sankarmatam road is on 17 March 2021, Wednesday between 1.00 to 2.00 PM.

Table 1. Diamond park to Sankaramatham road

Time (FN/AN)	Motor Cycles(2w)		Autos(3w)		Cars(4w)		Trucks	
	in	out	in	out	in	out	in	out
8:00-9:00	1253	1223	170	110	170	173	2	1
9:00-10:00	1246	1263	187	125	189	191	3	0
10:00-11:0	1471	1604	208	159	243	300	5	1
1:00-2:00	2067	1042	193	129	438	231	3	0
2:00-3:00	1642	1267	156	120	252	276	4	1
3:00-4:00	2000	1050	170	140	300	329	0	0
Total	9679	7449	1084	783	1592	1500	17	2
Volume	17128		1867		3092		19	

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Table 2. Sankaramatam road to diamond park

Time (FN/AN)	Motor Cycles(2w)		Autos(3w)		Cars(4w)		Trucks	
	in	out	in	out	in	out	in	out
8:00-9:00	540	700	70	100	110	140	0	1
9:00-10:00	642	912	68	120	114	156	0	2
10:00-11:0	1365	621	160	155	224	200	1	3
1:00-2:00	670	1356	63	99	202	344	1	3
2:00-3:00	557	670	48	61	145	201	0	2
3:00-4:00	600	620	65	70	160	210	0	0
Total Volume	4374	4879	474	605	955	1251	2	11
	9253		1079		2206		13	

Table 3. Total volume of vehicles passed through Sankaramatam road

Time	Day 1	Day 2	Day 3
8:00-9:00	1661	4615	5657
9:00-10:0	5218	5327	7341
10:0-11:0	6720	7068	7850
1:00-2:00	6841	7327	8129
2:00-3:00	5396	5611	5815
3:00-4:00	5714	6296	3572

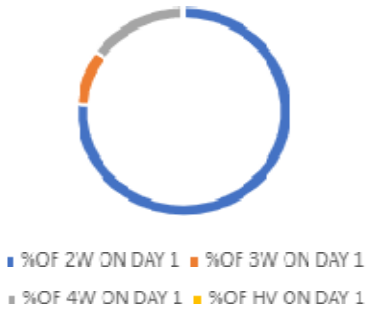

Figure 1. % of vehicles passed through sankaramatam road

The traffic volume on the 2nd road was conducted for three consecutive days starting from18 March 2021 for six hours in a day. Table 4, 5 and 6 show the data collected for railwaycolony road. The maximum number of vehicles passing through railway colony road is observed between 9 to 10 AM on day 3 on a Saturday.

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Table 4. Diamond park to railway colony road

Time (FN/AN)	Motor Cycles(2w)		Autos(3w)		Cars(4w)		Trucks	
	in	out	in	out	in	out	in	out
8:00-9:00	725	798	412	584	58	52	12	14
9:00-10:00	780	1140	447	638	130	89	14	8
10:00-11:0	1000	980	486	536	128	152	16	13
1:00-2:00	1220	970	440	449	151	184	10	23
2:00-3:00	1110	798	350	362	190	167	18	16
3:00-4:00	1258	900	332	375	160	179	15	14
Total Volume	6093	5586	2467	2944	817	823	85	88
	12489		5411		1640		173	

Table 5. Railway colony road to Diamond park

Time (FN/AN)	Motor Cycles(2w)		Autos(3w)		Cars(4w)		Trucks	
	in	out	in	out	in	out	in	out
8:00-9:00	995	968	626	487	76	38	6	0
9:00-10:00	520	1077	728	688	128	43	15	12
10:00-11:0	328	865	498	301	157	69	11	7
1:00-2:00	790	746	312	200	123	47	15	6
2:00-3:00	880	543	198	210	46	94	1	2
3:00-4:00	353	397	87	102	57	109	3	8
Total Volume	866	4596	2449	1988	587	400	51	43
	10462		4437		987		94	

Table 6. Total volume of vehicles passing through railway colony road

Time	Day 1	Day 2	Day 3
8:00-9:00	5851	5987	5973
9:00-10:0	7457	7593	8111
10:0-11:0	6547	6932	5414
1:00-2:00	5686	5871	6542
2:00-3:00	4951	5107	6558
3:00-4:00	4349	4486	6113

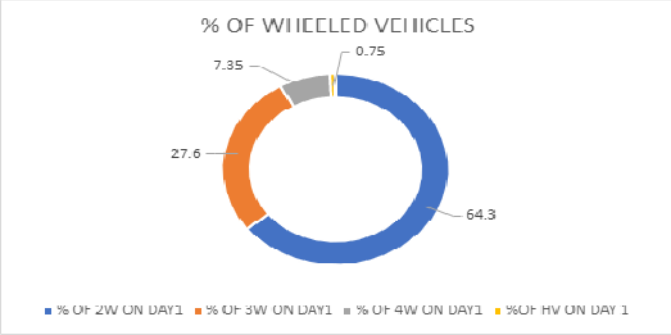

Figure 2. % of vehicles passed through railway colony road

The traffic volume study on the 3nd road complex road was conducted for three consecutive days starting from 21

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March 2021 for six hours in a day. Table 7, 8 and 9 show the data collected for complex road. The maximum number of vehicles passing through complex road is observed between 10 to 11 AM on day 1 on a Sunday.

The percentage composition of vehicles as observed on Complex road is shown in Fig. 3.The percentages of 2W, 3W, 4W and HV on day 1, Sunday are 65.94, 23.73, 9.69 and 0.64.

Table 7. Diamond park to complex road

Time (FN/AN)	Motor Cycles(2w)		Autos(3w)		Cars(4w)		Trucks	
	in	out	in	out	in	out	in	out
8:00-9:00	916	588	498	223	101	64	11	0
9:00-10:00	1026	646	537	313	96	82	11	3
10:00-11:0	1305	765	464	339	142	124	18	1
1:00-2:00	1141	1094	285	298	198	183	17	0
2:00-3:00	1022	981	287	314	213	94	25	6
3:00-4:00	1134	967	265	275	202	210	18	2
Total Volume	6544	5041	2336	1762	952	757	10	12
	11585		4098		1709		112	

Table 8. Complex road to diamond park

Time (FN/AN)	Motor Cycles(2w)		Autos(3w)		Cars(4w)		Trucks	
	in	out	in	out	in	out	in	out
8:00-9:00	602	901	301	498	73	96	1	11
9:00-10:00	769	998	334	535	87	91	2	10
10:00-11:0	918	1102	349	463	150	141	1	18
1:00-2:00	701	1311	268	280	130	195	1	17
2:00-3:00	990	1000	320	287	98	211	5	25
3:00-4:00	980	1131	275	265	200	198	2	18
Total Volume	4960	6443	1847	2328	738	932	12	99
	11403		4175		1670		111	

Table 9. Total volume of vehicles passing through through complex road

Time	Day 1	Day 2	Day 3
8:00-9:00	4884	5547	5185
9:00-10:0	5540	4618	5839
10:0-11:0	6300	4128	6041
1:00-2:00	6119	5202	6182
2:00-3:00	5878	4409	5604
3:00-4:00	6142	5323	5791

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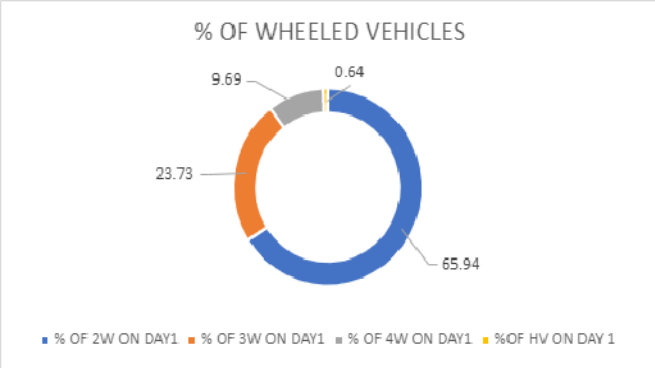

FIG 3 : % of vehicles passing through complex road

6. Conclusions

- Most of the traffic volume flow was due to 2 wheelers on all the lanes under study.
- There was also good number of pedestrians, using the roads.
- There was traffic jam/haul due to sudden parking of the vehicles on the lanes, to meet their needs (especially 3and 4 wheelers)
- The peak traffic observed on all the roads under study was between 10-11AM in the forenoon, and 1-2PM in the afternoon.
- 3 Wheelers were quite regular on railway and complex roads, since many passengers wait to go to complex or railway station side to go to different routes/cities.
- Heavy traffic and delays in the evening hours of 4:30-5PM was observed on the Sankarmatham road.
- On the railway colony road, 3 wheelers and buses at regular pace were observed.
- On railway colony road, there were goods trucks using the lane from gate 1 in togate 2 out, for unloading the goods to various complexes and big stores.

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