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Traffic Volume Study in Pulivendula Town

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Abstract- The main objective of Transportation Engineering ensuring safe, efficient, and sustainable movement of people and goods within urban, suburban, and rural areas. In the recent past, traffic congestion has emerged as one of the main challenges for engineers, planners and policy makers in the area. The current work studies traffic characteristics in the town of Pulivendula at one selected priority junction. Traffic flow is studied by manual methods. The traffic patterns in different time periods have been analyzed with the help of this data. Hence the results from the present study are helpful in controlling the traffic at the intersection and also in suggesting some of the remedial measures to improve the traffic safety in the region.

Keywords-Traffic Congestion, Traffic Flow, Traffic Patterns

I. Introduction

The term traffic volume study can be termed as traffic flow survey or simply the traffic survey. It is defined as the procedure to determine mainly volume of traffic moving on the roads at a particular section during a particular time. It is measured in vehicle per minute, vehicle per hour and vehicle per day. Traffic data are needed in research, planning, designing and regulation phases of traffic engineering and are also used in established priorities and schedules of traffic improvements.

II. Literature Review

Satyanarayana, et.al (2012) studied the effect of traffic volume, its composition and stream speed on passenger car equivalents. The mixed traffic flow is transformed into Passenger Car Units (PCU) is given by Ashish and Chandra. Andrew P, Tarko and Rafaell, et.al (2005) paper presents such a model, which links PHF with hourly volume, population, and time of day, and demonstrates that a large portion of the variability in the sample of observations can either be explained with the model or be attributed to the day-to-day fluctuation. Marisa Al Maaiteh and Rana Imam, et.al (2018) explained about the reliability of the expansion factors for arterials in Amman including hourly expansion factors HEF, weekly expansion factors WEF, monthly expansion factors ME and the identified expansion factors were found to be reliable for both the arterials and the intersections. Parker, et.al (1996): observed that knowledge of traffic composition plays an important role in determining capacity. It was found that the percentage of heavy goods vehicles (HGVs) within traffic stream has a major effect on capacity due to length, limited manoeuvrability, lower desired speed and engine power to weight ratio.

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Objectives of Traffic Volume Studies

The objectives of Traffic Volume Studies are

- Aiding in Structural and geometric design of Pavements
- Guiding Improvements for Safer and Efficient Road Systems
- Analyzation of traffic patterns and its trends
- Computation of Accident Rates Per Vehicles Mile

Study Location

1. Traffic study done at
    - Date: 04-07-2021 to 13-07- 2021
    - Counting Period: 4 hours
    - Weather Condition: All days were sunny mornings and sky was clear
    - Survey Location: The Four Road Junction connecting Pulivendula Centre to Bus Stand Road
    - Method: Manual Method
    - Duration: 4 hours
    - Equipment's:Tabulated Tally Sheet, Mobile Stop Watch

B. Significance of Study Area

The Pulivendula Four Road Junction serves a pivotal role within the town's transportation network. This junction is intricately connected to various essential facilities, including educational institutions, hostels, administrative departments, and a crucial link to the Kadapa Route. As a result, it experiences high volumes of traffic, primarily driven by educational and industrial activities.

Traffic volume studies were conducted over a span of three days at the Pulivendula Four Road Junction. The 1st Junction Road connects Pulivendula Centre to Police Station Road consequently, we counted the vehicles entering and exiting this junction. At another Junction Roads, we counted the vehicles entering and exiting the road for three days, each day for duration of 4 hours.

Traffic volume data for incoming and outgoing vehicles at 1st Junction Road on July 4, 2021, is provided in Table I and II. Traffic volume data for incoming and outgoing vehicles at 2nd Junction Road on July 6, 2021, is provided in Table III and IV. The traffic volume count conducted on July 8, 2021 is represented in Table V to Table VI. Similarly, traffic volume count conducted on July 13, 2021 is represented in Table VII to Table VIII.

C. DATA INTERPRETATION

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TABLE I 1st Junction Road

TRAFFICVOLUMEDATA											
DATE:04-07-2021				DAY:SUNDAY							
STRETCH:PULIVENDULACENTERTOPOLICESTATIONROAD											
HOUR	TWOWHEELERS	AUTOS	CARS	TRUCKS		BUSES	AMBULANCE	TRACTOR	HAND PUSH	TOTALVEHICLES	PCU
				SMALL	LARGE						
8 AM TO 9 AM	820	200	20	10	1	0	1	0	0	1052	811
9 AM TO10AM	1011	119	40	4	0	0	0	1	0	1175	846
10 AM TO11AM	1002	149	29	2	0	0	0	0	0	1182	862
11 AM TO12PM	1105	99	24	1	0	0	0	0	0	1229	863
TOTAL	**3938**	**567**	**113**	**17**	**1**	**0**	**1**	**1**	**0**	**4638**	**3383**

TRAFFICVOLUMEDATA											
DATE:04-07-2021				DAY:SUNDAY							
STRETCH:POLICESTATIONTOPULUVENDULACENTERROAD											
HOUR	*TWO WHEELERS*	*AUTOS*	*CARS*	*TRUCKS*		*BUSES*	*AMBULANCE*	*TRACTOR*	*HANDPUSH*	*TOTALVEHICLES*	*PCU*
				SMALL	*LARGE*						
8 AM TO 9	990	250	46	8	0	0	0	2	0	1296	1005
9 AM TO10 AM	1200	159	40	9	0	0	1	1	0	1409	1026
10 AM TO11 AM	992	140	51	4	0	0	0	1	0	1188	872
11 AM TO12 PM	850	139	24	2	0	0	0	0	0	1015	746
TOTAL	**4032**	**688**	**161**	**23**	**0**	**0**	**1**	**4**	**0**	**4908**	**3649**

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TABLE (B)

DIRECTION	PCU/HR	TOTAL	DIRECTIONAL DISTRIBUTION
P.C TOP.S	863	1889	45.6 %
P.STOP.C	1026		54.4 %

TABLE II

TRAFFIC VOLUME DATA											
DATE:06-07-2021				DAY:TUESDAY							
STRETCH:BUSSTAND TO PULIVENDULA CENTER											
HOUR	*TWOW HEELERS*	*AUTOS*	*CARS*	*TRUCKS*		*BUSES*	*AMBULANCE*	*TRACTOR*	*HAN DPU SH*	*TOTAL VEHICLE S*	*PCU*
				SMALL	*LARGE*						
8 AM TO 9A M	1249	230	49	20	2	12	0	2	2	1566	1206
9 AM TO10 AM	1549	249	59	12	1	9	0	3	2	1884	1416
10 AM TO11 AM	1380	250	84	6	1	4	0	4	4	1733	1321
11 AM TO12P M	1410	182	82	4	0	6	6	1	3	1682	1247
TOTAL	**5588**	**911**	**274**	**42**	**4**	**31**	**6**	**10**	**11**	**6865**	**5190**

TRAFFICVOLUMEDATA	
DATE:06-07-2021	DAY:TUESDAY
STRETCH:PULIVENDULACENTERTOBUSSTANDROAD	

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HOUR	TWOW HEELERS	AUTOS	CARS	TRUCKS		BUSES	AMBULANCE	TRACTOR	HANDPUSH	TOTAL VEHICLES	PCU
				SMALL	LARGE						
8 AM TO 9 AM	1210	342	89	20	10	6	0	6	10	1683	1393
9 AM TO 10 AM	1549	259	120	15	6	5	2	4	8	1968	1519
10 AM TO 11 AM	1649	243	70	10	5	4	0	2	3	1986	1481
11 AM TO 12 PM	1499	184	92	14	4	4	0	5	2	1804	1342
TOTAL	**5907**	**1028**	**371**	**59**	**25**	**19**	**2**	**17**	**23**	**7441**	**5735**

TABLE (B)

DIRECTION	PCU/HR	TOTAL	DIRECTIONAL DISTRIBUTION
P.CTO B.S	1519	2938	51.7 %
B.STO P.C	1416		48.3 %

TABLE III

TRAFFICVOLUMEDATA										
DATE:08-07-2021				DAY:THURSDAY						
STRETCH:PULIVENDULACENTERTOMUDDANURROAD										
	TWOW			TRUCKS				HANDP	TOTA	

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HOUR	*HEELERS*	*AUTOS*	*CARS*	*SMALL*	*LARGE*	*BUSES*	*AMBULANCE*	*TRACTOR*	*USH*	*LVEHICLES*	*PCU*
8 AM TO 9AM	950	220	45	10	0	5	0	4	0	1234	960
9 AM TO10AM	1100	210	53	8	4	4	2	2	1	1384	1059
10 AM TO11AM	1200	195	40	5	3	2	1	3	0	1449	1080
11 AM TO12PM	800	150	10	3	1	3	0	1	1	969	728
TOTAL	**4050**	**775**	**148**	**26**	**8**	**14**	**3**	**10**	**2**	**5036**	**3827**

TRAFFIC VOLUME DATA

DATE:08-07-2021	**DAY:THURSDAY**

STRETCH:MUDDANURROADTOPULIVENDULACENTER

HOUR	*TWOWHEELERS*	*AUTOS*	*CARS*	*TRUCKS*		*BUSES*	*AMBULANCE*	*TRACTOR*	*HANDPUSH*	*TOTALVEHICLES*	*PCU*
				SMALL	*LARGE*						
8 AM TO 9AM	921	100	10	10	2	10	0	0	0	1053	766
9 AM TO10AM	900	200	25	15	4	6	1	2	0	1153	899
10 AM TO11AM	899	110	23	4	3	2	0	0	0	1041	756
11 AM TO12PM	600	159	12	2	1	4	0	0	0	778	607
TOTAL	**3320**	**569**	**70**	**31**	**10**	**22**	**1**	**2**	**0**	**4025**	**3028**

TABLE (B)

DIRECTION	**PCU/HR**	**TOTAL**	**DIRECTIONAL DISTRIBUTION**
P.C TOM.R	1080		54.57 %

M.R TOP.C	899	1979	45.43 %

TABLE IV

TRAFFICVOLUMEDATA											
DATE:13-07-2021				**DAY:MONDAY**							
STRETCH:PULIVENDULACENTERTOPARNAPALLIROAD											
HOUR	***TWOWHEELERS***	***AUTOS***	***CARS***	***TRUCKS***		***BUSES***	***AMBULANCE***	***TRACTOR***	***HAND PUSH***	***TOTALVEHICLES***	***PCU***
				SMALL	***LARGE***						
8 AM TO 9 AM	1070	220	30	27	3	5	0	2	2	1359	1055
9 AM TO10AM	1199	199	45	12	2	4	0	4	2	1467	1108
10 AM TO11AM	1050	210	65	4	0	4	1	5	1	1340	1029
11 AM TO12PM	1201	156	59	9	1	6	0	6	0	1438	1068
TOTAL	**4520**	**785**	**199**	**52**	**6**	**19**	**1**	**17**	**5**	**5604**	**4240**

TRAFFICVOLUMEDATA											
DATE:13-07-2021				**DAY:MONDAY**							
STRETCH:PARNAPALLIROADTOPULIVENDULACENTER											
HOUR	***TWOWHEELERS***	***AUTOS***	***CARS***	***TRUCKS***		***BUSES***	***AMBULANCE***	***TRACTOR***	***HANDPUSH***	***TOTALVEHICLES***	***PCU***
				SMALL	***LARGE***						
8 AM TO 9	1050	250	30	20	2	4	0	4	4	1360	1075

9 AM TO10AM	1196	240	94	22	4	5	0	6	3	1570	1232
10 AM TO11AM	1100	195	49	14	2	5	0	5	8	1378	1079
11 AM TO12PM	1220	150	52	10	0	3	0	10	2	1447	1064
TOTAL	***4566***	***835***	***215***	***66***	***8***	***17***	***0***	***25***	***17***	***5755***	***4450***

TABLE (B)

DIRECTION	PCU/HR	TOTAL	DIRECTIONAL DISTRIBUTION
P.C TOP.R	1108	2340	47.3 %
P.R TOP.C	1232		52.7 %

The Table V shows the conversion of different type of vehicles into PCUs

TABLE V

TYPE OF VEHICLE	**PCU**
TWO WHEELER	0.65
AUTO RICKSHAW	1.2
CARS	1
TRUCKSMALL	1.4
TRUCKLARGE	2.2
BUS	2.2
AMBULANCE	1.5
TRACTOR	2.2
HANDPUSHVEHICLE	3

BULLOCK CART	8

The Table VI represents the hourly fluctuations of Pulivendula Centre to Bus Stand Road based on AADT

TIME	PULIVENDULATO BUS STANDDIRECTIONFLOWRATE (PCU/HR)	BUS STAND TOPULIVENDULADIRECTIONFLOWRATE (PCU/HR)	PULIVENDULATO BUS STANDADT	BUS STAND TOPULIVENDULAADT	PULIVENDULATOBUSSTAND %ADT	BUS STAND TOPULIVENDULA %ADT
8 AM TO 9AM	1393	1206	30198	27297	4.61	4.41
9AM TO 10AM	1519	1416			5.03	5.18
10 AMTO11 AM	1481	1321			4.90	4.83
11AM TO 10AM	1342	1247			4.44	4.56

From the Table(b) of Table I, II, III and IV there is difference in the directional distribution and Table VI shows the hourly fluctuations and the ADT% varies for different Periods of Time.

CONCLUSION

- Two wheelers occupied about 80 % of total vehicles.
- Traffic volume is increased three times in the past 6 years (past data obtained from previous surveys)
- Approximately 5% difference is observed in distribution of traffic in every route under our survey.
- To cope with current traffic congestions an additional width of 1.45 m is required along with 1 m shoulders.
- Percentage of public transport is very low which is about 1 %
- About 500 two wheelers on average required parking area which is about 850 m2 (excluding of circulating area).

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