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Traffic Volume Study on Road Connecting Maddilapalem to Pedawaltair

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***Abstract*— The main objective of Transportation engineering involves safe movement of people and goods on roadways in short time. A number of factors influence the movement of people and goods. The volume, speed and density affect the traffic flow. Traffic volume studies are required as they help in planning, traffic management and predict if any future widening of roads is required.**

The current work studies traffic characteristics in the city of Visakhapatnam at Andhra University College of Engineering Road connecting Maddilapalem road to Waltair road.. Traffic flow data was collected by manual methods. The traffic patterns during different time periods were analyzed from the data obtained. Hence the results from the present study are helpful in predicting the peak hour traffic, vehicle composition and estimate average daily traffic.

Keywords—Volume, average daily traffic, peak hour traffic.

I. INTRODUCTION

The term traffic volume study can be termed as traffic flow survey to determine the traffic flow rate. Traffic survey helps in planning and designing pavements. It is defined as the procedure to determine mainly traffic volume of vehicles moving on the roads at a particular section during a particular time. Traffic volume studies are conducted to determine the number, movements and classifications of roadway vehicles at a given location. These data help to identify critical flow time periods, determining the influence of large vehicles or pedestrians on vehicular traffic flow.

II. LITERATURE REVIEW

Chandra et. al(1995) studied the capacity of urban roads. Data collected at Delhi was used to study dynamic nature of passenger car unit for a vehicle type. The mixed traffic flow transformed to equivalent flow in passenger car units (PCU) is given by Ashish and Chandra **(2013)**. These PCU values are utilized to convert highly dynamic traffic volume to homogeneous volume in PCU per hour. New concept of stream equivalency factor is developed and denoted by K. Relation between traffic volume and geometric cross section of road which helps in studying variation in capacity with respect to various widths of road elements is given by Pothula Sanyasi Naidu et.al (2015). The traffic volume and level of service in Punjab University Campus, Chandigarh was studied by Bhavneet Singh and Tripta Goyal (2015). The traffic characteristics in the campus were analyzed and level of service was observed to be of C level.

OBJECTIVES OF TRAFFIC VOLUME STUDIES

The objectives of carrying out traffic volume study are:

- Determination of vehicle composition in traffic stream
- To determine the flow rate in PCU/PCE unit
- To determine the peak flow rate and minimum flow characteristics.
- To determine directional distribution.

A. STUDY LOCATION

1. Traffic study done at AUCE road

- *Date :* 15/03/2021 to 17/03/2021
- *Counting Period :* 9 hrs
- *Weather Condition:* Day 1 was sunny while Day 2 and 3 were partially sunny.
- *Survey Location:* AUCE road connecting Maddilapalem and Waltair main road.
- *Method :* Manual Method
- *Duration :* 9 hrs
- *Equipments:* Data Sheet, Camera (to take photos of vehicles), watch.

B. SIGNIFICANCE OF STUDY AREA

Maddilapalem junction is one among the busy transport hubs in Visakhapatnam. AUCE road which has a connection with this junction serves various purposes.

One of its main purpose is, not only it serves as a main road connecting the departments, the college, hostels but also connects to the *waltair main road.* This allows passengers to utilize the road more often for the educational and commercial purposes.

Traffic volume studies were carried out for three days on the AndhraUniversity college of Engineering road. The Gate 1 connects Maddilapalem Junction and hence the vehicles coming in and going out at this junction were counted. Similarly at Gate 2, vehicles entering this road and leaving were also counted for 3 consecutive days for a period of 9 hours. The traffic volume studies on 15/3/2021at Gate 1 for incoming and outgoing vehicles are given in Table I and II. At Gate 2, the incoming and outgoing vehicles count is given in Table III and IV.

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The traffic volume studies on 16/3/2021at Gate 1 for incoming and outgoing vehicles are given in Table V and VI. At Gate 2, the incoming and outgoing vehicles count is given in Table VII and VIII.
Similarly, traffic volume count conducted on 17/3/2021 at Gate 1 and Gate 2 are represented in Table IX to Table XII . PCU factors of 0.75, 2, 1 and 2.2 for 2 wheeler, 3 wheeler, 4 wheeler and 6wheeler are used to calculate the total vehicles in PCU and flow rate is calculated.

C. DATA INTERPRETATION

Date: 15-03-2021
Time: 08:30 AM - 05:30 PM
Location: AUCE Road Gate 1

The road selected for study is free from traffic signals. The study is conducted on working days,from Monday to Wednesday. The volume count at both gates is carried out using manual method and also using video camera or photographic method.

TABLE I. AUCE ROAD GATE 1 NORTH TO SOUTH (IN)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	970	253	256	3	1496.1
09:30 – 10:30	1007	167	180	3	1276.1
10:30 – 11:30	730	141	179	2	1021.9
11:30 – 12:30	549	135	143	1	826.95
12:30 – 13:30	572	108	186	0	831
13:30 – 14:30	413	97	162	0	665.75
14:30 – 15:30	359	85	137	1	578.45
15:30 – 16:30	453	128	217	1	814.95
16:30 – 17:30	632	166	284	2	1094.4

Avg. PCU/hr: 956.17 PCU/hr

TABLE II. AUCE ROAD GATE 1 SOUTH TO NORTH (OUT)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	696	138	163	3	967.6
09:30 – 10:30	728	154	216	2	1074.4
10:30 – 11:30	680	127	148	2	916.4
11:30 – 12:30	550	102	120	1	738.7
12:30 – 13:30	634	138	164	0	915.5
13:30 – 14:30	591	112	138	1	807.45
14:30 – 15:30	447	88	115	0	626.25
15:30 – 16:30	376	63	92	1	502.2
16:30 – 17:30	563	144	178	1	890.45

TABLE III. AUCE ROAD GATE 2 SOUTH TO NORTH (IN)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	875	119	126	4	1029.05
09:30 – 10:30	584	91	103	0	725.25
10:30 – 11:30	640	112	141	1	847.2
11:30 – 12:30	601	97	124	1	770.95
12:30 – 13:30	586	86	114	0	725.5
13:30 – 14:30	624	82	132	0	764
14:30 – 15:30	592	63	122	2	692
15:30 – 16:30	528	79	123	0	677
16:30 – 17:30	628	91	128	1	783.2

Avg. PCU/hr : 779.35 PCU/hr.

TABLE IV. AUCE ROAD GATE 2 NORTH TO SOUTH (OUT)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	746	168	121	0	1016.5
09:30 – 10:30	733	157	171	1	1036.95
10:30 – 11:30	925	161	208	0	1223.75
11:30 – 12:30	785	117	202	1	1026.95
12:30 – 13:30	682	126	293	0	1056.5
13:30 – 14:30	665	83	175	0	839.75
14:30 – 15:30	577	66	160	0	724.75
15:30 – 16:30	638	99	152	1	830.7
16:30 – 17:30	667	146	281	1	1075.45

The maximum number of vehicles entering at Gate 1are 1482 on Monday during 8.30 AM to 9.30 AM ,from Table I. The maximum numbers of vehicles leaving are 1100 between 9.30 AM to 10.30 AM from Table II.

Date: 16-03-2021
Time: 08:30 AM -05:30 PM
Location: AUCE Road Gate 1

TABLE V. AUCE ROAD GATE 1 NORTH TO SOUTH (IN)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	1123	152	196	3	1348.85
09:30 – 10:30	1057	136	173	2	1242.15
10:30 – 11:30	796	125	148	2	999.4
11:30 – 12:30	599	116	125	1	807.7
12:30 – 13:30	624	194	132	0	988
13:30 – 14:30	348	205	107	1	780.2
14:30 – 15:30	216	129	118	0	538
15:30 – 16:30	524	186	219	1	986.2
16:30 – 17:30	502	184	216	1	962.7

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ISSN: 2278-0181
Vol. 10 Issue 11, November-2021

TABLE VI. AUCE ROAD GATE 1 SOUTH TO NORTH (OUT)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	668	150	162	3	969.6
09:30 – 10:30	600	143	152	3	894.6
10:30 – 11:30	567	127	129	2	812.65
11:30 – 12:30	454	102	116	1	662.7
12:30 – 13:30	377	79	108	0	548.75
13:30 – 14:30	328	72	97	0	497
14:30 – 15:30	410	83	78	1	553.7
15:30 – 16:30	536	128	109	1	769.2
16:30 – 17:30	644	93	166	2	839.4

Avg. PCU/hr: 727.15 PCU/hr.

TABLE VII. AUCE ROAD GATE 2 SOUTH TO NORTH (IN)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	695	124	122	1	893.45
09:30 – 10:30	675	111	119	0	847.25
10:30 – 11:30	587	101	122	1	667.45
11:30 – 12:30	395	115	142	1	670.45
12:30 – 13:30	405	119	13	0	677.75
13:30 – 14:30	549	92	132	0	727.75
14:30 – 15:30	525	57	11	2	628.15
15:30 – 16:30	592	117	114	1	794.2
16:30 – 17:30	309	72	93	1	470.95

Avg. PCU/hr: 708.6PCU/hr

TABLE VIII. AUCE ROAD GATE 2 SOUTH TO NORTH (OUT)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	998	0	0	2	752.9
09:30 – 10:30	982	12	150	0	1190.5
10:30 – 11:30	772	136	173	0	1024
11:30 – 12:30	562	125	125	1	798.7
12:30 – 13:30	636	96	132	0	801
13:30 – 14:30	436	82	107	1	600.2
14:30 – 15:30	218	93	118	0	467.5
15:30 – 16:30	627	121	219	1	933.45
16:30 – 17:30	298	74	108	1	481.7

Avg. PCU/hr: 783.32PCU/hr

Date: 17-03-2021
Time: 08:30 AM -05:30 PM
Location: AUCE Road Gate 1.

TABLE IX. AUCE ROAD GATE 1 NORTH TO SOUTH (IN)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	856	236	298	1	1414.2
09:30 – 10:30	773	158	182	1	1079.95
10:30 – 11:30	908	135	179	3	1136.6
11:30 – 12:30	483	94	157	0	707.25
12:30 – 13:30	456	108	124	2	686.4
13:30 – 14:30	538	96	138	2	737.9
14:30 – 15:30	412	85	162	1	643.2
15:30 – 16:30	652	124	129	0	866
16:30 – 17:30	343	72	98	1	505.85

Avg. PCU/hr: 864.15 PCU/hr

TABLE X. AUCE ROAD GATE 1 SOUTH TO NORTH (OUT)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	628	159	135	1	927.2
09:30 – 10:30	545	132	98	1	772.95
10:30 – 11:30	453	88	113	4	697.55
11:30 – 12:30	348	83	104	1	533.2
12:30 – 13:30	58	86	106	2	708.4
13:30 – 14:30	529	91	112	2	695.15
14:30 – 15:30	516	118	96	1	721.2
15:30 – 16:30	623	121	129	0	838.25
16:30 – 17:30	329	93	76	3	515.35

Avg. PCU/hr: 712.14 PCU/hr.

Date: 17-03-2021
Time : 08:30AM-05:30 PM
Location: AUCE Road Gate 2

TABLE XI. AUCE ROAD GATE 2 SOUTH TO NORTH (IN)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	648	116	132	0	850
09:30 – 10:30	652	107	119	0	822
10:30 – 11:30	598	128	122	0	826.5
11:30 – 12:30	433	98	96	0	616.75
12:30 – 13:30	568	92	106	0	716
13:30 – 14:30	529	8	112	0	680.75
14:30 – 15:30	51	91	96	0	665
15:30 – 16:30	623	118	129	0	832.25
16:30 – 17:30	329	69	76	0	460.75

Avg.PCU/hr :718.89 PCU/hr

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Vol. 10 Issue 11, November-2021

The hourly variation for three days for Gate 2 is given in Table III, VII and XI. The maximum numbers of vehicles entering at Gate2 are 1124 on Monday during 8.30 AM to 9.30 AM. From Table IV, VIII and XII, the maximum number of vehicles leaving Gate 2 for three days are 1243on Wednesday during 8.30 AM to 9.30 AM.

TABLE XII. AUCE ROAD GATE 2 NORTH TO SOUTH (OUT)

Time Interval	Type of vehicle				
	2	3	4	6	RATE OF FLOW (VEHICLE/hr)
08:30 – 09:30	729	228	286	0	1288.75
09:30 – 10:30	697	146	173	0	987.75
10:30 – 11:30	768	135	163	0	1009
11:30 – 12:30	439	94	132	0	649.25
12:30 – 13:30	45	99	109	0	649
13:30 – 14:30	538	82	136	0	703.5
14:30 – 15:30	412	93	84	0	579
15:30 – 16:30	652	124	146	0	883
16:30 – 17:30	343	76	83	0	492.25

Avg.PCU/hr :804.62 PCU/hr

CONCLUSIONS

- The number of passengers using 2- wheeler is more when compared to the passengers using 3-wheeler, 4- wheeler and 6- wheeler.
- There is no RTC bus route in this road and there is hardly any bus transportation in this road.
- The peak hour traffic is between 8.30 - 9.30 AM on Monday 1482 vehicles at Gate 1 and 1124 vehicles from Gate 2 entering the road.
- The vehicle composition at Gate 1 on Monday was 66.77% two wheelers, 14.31% three wheelers, 18.77% four wheelers and 0.15% six wheelers while at Gate 2, the composition of vehicles was 71%, 12%, 17% and 0.076%.
- On Tuesday, the vehicle composition of 2,3,4 and 6 wheeler at Gate 1 was 67.74%, 15.53%, 16.55% and 0.15% and at Gate 2, the vehicle composition was 71. 67 %, 12.48%, 15.56% and0.0891% .
- On Wednesday, the vehicle composition of 2,3,4 and 6 wheeler at Gate 1 was 68.39%, 14.22%, 17.15% and 0.19% and at Gate 2, the vehicle composition was 70%, 14%, 16% and 0.0% .

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