DESIGN OF SIGNALING SYSTEM AT FOUR ROAD JUNCTION, ATCHUTHAPURAM.

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ABSTRACT

This is an attempt to study the basic traffic engineering using engineering methods and techniques to achieve the safe and time efficiency movements of people and goods on roadways. The main parameters of a traffic flow are volume study, speed study. The traffic volume is studied for better understanding of the present status of traffic survey. With the help of data controlling the traffic at the intersection by designing the traffic signal by using the data Volume count, PCU, Rate of flow, Average annual daily traffic(AADT), Average annual weekday traffic (AAWT), Average daily traffic (ADT), Average weekday traffic (AWT), Design hourly volume.

Our project emphasis is on analyzing existing evaluation of traffic volume and traffic flow at "ACHUTHAPURAM" in VISAKHAPATNAM .For clear understanding of traffic volume and traffic flow characteristics traffic surveys are conducted by manual methods. Passenger car units (PCU'S) for different vehicles are calculated.

The data collected through our project will be helpful in controlling traffic flow in peak hours at the above mentioned area. That data is used to design a signaling system at four road junction by using IRC method and Webster method.

INTRODUCTION

Increasing traffic congestions on roads and at road intersections is not an uncommon problem in developed as well as in developing countries like India. The daily commute from home to workplace has become much worsened as the road networks fail to cater to the needs of vehicles moving on the roads. The anticipated traffic in the next 10 years may increase to 1.5 times the present day traffic as the incentives being provided by the automobile companies facilitate the users to buy new vehicles with such as ease that has existed never before.

Intersections are important part of a road section when provided without any proper traffic control measures they end up with congestion. So, to prevent this issue these should be designed on the aim of decreasing it has been observed during this study that many intersection in atchuthapuram have become inadequate to the handle the present day traffic causing congestion delay and accidents particularly during the peak hour as the traffic control system installed on these intersections are pre-timed

The efficiency of traffic control at the intersection can only be improved by the provision of automatic traffic signal system which works on real-time detections and eliminates the wastage of green time allotted to a phase .which deals with the placement of automatic traffic signals at the intersection to enable the efficient traffic control of traffic and also the faster cleaning off the traffic from the intersection and we have analyzed the traffic characteristics of these locations and suggested some suitable remedies for decreasing the traffic flow especially during peak hours in order to save travel time.

SELECTION OF SITE:

After examining the heavy congested places in Visakhapatnam we have selected one intercity stretch to provide some of alternatives to lower the traffic flow and congestion.

The study area for the traffic study should include:

- Road connecting major parts of the city
- Place where heavy traffic flow occurs
- Place where future extensions are necessary

The selected four road junction at "**ACHUTHAPURAM**" in **VISAKHAPATNAM**

GEOMETRIC PARAMETERS ACCORDING TO IRC AND NH CODES:

Median /traffic separators:

The IRC recommends a minimum desirable width of median of for:

1) Rural highways - 5.0 m
2) Urban highways - 5.0 m
   (a)Pedestrian refugee - 4.0 to 7.5m
   (b)At intersection - 1.2m
3) Express ways - 15 m

FIELD STUDY

Geometric conditions:

S.NO	DESCRIPTION	WIDTH(m)	HEIGHT(m)
1	TRAFFIC LANE	7	-
2	MEDIAN	1.2	-
3	SHOULDER(PAVED)	1.25	-
4	SHOULDER(UNPAVED)	1.75	-
5	KERB	-	0.2

Field measurements

S.No	LANE	ENTRY LANE WIDTH	EXIT LANE WIDTH	Flare ENTRY LANE WIDTH	Flare EXIT LANE WIDTH	ROAD CONDITION	PEDESTRAIAN
01	A	5.1	5.17	5.4	5.3	GOOD	YES
02	B	6.0	5.6	6.4	6.0	GOOD	YES
03	C	8.12	8.81	8.4	8.5	GOOD	YES
04	D	9.2	9.17	9.14	9.7	GOOD	YES

COLLECTION OF DATA

(a) Location: Location of the spot for traffic volume survey was selected at "**ACHUTHAPURAM**" intersections in Visakhapatnam district.

(b) Date: Data for volume study was collected at "ACHUTHAPURAM" intersection.

(c)Observation:Classified Vehicle Counts.

(d) Method:Direct Manual Method.

(e) Duration: 3 hours in the morning and 2 hours in the evening.

sl.no	Vehicle class	Equvalency factors
	Fast vehicles	
1	Motor cycles and scooter	0.5
2	passenger car,pick-up van and aut	1
3	Agricultural tractor and light comn	1.5
4	single unit Truck and bus	3
5	Truck-trailer and agricultural tract	4.5
	slow vehicles	
6	pedal cycle	0.5
7	cycle rickshaw	2
8	Hand cart	3
9	Horse drawn vehicle	4
10(a)	Bullock cart-small	6
10(b)	Bullock cart	8

LOCATION:ATCHUTHAPURAM **CLIMATE: SUNNY** **LANE: A**

Yelamanchale **TIMING: 7:00AM-7:00PM**

S.No	Timings	Bike	Cars	Auto	Bus	Lorry	Heavy vehicles	PCU
01	6:45-7:45 am	200	92	267	48	32	39	1684.6
02	7:45-8:45 am	270	82	284	31	45	31	2648.49
03	8:45-9:45am	760	297	492	78	89	69	3692.5
04	9:45-10:45am	212	76	211	37	39	33	2013.48
05	10:45-11:4am	194	54	101	24	25	25	1484.56
06	11:45-12:45pm	81	56	142	17	27	23	887.68
07	1:45-2:45Pm	74	34	79	24	14	14	748.44
08	2:45-3:45pm	51	42	64	31	35	27	686.83
09	3:45-4:45pm	96	59	81	67	33	39	1764.48
10	4:45-5:45pm	268	74	197	97	39	49	3643.86
11	5:45-6:45pm	794	297	472	124	97	64	4102.7
13	6:45-7:45pm	194	104	196	52	35	27	3546.48

LOCATION:ATCHUTHAPURAM **CLIMATE: SUNNY** **LANE: B**

PUDIMADAKA **TIMING: 7:00AM-7:00PM**

S.No	Timings	Bike	Cars	Auto	Bus	Lorry	Heavy vehicles	PCU
01	6:45-7:45 am	321	192	267	68	42	49	1450.48
02	7:45-8:45 am	470	182	384	91	65	51	2040.48
03	8:45-9:45am	801	312	484	109	79	72	4112.4
04	9:45-10:45am	592	116	211	97	39	63	2013.34
05	10:45-11:45am	494	124	101	74	25	25	1731.86
06	11:45-12:45am	381	96	142	57	27	23	829.54
07	1:45-2:45am	274	54	77	34	14	14	712.45
08	2:45-3:45pm	151	62	44	41	35	27	999.54
09	3:45-4:45pm	206	89	81	27	33	39	1715.48
10	4:45-5:45pm	568	154	247	37	49	49	2099.54
11	5:45-6:45pm	629	265	329	62	81	57	2729.54
13	6:45-7:45pm	464	104	206	52	65	37	1468.45

TRAFFIC VOLUME COUNT

At atchuthapuram intersection:

From the data represented in the above sheets it is inferred that the peak volumes at this intersection occurs most often from 8.45am-9.45am in the morning and from 5.45pm-6.45pm in the evening and the volumes during these peak hours are given in the table below

1Morning peak hour: 8.45AM-9.45AM

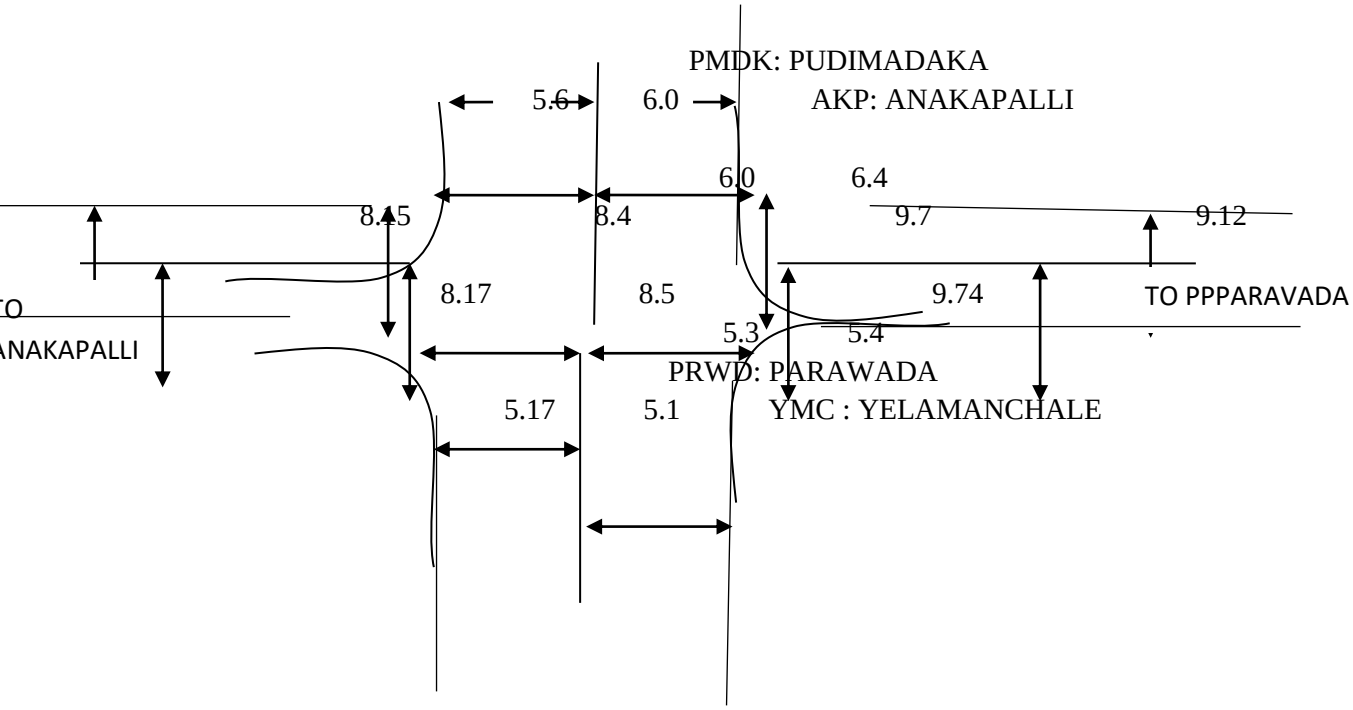
Sl.no	Approaching road	Volume in PCU
1.	Yelamanchale	3702.02
2	Pudimadaka	4419.5
3	Anakapalli	2119.54
4	Parawada	265.8

Evening peak hour: 5.45PM-6.45PM

Sl.no	Approaching road	Volume in PCU
1.	Yelamanchale	4120.59
2	Pudimadaka	2736.7
3	Anakapalli	1213.64
4	Parawada	305.39

RESULTS ANALYSIS FOR TRAFFIC VOLUME:

Atchuthapuram intersection:



Speed trends inferred from the graphs

INTERSECTION:

YMC: YELAMANCHALE AKP: ANAKAPALLI

PMDK: PUDIMADAKA PRWD: PARAWADA

S.NO	DIRECTION	MODAL SPEED IN (kmph)	15th PERCENTILE SPEED IN (kmph)	85th PERCENTILE SPEED IN (kmph)	98th PERCENTILE SPEED IN(KMPH)
01	YMC-AKP	43	15	40	55
02	AKP-YMC	18	11	28	65
03	AKP-PMDK	27	15	29.2	50
04	PMDK-AKP	26	15	26.5	40
05	PRWD-AKP	18.5	11.5	29	46
06	AKP-PRWD	27	12.55	27.8	50

WEBSTER'S method

In this method, the optimum signal cycle co corresponding to least total delay to the vehicles at the signalized intersection has been workout this is a rational approach the field work consists of finding

1. The saturation flow s per unit time on each approach of the water section and
2. The normal flow q on each approach during the design hour.

Based on the higher value of normal flow, the ratio Y1= q1/S1 and Y2= q2/S2 are determined on the approach roads 1 and 2. In the case of mixed traffic, it is necessary to convert all the normal flow and saturation flow values in terms of suitable PCU values which should be determined separately.

The saturation flow is to be obtained from careful field studies by noting the number of vehicles in the stream of compact flow during the green phases, and the corresponding time intervals precisely. In the absence of data the approximate value of saturation flow is estimated assuming 160 PCU per 0.3 meter width of the approach. The normal flow of the traffic is also determined on the approach roads from the field studies for the design period (during the peak or off-peak hour as the case may be).

The optimum signal cycle is given by:

$$C0 = 1.5L+5 / 1-Y$$

Where,

L = total lost time per cycle, sec. = 2n+R (n is the number of phase and R is all red-time)

$$Y = Y1+Y2$$

$$G1 = Y1/Y (C0-L) \text{ and } G2 = Y2/Y(C0-L)$$

SUMMARY AND CONCLUSION

Due to increase in population the traffic congestion at signals is increasing day by day. To control the traffic and to provide alternatives for heavy congested places we have selected one highway stretch **(ATCHUTHAPURAM JUNCTION),** it is the heavy congested places in **VISAKHAPATNAM**. The data analyses are as follows:

ATCHUTHAPURAM INTERSECTION:

The average PCU's of approaching vehicles at intersection are:

Yelamanchale	3702.02
Pudimadaka	4419.5
Anakapalli	2119.54
Parawada	265.8

RESULTS ANALYSIS FOR SIGNALING

Signal 1
Green time -20 Sec
Amber time–2 sec
Red time -48 sec
Signal 2
Green time -20 sec
Amber time -2 sec
Red time - 48 sec
Signal 3
Green time- 16 sec
Amber time – 2 sec
Red time - 62 sec
Signal 4
Green time- 16 sec
Amber time – 2 sec
Red time - 62 sec
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5.IRC 106-1990 GUIDELINES