*International Journal For Technological Research In Engineering*
*Volume 4, Issue 9, May-2017* *ISSN (Online): 2347 - 4718*

# DESIGN AND COMPARISION OF TRAFFIC CONTROL AND SIGNAL INITIALIZATION AT TWO INTERSECTIONS

Siyyagalla Subbarayudu[1], G.Sravanthi[2], B.Vinay Naik[3], E.Lavanya[4], P.Krupalatha[5]
[1]Assistant Professor, [2,3,4,5]Students of Final Year B.Tech., Department of Civil Engineering,
JNTUA college of engineering, Pulivendula. Dist: Kadapa, AP, India.

***ABSTRACT: Now a days due to increase in population, traffic congestion is growing and becoming a huge problem in major cities. This leads to many problems like pollution, time delay, accidents, wastage of fuel and time etc., These problems are overcome by providing an efficient traffic control at intersections and that can be achieved by provision of automated volume based traffic signal system for efficient and continuous movement of vehicles through the intersections. So, in our project we calculate the traffic volume by manual counting considering the PCU units for different vehicles. By using WEBSTER's method, we will calculate the delays at two intersections in pulivendula and compared the variation of Green, Red, Amber times and based on that traffic signal is designed to provide smooth traffic flow at the intersections.***

***Key words: Traffic Control, PCU, Intersection, Traffic Field Studies, Webster's Method, Manual count.***

## I. INTRODUCTION

Intersections are important part of a road section. When provided without any proper traffic control measures they end up with congestion and bottlenecks. So, to prevent this issue, these should be designed on the aim of decreasing. It has been observed during this study that many intersections have become inadequate to handle the present day traffic causing congestion, delays, bottlenecks and accidents particularly during the peak hours as the traffic control system installed on these intersections are pre timed. The efficiency of traffic control at the intersection can now 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. Traffic signals at the intersections to enable the efficient traffic control of traffic and also the faster clearing off the traffic from the intersection. The signal timings for pre timed traffic signals were redesigned by making use of Webster's method.

The major traffic problems that every town and city faces in day-to-day life as follows:

1. Insufficient road width
2. Improper signal design
3. Heavy vehicle growth
4. Lack of awareness of traffic rules

The various aids and devices used to control, regulate and guide traffic may called as traffic control devices. The general requirements of traffic control devices are attention, meaning, time for response and respect for road users.

In our project we have chosen to study the traffic flow and traffic capacity of different road junctions and signal design studies in selected locations of pulivendula town. In order to know the traffic capacity, traffic volume studies should be carried out.

## II. OBJECTIVE OF THE STUDY

The objective of the study is to identify factors impeding traffic mobility and propose measures to improve the prevailing traffic conditions duly planning for the future. Keeping in view the growth pattern and the socio economic scenario envisaged.

With the objective aforesaid, the scope of services is given here under:

1. Collection and appraisal of data/reports
2. Surveys and investigations
3. Processing
4. Engineering studies
5. Better traffic management measure

## III. LITERATURE SURVEY

John A. Bieberitz, P.E.I, Donald j. Lee E.L.T, studied the neighbourhood traffic control in requirement of a traffic signal installation. Neighbourhood traffic control continues to be of major importance to residents who are typically concerned about safe pedestrian crossings and vehicle access to their neighbourhood collector street. Many traffic diverters have been studied over the years to discourage both speeding and through traffic on these streets.

KEVIN FEHON P.E.,PTOE and Jim peters., POTE interest in adaptive traffic signals in the U.S.A is increasing and the use adaptive signals is strongly supported by FHWA There are several systems.(notably SCOOT and SCATS)that are widely used through hour the world and several new adaptive products have been recently been released.

Todd Knox; Reginald R. Souleyreth this paper reports the status and preliminary results of an ongoing study investigating the safety benefit of signalising intersections of high-speed (50.mph and greater)divided express ways. Before and after analysis was conducted and compared to empirical Bayesian (EB) techniques. A safety performance function was developed using negative binomial regression for a control group of 67 non-signalised intersections and compared to the performance of 20 intersections signalised between 1994 and 2001.

## IV. METHODOLOGY

### *4.1 TRAFFIC VOLUME STUDY*

Traffic volume or flow expressed as the number of vehicles crossing a section of road per unit time. Done by manual or automatic counters. In this study, the type of vehicles and number of vehicles are to be counted including the direction

of vehicles. Generally, the traffic volume is expressed as vehicles/day or vehicles/hour. Thus the volume can be obtained as a uniform value, when it is expressed in terms of passenger car unit (PCU) per hour or day.

*4.2WEBSTER'S METHOD*

- This is a rational method.
- Optimum signal cycle time based on least delay at intersections is worked out.
- Saturation flow(S) and Normal flow and normal flow (q) values per unit time on each road meeting at junction are required for signal design.

*4.2.1 OPTIMUM CYCLE TIME*

$$C_0 = \frac{1.5L+5}{1-Y}$$

*4.2.2 GREEN TIME ON ROAD*

$$G = \frac{y}{Y}(C_0\text{-}L)$$

Where,
Y=y1+y2+y3.....

$$Y1 = \frac{q1}{s1},\ y2 = \frac{q2}{s2},\ y3 = \frac{q3}{s3}\ .....$$

*4.2.3 LOST TIME PER CYCLE IN SECONDS*

$$L=2n+R$$

Where, n=number of phases
R=all red time

*4.3 CALUCULATION*

$$y = \frac{q}{s}$$

$\mathbf{y_1} = \frac{713}{3675} = 0.1940$; $\mathbf{y_2} = \frac{697}{3675} = 0.1896$; $\mathbf{y_3} = \frac{799}{3675} = 0.2174$; $\mathbf{y_4} = \frac{675}{3675} = 0.1836$.

i.e., $Y=y_1+y_2+y_3+y_4=\mathbf{0.7846}$

**L=2n+R** =2 x 4+0 =8sec (R=Red pedestrian time)

$\mathbf{C_0} = \frac{1.5L+5}{1-Y}$

$C_0 = \frac{1.5x8+5}{1-0.7846} =$ **79sec**

*4.4 GREEN TIMES*

$$G = \frac{y}{Y}(C_0\text{-}L)$$

$G_1 = \frac{y1}{Y}(C_0\text{-}L); = \frac{0.1940}{0.7846}(79\text{-}8); =$ **18 sec**

$G_2 = \frac{y2}{Y}(C_0\text{-}L); = \frac{0.2174}{0.7846}(79\text{-}8); =$**17 sec**

$G_3 = \frac{y3}{Y}(C_0\text{-}L); = \frac{0.1846}{0.7846}(79\text{-}8); =$ **20 sec**

$G_4 = \frac{y4}{Y}(C_0\text{-}L); = \frac{0.1836}{0.7846}(79\text{-}8) =$**16sec**

*4.5 AMBER TIMES*

Assuming A1 = 2 sec; A2 = 2 sec; A3 = 2 sec; A4 = 2 sec

*4.6 RED TIMES*

$R_1 = C_0\text{-}G_1\text{-}A_1$ =79-18-2 =59 sec; $R_2 = C_0\text{-}G_2\text{-}A_2$ =79-17-2 =60 sec

$R_3 = C_0\text{-}G_3\text{-}A_3$ =79-20-2 =57 sec; $R_4 = C_0\text{-}G_4\text{-}A_4$ =79-16-2 =61 sec

## V. RESULTS

1st INTERSECTION

5.1 The traffic intersection flow diagram by traffic volume studies for present work is shown below:

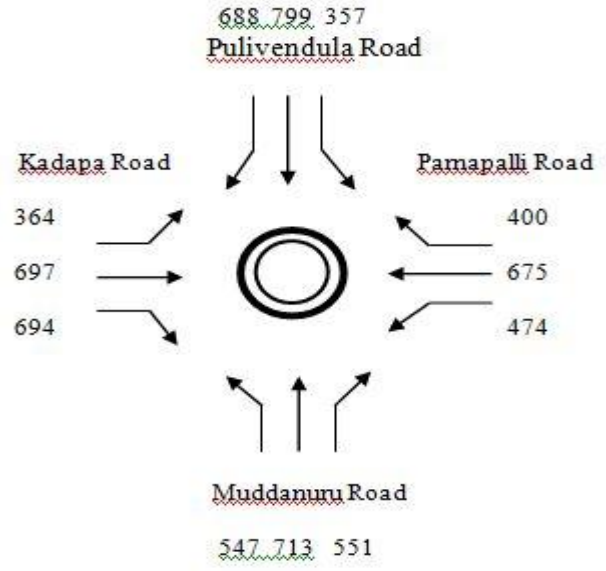
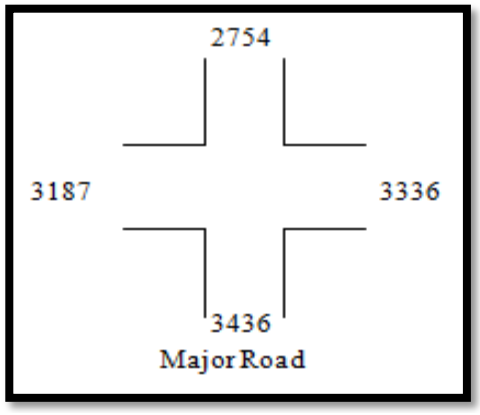



Fig 5.1 Traffic intersection flow diagram.

The vehicular volume at the four approaches of the intersection is present below.

Volume approach:
Volume on muddanur = 3536 Veh
Volume on Kadapa = 3187 Veh
Volume on Pulivendula = 2754 Veh
Volume on parnapalli = 3336 Veh
Volume on Major road = 1154 Veh>800 Veh/hr
Volume on minor road = 996 Veh>250 Veh/hr

Major and minor roads determination by using the above vehicular volume for first intersection result as shown in figure 5.1



2nd INTERSECTION

5.2 The traffic intersection flow diagram by the traffic volume studies for present work is shown below:

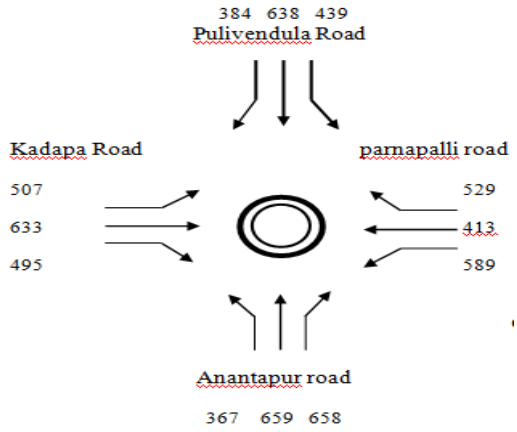


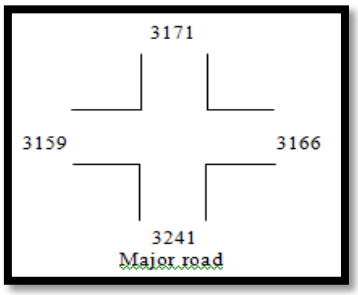

Fig 5.2 Traffic intersection flow diagram

The vehicular volume at the four approaches of the intersection is present below.

Volume approach:

Volume on Anantapur = 3241 Veh
Volume on Kadapa = 3159 Veh
Volume on Pulivendula = 3179 Veh
Volume on Mudigubba = 3166 Veh
Volume on Major road = 1130 Veh>800 Veh/hr
Volume on minor road = 818 Veh>250 Veh/hr

Major and minor roads determination by using the above vehicular volume for second intersection result as shown in figure 5.2




5.3 The four phase diagram with signal timings at the Pulivendula intersection is as below:

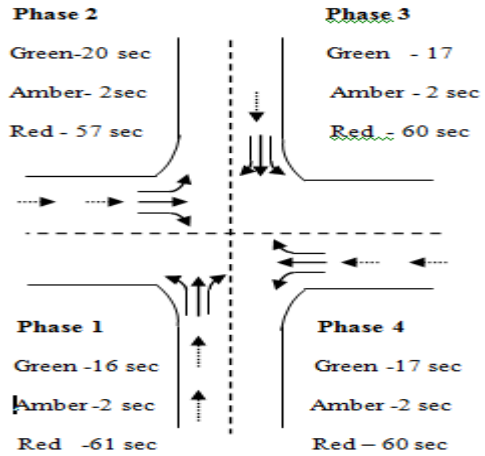
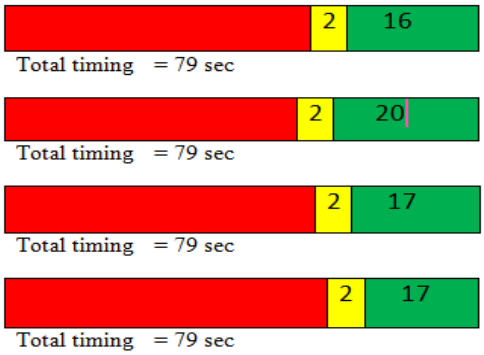



Fig 5.5 The details of design timings at the proposed Pulivendula intersection.




5.4 The four phase diagram with signal timings at the parnapalli intersection is as below:

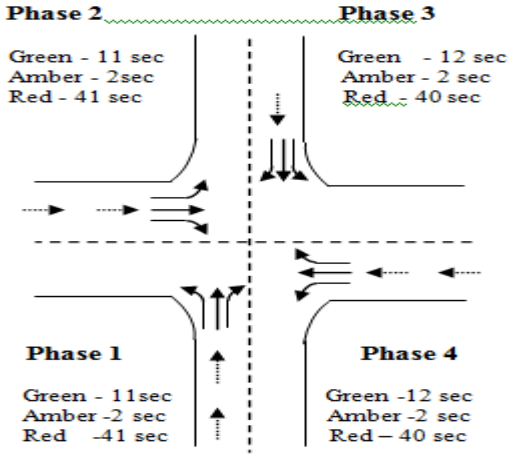
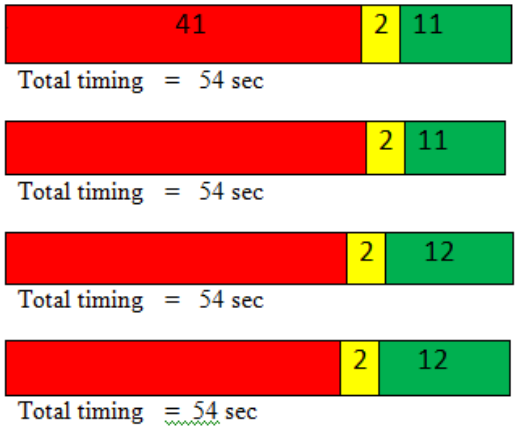



Fig 5.6 The details of design timings at the proposed Parnapalli intersection.




The signal timings at two intersections are determined from the above calculations, the signal cycle length for (I) intersection is 79 sec and for (II) intersection is 54 sec. By providing signal at these intersections there will be reduction in the accidents and orderly movement of traffic at these intersections.

## VI. CONCLUSION

- The justification of traffic signal installation is done by satisfying the two signal warrants through traffic volume studies.
- By comparing the both rotary signals we are

reducing traffic delay, accidents content &increasing free passage of traffic flow without intereption based on increasing the signal timings at two rotaries.

- The Four Phase traffic signal installation is done efficiently and is presented with the designed signal timings.

*ACKNOWLEDGMENT*
The Author thankfully acknowledge to SHAIK AKHIL MASTAN M.Tech, Assistant Professor, Department of Civil Engineering, JNTUA college of engineering, Pulivendula. Dist: Kadapa, AP, India. We express our deep gratitude; we honestly thank our sir and motivator for his support, suggestions, commitment and devotion throughout the course of this project. His unconditional care meticulous supervision, sparkling interpretation and robust wisdom have given us necessary inspiration, encouragement and academic sustenance while pursuing project for which we remain beholden to him.

REFERENCES

[1] Pradeep K. Gupta and Ishant Sharma , april- june( 2015) ,"Study of traffic flow in Entire Day at a congested Intersection of Chandigarh",Journal of Civil Engineering and Environmental Technology ISSN : 2349-8404,Volume 2,Number 12,pp.70-73.

[2] Tom V.Mathews ,"Transporation Engineering –I ", Transportation System Engineering ,Civil Engineering Department, Indian Institute of Technology Bombay,2006.

[3] Dr. L.R. Kadiyali, Dr. N.B.Lal (2010), "Principles and Practices of highway engineering , including express ways and airport engineering ",Khanna publishers ,new delhi, page.no.698-705.

[4] S.K.Khanna and C.E.G.Justo(2003),"highway engineering"Nemchand and Bro's page no.218-230.

[5] L.R.Kadiyali.,B.E.(2003),"Traffic engineering and transport planning",Khanna publishers ,new delhi,page no 335-360.