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Traffic Signal Co-Ordination - A case study of Canal Cross Road to Royal Cross Road - Surat City

Jenish Gajera[1], Piyush Gadhiya[2], Parth Kachhadiya[3], Rahul Hadiya[4], Bhautik Koladiya[5], Darshak Chauhan[6]

[1-5]Student, Civil Engineering Department, Sigma Institute of engineering, Vadodara, Gujarat, India
[6]Assistant Professor, Civil Engineering Department, Sigma Institute of engineering, Vadodara, Gujarat, India

ABSTRACT

The aim of coordinating traffic signals is to provide smooth of traffic along streets and highways in order to reduce travel time, stops and delay. This research was carried out to investigate the benefits of signal coordination by means of traffic micro simulation software. After performed by executing simulation runs of the prepared model in vissim. The output values of the performance measures, namely `delay' and `travel time' were compared to the corresponding values before coordination Optimized offset value.

Keywords : Signal co-ordination, Traffic volume study, Travel time & Delay study

I. INTRODUCTION

Traffic signal coordination happens when a gathering of at least two activity signals are cooperating with the goal that autos traveling through the gathering will make minimal number of stops conceivable. With the goal for this to happen, each activity motion in the gathering must permit a green light for all bearings of movement amid a settled day and age. Moreover, that settled day and age must be the same for each activity motion in the gathering. Since each movement motion in a gathering goes through every one of its headings in a similar day and age, it at that point ends up conceivable to "line up" the green lights for one course. The way the green lights "line up" relies upon the separation between movement signals and the speed of the activity.

Benefits of signal coordination include the following:

- Improved mobility and access
- Bolstered local economies
- Reduced vehicular accidents
- Reduced energy and fuel consumption
- Eliminated or delayed street widening needs

LITERATURE REVIEW

The first interconnected traffic signal system was installed in Salt Lake City in 1917, with six connected intersections controlled simultaneously from a manual switch.

Kadiya Dipesh (2011) have presented a methodology to coordinate the signals in two-way direction on the busy urban corridor. They have suggested two-phase plans and their suitability for the satisfactory coordination in odd and even phase difference between two signals. This strategy is useful for pre-timed signal control and reduces about 30% travel time without any cost for sensors and software. They showed that vehicular traffic volumes on all approaches of an intersection are heavy during peak hours and such that vehicular actuated signals may operate as fixed–timed signals so their installation, operation and maintenance costs are more than fixed-time signals. Therefore, the provision of fixed-timed signals at the intersections is justifiable. For its implementation, there is no need of extra cost of software sensors, and other arrangements and their methodology can be easily adoptable to Indian traffic conditions.

Patel Khushboo (2011) has presented a methodology for the pre-timed signal coordination at network level i.e. as a four-way coordination, by adopting different phase plans to reduce the vehicular delay in this study. They applied proposed methodology to a small network level and found that the total stopped delay was considerably reduced, compared to the existing signal system. This methodology does not require extra cost and can be considered as an economic Traffic Management System. They suggested that equal phase timing and proper selection of phase interval reduces delay considerably and for closer intersections, shorter cycle is more beneficial for quicker movements of traffic.

II. OBJECTIVES

- Design purpose
- Improving traffic system
- Planning and management
- Reduced energy and fuel consumption

STUDY AREA

Surat city is having circular and radial street road pattern and there are so many signalized intersections. For proposed study of two-way coordination of traffic signals, a continuous stretch is required having closely located signalize intersections. And this type of stretch is found near Varachha with a great difficulty. The considered road is situated in commercial area and shops and offices are either side of roadway. In the selected corridor, 3 intersections are four armed and 1 intersection is five armed and all the intersections are signalized. As per the standard code IRC: 93-1985, the distance between consecutive intersections should be less than 1 km for coordination and this condition satisfies here. Separated parking space is provided on either sides of roadway. The geometrics of the intersections are well defined and good as per design consideration

GEOMETRY OF CORRIDOR

The list of intersections which are considered for coordination.

1. Canal intersection
2. Puna simada intersection
3. Sitanagar intersection
4. Royal Cross Road

Table 1. Distance between consecutive intersections

Sr. No	Section of Road	Distance in kilometre
1	Canal intersection to Puna simada intersection	1.13
2	Puna simada intersection to Sitanagar intersection	1.09
3	Sitanagar intersection to Royal cross roads	1.78

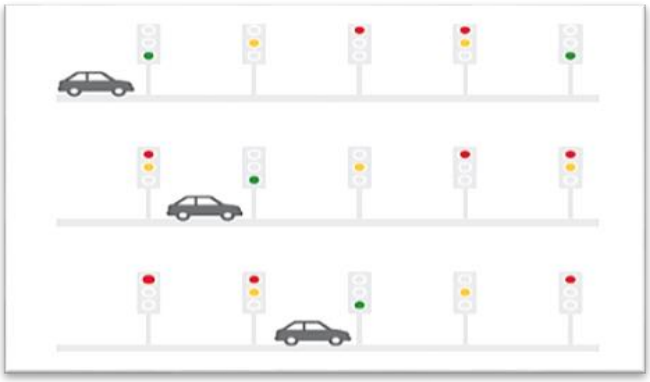

Fig 1 Signal Coordination

So it is good situation for coordination of signals on this road. There are no minor intersections between selected signalized intersections of study area. So the entry of vehicles is eliminated and that allows smooth operation of through vehicle and doesn't affect the flow.

1) Canal intersection

This intersection is connected by roads - one from Canal, second from Gulbai Tekra, third from Panchvati and fourth from Law garden.

Fig 2 Canal Intersection

2) Puna simada intersection

This intersection is connected by roads - one from puna simada, second from Xavier's, third from Bodyline and fourth from Saroli road.

Fig 3 Puna simada Intersection

3) Sitanagar intersection

This intersection is connected by roads - one from Sardar Patel stadium, second from H.L., third from and Canal fourth from Navrangpura.

Fig 4 Sitanagar Intersection

4) Royal cross roads

This intersection is connected by roads - one from Income-Tax Intersection, second from Navrang colony, third from swastika, fourth from commerce six roads and fifth from Vadvala Chowk.

Fig 5 Royal Cross road Intersection

The surveys were carried out in the peak period of the day and data were collected by video graphic survey at intersections and mid-blocks.

DATA COLLECTION

The traffic surveys which are required for base data for traffic signal coordination are as follow,

1. Classified Volume Count
2. Stopped delay at intersections
3. Spot Speed study

The surveys were carried out in the peak period of the day and data were collected by video graphic survey at intersections and mid-blocks

III. DATA ANALYSIS

Cycle time calculation

At present, all four intersections are controlled by fixed time signals. The cycle time of all four intersections in peak hour is
shown in table 2.

Table 2. Existing cycle time at intersections

Approach	Green time in second	Amber time in second	Total cycle time in second
Canal Intersection			
From Imata Intersection	30	3	116
From mangadh Tekra	24	3	
From Kharvar Intersection	26	3	
From maharaja Garden	24	3	
Puna simada Intersection			
From valathan	27	3	112
From Punagam Intersection	25	3	
From kathodara Intersection	26	3	
From Yogi Chowk	22	3	
Sitanagar intersection			
From Puna patiya	27	3	120
From Puna saroliRoads	31	3	
From Khetheshwar	25	3	
From Baroda	25	3	
Royal cross roads			
From Gaytri road	40	5	185
From Om nagar	30	5	
From Udhna road	35	5	
From Kangaroo	30	5	

Table 3. Vehicle volume count

LOCATION OF SURVEY NAME :			
ORIGIN & DESTINTION:			
TOTAL TINE OF SURVEY:			
DAY OR DATE OF SURVEY:			
TIME FROM	TIME TO	MOTOR CYCLES	CARS
09:00 AM	09:05 AM		
09:05 AM	09:10 AM		
09:10 AM	09:15 AM		
09:15 AM	09:20 AM		
09:20 AM	09:25 AM		
09:25 AM	09:30 AM		

Table 4 Vehicle PCU

Sr. No.	Direction	Total PCU
1	canal to puna intersection	1833
2	puna to sitanagar intersection	1436
3	sitanagar to royal cross road	1633

IV. CONCLUSION

In this paper, methodology for traffic signal coordination on urban corridor is developed and applied for the collected data of all selected junctions.

- Light vehicles (car,jeep,bus) occupied 68% of total vehicle.
- Theoretically, after implementation of this methodology, stopped delay of through traffic can be eliminated.
- Percentage of public transport is very low.

REFERENCES

[1]. Kadiyali.L.R.(2007), `Traffic Engineering and Transport Planning', 7th edition, Khanna publishers, Delhi.

[2] Real-Time Control of Signalized Networks—Different Approaches for Different Needs. Proc. "Extensions and New Applications of the Traffic-Responsive Urban Control Strategy: Coordinated Signal Control for Urban Networks"

[3] C. Applied Probability and Statistical Methods. Little, Brown and Company, 1984 "A Real-Time Simulation Environment for Evaluating Traffic Signal Systems"

[4] A Traffic Responsive Method of Coordinating Signals. TRRL Report 1014 "Data-Driven Algorithms for Real-Time Adaptive Tuning of Offsets in Coordinated Traffic Signal Systems"