

USE OF SYNCHRO SOFTWARE TO ASSES JOURNEY TIME AND INTERSECTION ALONG COURT ROAD IN KALABURAGI CITY

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Introduction:

There has been a tremendous increase in the number of personalized vehicles such as two-wheelers and motorcars. The city growing radially with new towns being constructed has led to high level of traffic which has put the road network under great strain. The government and the concerned agencies have the task of improving the transportation infrastructure to meet the growth of traffic needs. Also, it is very useful and important to know not only verbally, but in numeric amounts the congestion impacts. This becomes even more significant in a rapidly growing city like Kalaburagi.

About The Software: Traffic modelling programs are vital to engineers across the globe, serving engineers, researchers, and planners as they manage and enhance transportation systems that have become increasingly more complex and congested. Synchro and SimTraffic, both developed by Trafficware, are two of the most widely used programs.

Synchro: It is primarily used for modelling traffic flow, traffic signal progression and optimization of traffic signal timing. Additionally, it can be used to analyse arterials and signalized/unsignalized intersections. Synchro can determine the Level of Service, delays, queue lengths, capacity, traffic signal timings, cycle lengths, splits, and offsets.

SimTraffic: It is used for modeling of individual cars, trucks, buses and pedestrians traveling through a network of freeways, streets, and multiple types of intersections. Delays, vehicular queues, travel times and other measures of effectiveness are computed for these modelled users over a defined simulation period and can be determined for roadway segments and corridors in addition to individual intersections.

Objectives:

- To study existing traffic and road characteristics along the stretch considered for the analysis through field observations.
- Design, modeling and optimization of signalized and un-signalized intersections along the study stretch using Synchro software.
- Evaluate traffic performance along the study stretch to arrive at suitable measures to minimize delay, queue length and Journey time.

Methodology:

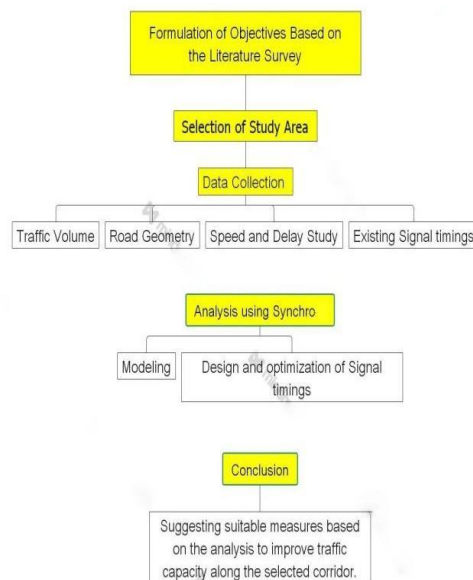


Fig 1: Methodology chart

Study Area:

According to the guidelines of IRC:93-1985 "Guidelines on Design and Installation of Road Traffic Signals" signals which are located in series with minimum distance (within 1000 meters) between each other are required to synchronize with each other to reduce delays and avoid traffic from a stop and go movement at every intersection. Kalaburagi population is growing rapidly day by day. The intensity of the traffic has increased significantly and there is a requirement of increase of capacity for safe and efficient means to cross over roads especially at junctions in multiple directions. The study stretch consists of 3 junctions namely Sardar Vallabhbhai Patel Chowk, Anand Hotel Circle and Lalgeri Cross.

Table 1: Distance between the Intersections

Intersection number	Intersection name	Distance (Meter)
1	Sardar Vallabhbhai Patel Chowk	-
2	Anand Hotel Circle	1200
3	Lalgeri Cross	1000

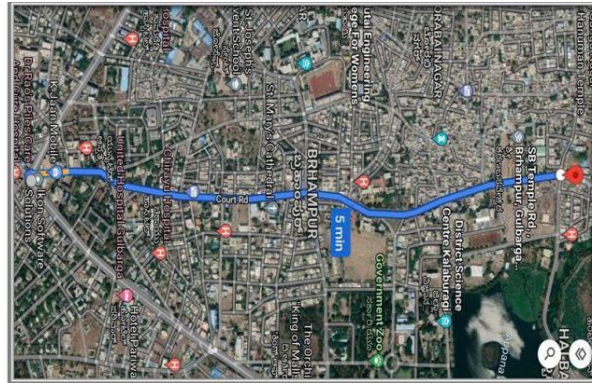


Fig 2: Aerial image of the selected study area

Data Collection:

Road Geometry: Reconnaissance Survey is carried out along the Corridor and at the Junctions and the physical characteristics of the corridor and junctions such as road geometrics, pavement details, traffic Controls (signs, signals, road markings and parking restrictions), sidewalks, shoulders, adjacent land use, approach width at intersection, distance between the intersections, measurement of road width are to be observed.

Table 2: Approach width at intersection

Intersection number	Intersection name	Approach road	Width of carriageway (m)
1	Sardar Vallabhbhai Patel Chowk	Court road	6.6
		MSK mill road	9.1
		Station road	11.5
		P.D.A Engineering College road	6.1
		Sardar Vallabhbhai Patel Road	10
2	Anand Hotel Circle	S.B Temple road	5.6
		S.B College road	7.4
		Court road	6.6
		Public Garden road	5.6
3	Lalgeri Cross	SB Naka road	6.6
		More complex road	9.5
		S.B Temple road	5.6
		Market road	9.2



Fig 3: Measurement of Road Width

Traffic Volume Studies: Traffic volume is the number of vehicles crossing a section of road per unit time at any selected period. To conduct traffic volume study at the junction, we will adopt manual method of counting for 3 working days and 2 non-working days they are Monday, Tuesday, Thursday, Saturday and Sunday. Morning and evening peak hours to be selected for the study, i.e., 8:00-11:00 am, and 5:00-8:00 pm.



Fig 4: Traffic survey at intersection

We have taken count for left turning, straight going and right turning vehicles and vehicles flow are in Passengers Car Unit. Simplified table of our volume count taken at intersections are shown below.

Table 3: traffic volume at all intersections for all approaches

INTERSECTIONS		Flow in PCU (per hour)			
		Left	Straight	Right	Extreme right
Sardar Vallabhbai Patel Chowk	Court road	85	164	276	275
	MSK mill road	247	784	1836	325
	Station Road	254	203	313	34
	P.D.A Engineering College road	26	117	57	28
	Sardar Vallabhbai Patel Road	62	343	671	103
Anand Hotel Circle	S.B Temple road	89	814	352	-
	S.B College road	611	269	75	-
	Court road	73	552	57	-
	Public Garden Road	103	219	101	-
Lalgeri Cross	SB Naka road	57	501	155	-
	More complex road	163	270	58	-
	S.B Temple Road	149	580	238	-
	Market road	207	408	149	-

Table 4: Delay time from intersection 1-3

Intersections	Distance in m	rounds	Stopped delay sec	Controlled delay sec	Average delay sec
1 to 2	1200	1	85	156	246
		2	10	145	
		Total	95	301	
2 to 3	1000	1	43	170	216
		2	10	156	
		Total	53	326	
3 to 2	1000	1	68	162	259
		2	15	190	
		Total	83	352	
2 to 1	1200	1	34	125	179
		2	8	148	
		Total	42	273	

Delay Studies Stopped (Fixed) Time Delay: Stopped-time delay is defined as the time a vehicle is stopped in queue while waiting to pass through the intersection. It begins when the vehicle is fully stopped and ends when the vehicle begins to accelerate. Average stopped-time delay is the average for all vehicles during a specified time period.

Existing Signal Timings: The signal timings of major junctions along court route in kalaburagi city have to be collected manually. It includes Cycle length of signal, Cycle length, effective green time, yellow time and all red time.

Table 3.7 Existing Signal Timings

Intersections	Green time (sec)	Red time (sec)
1	25	80
2	40	67
3	30	90

Data and Result Analysis:

Data Analysis: In this section, Synchro software was used to evaluate the operational performance for each intersection during the existing conditions and for suggested scenarios. This software is compatible with Highway Capacity Manual (HCM) 6th Edition, 2000 and 2010 for the roundabout, signalized intersections, and un-signalized intersections. The following scenarios were evaluated,

1. Current conditions at all intersections.

2. Adding traffic light at all intersections.
3. Adding a roundabout at all intersections.

The first step in traffic simulation modelling using Synchro is to construct the road network (i.e., segments and intersections) using the existing road conditions. In this step, all geometric and traffic data such as lane numbers, lane widths, road slopes, traffic volumes were entered.



Fig 5.1: Design of intersection

The second step is to calibrate the model to ensure that the model provides realistic simulations for existing conditions. This step will be carried out before any change in the base conditions of the road features.



Fig 5.2: Modelling of intersection

In the third step, the road features will be changed according to the suggested solutions to evaluate the traffic operations before and after the suggested improvement.

Scope for Future Works:

The present project which we have conducted covers only three intersections in the middle of the city. This project can be further adopted for other heavy traffic intersections of the city covering the outer area such as kharage petrol pump circle, Aland check post and Jagath circle which is located in the centre of the city, so that the required changes can be done in order to reduce the traffic congestion.