IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

TRAFFIC SIGNAL DESIGN IN SHIVAMOGGA CITY

Dinesh Kumar B[1], Chethan Kumar N T[2],

Shivanand[3], Kishan Rao B S[4]

[1,2,3]Department of Civil Engineering & [4]Master Trainer

[1]Lecturer, D S Dinakar National Polytechnic, Shivamogga.(India)

[2]Asst. Professor, SCEM, Mangaluru.(India)

[3]Asst. Professor, VCET, Puttur.(India)

[4]ANSSIRD Mysore(India)

ABSTRACT

Over a past several decades, the rapid growth of travel has increased traffic congestion, especially in major metropolitan areas. There are many road sections in Shivamogga which contributes heavy traffic congestion. The traffic congestion is controlled by traffic Signals. And the signal designs are to be cross checked with each passing year with increase in traffic.

This dissertation discusses the detailed study of selected three four-legged junctions which have been selected in a Shivamogga for the defined objectives in the current study. As a part of study various parameters that contribute towards traffic congestion. It includes study of signal, its characteristics (phase and time of signal), geometric design of road(i.e. length, width, number of lanes, presence of median), traffic parameters(i.e. number of vehicles counted in saturation flow period). All these parameters would be modeled for analysis using Webster's method of design.

From the defined objectives and methodology, traffic signal timings are designed using Webster's method of design for the present day traffic data and the obtained result are compared with present signal timings at all the three selected junctions.

Keywords: Methodology, Data collection, Road geometry, Traffic Signal data, Traffic data, Webster's method, Traffic signal design, peak hour, Off peak hour.

I. INTRODUCTION

An intersection is the location where two or more roads cross to each other for movement of vehicles in different directions. Signalized intersections are more important and common for traffic control as well as other roadway operations.Signals at intersections are able to reduce accidents on heavy traffic and to provide more safety for pedestrian crossing.At the intersection locations, the traffic volume observed on the approaches of the intersection is high, which leads to over-saturation condition there by the Level of Service falls to lower Serviceability leading to delay, causing driver discomfort, loss of time for waiting red Signal, increase in travel time and fuel consumption.The dissertation work deals with the concept of determination of vehicle count at each junction, and design of signal timings using Webster's method.

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II. LITERATURE REVEIW

A. PCU and Saturation Flow models for urban Signalized Junctions

Saturation flow for intersection acts as a major component for designing the signals, which is influenced by many factors like road geometry, composition of vehicles and driver behaviour. This article represents the methodology to adopt saturation flow model based on dynamic PCU by microscopic analysis. They have studies field data for intersection of three Indian cities i.e. Jaipur, Bangalore and Trivandrum. PCU values are derived from these field data. This model is validated with saturation flows collected from different locations. In addition based on saturation flow delays can be determined by using HCM and Webster's method. These delays are compared with observed delays.

B. Saturation Flow

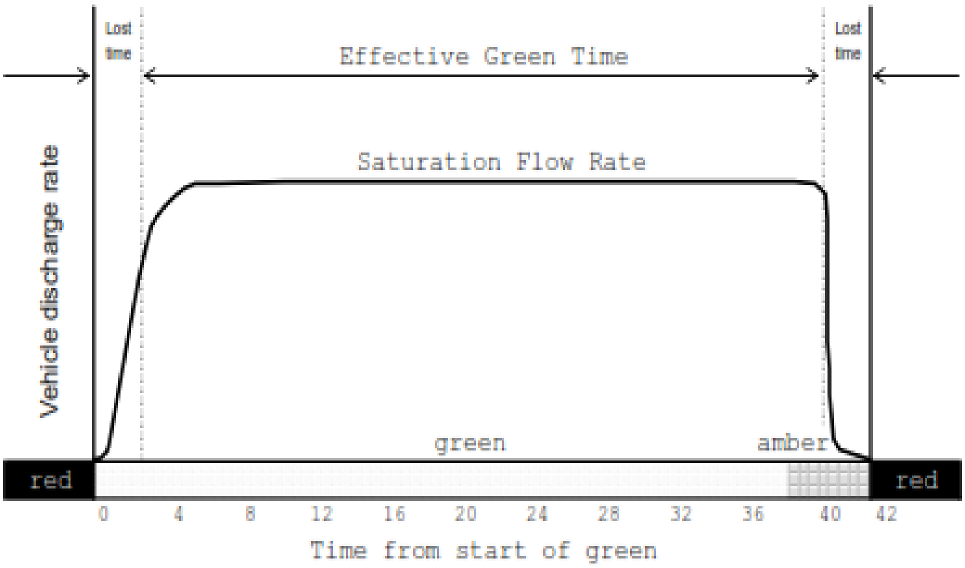

Figure.1 Queuing Model under Queue Deterministic Analysis

This diagram (fig-1) assumes that vehicles are discharged at green time gradually rises to maximum and remains uniform for up to ending of green signal timing. The movement of vehicles are gradually decreases at the ending of green signal, when the red signal starts the vehicles are forced to stop. The flow becomes zero. While measuring saturation flow they exclude beginning vehicle at the moment of initial green time. Counting is done till last vehicle exist the stop line.

For heterogeneous traffic this method is not accurate, in this cases vehicles are move randomly, parallel to each other here movement of vehicles are not in queue. This method is only adopted for developed countries.

III. METHODOLOGY AND DATA COLLECTION

Data collection is the one of the important process for all analysis (fig.2) Discussions and conclusions can be done based on these data collected and their analysis.

IJARSE
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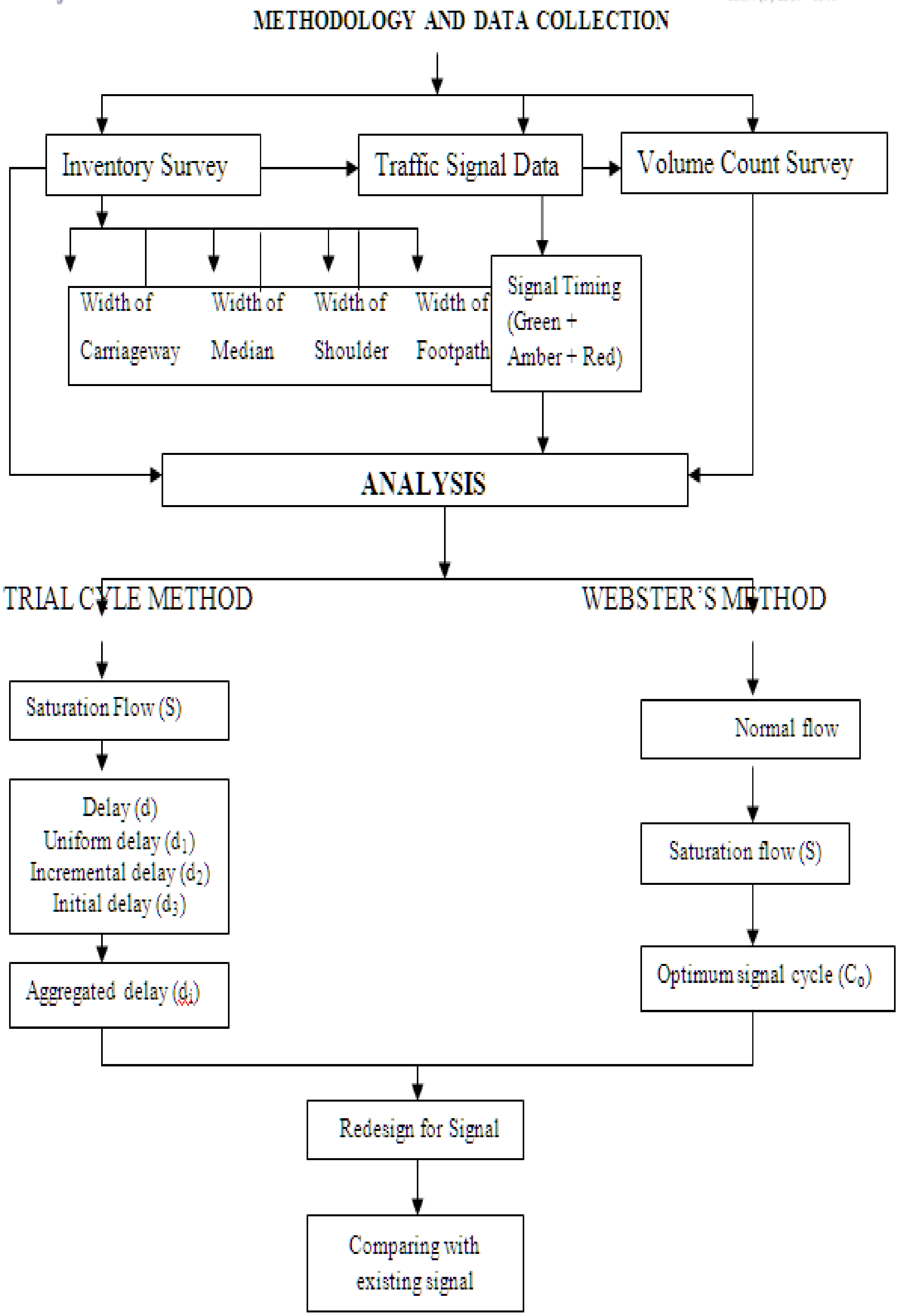

Figure.2 Flow-chart for data collection and Analysis

IJARSE
ISSN (O) 2319 - 8354
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IV. COMPARISON OF SIGNAL TIMINGS:

Table.1 COMPARISONS OF SIGNAL TIMINGS AT USHA NURSING HOME CIRCLE

USHA NURSING HOME CIRCLE	Present collected signal cycle length (sec)	Designed signal cycle length using Webster's method (sec) Morning peak hour	Designed signal cycle length using Webster's method (sec) Off peak hour	Designed signal cycle length using Webster's method (sec) Evening peak hour
FROM SAVALANGA	138	96	89	92
FROM RAILWAY STATION	141	96	89	92
FROM SHIVAMURTHY CIRCLE	136	96	89	92
FROM VINOBANAGARA	137	96	89	92

Graph.1 Comparisons of Signal Timings at Usha Nursing Home Circle

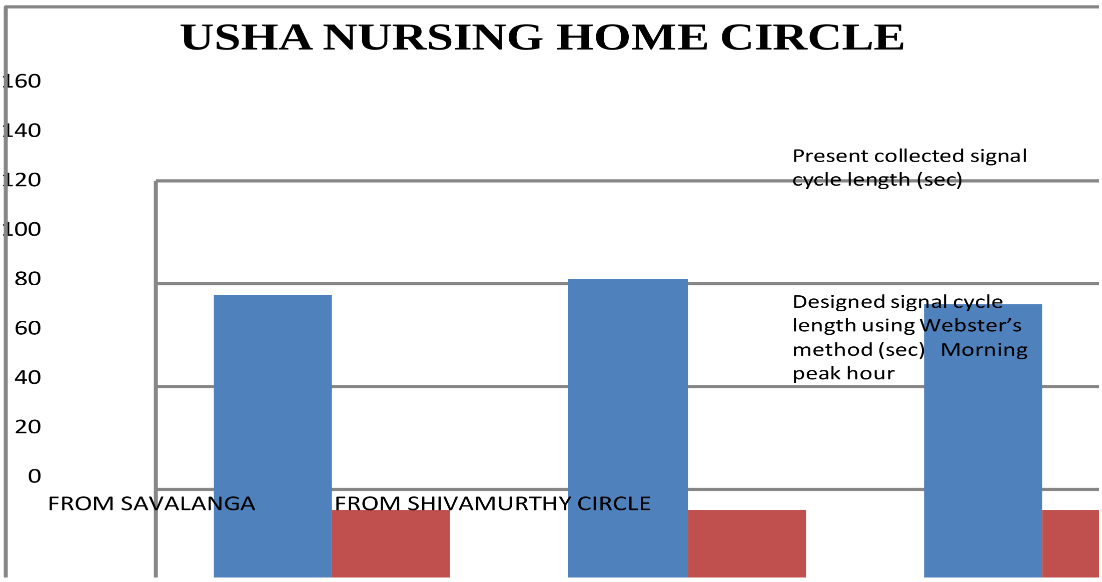

Table.2 Comparisons of Signal Timings at Shivamurthy Circle

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ISSN (O) 2319 - 8354
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SHIVAMURTHY CIRCLE	Present collected signal cycle length (sec)	Designed signal cycle length using Webster's method (sec) Morning peak hour	Designed signal cycle length using Webster's method (sec) Off peak hour	Designed signal cycle length using Webster's method (sec) Evening peak hour
FROM BASAVANAGUDI	124	85	78	96
FROM USHA	124	85	78	96
FROM MAHAVEERA CIRCLE	123	85	78	96
FROM NANJAPPA	116	85	78	96

Graph.2 Comparisons of Signal Timings at Shivamurthy Circle

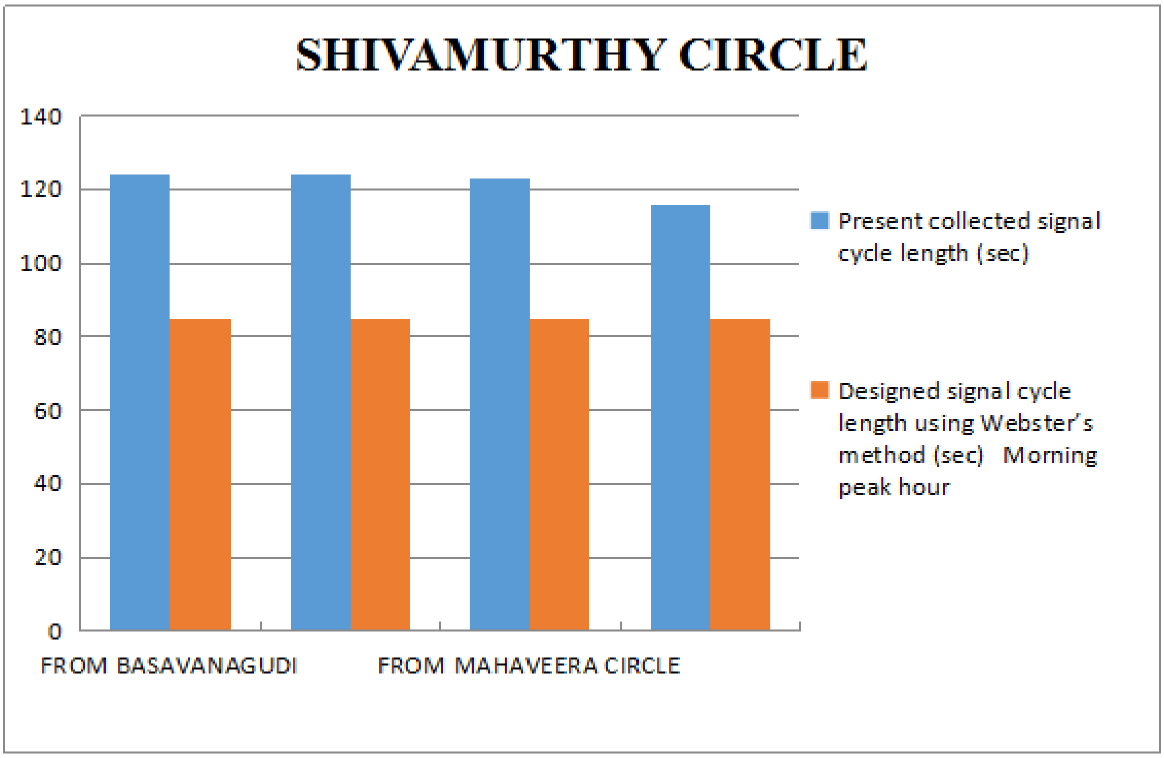
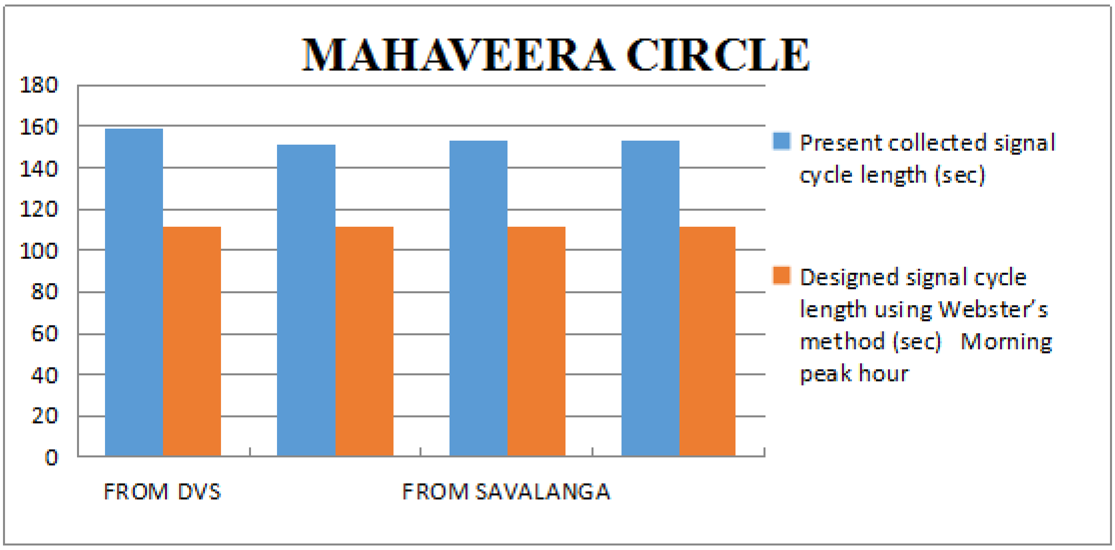


Table.3 COMPARISONS OF SIGNAL TIMINGS AT MAHAVEERA CIRCLE

MAHAVEERA CIRCLE	Present collected signal cycle length (sec)	Designed signal cycle length using Webster's method (sec) Morning peak hour	Designed signal cycle length using Webster's method (sec) Off peak hour	Designed signal cycle length using Webster's method (sec) Evening peak hour
FROM DVS	159	111	97	104
FROM GOPI CIRCLE	151	111	97	104
FROM SAVALANGA	153	111	97	104
FROM RAILWAY STATION	153	111	97	104

Graph.3 Comparisons of Signal Timings At Mahaveera Circle



V.CONCLUSION

1. At all 3 selected junctions i.e.,

i. Usha nursing home circle junction

ii. Shivamurthy circle junction

iii. Mahaveera circle junction

The present signal timings are more than the designed signal timings for the present day traffic both at off peak hour and peak hour traffic conditions. (Table no.1 to Table no.3) (Graph.1 to Graph.3)

2. Due to this excess signal timings at each leg of intersection, there is unnecessary increase in delays for the road user leading to congestion and inconvenience to commuters.
3. Hence the designed signal timings are to be provided at all the selected junctions for efficient and effective movement of traffic.

VI. FUTURE SCOPE

The study can be extended for future projected traffic and signal design can be done for the same.

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