

Approaches to Achieve Better Traffic Management using PTV Vissim

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ABSTRACT: Rapid urbanization causes traffic congestion, accidents as well as environmental impacts. The number of vehicles continuously increases faster than the available traffic infrastructure to support. So for overcoming these problems we need a good traffic management system. In traffic signal design, an efficient signal time is one of the most cost-effective ways to improve traffic flow and safety and also minimizing emission and fuel consumption. Traffic volume studies are to determine the number, movement and classification of vehicles through direct field survey. These data used to identify the normal flow of the road and to determine the influence of heavy vehicles or pedestrians on vehicular traffic volume. The collected data is converted into PCU units. Webster's method is used here for designing the signal timing. Traffic signaling is installed by using PTV VISSIM software. With its complete features, simulation of traffic conditions can be done to represent real world conditions. As per the present scenario COVID 19 is spreading all over the world and causes tremendous increase in the rate of death so to meet with the situation we introduce a route connecting the different quarantine homes with the respective hospital and thereby reducing the amount of community spreading. After analyzing the selected study area we had provided rerouting, widening and prohibition of right turn for the smooth traffic flow.

KEYWORDS: PTV VISSIM, Traffic Congestion, Traffic Signal.

I. INTRODUCTION

Kottayam lies on the National Highway 183 NH183 connects Kottayam to the state of Tamil Nadu and many tourist destinations. The current trends in Kottayam show that a large population is migrating into the town in search of a job. Due to the increasing economic growth and shopping power of Kottayam, people are attracted to do business and investment in this town.

The data collected from Kottayam police station states that, the number of new accidents per year is so alarming to the current road condition. The selected areas are Pulimoodu junction, central junction and baker junction.

Manual counting method is used for finding the volume of traffic. The volume of vehicles passing the area is very large, this causes the reduction in Level of Service at the Junction and the volume of traffic exceeds the capacity of road. In addition to it the pedestrian amenities in the junction are not sufficient. Unauthorized parking causes traffic congestion, absence of Zebra crossing, buses halting in the carriage way reduces road capacity, absence of traffic signs and road markings, extensions of certain buildings to the carriage way thereby obstructing the sight distance, uncontrolled traffic flow are the major issues found on the junction by further study.

Implementing the short term mitigation solution in junction can control traffic to a limit such as rerouting of vehicles, changing position of the bus stop, ensuring parking space etc can be used. The long term mitigation is providing traffic signal at Pulimoodu junction. And as a future proposal we can build a fly over at mc road thereby enhancing smooth traffic flow.

II. TRAFFIC CONGESTION

The number of vehicles continuously increases faster than the available traffic infrastructure to support. So it leads to increase in the rate of accidents and time delay. The major problem in the junction is insufficient width of road, private vehicles parking within the carriage way, vendor's encroachment in roads and buses stops at the unstated point. And also insufficient street light, sign boards and markings.

The increasing of traffic volume at our intersection has been arising problems like road accidents, conflicts and congestions. These problems can solve by providing an efficient traffic signal control at the intersection for continuous and efficient movement of vehicles through the intersection.

III. REMEDIAL MEASURES

So by inadequate road width we propose to widening the existing carriage way, so widening done by land acquisition. Decreasing the amount of private vehicles or queuing of the vehicles in baker junction rerouting be provided from the existing road way. The vehicles from thrunnikara private bus stand and mahatma Gandhi square, reaches to chalukunnu junction currently the vehicles are ride through baker road, and by the vehicles move through temple road. And provide proper road markings and sign boards for the valuable information to drivers and other road users. They represent rules that are in place to keep you safe, and help to communicate messages to drivers and pedestrians that can maintain order and reduce accidents. Neglecting them can be dangerous. Also ensures proper street lights to improves safety for drivers, riders, and pedestrians. Street lighting provides security in urban areas. It increases the quality of life by artificially extending the hours of light so that man can carry on despite the dark.

IV. TRAFFIC SIGNAL DESIGN



Figure 1 Pulimoodu Junction (google map)

The design of traffic signal nowadays has become an important factor for major intersections of towns and cities. Signal timing involves deciding how much green time the traffic lights shall provide at an intersection approach. How long the pedestrian walk signal should be, and many numerous other factors. Traffic signal controls the movement of traffic and not only reduces accidents but enables the road safety users to effectively use the area of road at intersection. We used Webster's method for designing signal time and by PTV VISSIM to minimizing total travel time.

WEBESTER'S METHOD:

Webster method is a rational approach for signal design. The design is simple and is totally based on formulas laid down by Webster, in this method, the total cycle of the signal is determined which forms a total least delay occurring at signal.

$$q_1=1764, y_1=0.48$$

$$q_2=1271, y_2=0.346$$

$$\text{Maximum flow ratio} = y_1 + y_2 = 0.826$$

$$\text{Lost time} = 8 \text{ sec}$$

$$\text{Optimum cycle time} = C_0 = \frac{1.5L+5}{1-Y} = 97.7 = 98 \text{ sec}$$



$$G_1 = \frac{y_1 \times (C_0 - L)}{y} = 52 \text{ sec}$$

$$G_2 = \frac{y_2 \times (C_0 - L)}{y} = 38 \text{ sec}$$

PTV VISSIM:

PTV Vissim is a microscopic multi-modal traffic flow simulation software package developed by PTV Planung Transport Verkehr AG in Karlsruhe, Germany. It is used to analyse private and public vehicles even under constraints such as lane configurations, vehicle composition, traffic signal etc.

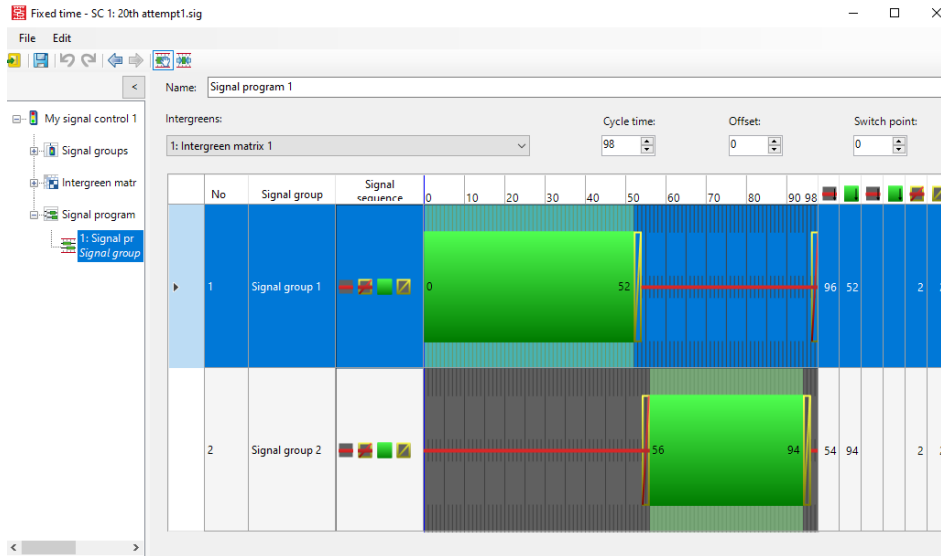


Figure 2 screenshot of signal timing

- Building road network- using links and connectors
- Provision of vehicle inputs to each link
- Vehicle composition for overall network
- Inputs to indicate driving behavior
- Routing options for vehicle along with the vehicular volume in each route
- Signal Phasing and cycle time for the entire Intersection

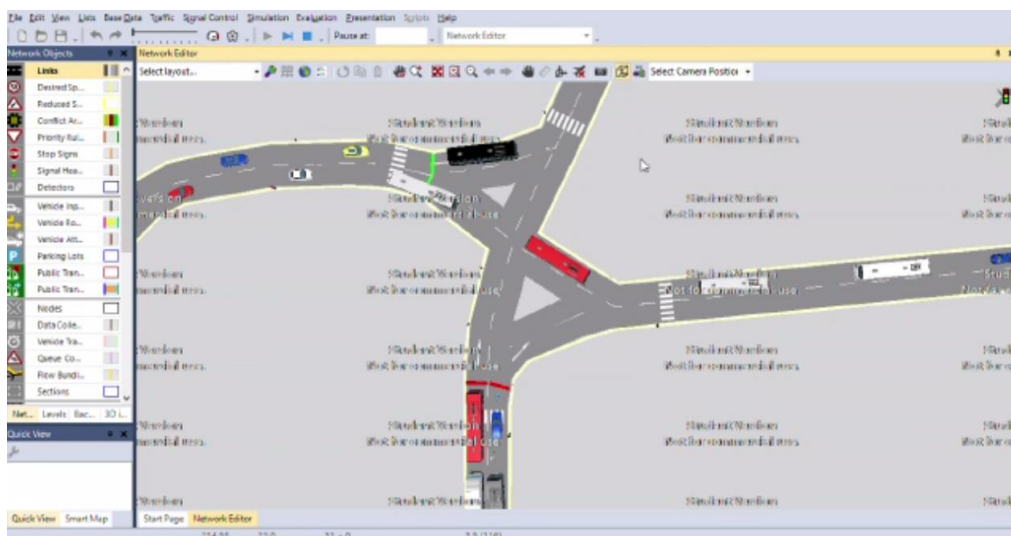


Figure 3 screenshot of traffic simulation

V.EMISSION MODELING

By using PTV Vissim software we can find the amount of carbon monoxide and nitrogen oxide emissions existing in the selected area before the installation of traffic signal and after the installation of traffic signal.

Vi. ENHANCED TRAFFIC CONTROL BUNDLING

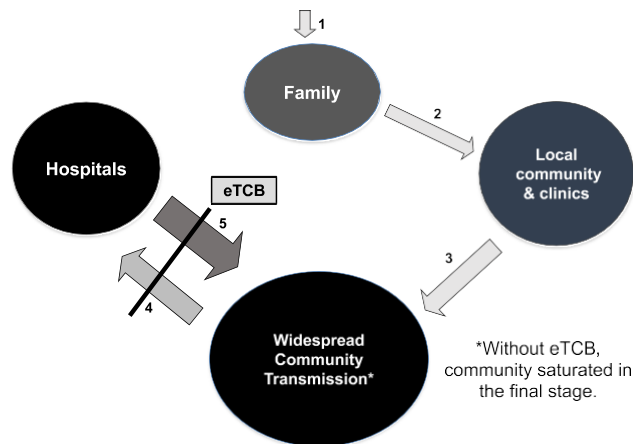


Figure 4 Community-hospital-community chain of amplification of COVID 19

It is technique used to reduce the COVID 19 spreading to a limit. In this technique one route is selected, which is connecting all the hotspots of the district to the allotted hospital nearby. This route is fully isolated from rest of the roadways thereby reducing the chance of spreading the deadly virus. There are chances of spreading of hospital in order to reduce it we use traffic control bundling.

VII. CONCLUSIONS AND RECOMMENDATIONS

The increase in population and rapid urbanization of India has resulted in increased usage of vehicles and transportation facilities, which in turn result in traffic congestion and related problems. By proper data analysis and strategic planning help in designing the signal timing and improvement proposals, Then provided traffic signal at Pulimoodu junction. The major traffic problem founded are heavy volume of traffic during peak hours, Lack of lane traffic, improper location of pedestrian zebra crossing, insufficient traffic signs and lightings, poor pedestrian facilities, improper parking of vehicles, formation of long queues during peak hours. The new proposals are providing traffic signal at Pulimoodu junction, installation of Traffic sign board and street lights, Proper lane marking and widening of road width.

And the future recommendation are providing a flyover or underpass in the junction connecting the NH183.

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