Design of Traffic Intersection

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Abstract— India is a highly populated and developing country. Growth in Public as well as in Private sector must be the reason behind the development. Growth in these two sector makes the people to travel to the core and crust of the cities. These leads to congestion and traffic jams at major cities, especially in major intersections. Hence to reduce the congestion, to provide safe transportation and to reduce travel time across intersection, we have come up with alternatives that leads to reduce congestion by means of general observation, vehicle survey and analysis referring to the corresponding IRC codes.

Key words: Plastic Fines, Perpetual Pavement, Fine Aggregate, Marshall Mix Design, HMA-Hot Mix Asphalt
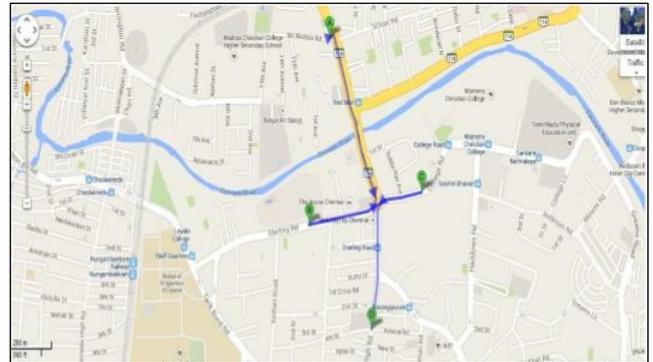
I. INTRODUCTION

Sterling roads is one of the principal lane in Nungambakkam, which is been there over 100 years and it even appears in 1909 map of madras city. Nungambakkam is a locality in Chennai, India's fourth largest metropolitan city. The neighborhood abounds with multi-national commercial establishments, important government offices, foreign consulates, sprawling educational institutions, shopping malls, sporting facilities, tourist spots, star hotels, restaurants, and cultural centers. Nungambakkam is also a prime residential area in Chennai. The adjoining regions of Nungambakkam include Egmore, Chetput (Chetpet), T. Nagar, Kodambakkam, Choolaimedu and Kilpauk.

Nungambakkam is well connected to other parts of the city. Many of the state-run Metropolitan Transport Corporation (MTC) buses run through Nungambakkam. Nungambakkam has its own Suburban Train Station on the Chennai Beach - Tambaram Railway Station railway line, which connects it to other parts of the city.

Aim of our project is to improve intersection in sterling road safely through innovation and modification of existing infrastructure design and operation, using a multifaceted and multidisciplinary approach to find a new, sustainable solutions to existing problems. In this we analyze the operation principles and to critically review the existing problems and solutions and hence to identify key road safety problems at existing intersections.

In this we develop, test, demonstrate and evaluate new intersection designs based on valid design principles, concepts and integrate these into existing practices. To achieve sustainability in transport systems and to facilitate National Road Safety Strategy
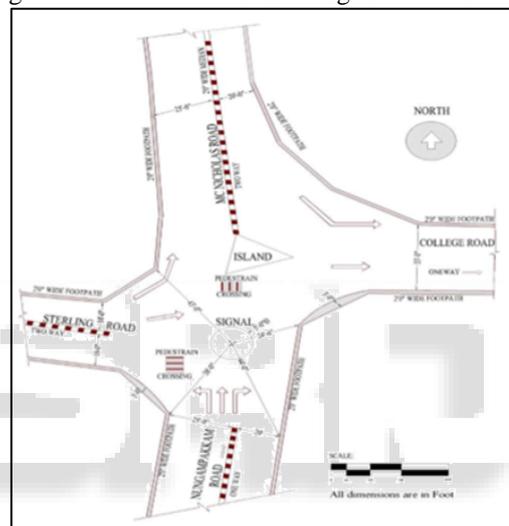

Fig. 1: The aerial view of Sterling road intersection

Fig. 2: Road inventory and existing traffic flow at sterling road intersection

II. OBJECTIVES

The Objective of this study is
– To obtain traffic volume in the intersection.
– Analyze the data and provide optimal solution.
– To identify the problems in the intersection.
– Improve the level of service.

III. NEED FOR STUDY

– To control Traffic volume.
– To Save time and fuel.
– To Facilitate safety to the road user

IV. PLANNING OF SURVEY

The first stage in the formulation of a transport plan is to collect the data on all factors that are likely to influence travel pattern. The work involves number of surveys to be conducted so as to have an inventory of existing travel pattern, transport facilities, land use and economic activities

A. Reconnaissance Survey

It is done to examine the general character of th area for the purpose of determining the most feasible route or routes for further more detailed investigations. Data collected from reconnaissance survey is used to know the feasibility of all different routes, preparation of approximate estimate of quantities and cost. This helps in selection of most suitable alternatives. This survey also helps in determining the deviations required in the basic geometric standards to be adopted for the highway facility.

B. Definition Of Study Area

The study area for which transportation facilities are being planned in first of all defined. For planning at urban level, the study area embrace the whole conurbation containing the existing potential continuously built up areas of the city.

Sterling road intersection has four arms connecting roads such as Sterling Road in north, College road in east, MC Nicholas road in south and Nungambakkam high road in west. They form a major intersection, which is the focal point of the city traffic. The College road and Sterling road are assigned with one-way flow. The one-way system has relived the congestion at the intersections, but the additional detour has resulted in an increase of travel time and vehicle operating costs.

V. TRAFFIC VOLUME SURVEY

Traffic volume studies are conducted to determine the number, movements and classification of roadway vehicles at a given location. These data can help to identify the critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow and document traffic volume trends. The length of the sampling period depends on the type of count being taken and the intended use of the data recorded. Traffic counts provide the source data used to calculate the Annual Average Daily Traffic (AADT), which is the common indicator used to represent traffic volume. Traffic counts are useful for comparing two or more roads and can also be used alongside other methods to find out where the CBD of settlement is located.

Road inventory survey and traffic volume count is carried at the intersection from 8-20 hours. Traffic volume at various locations of the intersection are studied and graphs of the traffic accumulations at every half an hour are developed and shown in figures 4-10 from which peak volume is identified as 9.30-10.30 am. Passenger car equivalence is used to represent the effects of changes in traffic composition (the mix of cars, vans, jeeps, goods vehicles, buses, cycles and so on) on the saturation flows at traffic signal intersections. It is used to bring all modes into a single unit and the conversion factor is shown in the Table 1.

| Class of Vehicle	Conversion Factor
Two Wheelers	0.75
Auto Rickshaw	2
Car /Jeep / Van	1
Standard Bus	3.7
LCV	2

Ref: IRC-86-1983

Table 1: PCE Conversion Factor

VI. ANALYSIS OF SURVEY DATA

The volume of traffic from various directions in PCE at morning and evening sessions, the hourly peak volume of intersection is arrived as 5740 PCE and the volume of flow. The capacity of the intersection is calculated from the sum of four lanes divided two ways and two lane of one way road as 4000 PCE per hour (Ref: Indian Road Congress: 106 -1990). It is found that volume to capacity is 1.435 which is more than one which is the reason why the intersection is getting congested and improvement measures are needed as early to regulate the traffic flow.
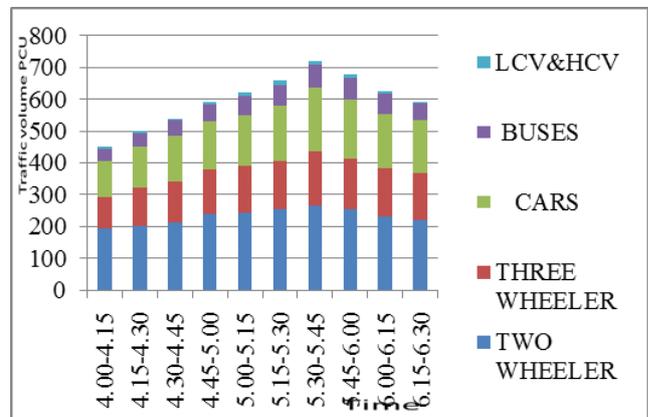
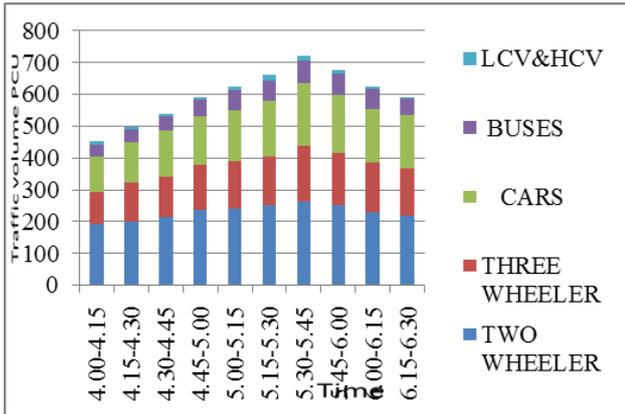### A. Nungambakkam High Road (S) to College Road (E)
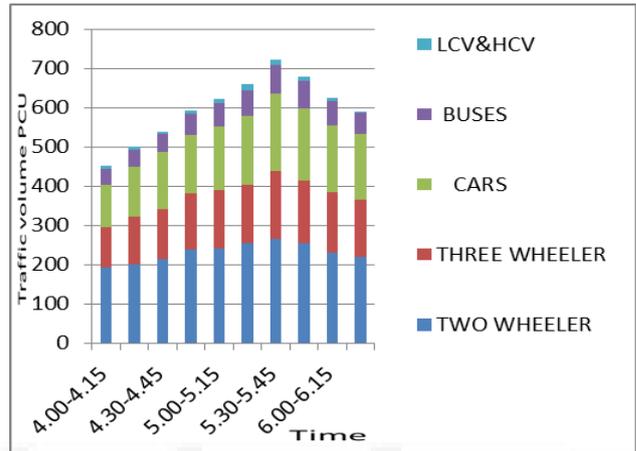
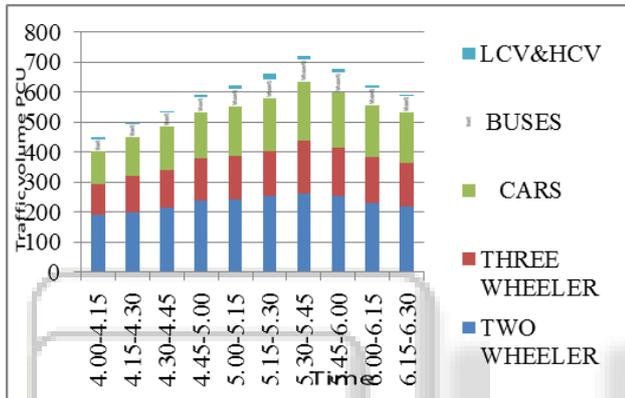### B. Nungambakkam High Road(S) to Mc Nicholas Road(N)
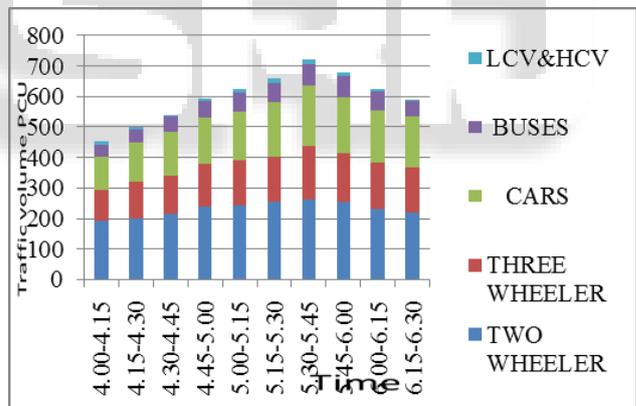
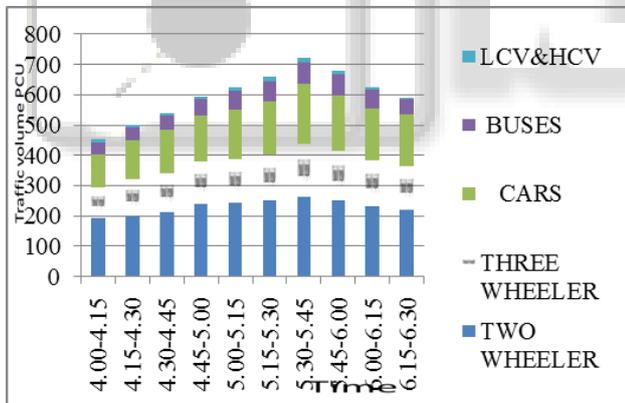### C. Nungambakkam High Road (S) to Sterling Road (W)

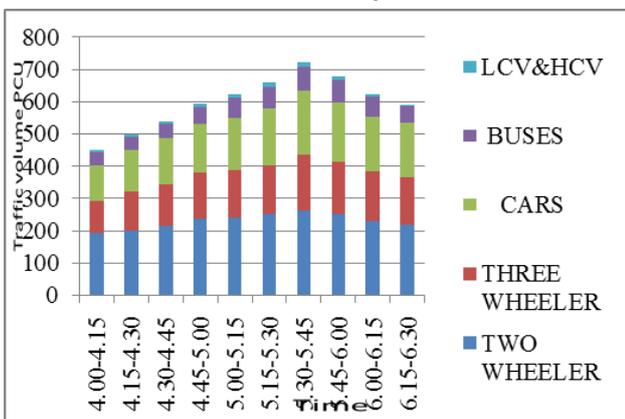*D. Sterling Road (W) to Mc Nicholas Road(N)*

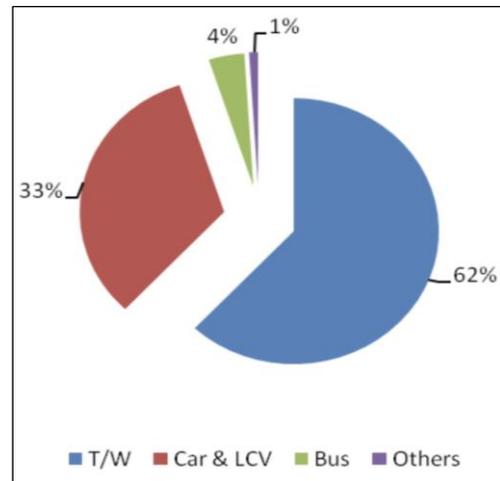*E. Sterling Road (W) to College Road (E)*

F. Mc Nicholas Road (N) to Sterling Road(W)

G. Mc Nicholas Road (N) to College Road (E)

The vehicle composition at the intersection is observed on a whole day shows that the share of two-wheeler is predominant which is shown in figure. In this the contribution of bus is just 4% which lead generation of other modes of traffic

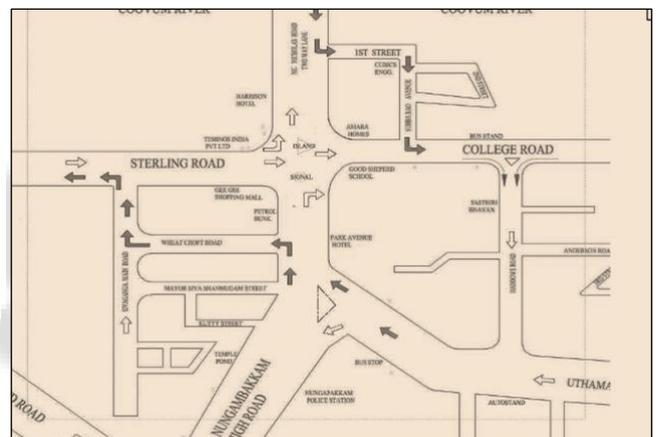*H. Vehicle Composition at Sterling road*

Fig. : Proposed flow of traffic at Sterling road intersection

VII. RECOMMENDATIONS

Transportation system management (TSM) measures can improve the situation of the Intersection to a maximum effect. By providing escalator it can improve pedestrian movement and it will reduce the stoppage of traffic due to pedestrians. On street parking is available at Haddows road and Nungambakkam high road. Moer than this unauthorised on street parking creates traffic problem

No parking to be implemented up to 100m from the intersection as per IRC standard. Commercial buildings has to take care of their parking demand

The entry of flow can also be restricted from east towards west and south at intersection by turning the vehicles at Haddows road itself will reduce the V/C ratio to 0.86 from 1.435.

VIII. CONCLUSION

Sterling road intersection is located at the west of Chennai. This area is covering much of the commercial developments. It is the intersection where MC Nicholas road (N), College road (E), Nungambakkam high road (S) and Sterling road

(W) are intersecting. Road inventory survey and volume count are conducted. The width of the MC Nicholas road and Nungambakkam high road is 14.30m, College road is 10.05m and Sterling road is 10.40m. Edges of roads are occupied by encroachers and unauthorized parking on roads brings down speed of vehicles. From the survey data the volume accumulations charts are plotted. Based on this proposal three (N to E and W, S to W) out of seven directional movement can be evicted from the intersection which will drags the volume and improve the flow smoothly. The nearby intersections are also to be studied and the integrated study will helps to operate the traffic in an efficient way. Thus, TSM can improve the efficiency of the intersection.

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