An Investigation to Propose Signal Free Corridor at Mandamalla Junction

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***Abstract*:** Signaling system in India has come into existence in the recent times. The basic use of signal is to have a safe ride and to control the traffic at regular intervals. Many improvements and investigations are done in signaling systems to avoid the traffic on streets but the situations in present days are going tough due to heavy traffic congestion in main junctions during peak hours. The possibility to avoid traffic congestion on roads would be mostly done by introducing a signal free corridor, corridor improvement plans (road widening) and intelligent transport system (ITS). In present situation, there is no possibility of road widening condition due to high raised cost in developing cities like HYDERABAD. Many research activities are going on in introducing new signal types but those are not serving people to the maximum extent. Recent advancements like removing signals at the junctions and converting them into "SIGNAL FREE CORRIDOR" has been giving positive results. The main topic of this paper is to investigate the provision of a Signal free corridor at MANDAMALLAMA JUNCTION".

***Index Terms*—Signal free corridor, Intelligent transportation system, ITS, Mandamallama**.

I. INTRODUCTION

A freeway or corridor is a long stretch of road connecting various large and small streets intersecting it at various spots. They provide a nonstop, comfortable and an easy access to the road users without delays and with less vehicular fuel costs with the presence of grade separated junctions including flyovers and underpasses (Fig. 2, 3).

Freeways and corridors are free of regulatory signals or stop signs hereby allowing the vehicles to adopt higher traveling speeds. Therefore, the corridors are commonly known as Signal Free Corridors. Corridors aim at managing traffic, minimizing disruptions, and reduce inconveniences experienced by motorists and other road users while traveling.

The interconnection of freeways or corridors by other roads is typically achieved with grade separated facilities in the form of either underpasses or overpasses. Freeways or Signal Free Corridors (Fig. 1) usually have footpaths attached with it to provide a safe walk for the pedestrians. Other than that, specialized pedestrian footbridges or tunnels are also provided at various spots along the corridors after careful and detailed study of the pedestrian movement involved at the spots.

These facilities enable pedestrians to cross the freeway at that point without coming on the main roads and risking their lives as the vehicles are moving relatively faster along the signal free corridors. However, these facilities are rendered useless and a waste of the funded money when the pedestrians prefer to cross the busy corridors at grade risking their lives and also the lives of the motorists. Not each hale and healthy citizen is willing to climb the tiring steps of the pedestrian bridges and cross the street safely. This scenario is quite evident in Karachi where the citizens lacking basic civic sense risks their lives and jump off the heavy New Jersey barriers installed along the medians of the corridors prohibit road crossing across the streets.

Karachi experienced a vast development in its infrastructure in the last five years with the emerging concept of the signal free corridors. Three corridors have already been completed in these few years and two more are currently under construction phase. Though not a permanent solution to the city's ever-growing population and traffic problems, the signal free corridors have eased the traffic problems temporarily for at least ten years. Although the sophisticated and well-designed signal free corridors allow for easy, smooth and uninterrupted transitions between busy arterial roads they do have a few drawbacks and shortcomings that need to be looked into. The road safety situation which has now worsen greatly after the construction of these signal free corridors should be considered and proper safety provisions should be devised to overcome this hazard.

In this paper, the vehicular traffic involving different types of vehicles namely two wheelers, three wheelers, four wheelers and heavy vehicles crossing the junction have been counted. The data is analysed and suitable recommendations were made.

Figure 1 showing signal free corridor

1.2 Need for Signal Free Corridor

A signal free corridor can improve the availability, connectivity and ease of access to all road users. It can reduce the travel time and travel congestions like traffic jams, delays. The fuel emissions at the signals can be reduced and hence the levels of pollution can be controlled.

1.3 Grade separated intersections

Flyover (Fig. 2) is a high-level overpass, built above main overpass lanes, or a bridge built over what had been an at-grade intersection. Traffic engineers usually refer to the latter as a grade separation. A flyover may also be an extra ramp added to an existing interchange, either replacing an existing cloverleaf loop (or being built in place of one) with a higher, faster ramp that eventually bears left, but may be built as a right or left exit.

A cloverleaf or partial cloverleaf contains some 270-degree loops, which can slow traffic and can be difficult to construct with multiple lanes. Where all such turns are replaced with flyovers (perhaps with some underpasses) only 90-degree turns are needed, and there may be four or more distinct levels of traffic. Depending upon design, traffic may flow in all directions at or near open road speeds (when not congested). For more examples see Freeway interchange.

2.0 LITERATURE REVIEW

C.C. Bhattacharya considered safety as a key objective and introduced traffic calming techniques. The sole idea for this study is to enforce a speed control to 15 to 20 km/hr, is considered as a safe speed of travel. Methods performed and designed in this study are changed in street alignment, installation of barriers and installation of other traffic control devices as the situations demands. Reduction in number and severity of accidents, improve facilities for non- motorized modes, increased in property values etc are the benefits of traffic calming conducted a study on traffic flow characteristics which included traffic speed, volume, density, etc. on two stretches. The field study was carried out for 1km length on each stretch. The experiments were conducted between the average peak periods on week days. The traffic densities and vehicular speeds were observed through regression equations. The speed – flow relationships were drawn and concluded that the speed decreased with the increased in volume.

Fig 2. Flyover

Fig. 3 Underpass

Field surveys were carried out to find classified volume count and speed data was obtained manually and through video graphic method. Mutli regime speed flow relation is developed based on data extracted from the field. Based on volume to capacity ratio level of service are established by cluster analysis approach. The results are very useful for evaluation of traffic quality for access controlled urban arterials in mixed.

It is found that the capacity and speed predicted by Indonesian HCM are too high. The effects of side frictions, e.g.: on street parking, city bus stopping anywhere on the roadway (there is no specific bus stop for city bus), exit/entry vehicles and U-turn vehicles are higher than those predicted by Indonesian HCM. It is concluded that, when the side friction is too high, there is a significant different between the actual speed/capacity and that predicted by Indonesian HCM.
The signal system must meet the following criteria, 1) Passenger Car Unit, PCU and 2) Level of Service, LOS. To adopt a signal system, the volume of traffic in any of the lanes should be greater than 1000 (i.e., PCU >1000). In this city, there are many junctions which need a new signal system and Mandamallamma junction is also one of such kind.

3.0 METHODOLOGY

3.1 General
The methodology adopted for the study is discussed.

A Detailed site investigation which includes reconnaissance and topographical studies
A reconnaissance survey was done to identify the issues pertaining to the intersections, parking, black spots, etc as well as identify the traffic circulation pattern in and around the study area. This was followed by the data collection effort in the form of primary and secondary surveys where primary surveys like traffic volume counts, bus boarding & amp; alighting. Bus passenger opinion, parking surveys, etc were carried out to obtain an idea of the traffic scenario of the study area.

B. Traffic survey and analysis
The collected data was analyzed to identify the Roadway Segments capacity and Level of Service (LOS), based on the Indian Roads Congress (IRC) standards sourced from Guidelines for Capacity of Urban Roads in Plain Areas IRC 106-1990.

C. Preparation of conceptual design
The next step was to propose section specific interventions to the identified issue and prepare implementation plan. Based on the need of urgency, the interventions were classified as short, medium and long-term measures.

D. Reconnaissance survey Classified traffic volume count was conducted in each mid-block
Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. These data can help identify critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow, or document traffic volume trends. Spot speed studies were conducted in all mid blocks: Spot speed studies were done at different times to identify the speed of vehicles in each midblock. The instrument used for spot speed study is RADAR gun which gives as instantaneous speed of each vehicle. Floating car method did speed and delay: Speed and delay studies were conducted during peak hour and non-peak hour on each midblock by floating car method. Here the time required to cover the entire road stretch is noted down and delay caused due to different factors in noted are recorded Road way width, Shoulder width, and Median width, Distance of each mid-block, Footpath width and Car parking areas.

3.2 Data Collection
The following data is collected for the study -
Geometrical condition of the road, which includes collection the lane width & shoulder width. Volume count for mixed traffic, manual method collected the data. The spot speed data was also collected simultaneously using baseline method manually. All the relevant data were collected by manual method at the selected stretch.
The traffic volume and spot speed was collected for both directions by manual method.

The period of the volume counting is divided into 30 minutes intervals at the junction as follows:

A. First stretch - from Balapur to Sagar Road (Fig. 4, 5)
B. Second stretch - from Owaisi to Balapur
C. Third stretch – from Sagar Road to Owaisi
D. Fourth stretch – from Sagar Road to Balapur

The data has been collected for a duration of two weeks, only sample data (as shown Table 1, 2, 3) is included here. As shown in the Fig.6 the junction after adopting a signal free corridor.

Fig 4 Road Map showing the Mandamallamma Junction

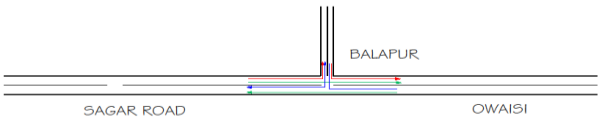

Fig. 5 Present scenario of Mandamallamma Junction

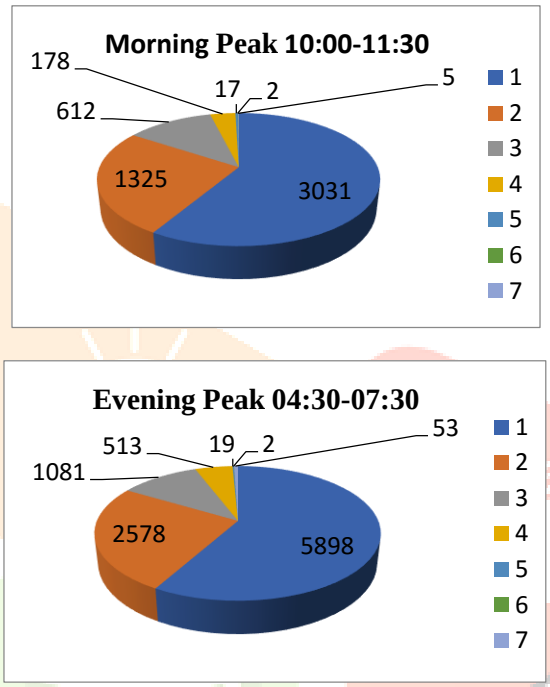

Fig.6 Traffic Moving Owaisi Hospital to L.b.nagar

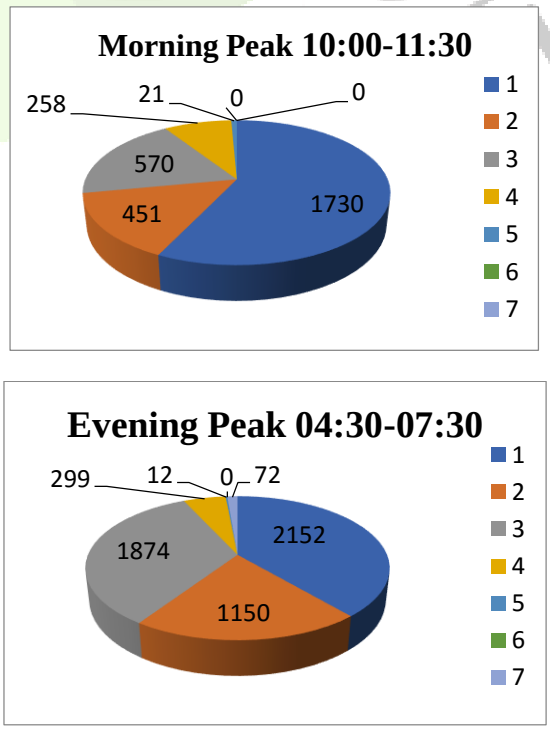

Fig.7 Traffic Moving Owaisi Hospital to Balapur

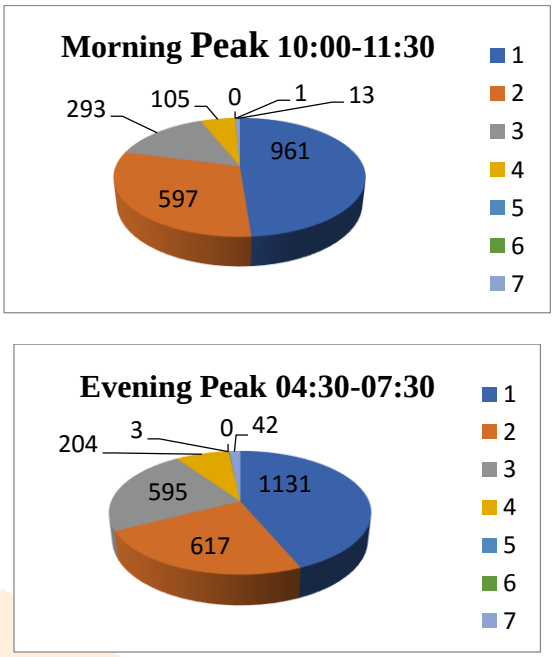

Fig.8 Traffic Moving Balapur to L.b.nagar

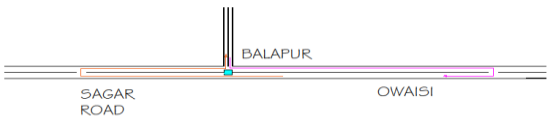

Figure 6 Mandamallama Junction after adopting a signal free corridor.

CONCLUSIONS

Hyderabad is the best due to many factors like IT, culture, emerging industries, and employment, etc. There are many people from all over the country living here. The density of population is increasing with the increase in the population, and hence the density and volume of traffic is ever increasing. A Signalized system should be installed to cater to the needs of the ever-increasing traffic.

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