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Research Paper

"Traffic Congestion and Speed Delays at Benz Circle, Vijayawada Due to Construction Activities", A Case Study

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Abstract:

In urban areas, traffic congestion is a major problem. Heavy traffic flow on National Highways with high speed, when mixed up with local traffic at crossings, traffic congestion is likely to occur. This causes many negative effects like pollution, delay, accidents and improper traffic management at crossings. At Benz circle one of the rotary intersections in Vijayawada, the above problem frequently occurs. To reduce the ill effects, some solution is needed to be provided. So, as a solution- Construction of flyover at this intersection is proposed and accepted as the best alternative or solution for the problem. For this classified volume count survey and analysis is carried out and the capacity of the existing lane is checked. But in the mean-time of construction there might be increase in the traffic congestion and speed delays due to the diversion of routes.

Keywords: *Flyover Construction, Rotary intersection, Speed Delay study, Traffic Congestion, Volume Study.*

1. Introduction

Indian cities are facing the crisis of urban transportation. Despite of investments in road infrastructure and plans for transport development, user faces the problem of congestion, accidents and pollution [1]. Accident is a major problem, especially at the intersection of national highway and other roads. Also due to traffic jam, lot of time is wasted. Pedestrians face troubles in crossing the road. Due to congestion, pollution increases and it causes harmful effects on human health living adjacent to the area [2]. National highway traffic delay and improper management as well as poor control over the flow of traffic increases rapidly is checked. As the proposed flyover is best solution to traffic congestion and speed delays, it might be remarkable as the traffic free zone after the construction

2. Objectives

- To determine the various factors leading for traffic Congestion at Benz circle intersection. Identification of such places where traffic congestion is more predominant based on the above factors. To identify various alternate measures for the control of traffic congestion.
- To satisfy that the control measure THE CONSTRUCTION OF FLYOVER which is proposed as the best measure.
- To study the remaining traffic and road safety issues at the Benz circle intersection and suggest the best alternate routes for diversion of traffic during construction.
- To make suggestions to further improve the performance of the fly over after its construction

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3. Literature Study

Every nations benefit from a well performing transportation network. It helps the business enterprises to manage inventories and transport, access suppliers and market for their products [3]. From the journals, article- a study of flyover bridge improved intersection and solution for reduction of traffic congestion we have came to know what are the different alternatives can be adopted as a solution for traffic congestion and in which conditions, what is the best alternative and also various factors that lead to traffic congestion, speed delays etc… and how to overcome this problems is known. The construction of flyovers, bridges and underpasses considered as an effective way of managing traffic and avoiding the traffic delays. It helps in reducing unnecessary wastage of fuel while waiting in the traffic signal [4][5]

4. Methodology

A research framework consists of six steps., the first is selecting

case studies covering all regions, the second is collection consists of physical data , traffic data and accident statistics, the third is data assessment, fourth is data analysis and comparison data consists of the control at intersection, road safety, accident cost and these data is used for determining in terms of traffic control such as phase times, time delay, vehicle queue length and level of service, then conclusion step and the last step is recommended to improve the case studies to better control.

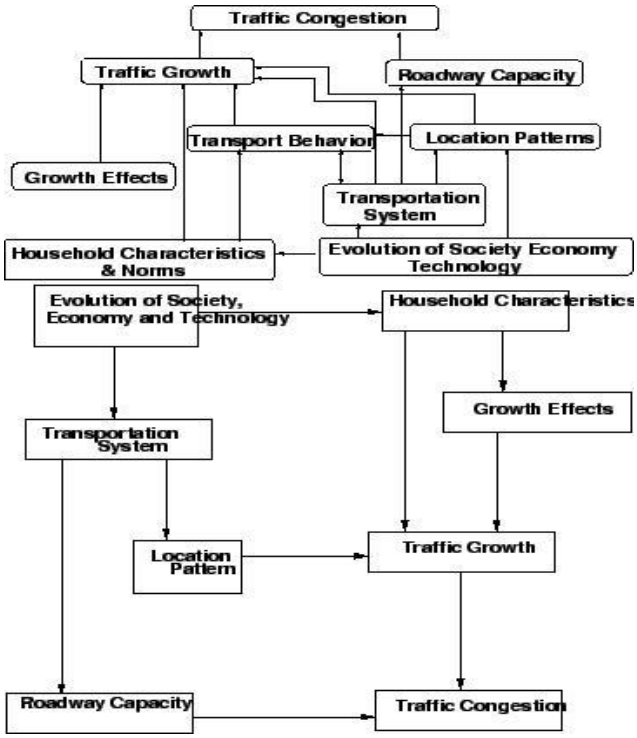

Fig. 1: Tree showing how the traffic congestion is caused

5. Selection of area of study:

The area of study considered for traffic congestion and speed delays at Benz circle one of the rotary intersection. This area is considered as it serves and important intersection for the local as well highway traffic. As the importance of junction for networking increases, all other phenomenon like traffic congestion which lead to congestion, speed delays, longer trip timing etc Based on the fact that demand for the traffic flow is increased then that of the supplied capacity of lanes there is a need for the upcoming of a solution to meet the demand in the possible best way. By considering various factors like the limited area so extension cannot be taken into account, based on the commercial construction near the intersection and various other factors construction of flyover is proposed as best alternative as a counter measure for traffic congestion.

In the mean-time traffic is diverted to other alternative routes, as the construction activities have to be done. So during the construction period traffic congestion will be increased much more than the present.

6. Existing Condition at Benz Circle

Fig. 2: An aerial view of Benz circle

At the present situation there is a lot of traffic congestion at Benz circle due to the following factors:

- Due to the construction activities of flyover. The process of digging and excavation is taking place. Traffic congestion.
- The capacity of intersection is decreased due to the decrease in lane width.
- Diversion of traffic is not up to the level and hence the increase in traffic with decrease of capacity leads to the traffic congestion.

7. Data collection:

Not only on-fields collected data, but also the important information such as the construction costs, number of casualties and flyover design.

8. Details of flyover:

It is considered as the iconic of Vijayawada city. It is one among the two infrastructures which are considered as the beauty of the city and which serve as the best traffic congestion control measure. The flyover is of 1.50kilometres length and of six lanes from Jyothi mahal to Ramesh hospital junction. The estimated cost of flyover is of 220 crores and is undertaken by Dilip buildcon.

9. Reason for considering the flyover as best Alternative:

Benz circle being a rotary intersection it serves for the flow of heavy traffic as well as local traffic. But due the increase in the volume of traffic and decrease of capacity has arise the problem for the need of new alternate to serve the flow. Then based on the dimensions of intersection other alternatives like roundabout, underpass, redesigning of the intersection seemed to be uneconomical and not beneficial up to the requirement. So Flyover is the only way to control traffic by using the space available at the intersection.

10. Construction activities at Benz circle

At present the green belt is considered for the construction. Previously discussions have been done for the area to be considered for the construction as the mid way of intersection that is at the regular traffic flow, but due to the reason of entire blocking of traffic and totally the construction of flyover will be of no use, so they

considered the green belt region for construction at present soil has been excavated and it is dumped far away from the city and the earthwork excavation has been done for the pile foundation for about 40m

Fig. 3: Construction activities at Benz circle

Fig. 4: Construction activities at Benz circle

11. Data assessment

11.1 Volumetric **study or traffic data collection**

The traffic movement is counted at each leg/direction that vehicles entering to the intersection , at location marked as 1,2,3,4 at the intersection; the traffic movement counted at locations marked as A,B,C and D. The vehicles were categorized into five groups; 2-wheelers, 3 and 4 wheelers, 6- wheelers, Bus and Heavy duty. The traffic volume is converted to equivalent passenger car unit by the unit factor 0.33, 1.0, 1.75, 2.25 and 2.25 respectively. From the volumetric studies the following data is collected. They are:

11.2 Classified volume survey

11.2.1 Volume Survey during normal week days

Table 1: Data collected during normal week days

Time	Two wheeler	Three wheeler	Four wheeler	Heavy vehicle
8 A.M. to 9 A.M.	920	1250	1090	1090
12 P.M. to 1 P.M	1165	1221	1673	945
5 P.M. to 6 P.M	1112	1540	1563	1255
Total	3197	4011	4326	3290

- From the above survey it was found that the during the following hours namely from 8 A.M. to 9 A. M. from 12 to 1 P.M. and from 5 P.M. to 6 P.M. the flow is more than the other period of times due to various activities of a day take place particularly at that hours so by which they got the name peak hours.

- Due to the construction activities the use of the service roads has been increased to divert the traffic from being entered into the left leg of the intersection. Traffic is increased when compared to that of the traffic before that of the construction activities of flyover because of the decreased capacity of the lane.

11.2.2 Volume Survey during weekends

Table 2: Data collected during weekends

Time	Two wheeler	Three wheeler	Four wheeler	Heavy vehicle
8 A.M. to 9 A.M.	1120	1100	900	1000
12 P.M. to 1 P.M	1000	1300	1500	1100
5 P.M. to 6 P.M	1300	1100	1250	1450
Total	3420	3500	3650	3550

- From the above survey it is clear that the traffic is increased during the weekends as Vijayawada is considered as the most residential colleges zone and during these days traffic will be much effected due to outing of the students and transportation means demand will be increased.

- In weekends transportation will be increased due to other reasons like vacations, shopping etc…

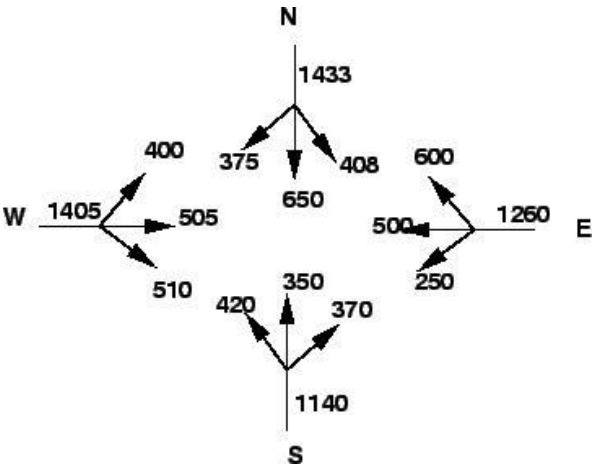

Fig. 5: Traffic flow at each leg of the intersection.

11.2.3 Speed studies:

It includes the study of speed and delay studies. The results obtained from the above study are as follows:

The distance between Ntr circle and Benz circle is approximately one kilometer. If the vehicle is travelled at a design speed of 30kmph it takes an average time of 2minutes to 3 minutes to travel the distance, but at the present situation it has a taken a minimum of 10min to travel the distance due to increase of traffic

11.2.4 Queue length

It is the length occupied by the vehicles when one phase of the lane is controlled of its movement. From the above survey about half of the kilometer or 500metres is occupied by the vehicles at one leg section when one phase of intersection is controlled from its traffic movement

The above image resembles the situation at Benz circle which describes the speed delays and queue length for about half of a kilometer.

Fig. 5: Traffic congestion at Benz circle.

In order to divert the traffic flow various alternate routes are considered for the diversion of heavy traffic. So that they can be avoided from entering into the intersection and hence flow will be decreased. First and foremost widening of Kankipadu bypass is taken into priority basis.

Some of the implementation of intelligent transportation system to the development of transportation sector so as to resemble foreign techniques in India. Improvement and maintenance that can be made to the flyover after construction of it are:

- Video vehicle detection: traffic-flow measurement and automatic incident detection using video cameras.
- Sensing technologies: new innovation like merging two technologies like metal detection and a GPS tracking system would be helpful to detect the illegal weapons travelling and with the help of GPS tracking it would track the vehicle which is transporting illegal weapons.
- Vehicle re-identification: This method requires sets of detectors mounted along the road. In this technique, a unique serial number for a device in the vehicle is detected at one location and then detected again further down the road.
- GPS and navigation devices: This type of ITS is being used to the maximum extent which helps in reducing the congestion. It enables the user to understand the congestion areas and avoid the traffic congested areas. So that traffic congestion will be reduced to some extent.

By using some of the ITS technologies it would definitely resemble foreign technologies in India and will also help in the increase in safety of users.

12. Conclusion

Above discussions shows that because of heavy traffic flow at Benz circle the need for the control measure of traffic congestion is arises. But in the mean time of construction of flyover in spite of decrease in the traffic congestion it has increased for about 30-35% than that of before. The cause for increase is that during construction soil excavation is done and to transfer the soil which is excavated heavy vehicles are used to dump them outside of the city. In addition to that the lane capacity is decreased due to blocking of half the width of road which is known as green belt. Due to the following factors traffic congestion is increased and it is proved by the classified volume studies and speed and delay studies conducted at week days as well as weekend days at the area of interest. Hazardous zones in the intersection area spread out to other zones which are approaching and exiting areas, at the work active zones the conflict points are increasing.

Even though it is a clear evident of speed delays and traffic delays at Benz circle due to construction activities, the way handling is efficient as much as it can. It is the only way on which heavy vehicles can flow along the regular traffic and no other routes can be provided in any aspect based on the physical characteristics and location of Vijayawada city. So the provided precautions and networking pattern is the best one.

In order to meet the advantages of construction of flyover, smooth flow of traffic has to be achieved in the mean while of the construction. So in order to allow the traffic flow various alternate routes are suggested , among them which will be the best alternate route and in which way the constructed flyover has to be maintained with new and developing technologies in order to be as an iconic for the beauty of Vijayawada city will be studied.

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