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The Design of the Flyover Toll Plaza Model to Minimize the Construction Area of Toll Plaza

S. Vijay Prasad[1], Ranadheer Donthi[2] and Mahesh Kumar Challa[3]
[1]Assistant Professor, Department of Mathematics,
Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur 522502 (Andhra Pradesh), India.
[2]Professor, Department of Mathematics, St. Martin's Engineering College,
Dhulapally, Kompally, Hyderabad, 500100 (Telangana), India.
[3]Department of Computer Science and Engineering,
BV Raju Institute of Technology, Narsapur, Medak, 502313 (Telangana), India.

(Corresponding author: S. Vijay Prasad)
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ABSTRACT: Now a day's toll gates are very common on each and every national highway and users of these toll gates are paying the toll tax to the government or infrastructure companies. In the recent years the automobile technology has been developed lot, due to this reason the usage personal vehicles has been increased even though the public transportation system is available and traffic also has been increased on the roads in the recent years. Because of the increased traffic many roads are expanded according to the requirements and toll gates also are increased due to lack of sufficient time and funds with the government. These toll gates are occupying lot of agriculture land throughout the country. Many research articles focused on to reduced the traffic and electronic payment methods at toll gates, but this research article focused on the importance of the agriculture land and to minimize the construction area of tollgates and new model has been introduced to reduce the construction area of the toll plazas.

Keywords: Design of Toll gates, Flyover model, Traffic, Vehicles, Construction area, High ways, waiting time.

I. INTRODUCTION

Every day million of people are travelling from one place to another place by using different mode of transportations out which many people are using the road transportation very frequently and also to transport the goods such as raw materials, manufacturing materials etc. In the recent years many changes has been takes place in the automobile industry more number of compact vehicles are designed due to this reason many people avoiding the use of public transportation and started using personal vehicles. Because of the usage of the more number of personal vehicles the traffic has been increased more and more on the roads. Because of the increased traffic many roads are expanded according to the requirements. due to lack of enough time, employment and the funds with the government, they are calling the tenders from the Infrastructure companies and give them this contract on making the road in a limit of time and after developing roads these companies are allowed to setup toll plazas on the planned location where the vehicles have to pay the toll in return of using the roads. Because of this reason many toll plazas are there on the roads.

The area where toll has been collected is called toll plaza. In the recent years toll plazas are frequently referred by the public, media and even designers as toll lanes, toll gates, and toll booths. The toll plazas are design according to the traffic flow, types of toll tax collection and its location and these things are significantly affect the layout, size, and pattern of the plaza and in addition the maintenance and operation of the toll plaza and its staffing are functions of the collection methods.

These toll gates have been occupied large amount of agricultural landscapes. The agriculture cannot be undervalued because the enhancement of agricultural production is helping fruitfully preserve a secure profitable growth of any country in the world. Every citizen from all sectors of the country ought to work mutually to make sure the food security as well as the employability. Agricultural products are the indispensable resource of food supply to the countries of the world and generate employment to the daily wage laborers like farmers, drivers, technicians of farming machinery and soon. Farming goods are the essential source of raw material for industries.

II. LITERATURE REVIEW

Every day thousands of people paying toll tax when they are passing through the toll plazas out of which many people are affected by the traffic which leads to waiting time of passenger and drivers which leads to delay to reach the offices, schools, hospitals and meetings which leads to disciplinary action, lost business or other personal losses and which leads to stress and frustration and also vehicles are waiting for long time at toll plazas leads to waste of fuel which increases the air pollution. The toll plazas are not permanent on the highways, the toll plazas will be removed after the recovering of the construction and maintenance cost. The first electronic tolling system was introduced by William Vickrey who was the winner of Nobel economics prize. And many researchers like Hushangabade and Dhopte [1]; Nandhini and Premkumar [2]; Mahajan [3]; Laghari *et al.*, [4]; Satyasrikanth *et al.*, [5] were studied and implemented electronic toll collection system and

focused on to reduced traffic issues at toll plazas. Erisman *et al.*, [7] recommend a holistic proposal that add to the expansion and performance of sustainable farming put into practice that mutually make use and sustain biodiversity and environment armed forces together in agricultural and in partially natural neighborhoods.

Many research studies pointed out on to reduced the traffic and electronic payment methods at toll gates, but This research paper paying attention on the importance of the agriculture land and to minimize the construction area of toll plazas and new model has been introduced to decrease the construction area of the tollgates.

III. RESULTS AND DISCUSSION

A. Present Model

The toll plaza which is located on national highway 16 (NH 16) at Kaza between Vijayawad and Guntur, it has been observed that there are sixteen lanes and sixteen toll booths are parallel one after another as shown in the fig.1 and each of the lane width is of 350 cm and each of the tollbooth width is of 180 cm. For operating one toll booth covers the total width of 530 cm of the place and the sixteen toll booths has covered the total width of 8480 cm.

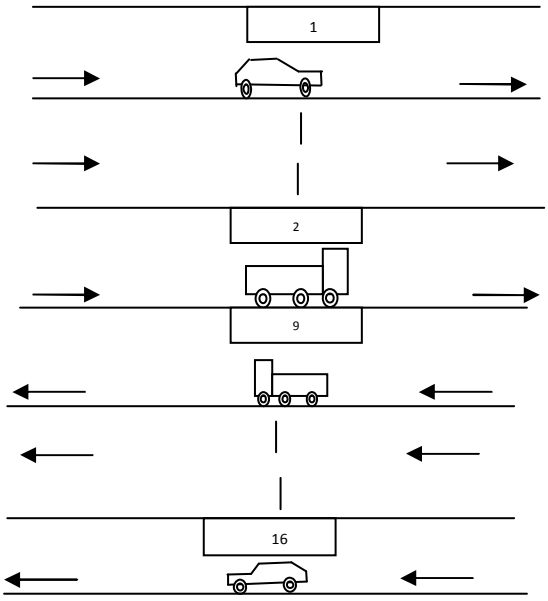

Fig. 1. Present toll plaza model.

B. Proposed Model

The flyover toll plaza model consisting of two lanes together at a time, one is at the ground level and the second one is at the flyover level. At ground level there will be one toll booth and one lane and the second booth and second lane are on the top of ground level toll booth like flyover. The ground level lane is for heavy motor vehicles which are having the maximum width of 260cm, like bus, truck etc., and the flyover level lane is for light motor vehicles which are having the maximum width of 180cm, such as cars and jeeps etc. as shown in the Fig. 2.

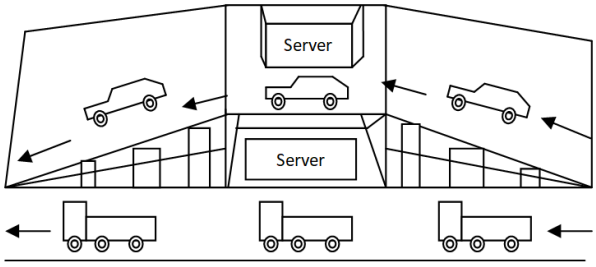

Fig. 2. Fly over toll plaza model.

At ground level lane is same as in the present model which 350cm, and toll booth width is of the 350cm and the flyover lane width is of 240cm and tollbooth width is of 110cm, the total width flyover is of 350cm to operate the flyover toll gate. The total width of 700cm is requires to operate the two lanes and to operate sixteen toll gates it requires the total width of 5600cm only.

IV. CONCLUSION

In this research paper the construction area of the present toll plaza model and the new proposed flyover toll plaza mode has been studied and presented the results. The present toll plaza has taken the total width space of 8480cm to operate sixteen lanes where as the new flyover toll plaza model has taken the total width space of 5600cm only which is less as comparing with the present model. So the new flyover toll plaza model helps to operate same number of lanes with less width of the space without wasting agricultural land.

V. FUTURE SCOPE

In this research article the authors gave only idea but not given construction design and blueprint of construction and not calculated the waiting time of vehicles when different types of vehicles passing through the mode of lanes. The future work can be done with this idea; by using different software's do designs the blue print and queuing theory can be used to calculate the waiting time of the vehicles.

Conflict of Interest. There are no identified conflicts of interest associated with this publication of the paper confirmed by the authors.

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