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Feasibility Studies for The Effective Use of Reversible Fastag Lane and Overload Penalty Policy on Hybrid Toll Plazas

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ABSTRACT: Toll plazas typically seem a bottleneck for the flow of traffic on National Highways & Expressways and they induce highway traffic congestion, which in turn leads to loss of time and resources. One solution to solving this issue is to increase the tolling lanes, but that is an expensive alternative. So, another solution may be found out after studying the current ETC system implemented in India on 15 Dec 2019, in which all the lanes in the toll plazas shall be declared as 'FASTag lanes' while leaving one lane in each direction as hybrid lane to accept FASTag as well as cash payments. Therefore, a current study was conducted on Three Toll Plazas i.e. Purankhedi, Pagara and Jogipura located at Four lane Shivpuri-Biaora section of NH-46 (Old NH-3, Agra-Mumbai NH). Data were collected from Toll Plaza authorities and by conducting on-site survey. After analyzing the data collected, the reason for the delay is observed which results in long queue length, blacklist of vehicles, failure of toll plaza server, bank-end interruption, failure of weight measurement equipment during peak hour and variation in overload penalty charges etc. Several solutions to these problems are proposed in this study. Due to sudden rollout of 100% ETC at all the Toll Plazas in India, new guidelines were introduced to increase the departure rate through FASTag lane by removing speed breaker from tolling lanes. But this guideline can cause negative effects on toll plazas such as: Over-speeding, error in measuring weight of moving vehicles, accidents etc. Based on the limitations identified on the Shivpuri-Biaora toll sites, some suggested modifications are proposed for various traffic conditions and toll plaza layout. This report provides a valuable guidance for decision making and management.

Keywords – ETC, Toll Plazas, Fastag, Guidelines

1 INTRODUCTION

1.1 Toll Road: It is also known as the toll or turnpike road. It may be a public or private road through which the movement of vehicles is paid with a fee

Up to the previous financial year there is no provision of dedicated ETC lanes in which special type of penalties are imposed on the road user, instead of this as per previous tolling arrangements there is provision of only one dedicated ETC lane in each direction. But in the present era, Government needs to make all vehicle 100 % ETC, by installing FASTag in each and every vehicle. This program of Central Government is named as 100% ETC ROLL OUT programme and in this programme Toll Charges are charged only through Electronic mode (FASTag) and came into effect from 01/03/2021 otherwise any Non-FASTag vehicle comes in ETC lane then that particular vehicle needs to pay double toll fee in the form of penalty.

1.2 User Fee Collection: It is a method of road pricing usually introduced to help recover road building and repair costs in the form of charging traffic fees on toll roads from the plying vehicles. User fee rates typically differ by type of vehicle, weight, number of freight truck axles

1.3 Significance

It reduces delay at toll plaza and it also decreases queue length at toll stretch. There was significant amount of malpractices in manual cash collection, resulting to revenue loss to the concessionaire but after imposition of ETC method it was considerably reduced.

Due to implementation of ETC, now transporters are able to pay toll in a systematic and organized manner for their no. of trucks from a single account.

1.4 Effects of overloading penalty:

- It resists vehicle owner to reduce its weight due to huge overloading penalties.
- Help in reducing maintenance cost for repairing damaged roads.

1.5 RFID tag:

Active Tags	Passive Tags
Tag transmits radio signal	Tag reflects radio signal from reader
Battery powered memory, radio & circuitry	Reader powered
High Read Range (100meters)	Shorter Read Range (10 cm – 5 meters)

II LITERATURE REVIEW:

ETC Implementation related letters & Articles;

1.1 MORTH Vide Letter no.: -F. No. H-25016/01/2018-Toll Promotion of Digital payment through RFID based FASTag

In order to promote the payment through digital mode and to provide for a seamless passage through the toll plazas, it has been decided that all the lanes in the toll plazas shall be declared as 'FASTag lanes of toll plazas' by 1st of December 2019.

1.2 NHAI Letter no.: - DO. No. 11019/2019/CO

The Government decided to implement 100% Electronic Toll Collection using FASTag from 01.12.2019 at all Toll Plazas on National Highways and selected State Highways with the objectives to save time and fuel, and reduce pollution

1.3 NHAI launches special drive to remove speed breakers from national highway

From 15 December 2019, NHAI introduced Electronic Toll Collection through FASTag to provide free movement on highways without commotion. The positive effects of ETC are being felt by the passengers at the toll plaza. With the introduction of speed breaker free highways, NHAI has taken a step forward in its commitment to provide safe, smooth and uninterrupted travel to passengers on national highways.

1.4 Overload penalty policy letter

III. METHODOLOGY

3.1 Site location

The study is conducted on the Four lane National Highway No. 46 (Old NH-3, Agra-Mumbai NH) and the subject study is done on part of NH-46 that is from Shivpuri to Bhaora having length of 191.20 Km and it enclose three Toll plazas i.e., Purankhedi, Pagara and Jogipura which are commercially operated on this national highway for generating Toll.

3.2 Preliminary survey

How a toll plaza operates?

To study traffic flow pattern & directional distribution.

How does Toll Plaza management work for making smooth traffic flow during peak hour?

Also, to know the problem faced by Toll management while running the plaza.

IV. RESULT & DISCUSSION

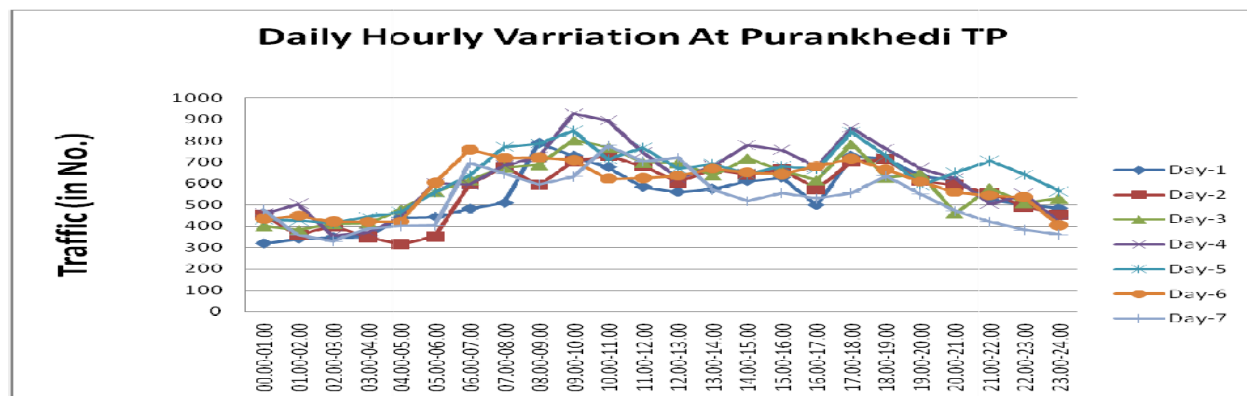


Figure 4.1 Seven days traffic flow at Purankhedi TP

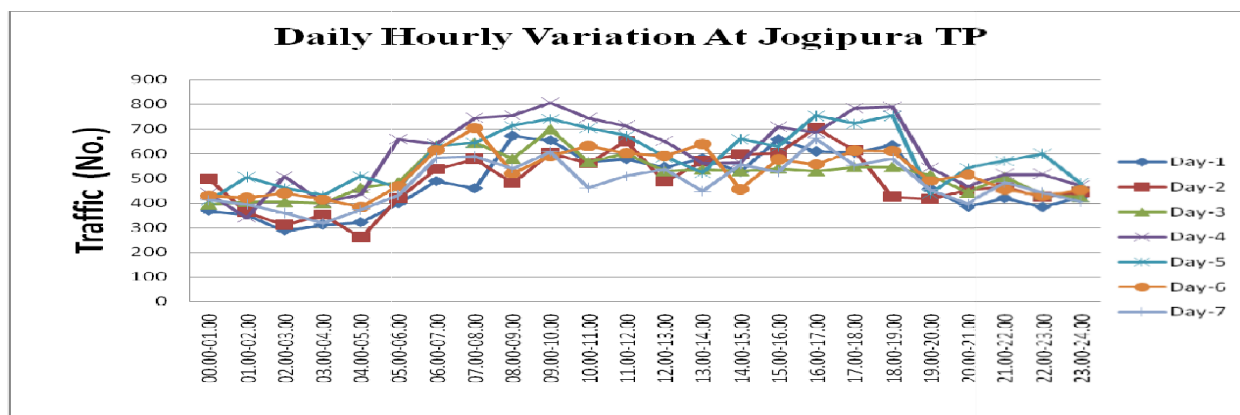


Figure 4.2 Seven days traffic flow at Jogipura TP

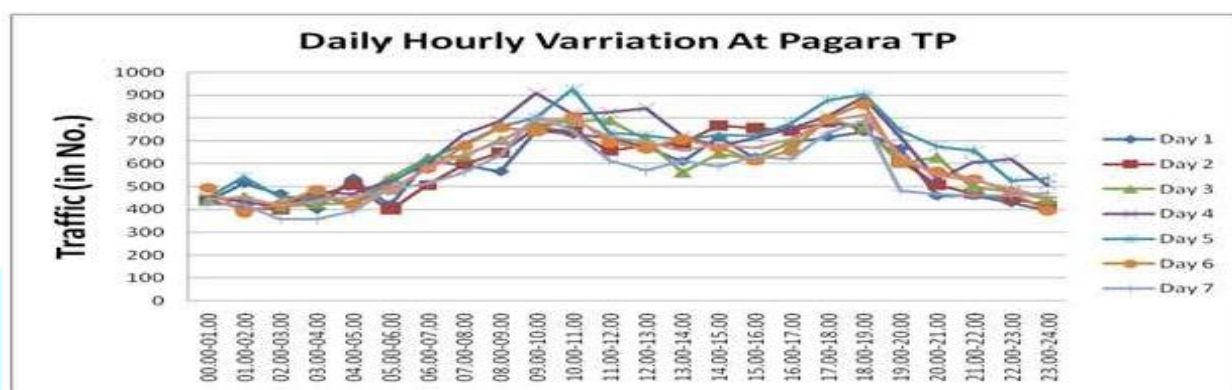


Figure 4.3 Seven days traffic flow at Pagara TP

V.CONCLUSION

5.1 Fascia Panel installed at Canopy of Plaza should be modified as per IRC: SP:84-2014.

5.2 Lane-5 & lane-6 are already existed reversible lanes but without proper lane display signs, so Lane-5 & Lane-6 are customized to overcome this problem. By providing proper overhead reversible lane signal along with overhead digital display board in which lane direction, class of vehicle as well as cycle duration etc. are displayed.

5.3 Results obtained by analyzing the Medium speed Weigh-In-Motion Bridge (MS-WIM), after 100% rollout of ETC on all the toll Plazas of India, new guidelines were introduced to increase the departure rate from ETC lane by removing speed breaker from the tolling lanes. But this guideline can create negative impact on toll plaza like; over-speeding, error in measuring weight of moving vehicles, accidents etc. So, to overcome above problem adopt any one suggestion;

Re-installing speed breakers on toll plaza premises

Replacing Ms-WIM by Hs-WIM which are capable in measuring weight of moving vehicle at high speed and produces less error in weight measurement

5.4 Based on the above analysis it was observed that maximum number of vehicles are carrying the overloaded weight in the range of 0% to 20% and paying minimum penalties. Hence, it is suggested to modify the policy in such a manner that for 0% to 20% range i.e., twice of user fee should be increased to four times or more so that the transporters can stop misusing the deficiencies present in the policy.

5.5 In the present scenario, the mode of payment for overload penalty is collected by the government in single mode i.e., cash mode. This is one of the major drawbacks in modern toll collection in which the government is insisting for ETC mode. ETC is a PAN India program for making Toll collection through FASTag. Hence after detailed study and analysis it is suggested to modify Handheld RFID reader to collect overload penalties at both toll booth and SWB cabin

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