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# TRAFFIC PROBLEMS AT JUNCTIONS IN VISAKHAPATNAM AND THEIR SOLUTIONS

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**Abstract - Visakhapatnam is the largest city in Andhra Pradesh state and also the revenue capital to the state. In 2015, Government of India declared Vizag as one of the 98 cities to be developed as a smart city. The favourable conditions for growth in the city, leading the vehicles on the road are also increasing in the city. Due to which the traffic problems like traffic congestion, traffic pollution are also increasing. This study involves addressing alternatives for junction improvements, and route diversions for free flow of traffic.**

**Key words: Junction improvements, Route diversions**.

## I. INTRODUCTION

The traffic is increasing due to people were using individual vehicles for their convenience, comfort and also for saving time in travelling, leads to rash driving, overtaking from wrong side "Abhijith Singh et, al.(2017), Singh et al.(2017)" which results in sudden rise in city traffic "Varmora et al. (2017)" another important factor is that public transport system is not adequate and is also becoming a challenge to the transportation officials to connect all routes and to provide in time delivery of goods and people "Kumar et al. (2018). Infrastructure facilities is a key factor in developing any zone, center, city in the country "Onkar et al. (2017), Panchal et al. (2015)". Road infrastructure had contributed 2% of the country's GDP "Pandey et al. (2015)".

The increased traffic causes many problems like

i. Congestion
ii. Accidents
iii. Pollution
iv. Parking issues.

Due to these problems public are experiencing difficulties in transportation. Developing countries reported about 70% fatalities due to road accidents "Sreedevi (2017)". Sometimes traffic related injuries and deaths were reported which affecting the country's GDP growth "Singh et al. (2017)" and also affecting their health due to increase in traffic pollution To safeguard the road users the standards of road safety should be improved and strict enforcement should be implemented to reduce fatalities "Kapila, et al., (2013)"

Traffic congestion is one of the important factor which increasing due to private vehicles and affecting the travel time and environment issues "Maji, et al., (2017), Thakur, et al., (2016), Pan, et al., (2013)". Traffic jams and vehicular pollution have become a great cause for concern. The bus traffic generated by a proliferation of many schools resulting in an increased congestion on roads "Vashisth, et al., (2018)".

The study address traffic problems identified and traffic impact study for the junctions and suggests alternatives for the city of Visakhapatnam. Traffic impact study is a useful thing for the developers and planners to develop transportation networks "Bindu, et al., (2019)" the traffic movements and problems were studied and observed by the authors and advice was sought from the traffic police whenever required.

The study includes addressing some traffic problems and suggesting alternative solutions for the Visakhapatnam city

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## II. FIELD STUDY

### 2.1. Relocation of traffic signal

The Carshed junction is a busy junction with multiple directions of traffic flow. All classes of vehicles are experiencing difficulties when negotiating, due to severe congestion at the junction.

The junction is located ($17^0$48’10.49’’N; $83^0$21’11.18’’E) on NH-16 and service roads on both sides with 7m width.

**Fig. 1. Traffic flow at junction**.


**Fig. 2a. Carshed signal junction from (Courtesy: Google Earth Pro)**

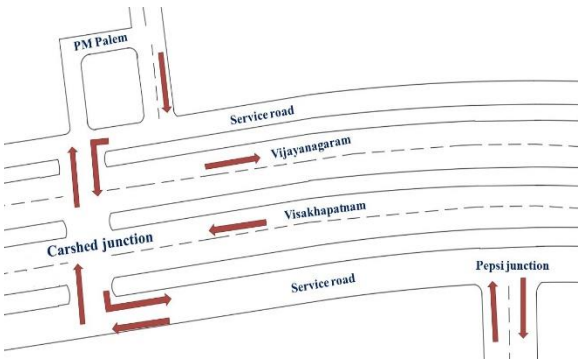


**Fig. 2b. Carshed signal junction**

From the study, it is observed that traffic at the junction is in six directions, viz., i) Visakhapatnam – Vijayanagaram, ii)Vijayanagaram – Visakhapatnam, iii)Carshed junction – Pepsi junction(17º48’18.48’’N, 83º21’13.94’’E), iv)Pepsi junction – Carshed junction,
v)PM Palem – Carshed junction, vi)Carshed junction – PM Palem(17º48’15.24’’N, 83º20’50.84’’E).

The traffic movements from Carshed junction-Pepsi junction, Pepsi junction-Carshed junction and also the traffic movements in PM Palem to Carshed junction route are becoming difficult due to insufficient turning radius.

From Carshed junction to Pepsi junction the road width is 7m. The traffic flow is in two directions. Buses and Lorries are experiencing difficulty when entering and leaving the Carshed junction. At Pepsi junction, the road width is 9m, which is sufficient for buses and trucks to enter and leave the junction, which is not the case at Carshed junction.

Vehicles which crossed V-Convention Centre intending to go to PM Palem, via Carshed junction on the highway, may be advised to avoid the highway and take the service road (which is 650m behind the Carshed junction) on the free left (shows in fig. 3) of the highway. So, unnecessary congestion may be avoided at Pepsi junction.

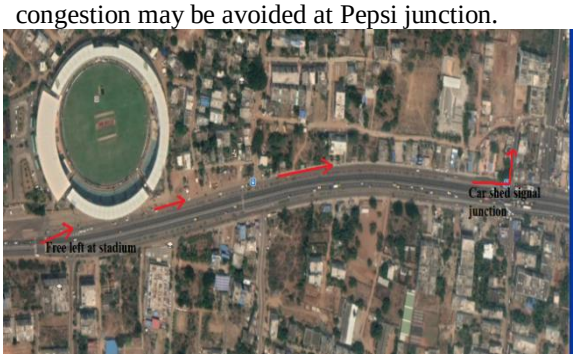


**Fig. 3. Free left from Cricket Stadium (Courtesy: Google Earth Pro)**

Currently, the vehicles from PM Palem intending to travel in different directions via the Carshed junction are experiencing difficulty to cross the junction. This is due to a moderately difficult ascending gradient (3% sudden rise) shown in Fig. 4 at the junction and also due to severe congestion at all times.

To solve this issue, it is proposed to relocate the signal from Carshed junction to Pepsi junction. Hence, the traffic from PM Palem is expected to enter the Pepsi junction via the service road (of length of 160m ahead of the current Carshed junction) and then split itself into various directions, shown in Fig. 5.

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Fig. 4. Unstable position of bus due to gradient

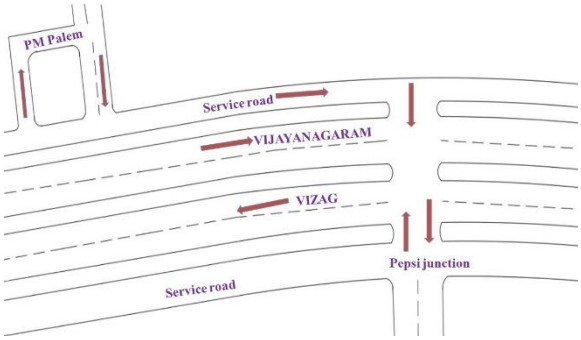


**Figure 5: Proposed relocation from signal near to Pepsi junction**

**2.1.1. Traffic surveys:**

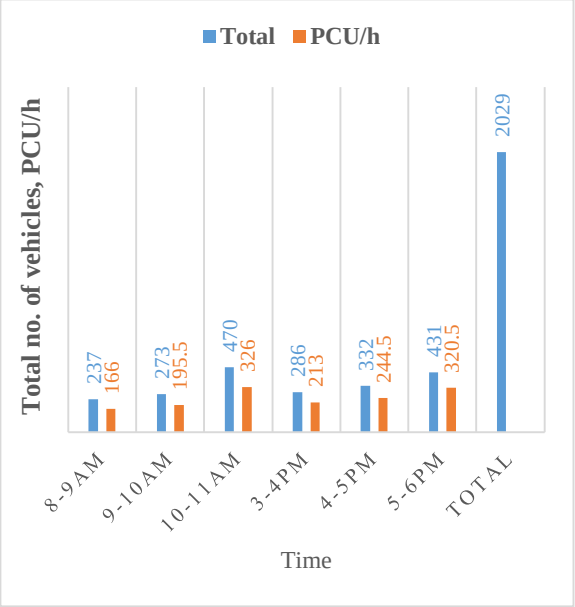


**Fig. 6 Traffic survey at Carshed-Pepsi junction**

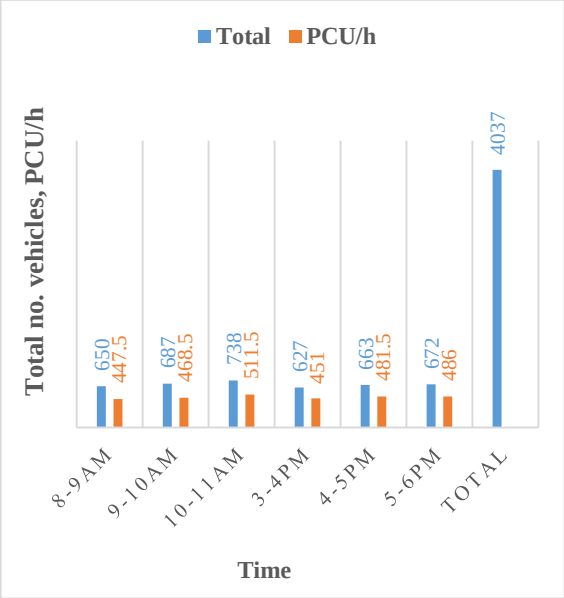


**Fig. 7. Traffic survey at Pepsi-Carshed junction**

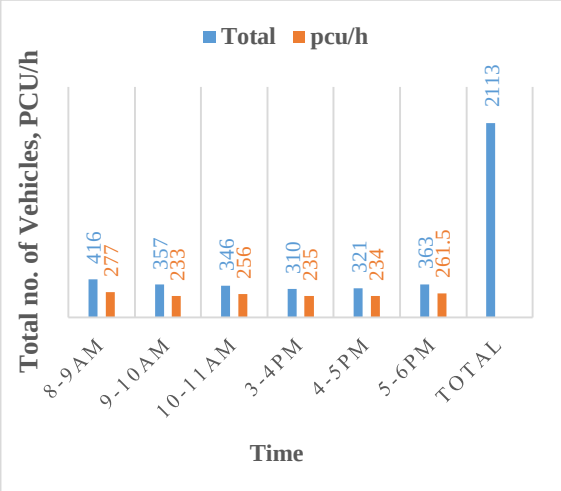


**Fig. 8. Traffic survey at Carshed-PM Palem**

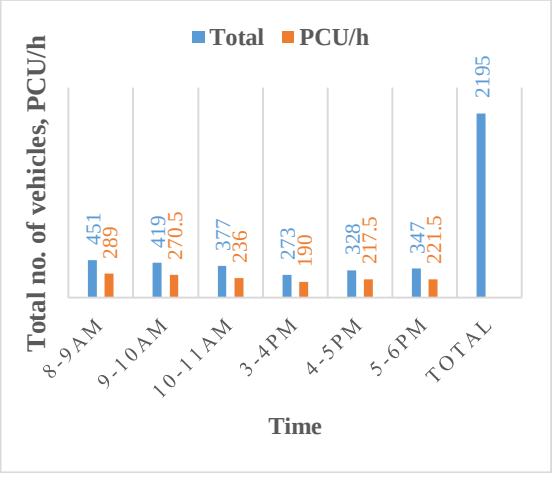


**Fig. 9. Traffic survey at PM Palem-Carshed junction**

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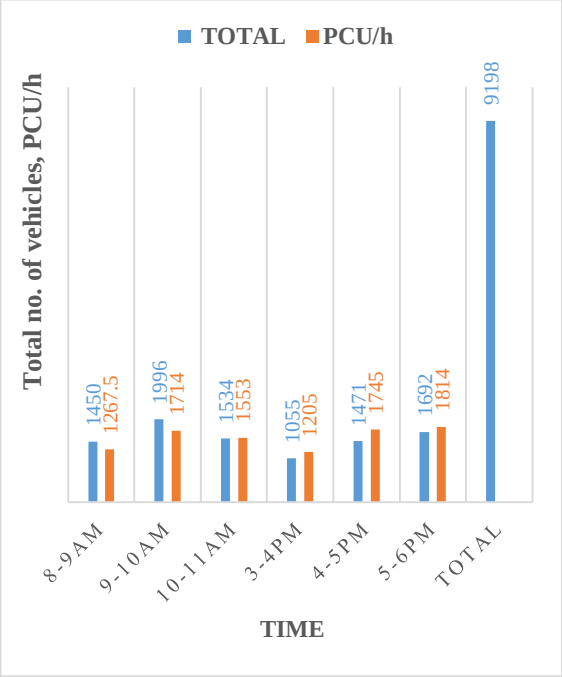


**Fig. 10. Traffic survey at Vijayanagaram-Visakhapatnam route**

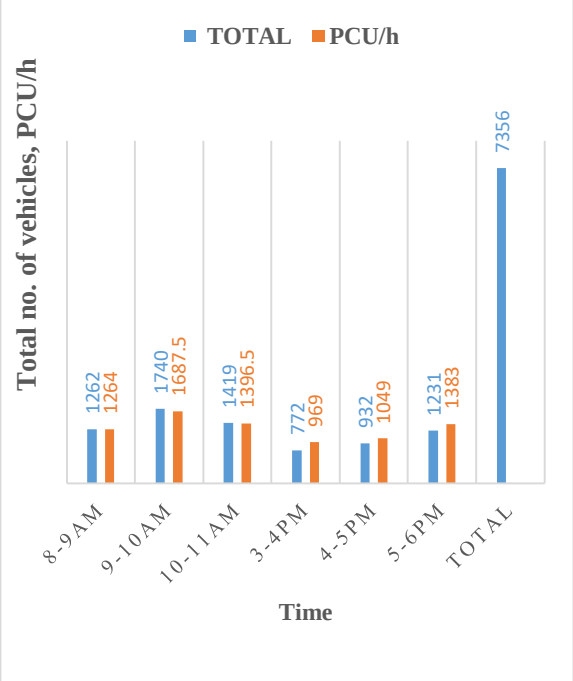


**Fig. 11. Traffic survey at Visakhapatnam-Vijayanagaram route**

Therefore, from Figs. 6-9, it is observed that the number of vehicles on Pepsi junction–Carshed route and Carshed-Pepsi junction route is more than that on the PM Palem –Carshed route and Carshed-PM Palem route put together. The most important point is, that a little over 2000 vehicles are to be diverted along the service road, adjoining the Cricket stadium (Fig. 3.) on the free left turn of the Carshed-PM Palem route. This was done to reduce the congestion at the Pepsi junction.

### 2.2. Traffic study at subway near RTC complex

A subway was constructed near RTC complex (17º43’28.28’’N; 83º18’30.85’’E) for one-way traffic flow from Jagadamba Junction (17º42’43.47’’N; 83º18’08.64’’E) to Maddilapalem. The traffic from Maddilapalem Junction bound for Jagadamba Junction was compelled to cross the traffic signal at the at-grade-intersection near RTC complex and as such this traffic was not allowed to use the subway.

This led to severe congestion at the traffic signal, and moreover the subway was partly used for most part of the day. In order to address this problem, the authors thought of an alternative, of opening the subway for two-way traffic. To support this thought, a traffic study was conducted by opening the subway for two-way traffic.

Fig. 10 shows the traffic using the subway for two-way movements, and the Traffic police personnel manning the traffic movements in subway.

As the results of the survey were encouraging, the authors reasoned with the road traffic authorities to open the subway for two-way traffic to relieve congestion at the traffic signal at RTC Complex. This solution was implemented in December 2018 and a marked reduction in traffic congestion at the traffic signal was observed much to relief of the road users. With this measure, the subway was also being put to maximum use in the form of two-way traffic.

Hence, the vehicles from Maddilapalem (17º44’08.2’’N; $83^0$19’14.52’’E) to Jagadamba Junction can now avoid the signal at RTC Complex junction and take the subway, thereby reducing the congestion and travel time.

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**Fig. 12. Traffic diverting to subway**

**Table - 1 Traffic survey results at subway**

| Type of vehicle | Number of vehicles towards subway | Number of vehicles towards RTC Complex | Total number of vehicles | % of vehicles towards RTC Complex | % of vehicles towards subway |
|---|---|---|---|---|---|
| **2-wheelers** | 4508 | 10935 | 15443 | 70.8 | 29.2 |
| **3-wheelers** | 520 | 5925 | 6445 | 91.3 | 8.7 |
| **4-wheelers** | 1179 | 2265 | 3444 | 65 | 35 |
| **Buses** | 34 | 655 | 689 | 95 | 5 |
| **Mini-trucks** | 167 | 339 | 506 | 70 | 30 |
| **2-axle heavy-duty trucks** | 15 | 28 | 43 | 65 | 35 |
| **Total** | 6423 | 20147 | 26570 | 76.3 | 23.7 |

**2.3. Alleviation of congestion in service road**

The traffic congestion at D-MART (a departmental store) is very severe in evening peak hours and it is terrible during weekends and holidays and is located ($17^0$48'56.13''N; $83^0$21'23.44''E) adjoining the service road in Madhurawada. The traffic movement in service road is in two directions. While entering and leaving D-MART there is traffic congestion as entry gate doubles up as an exit. Where one vehicle is leaving the Mart another vehicle is waiting in the service road for entry to the Mart. In this situation traffic builds up leading to congestion in the service road. The width of the

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entry/exit gate is 5m, which is insufficient to cater to the smooth entry and exit of vehicles. Four-wheelers are the worst hit. The Fig. 13-14 shows the situation at D-MART.

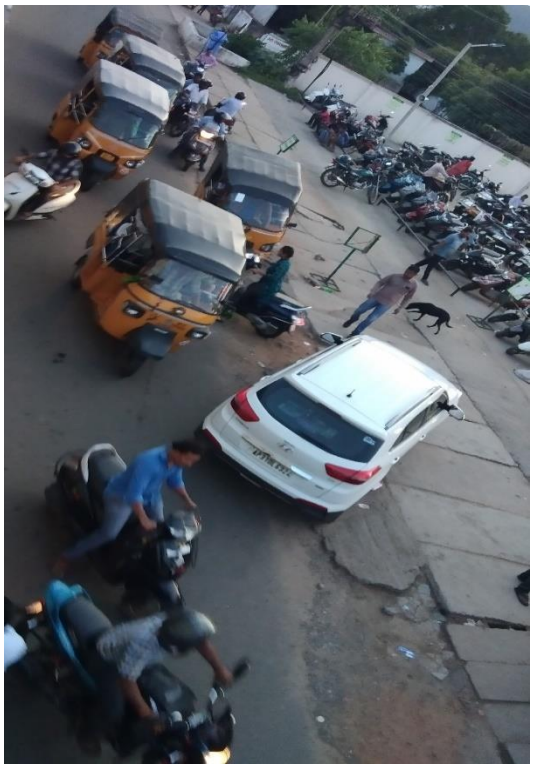

**Fig. 13. Traffic scenario at D-MART entrance**

**Fig.14. Traffic congestion at entrance of D_MArt**

Fig. 15 shows the entry and exit point of the Mart. The entry to the Mart is in two stages, viz., firstly from the service road over the covered drain perpendicular to the service road (by mounting a small ramp) and secondly entering the D-MART premises. There are in total two ramps to gain access to the Mart, in addition to the flat grade. Due to this the movement of vehicles is very slow resulting in traffic congestion. Another point to be noted is that the vehicles are stopping on the road in front of D-MART for dropping and pickup of people. Due to that stoppage of vehicles, there is traffic jams on the road. From the figure, one can see that there is drainage in front of D-MART which was covered by concrete slabs. If the vehicles are permitted to pickup and drop customers on the covered drainage, then there will be free movement of vehicles and vehicles will no longer halt on the service road resulting in reduction of traffic congestion.

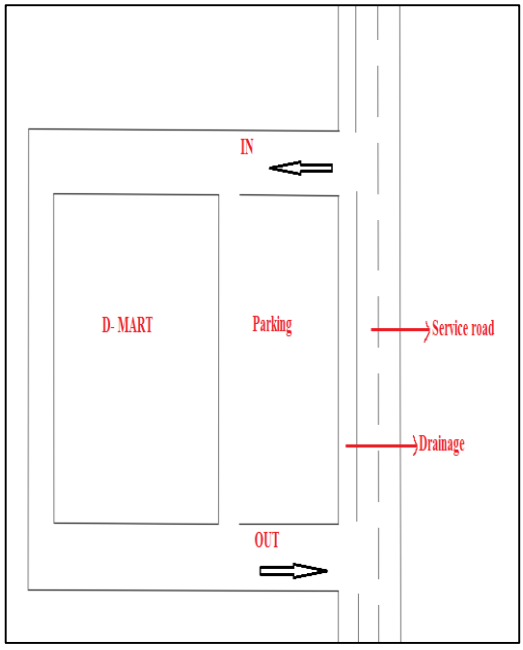


**Fig. 15. Proposed alternative arrangement for entrance and exit at D-MART**

Hence the entrance and exit to the D-MART may be planned as shown in Fig. 15. It is suggested that two separate ways be provided for safe entry and exit from the Mart. Hence vehicles will not be required to wait on the service road to enter or leave the Mart, resulting in considerable

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reduction in traffic congestion in the service road.

### 2.4. Proposal for RTC bus re-routing

Jagadamba Junction is a commercial hub of Visakhapatnam city. People frequent this place because there are many hotels and shopping malls. The traffic in this area is very horrible and high all the times. To reduce traffic congestion in the area, the road stretch from Jagadamba to the RTC complex has been considered. In this stretch the traffic is very high. The results of traffic survey are given below.

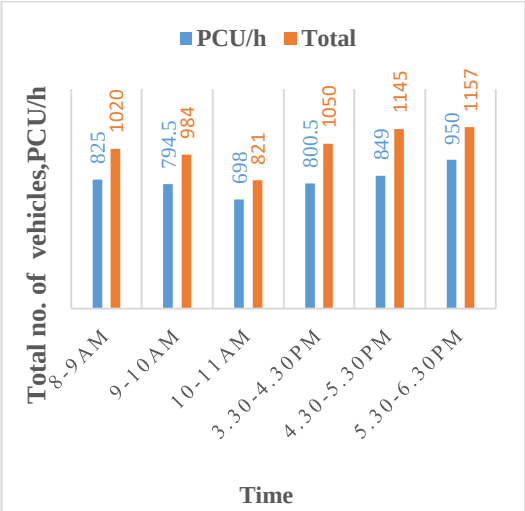


**Fig. 16. Traffic survey at Jagadamba-Jail road junction**

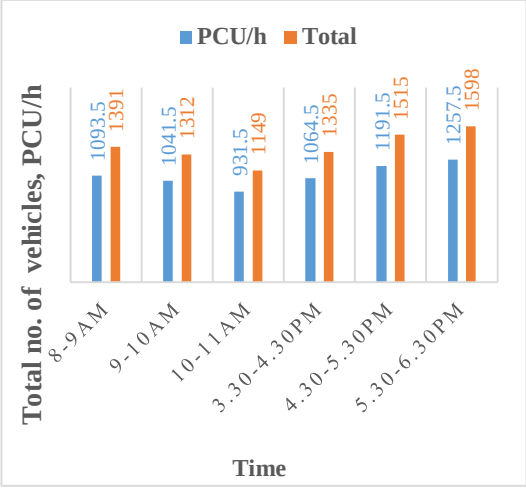


**Fig. 17. Traffic survey at Jail road-Jagadamba junction**

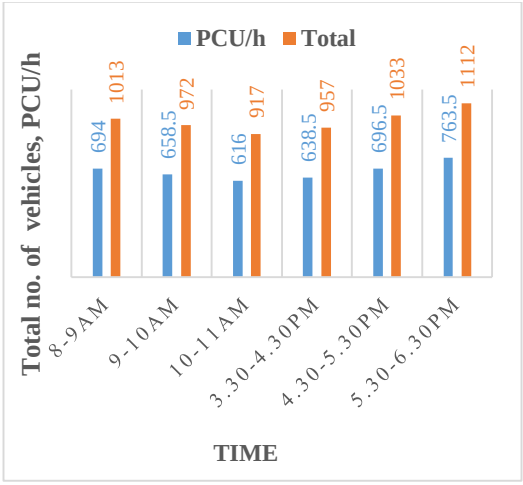


**Fig. 18. Traffic survey at Jagadamba-Seven hills Junction**

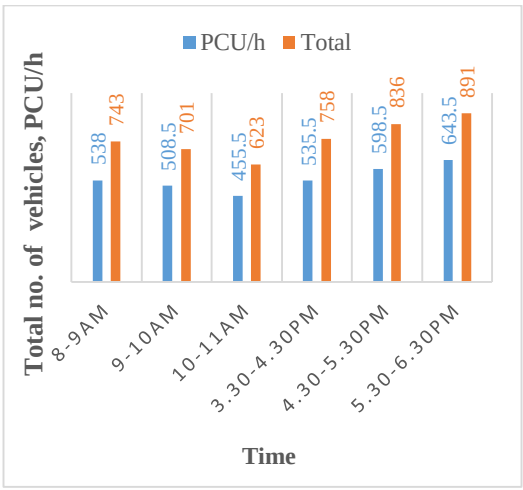


**Fig. 19. Traffic survey at Seven Hills-Jail road junction**

The stretch from Jagadamba to Jail road junction ($17^0$ 43’11.56’’ N; $83^0$18’22.89’’ E) is very congested, and is a 9m wide road with an undivided carriageway. During public holidays and weekends traffic jams are a regular scene in this stretch.

Another issue is the overhanging tree branches of the old banyan trees, 12feet above the road surface, that are stretching up to 2m on both sides of the road. These tree branches are obstructing the clear vision, causing great inconvenience to the movement of buses and large vehicles.

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**Fig. 20. Road stretch from Jagadamba-Jail road junction**

From the Fig. 20, it can be observed that the tree branches are hovering above the road surface on either sides of the road. Cutting the branches will be considered as being environment-unfriendly. It is suggested that the branches may be tied appropriately, so as not to obstruct the vision of the bus drivers. Another alternative is to re-route the RTC buses plying on Jagadamba-Jail road junction, be diverted along Jagadamba-Seven hills-Jail road junction ($17^0$43'03.7''N; $83^0$ 18'33.50''E).


**Fig. 21. Alternative bus route for Jagadamba-jail road junction.**

Hence, from the above figure, black lines represent the present to and fro bus routes of the Jail road–Jagadamba junction. The red lines indicate the alternative suggested by the authors to divert the RTC buses along Jagadamba–Jail road junction. The buses plying presently in the Jail road-Jagadamba junction will continue to use the same route without any diversion. Z

## III. CONCLUSIONS

1. Currently the number of vehicles in the Carshed Junction to PM Palem route are 2113. There will be decrease in the number of vehicles by 2113 numbers if the signal is relocated to Pepsi Junction.
2. The traffic congestion at Pepsi junction will be reduced by re-routing the traffic bound for PM Palem, as the traffic may be advised to take the service road along stadium-Bhoolokamatha temple – PM Palem route, in order to relieve the congestion at Pepsi Junction.
3. The number of vehicles diverted to subway at RTC Complex is 6423 which in percentage terms is 23.5%. Among which two-wheelers, four-wheelers are 4508 and 1179 respectively are diverted towards subway and in percentage terms they are 29.2% and 35% respectively.
4. In view of the above, by adopting the above measures the congestion at RTC complex Junction below the flyover and near petrol bunk can be reduced.
5. The number of RTC buses from Jagadamba junction – Jail road Junction is 27 buses per hour. The number of RTC buses from Jagadamba Junction – Seven Hills Junction is about 2-3 buses per hour. The RTC buses in the Jagadamba Junction–Jail road Junction route are to be diverted to Jagadamba Junction – Seven Hills Junction – Jail road Junction route.
6. As per this observation, it can be concluded that by re-routing the RTC bus traffic on another route, unnecessary congestion can be avoided along Jagadamba Junction – Jail road Junction, thereby making efficient use of available road space for heavy vehicles also.

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