Study of Congestion of the Road Traffic at Railway Crossings

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Abstract: People of Anand and vallabh vidyanagar are facing acute traffic and delay problems at railway crossing roads. The main reason for this problem is passage of more number of trains from here which results in closure of railway gate for longer periods of time. People have to wait for several minutes to pass through this railway crossing. In the study area all the railway crossings are not having the median or wide roadway so creating more congestion at the time of approaching the train. In this paper various railway crossings of Anand and Vallabh vidyanagar are visited and various primary surveys are conducted. As a part of study analysis is carried out.

Keywords: railway crossing, congestion, delay, classified volume count.

I. INTRODUCTION

Vehicular traffic on roads has grown at an uncontrollable rate over the years making travel chaotic, tiring, and time delaying also unsafe one. It is common thing that when two roads intersect, junction appears and because of both the intersecting roads in the same horizontal plane. These are junctions from where traffic from different directions converge and causing traffic congestion, delay and also accidents. The main reason for this traffic delay is overfilling at junctions due to the increased density of traffic from both directions of railway crossing.

In developing country like India, the traffic is heterogeneous means mixed traffic flow, with vehicles of wide-ranging static and dynamic characteristics. Also the size of vehicles varies widely, and the lateral and longitudinal placement of vehicles on the carriageway are complex, with no discernible lane discipline. The saturation flow, which is the maximum possible value of flow through various railway crossings approach, is an important factor in the analysis of delay.

II. STUDYAREA

To avoid subsequent congestion, flyover or road over bridge were designed which have partially solved the problem of congestion and accidents. As traffic is not only problem of mega cities but also the problem of small developing cities in India. Mega cities are well planned having transport system also well - equipped on other hand the developing cities are not so well planned. That’s why if planning of small city is taken in to account it may create problems. As example if any developing city has residential area divided in small part and if some part of city is generating employment, providing business and educational facilities for people of about ½ population of city than it can create traffic problem due trip generation from different area of city toward that area.

Anand is a fast growing medium town which has a major educational and cooperative type setup and also Vallabh Vidyanagar. The traffic problem in the approach roads in the Vallabh Vidyanagar have increased due to increased vehicular traffic between Anand-Vallabh Vidyanagar. The internal road traffic due to pressure from daily commuters mostly students, business people, workers and related persons increase the problems on the roads such as traffic, parking and accidents.

The major access is also used by the public bses often passing from outside the city to another parts, creates problems for the regular traffic movements. Because these factors two railway crossings are facing acute traffic problems like congestion, delay. Meanwhile people at Vallabh Vidyanagar’s railway crossing at Janta Chokdi are facing traffic congestion and delay due to A.D.I.T. college campus, G.I.D.C. located in Vallabh Udognagar.

III. DATACOLLECTION

Classified volume count survey
### TABLE 1: Janta Chokdi Railway Crossing (Morning Peak Hours)

| Direction | Unit | To Jaanta Chokdi 8.00 to 9.00am | To Sardar Patel Statue 8.00 to 9.00am | Total |
|-----------|------|-------------------------------|----------------------------------------|-------|
| 2 wheelers| Vehicle | 933                           | 802                                   | 1735  |
|           | PCU    | 466.5                         | 401                                   | 867   |
| 3 wheelers| Vehicle | 189                           | 95                                    | 274   |
|           | PCU    | 151.2                         | 118.8                                 | 270   |
| 4 wheelers| Vehicle | 302                           | 197                                   | 499   |
|           | PCU    | 302                           | 197                                   | 499   |
| Bus/truck | Vehicle | 60                            | 49                                    | 109   |
|           | PCU    | 180                           | 147                                   | 327   |

### TABLE 2: Janta Chokdi Railway Crossing (Evening Peak Hours)

| Direction | Unit | To Jaanta Chokdi 6.00 to 7.00pm | To Sardar Patel Statue 6.00 to 7.00pm | Total |
|-----------|------|-------------------------------|----------------------------------------|-------|
| 2 wheelers| Vehicle | 950                           | 1008                                   | 1958  |
|           | PCU    | 475                           | 504                                    | 979   |
| 3 wheelers| Vehicle | 129                           | 220                                    | 349   |
|           | PCU    | 103.2                         | 176                                    | 279.2 |
| 4 wheelers| Vehicle | 247                           | 340                                    | 687   |
|           | PCU    | 247                           | 340                                    | 687   |
| Bus/truck | Vehicle | 47                            | 61                                     | 108   |
|           | PCU    | 141                           | 183                                    | 324   |

### TABLE 3: Ganesh Chokdi Railway Crossing (Morning Peak)

| Direction | Unit | To Ganesh Chokdi 8.00 to 9.00am | To Amul Dairy 8.00 to 9.00am | Total |
|-----------|------|-------------------------------|-------------------------------|-------|
| 2 wheelers| Vehicle | 422                           | 756                           | 1178  |
|           | PCU    | 211                           | 378                           | 589   |
| 3 wheelers| Vehicle | 365                           | 451                           | 816   |
|           | PCU    | 292                           | 360.8                         | 652.8 |
| 4 wheelers| Vehicle | 181                           | 210                           | 391   |
|           | PCU    | 181                           | 210                           | 391   |
| Bus/truck | Vehicle | 75                            | 53                            | 128   |
|           | PCU    | 225                           | 159                           | 384   |

### TABLE 4: Ganesh Chokdi Railway Crossing (Evening Peak Hours)

| Direction | Unit | To Amul Dairy 6.00 to 7.00pm | To Ganesh Chokdi 6.00 to 7.00pm | Total |
|-----------|------|-------------------------------|---------------------------------|-------|
| 2 wheelers| Vehicle | 736                           | 619                             | 1355  |
|           | PCU    | 368                           | 309.5                           | 677   |
From the table 2 it can be observed that the at level crossing from total of 1958 from janta chokdi total of 1008 vehicles travels in the crossing on the otherhand total of 950 vehicles travel in opposite direction. Which is the almost equal in both directions. From the table it can be also observed that movement of two wheelers is higher followed by three wheelers and four wheelers. It was observed that due to trains passing through this level crossing. The gate was closed continuously for 20 minutes due to repetitive shunting operations of trains. But it also observed in the morning peak and evening peak hours. This is causing hazardous situation at this crossing. The gate closure detail is summarized below in Table.

| Time duration(24 hour format) | Total Time (hrs.) |
|-------------------------------|-------------------|
| From | To |
| 5:00 | 5:10 | 0:10 |
| 6:00 | 6:09 | 0:09 |
| 7:08 | 7:20 | 0:12 |
| 8:05 | 8:14 | 0:09 |
| 9:25 | 9:35 | 0:10 |
| 10:20 | 10:29 | 0:09 |
| 11:15 | 11:25 | 0:10 |
| 12:15 | 12:24 | 0:09 |
| 13:40 | 13:49 | 0:08 |
| 14:35 | 14:45 | 0:10 |
| 15:38 | 15:45 | 0:07 |
| 16:38 | 16:45 | 0:07 |
| 18:05 | 18:14 | 0:09 |
| 19:00 | 19:10 | 0:10 |
| 20:15 | 20:27 | 0:12 |
| 21:10 | 21:19 | 0:09 |
| Total (Hrs.) | 2:43 |

TABLE 5 Frequency and duration of gate closure

| Direction | Janta Chokdi To Sardar Patel Statue | Sardar Patel Statue To Janta Chokdi |
|-----------|-------------------------------------|-------------------------------------|
| Veh. | PCU | Veh. | PCU | Veh. | PCU |
| 2Wheelers | 140 | 70 | 70 | 35 | 210 | 105 |
| 3Wheelers | 30 | 24 | 19 | 15.2 | 49 | 39.2 |
| 4Wheelers | 41 | 41 | 21 | 21 | 62 | 62 |
| Bus/Truck | 5 | 15 | 2 | 6 | 7 | 21 |
| Total | 266 | 150 | 112 | 77.2 | 378 | 227.2 |

TABLE 6 Vehicle Affected By Gate Closure

Location: Janta Chokadi Railway crossing (Morning Peak Hour)
Delay Time
It begins when the vehicle is fully stopped and ends when the vehicle in traffic flows normally. Average stopped-time delay is the average for all vehicles during a specified time period. The delay observed maximum was 14.30 minutes that was at ganesh chokdi as a pilot survey.

CONCLUSION
From the results of the analysis and from the field observation of traffic characteristics it may be concluded that:
Under saturated flow conditions, the inter correlation of vehicle groups, in addition to intersection geometry and average vehicular composition, is an important factor influencing the value of the passenger car unit (PCU) for different kinds of vehicles.
Janta chokdi railway crossing facing traffic having total highest PCU 2269.2, so more numbers of people have to face congestion and delay as compared to ganesh chokdi railway crossing having PCU 2016.2 and also people passing through Janta chokdi railway crossing are most of four wheelers as compared to three wheelers causing more congestion and total delay. Also crossing gate closure duration total of 2:43 hours during the whole day causing more stopped delay. Also in vehicles affected by gate closure there are higher number of four wheelers than three wheelers caused increase in queue length at Janta chokdi railway crossing at vidyanagar railway station.

REFERENCES
[1] Hanseo Cho, Ph.D. And Laurence R. Rilett, Ph.D., Improved Transition Preemption Strategy For Signalized Intersections Near At-Grade Railway Grade Crossing.
[2] Kuldip.B.Patel, Anand D. Sapariya Pradeep P. Lodha, Feasibility Study For Planning A Fly- Over Bridge Over Railway Crossing At Vijaipore Road, Navsari, Volume 2, Issue 1, January -2015
[3] Lei Yu2, Fenf'iang', Leonard Munghor", Xin Wang, And Anchalee, Application Of Its Technology To Improve Highway-Rail Grade Crossing Safet , Traffic And Transportation Studies.
[4] Parth M. Pande, Saurabh Patel, Jaimin Solanki, “Evaluation Of Delay And Level Of Service For Signalized Intersection Of Urban Area”, Issn: 0975
− 6744|Nov 15 To Oct 16 | Volume 4, Issue 1
[5] Vivek Singhal, Dr. S.S. Jain, Safety Information System Of Indian Unmanned Railway Level Crossings, E-Issn: 2278-1684,P-Issn: 2320-334x, Volume 12, Issue 4 Ver. Ii (Jul. - Aug.2015), Pp 70-80
[6] XinChen, Zhaohu Xu, Xuewen Chen, Yuanyuan Zhang, Analysis Of The Railway Crossing Traffic In Jinhua Urban District, Ictis 2013 © Asce 2013
[7] Xiangyang Li, Lin Cheng, Traffic Congestion Research Of Road And Railway Intersection, Icctp 2011 @ ASCE 2011

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