

DETD PROJECT ON

**“NEW DESIGN PROPOSAL FOR BHAGWAN TALKIES  
CROSSING RESEARCH”**

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## **ABSTRACT**

With the growth of urban populations, the increase in the number and size of major cities, and the reversal of urban migration, the Grade Separated Intersection's construction are often the answer to traffic problems. that enhances the ecology and livability of the city. Sophisticated systems are designed to measure the limitations of a different alternative to Agra's transport system. The Grade Separated Intersection which makes road and traffic more efficient and most useful for future purposeless the traffic congestion more economical transportation system and results in fewer delays, fewer time consumptions as well as less fuel consumption.

## **INTRODUCTION**

With the growth most of cities, most cities are undergoing multifaceted problems because of rapid urbanization. The congestion due to traffic becomes one of the most unacceptable problems in developed cities arising from the sudden increase in private transport affecting the community, the economy. Traffic Grade Separated Intersection and construction of underground passage, protection from the fire, and management of risk and task during the design-construction process. For the construction process of the Grade Separated Intersection, the GSIBM (Grade Separated Intersection Boring Machine) is used. Grade Separated Intersection Boring Machine generally having a large diameter of cylindrical shield equipment with a front rotating cutter head, a mucking device system, and an automatic segment erector are most frequently used. The Grade Separated Intersection Boring Machine is a machine that Grade Separated Intersections underground, progressively installing concrete lining, to support the excavated Grade Separated Intersection. TBMs are tailored for specific ground conditions and are more than 100 meters long and weigh up to 1,000 tones. Grade Separated Intersection proves to be the shortest alignment for the road traffic congestion proving a more efficient and effective medium of construction. The Grade Separated Intersection has the shortest route due to this the short route becomes more economical as well as the best solution for the reduction of traffic congestion. For all these purposes we will do survey work at BaghwanTalkies Chauraha Agra. Congestion prevents the movement of traffic, leading to an intolerable increase in journey time. The main aim of this paper is to give a solution for this traffic congestion problem. To the solution this traffic, congestion the Grade Separated Intersection has become an essential structure linking the highway system. The Grade Separated Intersection is a tabular structure with both ends are opened and it is enclosed in the middle, plus resistance, some alignment designs transition, adornment, and climate condition, especially at the entrance. The Grade Separated Intersection construction includes the issue of process and mechanization of the impact of driving the Grade Separated Intersection. We will do a two-way classified traffic survey of the road and also will calculate the average speed of commercial vehicles, private vehicles, and two-wheelers vehicles within mixed traffic after that we will do a traffic survey excluding whose amount of traffic more than all other vehicles. Lastly, we will study and comparison of fuel consumption and the total cost saving during Grade Separated Intersection construction.

## **DATA COLLECTION**

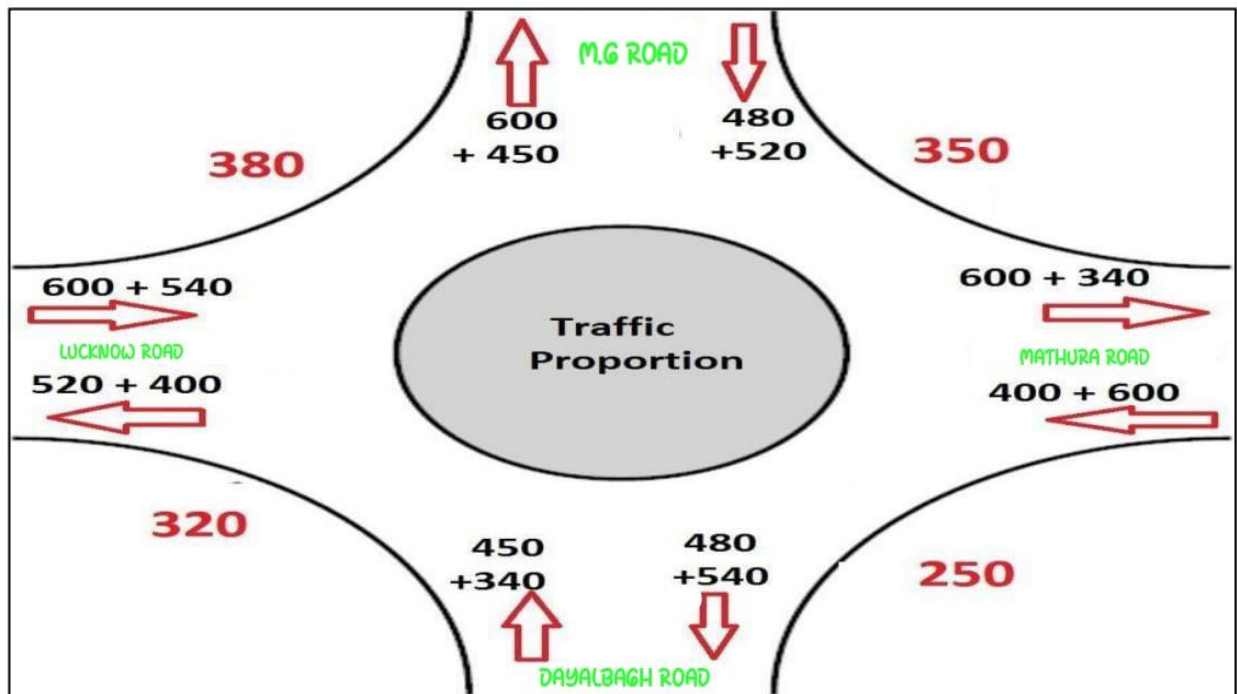
We did all our survey work on the Bhagwan talkies chauraha section. It is the main district road with 2 lanes. The survey has been done to give practical relation in the research work and for this purpose, the first thing we did is two way classified survey of the road for 24 hours. Calculate the average speed of commercial vehicles, personal vehicles as well as two-wheelers vehicles in mixed traffic. Study of the average speed of commercial vehicles, personal vehicles, and two-wheelers vehicles based on an algorithm that there is no working signal in mixed traffic.

### **The two-way classified traffic survey result:**

Types of Vehicles	Number of Vehicles
Cars/ Jeeps/ Vans/ Three wheelers etc	17,593
Buses	498
Trucks	685
Motorcycle/ Scooter	16442
Animal Drawn vehicles	3
Others ( Tractors)	209
Cycles	4863

### **Average speed difference ( with signals Vs signals not working ) for 5 KM:**

Vehicles	With signals (minutes)	Signals not working (Minutes)	Differences
Four Wheelers	11.13	10.02	1 min 11 sec
Pickup	13.46	12.48	1 min 38-sec
Bus	16.51	16.05	46 sec
Trucks	12.19	12.00	19 sec
Two-wheelers	13.41	13.00	41 sec
Three Wheelers	19.17	17.18	2 min 39-sec
Tractors	17.49	17.12	37 sec



## RESULT

### Calculation of Capacity of Rotary.

Result Evaluation & Analysis.

Traffic Signal

Design of

traffic

signal

Where,

$Q_p$  = capacity of rotary intersection in vehicle per hour

$W$  = width of weaving section in meter

$e$  = average width of entry and width of non-weaving section

$$Q_p = \frac{280w \left(1 + \frac{e}{w}\right) \left(1 + \frac{p}{3}\right)}{\left(1 + \frac{w}{L}\right)}$$

$e_1$  = width of weaving section at entrance in meter  
 $e_2$  = width of weaving section at exit in meter

$L$  = weaving length in meter

$p$  = proportion of weaving traffic

$a$  = left-turning traffic moving along left extreme lane

$b$  = weaving traffic turning toward right while entering the rotary intersection  
 $c$  = weaving traffic turning toward left while leaving the rotary intersection

### Calculation of Capacity of Rotary

$e_1=7.8$  meter &  $e_2=8.4$  meter

**$e = 8.1$  m**

$W = 11.6$  m

$L = 4 \times W = 46.4$  m

**M.G. road to Mathura road (N-E)**

$P_{NE}=0.6855$

**$Q_{(NE)} = 3404.32$  PCU/hour**

**Mathura road to Dayalbagh road (E-S)**

$P_{ES}=0.7240$

**$Q_{(ES)} = 3347.40$  PCU/hour**

**Dayalbagh road to Lucknow road (S-W)**

$P_{SW} = 0.6501$

**$Q_{(SW)} = 3456.40$  PCU/hour**

**Lucknow road to M.G. road (W-N)**

$P_{WN} = 0.7525$

**$Q_{(WN)} = 3305.77$  PCU/hour**

Now it is clear that the minimum capacity of the rotary intersection is 3306 PCU/hour. The capacity of the rotary is the minimum of the capacity of all the weaving sections. Now it is seen from the above result that the maximum capacity of the rotary is 3306 PCU/hour. And the total traffic entering the intersection is 5230 PCU/hour. Hence in this case the **Grade Separated Intersection** can be provided which is suggested in this case.

Average speed when signals are provided and when signals are not provided for 1 hour.

Vehicles	Average speed with signals(Km/hr)	Average speed without signals(Km/hr)	Difference(Km/hr)
Four-wheelers	45	48	3

Bus	35	36.5	1.5
Trucks	34.5	36	1.5
Two Wheelers	42	48	6
Tractors	32	34	2

After calculating the average speed of different types of vehicles, now calculated the fuel consumption for 1 hour for 1 vehicle in with signals and when signals not working hour.

### Fuel Consumption Cost for 1 Hour (for 1 vehicle)

Vehicles	Cost for with signals(Rs)	Cost for without signals(Rs)	Savings (Rs)
Four Wheeler	17593	17	299081
Bus	498	74	36852
Truck	685	78	53430
Two Wheeler	16442	1	16442
Tractor	209	74.5	15570.5
		Total Savings =	421375.5

The total saving by fuel consumption for one day for all type of vehicles is Rs 421,375.5 by this calculation we can calculate total saving by fuel consumption for one year and that is  $365 \times 421,375.5 = \text{Rs } 153,802,057.5$ . Assumed 1% of total fuel consumption due to that road and that is equal to Rs. 1,538,020.5

### Saving From Accident

Due to traffic congestion, according to police records there was a total of 52 accidents that happened on this particular road last year i.e. 2021. In this, some were minor accidents and some were major and there were 4 two-wheelers, 5 four-wheelers, 2 buses, 3 trucks, and 3 tractors was damaged and total 3 people died in a road accident on this particular road

Vehicles	Number of vehicles damaged by accident in 2021	Average repairing cost for 1 vehicle (Rs)	Repairing cost for total damaged vehicles as per data (Rs)
Four Wheeler	4	14289	57156
Bus	5	69744	348720
Truck	2	128752	257504
Two Wheeler	3	149000	447000
Tractor	3	58650	175950



		<b>Total Saving =</b>	<b>1286330</b>
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There are 2 people died in 2021 in an accident due to traffic congestion and one person loss is estimated Rs. 1,005,000 then it will be Rs. 1,286,330+ 2,010,000= Rs. 3,296,330 saving if there were no signals in mixed traffic.

### Costs due to air pollution

According to a study by the Centre of Environmental and Energy Development (CEED), Agra has recorded the fourth-highest number of premature deaths due to air pollution. The study revealed that an estimated 4,127 people has been died annually in the city due to diseases caused by air pollution. We can assume a total of 3 people have been died due to air pollution at Baghwan Talkies Road annually. It is estimated Rs. 10 lakh for one person's loss. Doctors at S.N. Medical College maintained that the number of patients with problems due to air pollution had jumped by 30%. Now the patient number is 325 per day. Assume that the total number of patients annually suffering health issues due to that road is 182. It is estimated Rs. 40,000 for treatment for one patient suffering health issues due to air pollution and Rs. 1,000,000 is estimated for one person's loss.

<b>Caused</b>	<b>No. of the person (Yearly)</b>	<b>One person cost (Rs)</b>	<b>Total cost (Rs) (Yearly)</b>
Died	3	1000000	3000000
Illness	182	40000	7280000
		<b>Total =</b>	<b>Rs 10,280,000</b>

### Tear and Wear Cost

The total tear and wear cost is calculated as Rs. 412,150 with there was no congestion on the road and Rs. 899,100 with there was congestion on the road. The value of tear and wear cost due to congestion is Rs. 899,100- Rs. 412,150= Rs. 486,950

### Costs Due to Time

Rs. 9,000 average monthly income estimated of a person working 8 hours daily. After analysis of data, it comes to Rs. 1,620 for all four-wheelers for 1 day. For buses, it comes to Rs. 1,350, for trucks Rs. 1,110, for two-wheelers Rs. 675 and for tractors Rs. 900. The total cost for one day is Rs. 5,655. For one year for all vehicles, the cost due to time is Rs. 41,219,760.

Grade Separated Intersection Construction Cost Let's assume if we are estimating the cost of construction of one kilometer long and 10 meters wide road Grade Separated Intersection.

Total cost estimated for 1 km construction of Grade Separated Intersection = 82,210,005

Estimated cost of construction of Grade Separated Intersection  
for 5km =  $5 \times 82,210,005 = 411,050,025$

### Total Cost Saving Due To Different Reasons

Factors	Savings (Rs)
Fuel consumption	1,538,020
Accidents	3,296,330
Pollution	10,280,000
Wear and tear	486,950
Time	41,219,760
Total Rs.	56,821,060

Estimated cost of road Grade Separated Intersection for 5 km in one side = Rs. 411,050,025

Estimated cost of road Grade Separated Intersection for 5 km for both sides =  $2 \times 411,050,025 =$   
Rs. 822,100,050.

Net Profit Due To road Grade Separated Intersection = **56,821,060 - 822,100,050 = (-) Rs. 765,278,990**

### CONCLUSION

1. The construction of a road Grade Separated Intersection can decrease the congestion of traffic at Baghwan Talkies Chauraha Agra.
2. Reduce parking congestion and roadway congestion also
3. Construction of the Grade Separated Intersection for transportation allows efficient use of underground land, redirecting traffic congestion from the town center, decreasing landscape damage due to the major roads passing through open space, and more.

4. Grade Separated Intersection construction appears promising in helping to reduce physical inactivity as well.
5. All alternatives that we examined showed benefits for each parameter (time, fuel pollution, and noise) compare to the alternative routes.
6. The net cost of construction of the Grade Separated Intersection is much higher than the total cost saving so we can say due to Grade Separated Intersection construction congestion and cost due to fuel, time, delay less but cost of construction is more so we cannot use because it is not economical.

## **FUTURE SCOPE**

Based on this study and findings, it is believed that a better analysis can be done on those roads where their traffic capacity is more and can derive an arithmetic formula.

- The relation between the increase in the average speed of vehicles due to signal working in mixed traffic could be done with more traffic capacity.
- The average speed difference in mixed traffic and signal working in mixed traffic could be done for far distance for more accurate results.
- The exact pollution emission due to traffic congestion on a specific road could be calculated.
- The results analysis says that the construction of the Grade Separated Intersection is more costly so it cannot be used for economic purposes in the future. but it saves fuel consumption, saving from accident, pollution, time and wear tear cost also. but road Grade Separated Intersection construction cost is much higher so we cannot adopt this method to reduce congestion for economic purposes.

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