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# Proposed Flyover at Metagalli Signal Junction on K R S Road

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***Abstract:*** **Urban traffic congestion has become a serious concern for transportation professionals and traffic managers. Transportation infrastructure conjointly will increase with increased traffic demands, which comes to decreased Mobility. The traffic problem is being faced by Mysore people at a railway crossing in KRS road. People need to expect many minutes to meet up with this railway crossing. The main reason for this problem is that people wait at the signal and later at railway crossing which results in increased traffic volume. In order to find a solution to this traffic congestion, the capacities of the roads were evaluated by compiling data related to prevailing vehicular flows and collecting other supportive information. From the capacity calculations made from field data, it is evident that all the roads in the area would fail to cater to future traffic demands. And proposing a flyover was a suitable solution. Also for the planning of flyover bridge over the railway crossing, basic rules and standards in bridge design as per Indian standards code should be considered. Keeping the above points in view, a survey was conducted during this study to explore the possibility of planning and constructing a fly-over bridge at Metagalli signal junction and over the succeeding railway crossing in KRS road.**

***Keywords— Traffic Congestion; Flyover; Turning Movement.***

## I INTRODUCTION

Rapid urbanization and industrialization have caused an unprecedented growth of vehicles in the world. Urban traffic congestion has a global phenomenon. Due to fast-growing vehicular traffic, old planned cities become congested road links, the intersection becomes saturated, busy and supply service is above its capacity [1]. An increase in income and in the absence of an insufficient, fast and reliable public transport system more and more people are shifting to personal vehicles in most of the cities, which results in the massive growth of the automobile population around the world. The reason for this traffic congestion is overcrowding at junctions due to the increasing density of traffic from all directions. At the intersection traffic jam problem may causes delay time and fuel consumption due to frequently stoppage of vehicles at a different intersection [2].

Therefore, it requires effective controls to regulate the traffic and optimize delay and congestion of the traffic at the intersection. Space sharing intersection e.g. rotaries and pre-timed signals are widely used to control the intersections. Space sharing intersections are intended to give equal priority and permit continuous movement of all intersecting vehicle flows [3]. For higher traffic volumes, space sharing intersections such as rotary is not preferable due to the increase in congestion and overall intersection delay and conflicts. In the pre-timed signal, green times for the phases remain constant for the particular period of the day, although demand fluctuates during that period. This problem can be eliminated by providing flyover at the intersection. To avoid junctions and subsequent congestion, flyover or road over the bridge were designed which have partially solved the problem of congestion and accidents [4].

A flyover is a bridge constructed along an intersecting highway over an at-grade intersection. It allows two-direction traffic to flow at free-flow speed on the bridge. The flyover is one of the methods for solving traffic problems at at-grade junctions on highways including capacity, congestion, long delay and queue length.

People of Mysore are facing acute traffic problem at railway crossing road in KRS road. People need to wait for many minutes to go through this railway crossing. The study area deals with two obstacles making it difficult for easy

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movement of vehicles. People wait at the intersection signal and later at the railway crossing. In order to solve this traffic problem, planning and constructing a Flyover Bridge over the signal junction and railway crossing may be a viable option [5].

Therefore, a feasibility study for planning a Fly-over Bridge over railway crossing was conducted keeping in view the following broad objectives: whether a fly-over can be constructed which is cost-effective, minimum demolition and safe and fast movement of the vehicle so that of traffic problem at Metagalli junction and railway crossing of KRS road can be solved.

## II METHODOLOGY

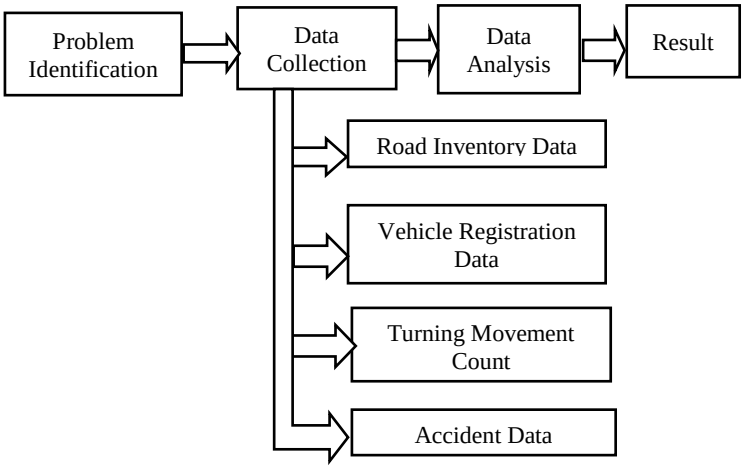


Figure 1: Flow Chart showing sequence of Methodology

### *A. Study Area*

To carry out research work, Metagalli Signal Junction, K R S road located in developing city located in Mysore, was selected. People have to wait long enough to pass through this railway crossing. The study area deals with two obstacles making it difficult for easy movement of vehicles. People wait at the intersection signal and later at the railway crossing.

Plate 1: Arial view of the study area

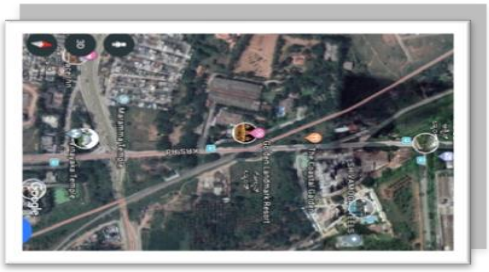

Figure 2: Map of Metagalli signal junction Mysore

### *B. Inventory survey*

Road Inventory survey was carried on the selected road network. Road inventory data provides the details of the existing road network. A recorder noted down the details provided by observer and tape holders. The information's collected from road inventory survey are given in Table 1.

Table 1: Inventory Data

| Component | Towards KRS | Toward VPS | Towards Nanjangud | Towards Columbia Asia |
|---|---|---|---|---|
| **Carriage way** | 2 lanes(3.5m) | 4 lanes (3.5m) | 11.10m | 11.15m |
| **Shoulder** | 3m | 4m | 1m | 1.1m |
| **Road Sign** | No | Yes | Yes | No |
| **Street Light** | No | No | No | No |
| **Bus Stand** | Yes | Yes | No | No |
| **Rikshaw stand** | Provided | Not provided | Not provided | Provided |
| **Police station** | No | No | No | No |
| **School** | No | No | No | No |
| **Temple** | No | No | No | No |
| **Divider** | Not provided | 1m | 2.8m | 2.8m |
| **Service Road** | Not provided | Not provided | Provided (6m) | Provided (6m) |

### *C. Vehicle Volume Data*

To study the trend of vehicle growth, the volume of vehicles registered in the last seven years (2012 to 2018) were collected from two Regional Transport Offices located in East & West of Mysore city.

Table 2: Vehicle Registered at RTO from 2012 to 2018

| Year | Total vehicle Registered |
|---|---|
| 2012 | 611429 |
| 2013 | 668658 |
| 2014 | 734536 |
| 2015 | 798580 |
| 2016 | 884437 |
| 2017 | 963237 |
| 2018 | 1577119 |

**(Source: RTO, Mysore)**

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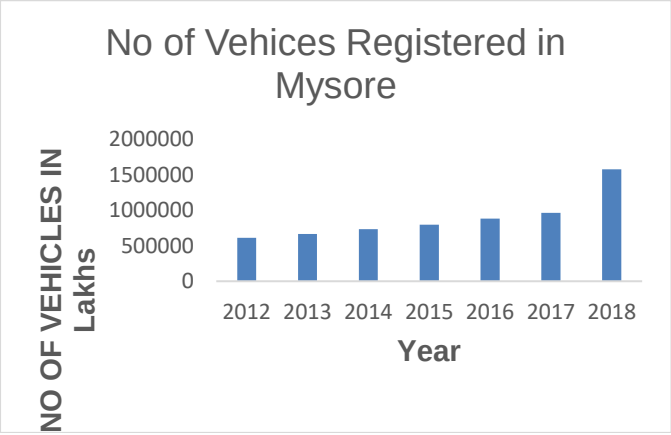


**Figure 3: Vehicle Volume Data**

*D.Turning Movement count*

Turning Movement counts helps to design capacity analysis, traffic signal timing, and phasing, turn lanes, parking and turning restrictions. Turning movement count was conducted manually where each individual stood at each corner of the Metagalli signal junction. A multi-counter application was used in order to calculate a number of vehicles moving left, straight and right in an easy way. This counting was carried out for 1 week and during holidays and it was carried out during peak hours.

*E. Accident data*

The accident data of Metagalli Signal junction was collected from Vontikoppal Police Station. Accident data provides valuable information to control, regulate and manage the traffic more effectively.

Table 3: Accident Data

| Intersection approach | | Existing Layout 135 s cycle length | |
|---|---|---|---|
| From | To | Average Delay(s) | Average Queue Length(m) |
| Vontikoppal Police Station | Through | 125 | 60 |
| Vontikoppal Police Station | Left & Right | 125 | 60 |
| Nanjangud Road | Through | 130 | 95 |
| Nanjangud Road | Left & Right | 130 | 95 |
| K R S | Through | 132 | 105 |
| K R S | Left & Right | 132 | 105 |
| Columbia Asia | Through | 127 | 80 |
| Columbia Asia | Left & Right | 127 | 80 |

*F. Level of Service*

Level of service (LOS) indicates the ease of comforts with which a traveler can travel on road. LOS is used to research roadways and intersections by categorizing traffic flow and distribution quality levels of traffic depending on performance measure like vehicle speed, density, congestion, etc.

The level of service obtained at the signal intersection was "F" since control delay time exceeded 80secs.

*G. Traffic Simulation using Vissim*

The collected inventory data was given as input to draw the road links of the required study area. Later vehicle volume data input and required data was given and then traffic was simulated in Vissim 2D & 3D.

## III RESULTS AND ANALYSIS

*A. Delay Time and Queue Length*

The average delay and Average queue length caused for the vehicle at signal Junction was noted down. It was observed that maximum delay and maximum queue length is observed at vehicles moving from K R S road.

Table 4: Average Delay and Average Queue Length

| Year | Accident | Type Of Accident | |
|---|---|---|---|
| | | Death | Injuries |
| 2015 | 3 | 0 | 3 |
| 2016 | 5 | 1 | 4 |
| 2017 | 8 | 4 | 5 |
| 2018 | 6 | 1 | 5 |

Plate 2: Queue length along KRS Road

Plate 3: Queue length along Vontikoppal Police Station Road

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Plate 4: Queue length along Nanjangud Road

Plate 5: Queue length along Columbia Asia Road

Plate 6: Queue length along K R S ROAD
near Railway crossing

Plate 7: Queue length along K R S ROAD
near Railway crossing

*B. Average Turning Movement Count*

Average Turning Movement count was calculated by using the data collected for one week. It clearly gives an idea of an average number of vehicles moving along all four roads during peak hours.

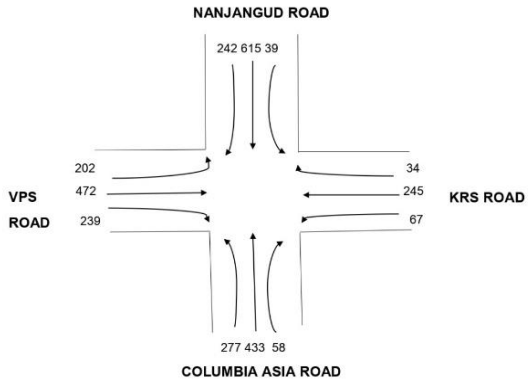


Figure 4: Average turning movement from 9am-10am

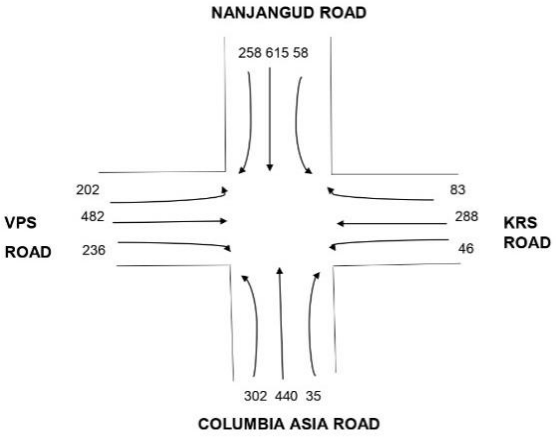


Figure 5: Average turning movement from 10am-11am

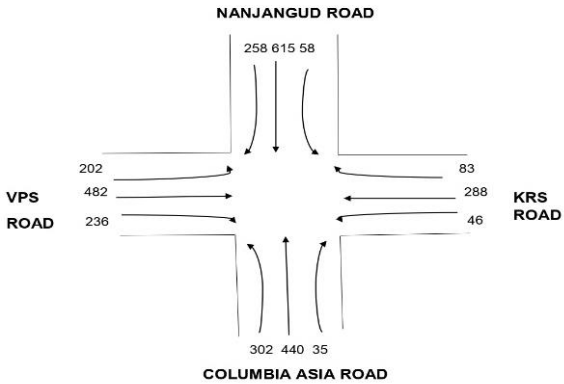


Figure 6: Average turning movement from 4pm-5pm

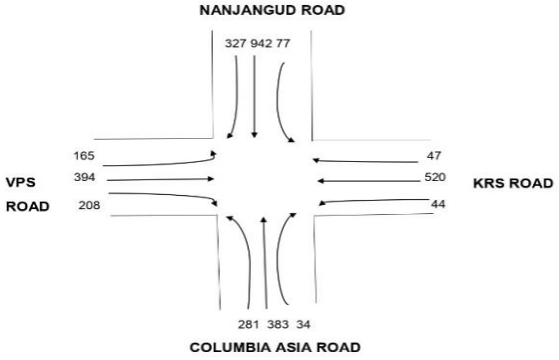


Figure 7: Average turning movement from 5pm-6pm

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*C. Components Specification of Proposed Flyover*

**Extension of flyover**
Towards K R S: 560m
Towards V P S: 370m
Towards centre: 120m
**Width of the Flyover**: 12m
The carriageway is 5.5m on each side
**Lanes**: 2 lane grade separator
**Gradient**: Transverse gradient towards K R S and VPS is 3%
**Maximum height of flyover**: 7m
**Stopping Sight Distance:** 81.07m
**Over Taking Sight Distance:** 287.05m

***D. Traffic simulation using Vissim Software***

The road links are drawn based on inventory data collected and it is showed in 2D in Figure 6. The traffic volume count is given as input and it is simulated in both 2D and 3D. Traffic simulation was carried out for 120sec and queue length is observed. Traffic simulation is shown in Figure 7.


Figure 6: Road links in Vissim Software

Figure 7: Traffic simulation using Software

## IV CONCLUSIONS

Based on the literature cited, the analysis made and results obtained, the following conclusions may be drawn

- The queue length and delay time observed at railway crossing was 115m and 420 seconds
- The maximum average queue length at K R S road was observed to be 105m and the maximum average delay time is 132 seconds
- The proposed flyover can reduce the queue length of about 300m and also save the delay time of about 700 seconds
- The proposed flyover can overcome traffic congestion

## ACKNOWLEDGMENT

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