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## FEASIBILITY STUDY FOR PLANNING A FLY- OVER BRIDGE OVER RAILWAY CROSSING AT VIJALPORE ROAD, NAVSARI

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**Abstract**-People of Vijalpore village are facing acute traffic problem at railway crossing road in Navsari. 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. Also, a underpass situated near the railway crossing is very small and water gets accumulated under in rainy season. Drainage system for removal of water is not adequate near the underpass. In order to solve this traffic problem, planning and constructing a Flyover Bridge over railway crossing may be a viable option. For planning of bridge, a site visit and traffic survey at railway crossing needed to be carried out. Also for planning of fly over bridge over 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 Vijalpore railway crossing.

**Key words:** Fly over, Railway Crossing, Vijalpore, Traffic Environment, FRL

### I. INTRODUCTION

Vehicular traffic on roads has grown at an unmanageable rate over the years making travel chaotic, tiring, and time consuming and unsafe. It is in the nature of occurrence that when two roads intersect, junctions appear and this is because both the intersecting roads are in the same horizontal plane. It is at these junctions where traffic from different directions converge and cause traffic congestion and also accidents. The reason for this traffic congestion is overcrowding at junctions due to the increasing density of traffic from all directions. To avoid junctions and subsequent congestion, flyover or road over bridge were designed which have partially solved the problem of congestion and accidents. Traffic is not only problem of big mega cities but also of small developing cities. Big mega cities are well planned and its transport system is also well -equipped while developing cities are not so well planned. That's the reason that if planning of small city is taken in to consideration it will create big problem. For example if a developing city have residential area divided in different small part and if some part of city is generating employment, providing business and educational facilities for people of about 1/2 population of city than it can create traffic problem due trip generation from different area of city toward that area. Navsari being a small city faces the same type situation described above.

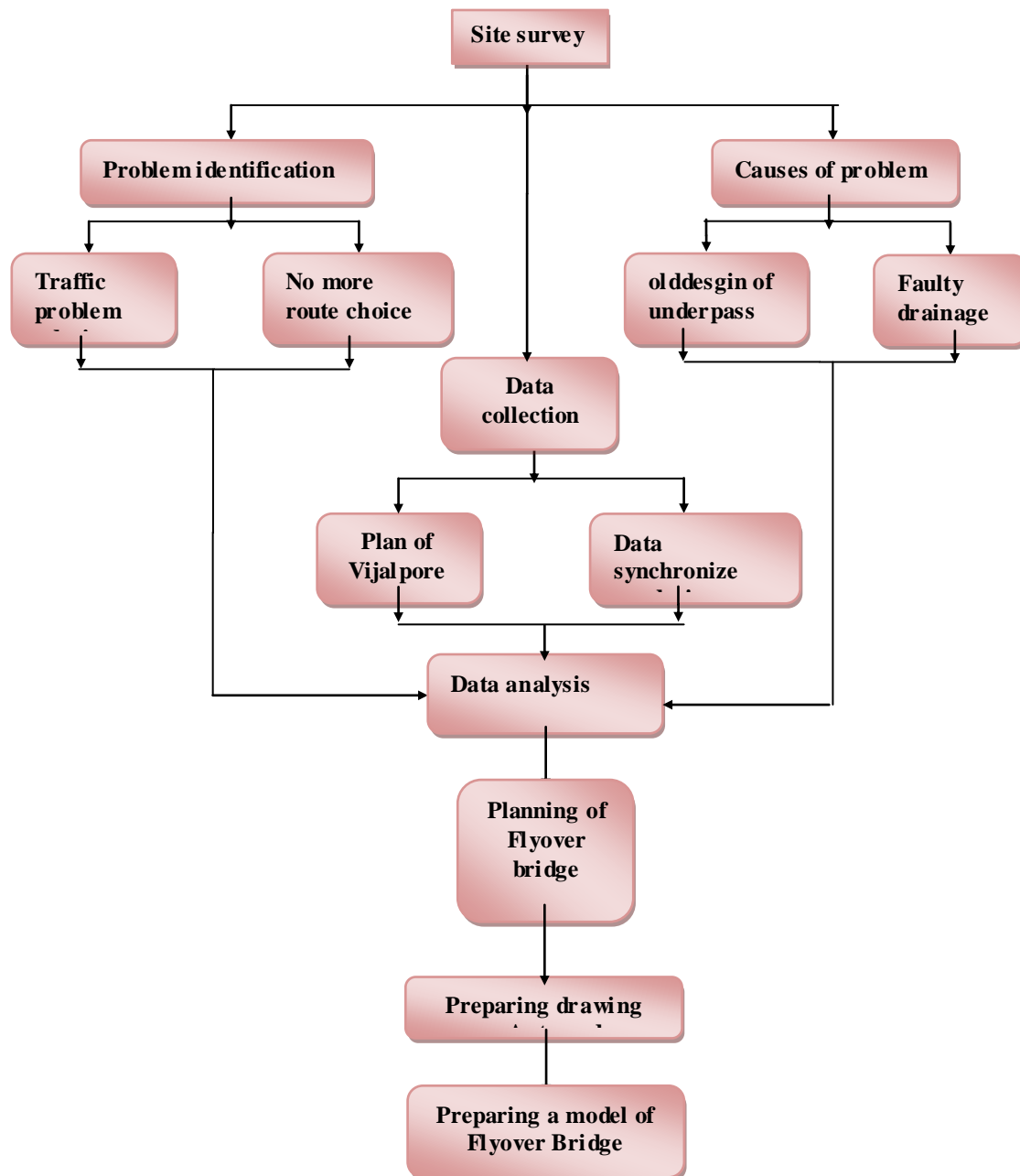
People of Vijalpore village are facing acute traffic problem at railway crossing road in Navsari. The main reason for this problem is passage of more number of trains from here which results in closure of railway gate for longer periods of time. People have to wait for several minutes to pass through this railway crossing. Also, a underpass situated near the railway crossing is very small and water gets accumulated under in rainy season. Drainage system for removal of water is not adequate near the underpass. In order to solve this traffic problem, planning and constructing a Flyover Bridge over railway crossing may be a viable option. 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 vehicle so that of traffic problem at railway crossing of Vijalpore road can be solved.

The specific objectives of the project were as follows:

- To study traffic at railway crossing.
- To carry out planning of bridge as per Indian standard code IRC: SP-13-2004.
- To prepare plan, elevation and section of bridge.
- To present a model of bridge.

## II. METHODS & MATERIALS

The survey was conducted to know the problems and also to find feasible way for construction of Fly-over Bridge. Also traffic study was done to count movement of different types of vehicles per hour through railway crossing and number of people waiting at railway crossing when railway crossing remains closed. For this, the Plan Map of Vijalpore was collected and then obtained data were analyzed. Data on bore-log was also collected from the Vijalpore Nagarpalika for making rough estimate about depth of foundation. This bore-log data gives information about types of soil at different depth from ground level. Also it gives information about depth of water table. From this bore-log data, we came to know that at depth of 30 m from G.L. there was medium dense yellow brownish silty clay of low plasticity. From this it was assumed that hard strata of soil exists at a depth of 35 m. After this, design of Retaining wall structure was done. The methodology adopted in this project has been shown below through the Flow-chart.



**Figure 1 Flowchart of Methodology**

### III. RESULTS AND DISCUSSION

After completing the site inspection and traffic survey, other relevant data were collected and analyzed. Based on this, the design of the fly-over bridge was made. For this design, IRC code SP-13 was referred for different norms of Flyover bridge and proposed the suitable design of fly-over bridge with the following specifications and design parameters.

The details of the designed parameters are as below:

1. Total length of bridge has been arrived at 935 m
2. As per the standard dimension of bridge and according to the site condition as per IS:DW221-229, width of bridge arrived was 12 m and span 21m.
3. For fly-over with walk-way, the length of span is 20 m and width 12 m. And for fly-over without walk-way, the length of span is 20 m and width of bridge is 8 m.
4. Total height of the bride has been arrived at 11 m.
5. The rising gradient was taken as 1 in 36 at 20 m interval.
6. The depth of foundation was arrived at 35 m using bore-log data.
7. After this, the design of retaining wall was made.



**Figure 2 Plan of proposed feasible way:**

### **3.1. CONSTRUCTION OF THE PROPOSED BRIDGE IN FUTURE**

The design will have R.C.C T-beam and slab super structure without footpaths. The bridge will have a overall width of 12 m. The design is according to the following codes: IRC: 5-1985, IRC: 6-1966(1985 reprint), IRC: 21-1987 and IRC: 83-1987. The following loads have been considered in the design: (a) One lane of IRC 70R or two lane of IRC class A on carriageway whichever governs, (b) Footpath load of 5 KN/m for superstructure having footpaths; (c) Wearing coat of 2KN/m<sup>2</sup> and (d) Temperature variation= +/- 25° C. The design is applicable for 'moderate' and severe condition and exposure.

#### **3.1.1. Material specification:**

- Concrete shall be design mix and shall have minimum 28 days characteristics strength on 150 mm cubed as 25 MPa for 'Moderate' condition of exposures and 30 MPa for 'Severe' condition of exposures.
- High strength ordinary Portland cement confirming to IS:8112 or ordinary Portland cement confirming to IS 269 capable of achieving required design concrete strength shall only be used.
- To improve workability of concrete, admixtures confirming to IS: 6925 and IS 9103 may be permitted subject to satisfactory proven use. Admixtures generating hydrogen, nitrogen... Etc. should not be used.
- Cement content in concrete should not be less than 310 kg/m<sup>3</sup> of concrete for 'Moderate environment' and 400 kg/m<sup>3</sup>.

#### **3.1.2. Reinforcement:**

All reinforcement steel shall be of high yield strength deformed bar confirming to IS: 1786. (except for mesh reinforcement which shall be MS steel bars designation 240 confirming to IS 432 part-I mild steel.)

Expansion joints:

- The expansion joints must be robust, durable, water tight and replaceable. It must be provided over the full width of superstructure including kerb and footpath following the same profile. Site fabricated expansion joint should be prohibited.
- The expansion joints should have following features:
  - It shall cater for a total movement of 20 mm with original gap of 40 mm between concrete faces.
  - It shall be either from elastomers or shall have a cushion of elastomer to enable absorption of shocks transmitted by vehicle.
- Fabricated steel parts in the nosing of expansion joints shall be positioned accurately before the concreting of that portion of the deck slab.

#### **3.1.3. Bearings:**

- Metallic bearing shall confirm to IRC: 83-83 + 1985 (part-I).
- Elastomeric bearing shall confirm to IRC: 83-1987.

#### **3.1.4. Workmanship/ Detailing:**

- Minimum clear cover to all reinforcement including stirrups shall be 50 mm unless shown otherwise in the drawing.
- For ensuring cover of concrete to reinforcement specially made polymer cover blocks should be used.
- Construction joints:
  - Construction joint should be provided as shown in Drawings. Concreting work should be carried out continuously up to the construction joints.
  - The concrete surface at the joint shall be brushed with a stiff brush after casting while concrete is still fresh and it has only slightly hardened.
  - New concrete should be thoroughly compacted in the region of the joint.
- Welding of reinforcement bars shall not be permitted.
- Loop in reinforcement:
  - Minimum lap length of reinforcement shall be kept as 83 d where d is diameter of bar.
  - Not more than 50 % of reinforcement should be lapped at any location.
  - For close spaced bars lapping may be avoided by providing suitable types of mechanical splices.
- Bending of reinforcement shall be done as per IS: 2502.
- Supporting chairs of suitable of 12mm diameter shall be provided at suitable intervals as per IS: 2502.

- Concrete shall be produced in a mechanical mixer of capacity not less than 200 litres having integral weight batching facilities and automatic water measuring devices and dispensing devices.
- Proper compaction of concrete shall be ensured by use of form and /or needle vibrator for compaction. Use of full width screed vibrator for compaction of concrete in deck slab shall be ensured.

The drawing of the proposed fly over bridge was prepared which has been shown in fig.2.

#### **IV.CONCLUSION**

This study has led to the following conclusions:

- In order to solve the traffic problems at vijalpore railway crossing, construction of a fly-over bridge was thought appropriate.
- A survey of the site was conducted for making a design of the proposed fly-over. After this, the design of the bridge was made using the data collected and obtained from various other sources.
- The proposed design is cost effective, to cause minimum demolition and safe for fast movement of vehicles.

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