

## **Feasibility Study of ROB at various Level Crossing in Vidarbha Region.**

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**Abstract --This paper deals with the methodology for the inception of ROB's proposed to be constructed at various level crossings under taken by Maharashtra State Road Development Corporation. The object of this paper is to bring more clarity on the aspects, which may prove helpful to the designers/planners while planning an ROB, by making optimum utilization of the policy of the Railways. We hope, with the proper knowledge of working of Railway department and their requirement, the ROB projects implementation would be a smooth process in the development of the Nation thus realizing the dream of our Hon. Prime Minister Narendra Modi and Union Minister for Road Transport & Highways ShriNitinGadkari.**

**Keyword – ROB, Level Crossing, Traffic, RDSO, TVU, Future Track, Railway Boundary**

### **INTRODUCTION**

Prime Minister Narendra Modi (Government of India) has launched SETU BHARATAM on 4<sup>th</sup> March 2016 at a budget of Rs. 102 billion (US\$1.6billion) with an aim to make all National Highways free of Railway Crossings by 2019. Under this project, as many as 208 ROB/RUB would be constructed at unmanned Railway crossings on National Highways and 1500 dilapidated British era bridges would be widened, rehabilitated or replaced in a phased manner at a cost of Rs.208billion (US\$ 3.2 billion) and Rs.300 billion (4.6 billion) respectively[1].

Taking inspiration from the above, for a major boost to the region's infrastructure, state government has asked Maharashtra State Road Development Corporation (MSRDC) to build 27 (Railway Over bridges) ROB's in east Vidarbha region. MSRDC would build ROB at level crossings as suggested by the competent authority of the Central railway and South East Central Railway at an estimated cost of Rs. 800 crores and expected to be completed by 2019. The locations are selected such that Train Vehicle Unit (TVU) at particular level crossing (LC) is more than one lakhs. In east Vidarbha, the ROB's are to be built are located in Nagpur – Wardha, Nagpur – Katol, Nagpur – Gondia and Wardha – Ballarsha section. The state's infrastructure committee had sanctioned 104 ROB's in the state way back in November 2015 [2] [3]. Now the locations are finalized and the MSRDC has been appointed as implementation agency. Of the 27 ROB's, 7 LC locations are coming under the jurisdiction of SECR and the balance 20 LC locations are under Central Railways.

### **Feasibility Study:**

Out of 7 LCs, 3 LC locations were identified as critical locations in terms of geometrically & topographically, are selected for case study. For planning an ROB at such locations, the action plan was prepared keeping in view the need of ROB and topography. The following methodology was adopted to study the feasibility and to arrive at basic structure of the proposed ROB:

- i. Reconnaissance Survey
- ii. Topographical Survey
- iii. Traffic Survey
- iv. Geotech Investigation Survey
- v. Study of standard RDSO drawings
- vi. Future Track provision –as desired by the Railways
- vii. Right of Way for Road and Railway Boundary
- viii. Train Vehicle Unit (TVU) count at each LC location
- ix. Adjacent land details for Land Acquisition
- x. Utility shifting scope
- xi. Possibility of providing Limited Height Subway for pedestrian and light traffic.

After carrying out detailed investigation of the parameter as listed above, the proposed alignment plan was prepared for all the LC location and the (General Arrangement Drawing) GADs were prepared in consultation with the client MSRDC. After receiving clearance from the client, the GADs were forwarded to the concerned authorities of the Railways for their in principal approval.

### **1) LC KRD1**



Figure 1: Google Map

**LOCATION:**The location of this Level crossing proposed for ROB is very critical. Though the alignment is straight on one side (right side), a newly constructed ROB cum viaduct bridge connecting Pardi to Kamptee road is in existence (left side) at a close distance of 175m. The LC contains two railway tracks as feeder lines for two power stations (Koradi & Khaperkheda TPS) and one underground line (narrow gauge line now being converted to broad gauge) connecting Nagpur to Chhindwara. The railway boundary is 108m. The classified traffic report shows high volume of two and four wheeler traffic with few commercial vehicles (Fig 1-google map)

Due to presence of ROB cum viaduct in the close vicinity (left side) of the proposed ROB at LC KRD1, the available approach length for ramp has to be restricted upto the stilt portion (open area below the bridge) of ROB cum viaduct by adopting a higher gradient value than the permissible (like in Mumbai) also to maintain vertical clearance (VC) in the stilt portion of ROB cum viaduct. The other side is free to have desired grade of approach (Fig 2 –Alignment plan)

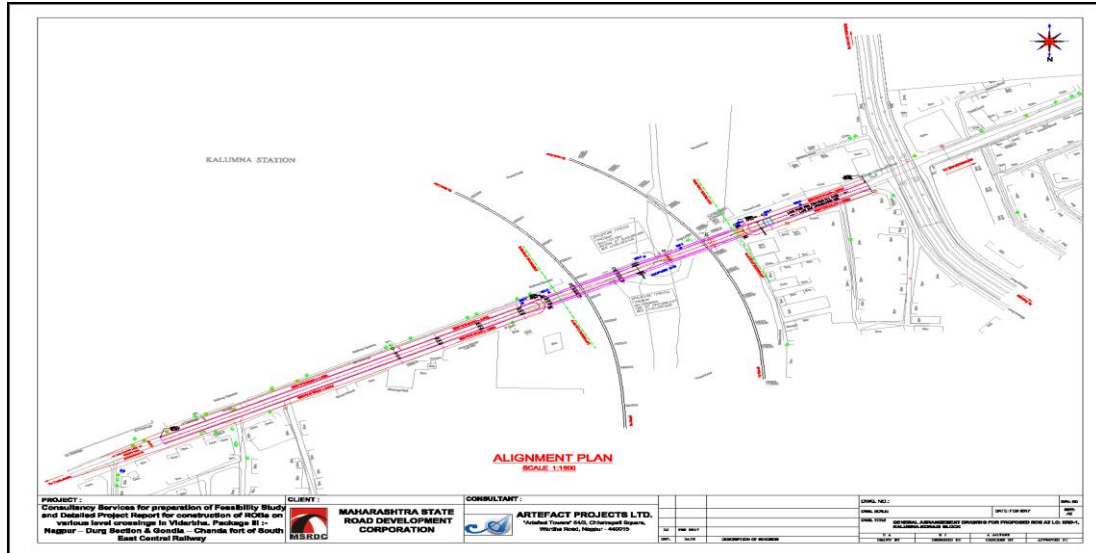


Figure 2; Alignment Plan

**SUGGESTION:** Since the existing LC (Level Crossing) is being used by 2/4 wheeler riders mostly, residing in the nearby area and a low volume of light commercial vehicles, it was opined to construct two lane ROB with viaduct portion. The site investigations were carried out and the span configuration was finalized to be adopted as BOW STRING super structure with 1x38 + 1x44+ 1x38. RDSO approved drawings RDSO/B-10408 and RDSO/B-10407 for the 44m and 38m spans are adopted respectively, which helps in reducing the depth of super structure as compared to composite steel girders. The final (General Arrangement Drawing) GAD (Fig 3 –GAD) thus prepared in consultation with the client Maharashtra State Road Development Corporation (MSRDC) and as per the directions/suggestions from the competent authorities of (South East Central Railway) SECR. After construction of ROB, the existing LC would be closed, as per the requirement of the SECR.

The feasibility of providing Limited Height Subway (LHS) was studied, but due to presence of underground track and large Railway land width (108m), this was not possible.

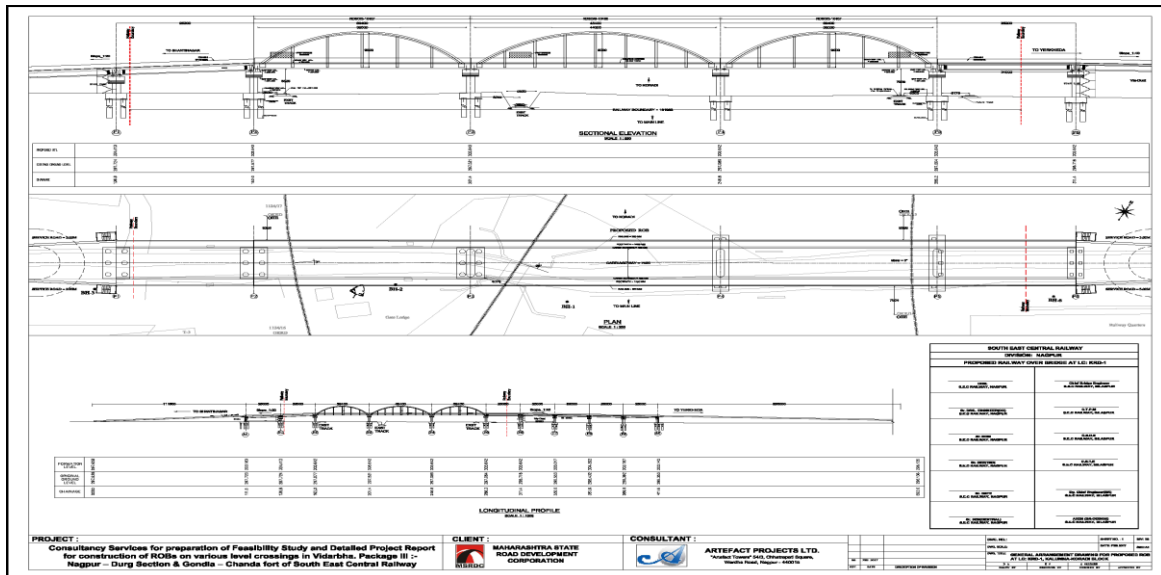


Figure 3; GAD

## 2) LC521

**LOCATION:** The existing LC lies in the close vicinity if Tirora Railway station. The existing approach road (ROW) is only 8.50m wide and there is sudden left turn immediately after railway crossing (Fig 4 – alignment plan). The ROB is proposed to be constructed at existing railway crossing. As per the requirement of the competent authorities of the SECR, an under pass is required to be provided for the free movement of light vehicles as well as pedestrians. The site for proposed underpass is selected after the point location as directed by the railways, where the sufficient embankment height is available.

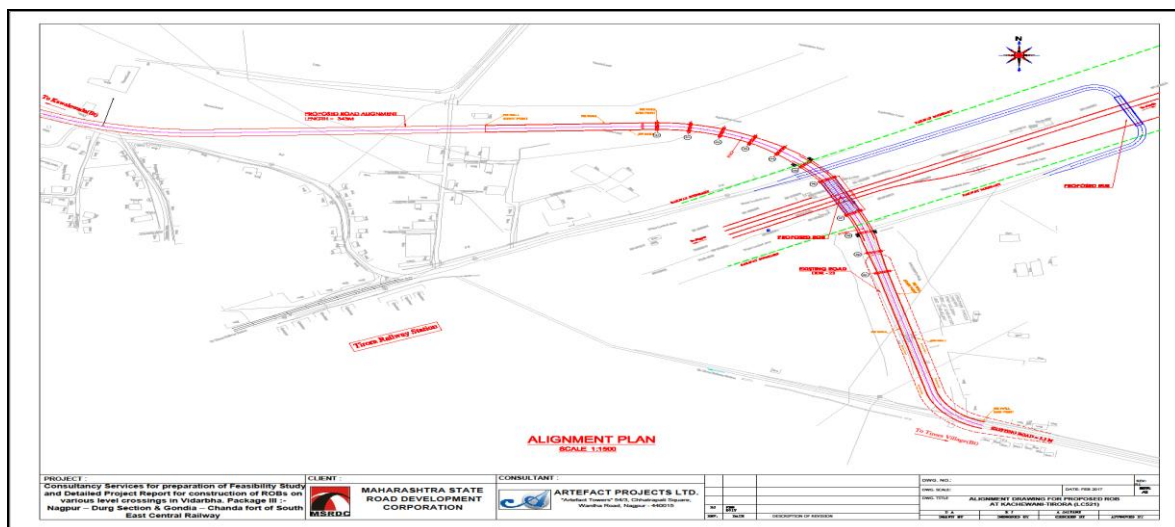


Figure 4;Alignment Plan

The GAD is planned on the existing road alignment with span arrangement incorporating provision of future tracks. The railway boundary is 103m at this LC location. The alignment on the other side passes through fields and near the toe of water tank/pond and will merge with the existing state highway. The service road on the other side needs to be developed within railway boundary.

The feasibility of providing LHS was carried out and the location of LHS is finalized in consultation with the competent authorities of the Railways which lies on RHS of the existing LC location at a distance of 90m.

## 3) LC 567

**LOCATION:** The existing LC is located near the Kalumna market (APMC) yard. On one side of the road stretch a compound wall of APMC market and on other side residential buildings & railway land is making the layout of proposed ROB difficult, as far as the movement of traffic is concerned. Also due to the market, movement of heavy vehicles causing great inconvenience to general traffic. The LC 567 lies on the main Mumbai – Howrah line. There is sudden right angle turn towards LEFT just before level crossing.

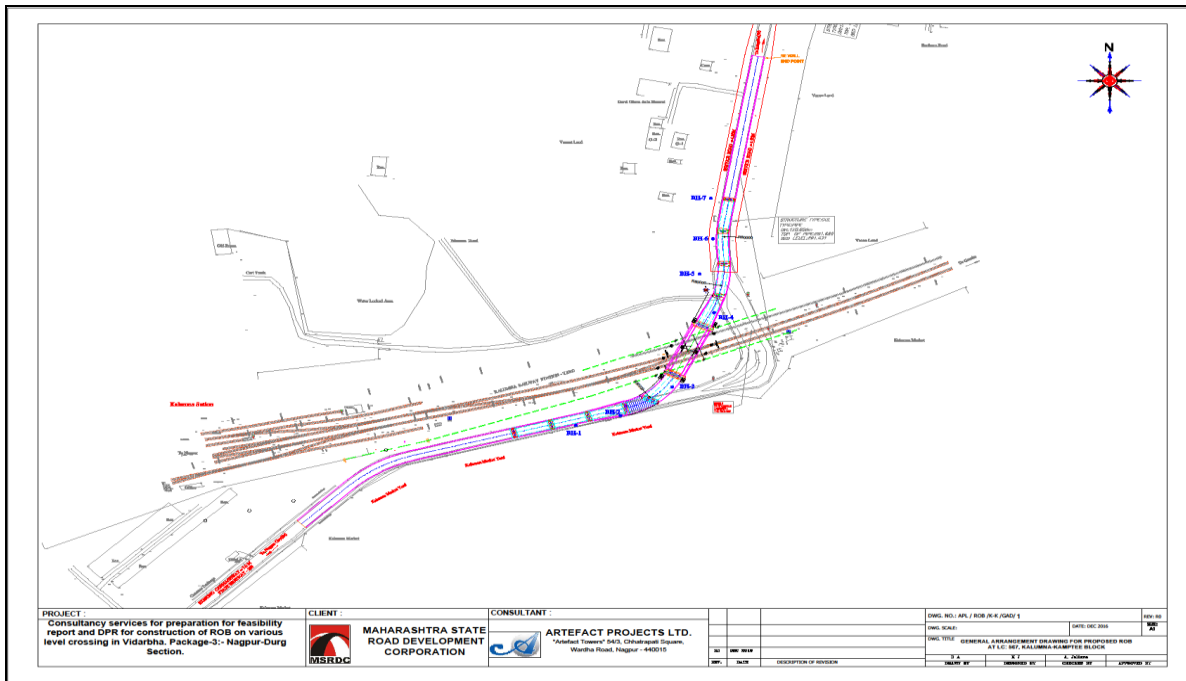


Figure 5:Alignment Plan

The crucial aspect in planning was to reduce the land acquisition, due to private land nearby the proposed alignment and the very less railway boundary 21m (Fig 5 – Alignment Plan). By considering the angle of skew as 44° and placing the common pier perpendicular to the span over railway portion, it was bound to adopt a BOW STRING (RDSO approved drawings RDSO/B-10408) type super structure. This would help in reducing the height of super structure thereby reducing the length of approaches on either side. Once the (Reinforced Earth) RE walls are in position/cast, the existing LC would be closed as desired by the Railways.

From the traffic data and the land use, it was decided not to provide LHS, since land on both the sides of existing tracks belong to the Railways and no habitation is allowed.

### Conclusion:

Thus with the proper and accurate knowledge of the requirement of the concerned authorities of the Railways and the above listed procedure, the planning and execution of ROB would be a win win situation for structural designers, the Client and the Railways. The case studies described above can be used for further development of the new concepts / inception of new ROB.

### References:

- 1) “Prime Minister NarendraModi launches SETU BHARATAM Project, vows to improve road transport in India,” Zee News, 4<sup>th</sup> March 2016.
- 2) “India poised for quantum leap in infra, says NarendraModi,” The Financial Express, 5<sup>th</sup> March 2016.
- 3) Press Information Bureau, Government Of India, Ministry Of Road Transport and Highways.