# ANNEXURE- ALTERNATIVE SITES EXAMINED

## Four laning of Balaghat - Gondia Section of NH 543 from km 0.000 to km 48.070 (Package-1A & Package-1B) under Bharatmala Pariyojana in the State of Madhya Pradesh and Maharashtra

## 1.0 INTRODUCTION

During the course of the detailed site investigations, the Consultant examined both the option of improvement & widening of the existing road and also the possibility of Re-alignments / Bypasses for some built up stretches which are difficult to widen due to Engineering and other constraints and the collective details are explained below.

## 2.0 IMPROVEMENT AND WIDENING OF EXISTING ROAD

The consultants have carried out detailed topographic survey of the existing alignment along with other engineering investigations.
As enumerated in Section 3.0 of this report, the existing road is deficient in geometrics and improving the geometrics will involve higher social unrest due to dismantling of road side structures. Further, there are some major bottlenecks for widening and improvement of existing road.
The project road is carrying medium to heavy traffic and become eligible for capacity augmentation to four lanes. With existing geometrics, terrain and involvement of R&R constraints, it is not feasible to widen the existing road to four lanes.
Considering the above facts, it is apparent that improvement & widening the existing road will be possible for some length and not for the entire length. Hence some alternative proposals of Re-alignments / Bypasses have been explored. The Consultant has accordingly worked out the alternative proposals and is described in the following sections. The evaluation criterion for widening proposals is as follows:

- ***Technical Considerations*** – Geometric, movement of traffic during construction, earthwork, cross drainage works, junction layout, relocation of existing utilities, bypasses, construction costs, and maintenance costs.
- ***Environmental Consideration*** – land use change, location of water bodies, river / canal / stream crossing, location of protected areas / critically polluted areas / eco-sensitive areas / forest etc.
- ***Social Consideration*** - Area of land acquisition, type of land acquisition, location of religious places / educational institutions / medical amenities / drinking water sources, resettlement and rehabilitation problems and costs.

## 3.0 POSSIBLE BYPASSES / RE-ALIGNMENTS

Based on the site condition, IRC guidelines, MoRT&H circulars the project road has been designed with design speed of 100kmph.

The project starts from Balaghat district head quarter within the congested area having very less right of way. Improvements along existing will involve large scale demolition of structures. The clearance between the building lines is about 25m. There are also sub-standard geometries with right angle turning. Widening along existing will involve large scale demolition and will create social unrest .Improvement along existing as per IRC

codal provision will involve large scale demolition of structures. Hence to avoid above hindrances for improvement to 4 lane standards, a bypass (**Balaghat Bypass**) on western side for a length of 14.40km has been proposed. Further the alignment follows the existing road up to **Rajegaon**. In Rajegaon the existing geometries are not conforming to IRC standard and the clearance between building line is about 17m. Hence improvement inside the market area will involve large scale demolition of private structures. Therefore, to avoid these hindrances for improvement a bypass (Rajegaon Bypass) option has been proposed. In **Ravanwadi** (Maharashtra) the clearance between building line is about 22m. Hence improvement inside the market area will involve large scale demolition of private structures. Therefore, to avoid these hindrances for improvement a **bypass** option has been proposed.

In addition to above bypasses, realignments have been proposed at 3 locations to improve the road geometry and to avoid habitation. The details of bypass and realignment are tabulated in **Table 1-12** below:

**Table - 1 Possible Locations of Realignments / Bypasses**

| Sl. No. | Name | Existing Chainage | | | Design Chainage | | |
|---|---|---|---|---|---|---|---|
| | | From | To | Length (Km) | From | To | Length (Km) |
| 1 | Balaghat Bypass (MP) | 0+000 | 9+110 | 9.110 | 0+000 | 14+400 | 14.400 |
| 2 | Rajegaon Bypass (MP) | 21+980 | 23+880 | 1.900 | 27+270 | 29+200 | 1.930 |
| 3 | Rajegaon Bypass (MH) | 28+420 | 31+075 | 2.655 | 33+755 | 36+570 | 2.815 |
| 4 | Rawanwadi Bypass (MH) | 33+000 | 36+000 | 3.000 | 38+500 | 41+690 | 3.190 |
| 5 | Vijaynagar Bypass (MH) | 36+915 | 41+550 | 4.635 | 42+600 | 47+500 | 4.900 |
| **Total Length of Bypass (Km)** | | | | | | | **27.235** |
| 1 | Realignment (MH) | 24+520 | 25+460 | 0.940 | 29+860 | 30+780 | 0.920 |
| **Total Length of Realignment (Km)** | | | | | | | **0.920** |

## 4.0 ANALYSIS OF ALTERNATIVES

The Alignment Improvement Proposals encompassing the improvement and widening of the existing road and also the possible Re-alignments / Bypasses / Tunnels, etc. has been described in detail in the following paragraphs.

### 4.1 Balaghat Bypass

The start point of the project is at Rani Avanti Bai Chowk (Junction with SH 26) in Balaghat (SH 11) in Balaghat District of Madhya Pradesh. Then the road traversed through Balaghat Municipality within congested 4 lane divided section upto the railway crossing for a length of 2.35 km. Since Balaghat municipality is the district head quarter, both commercial and residential buildings are present along the existing road. The clearance between the building lines is about 25m. Improvement along existing as per IRC codal provision may not be feasible and will involve large scale demolition of structures. Further the project road crosses west central railway line at Km 2+415 with a manned level crossing. Construction of ROB inside market will also involve large scale demolition. Hence to avoid these hindrances for improvement a bypass option has been

explored. During feasibility study, a bypass on eastern side was explored. However in the meeting held on 30th Dec 2017 with all the stake holders in Bhopal. Then considering the traffic flow on SH 26 (about 50% of the NH traffic), bypass on Western side was decided.

A bypass option on right side (Western side) has been explored and layout of the proposed bypass options is shown in **Figure-1.** The comparison of the bypass options on various parameters is given in **Table-2.**

**Table - 2 Comparison of different alignment proposal of Balaghat Bypass**

| S. No. | Factor | Option I (recommended) | Option II (along existing) | |
|---|---|---|---|---|
| 1. | Length (Km) | 14.4 | 9.11 (SH-11) | 5.76 (SH-26) |
| 2. | Lane Configuration | 4 Lane | 4 Lane with service road | |
| 3. | Service road/ slip (Km) | 2.94 | 5.05 | 2.5 |
| 4. | Geometrics | Good.<br>Design speed 100 Kmph | Poor<br>Design Speed 40 Kmph | |
| 5. | PROW (m) | 70 | 45 | |
| 6. | Land Acquisition (ha) | 100 | 67 | |
| 7. | Bridges / Structures | Flyover – 1<br>LVUP- 2<br>SVUP- 5<br>Minor Bridge – 6<br>Major Bridge-1<br>Interchange-1<br>ROB-2 | Elevated including ROB -4.5km<br>VUP- 1<br>ROB-1<br>Minor Bridge – 1<br>(on SH-11 only) | |
| 8. | Major Junctions | 3 | 3 | |
| 9. | Water bodies | No impact | No impact | |
| 10. | Land use | Large Scale | Medium Scale | |
| 11. | Forest | Diversion of **1.8596 ha** forest land | No impact | |
| 12. | Impact on Trees | **Approx. 1,700** trees to be felled | **Approx. 600** numbers of trees along existing road to be felled | |
| 13. | Protected Areas (NP/ WLS/ BR etc.) | No Protected Areas within 10 km | No Protected Areas within 10 km | |
| 14. | Eco Sensitive Zone (ESZ) | No ESZ within 10 km | No ESZ within 10 km | |
| 15. | Environmentally Sensitive Receptors | No impact | **17 religious structures, 3 hospitals & 7 educational institutions are to be demolished** | |
| 16. | Structures Impacted | Approx. **2 structures** are to be demolished | Approx. **1120 structures** are to be demolished | |
| 17. | Utility Relocation | Negligible | Large scale | |
| 18. | Social Impact | Cultivation/ barren land acquisition | Land acquisition is not feasible due to thick built up | |
| 19. | Civil Construction Cost (Rs. in Crores) | **306.96** | **511.55** | |

Based on the above comparison and considering the constraints involved with option II, the bypass option on Right side **(Option I) is recommended** in Balaghat (Madhya Pradesh)

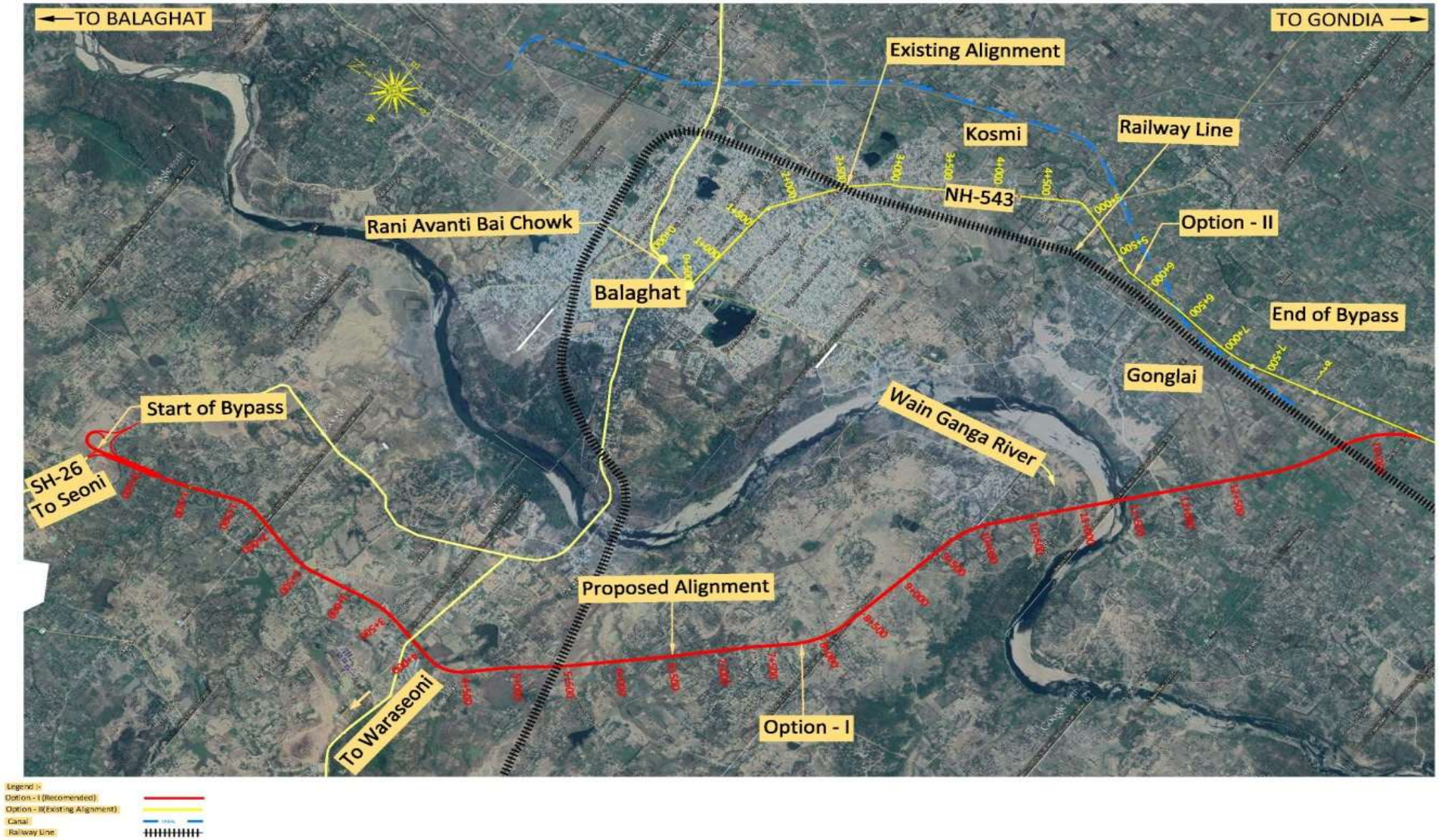


**Figure-1 Alignment Options of Proposed Balaghat Bypass**

## 4.2 Rajegaon Bypass (Madhya Pradesh)

The village Rajegaon is the last village before Madhya Pradesh / Maharashtra border. The project road passes through this village with an existing curve radius of 300m whereas the clearance of building line is about 17m. Hence improvement inside the market area will involve large scale demolition of private structures. This option will increase social unrest and loss of livelihood. Hence to avoid these hindrances for improvement a bypass option has been explored. The project road turns towards right before Bagh River and the extent of Rajegaon on left side. Hence **bypass on left side will involve larger length**. A bypass option on right side has been explored and layout of the proposed bypass options is shown in **Figure-2**.

- Option I - Bypass on Right side (West side of existing Km 21+980 to Km 23+880)
- Option II - Up gradation of existing road

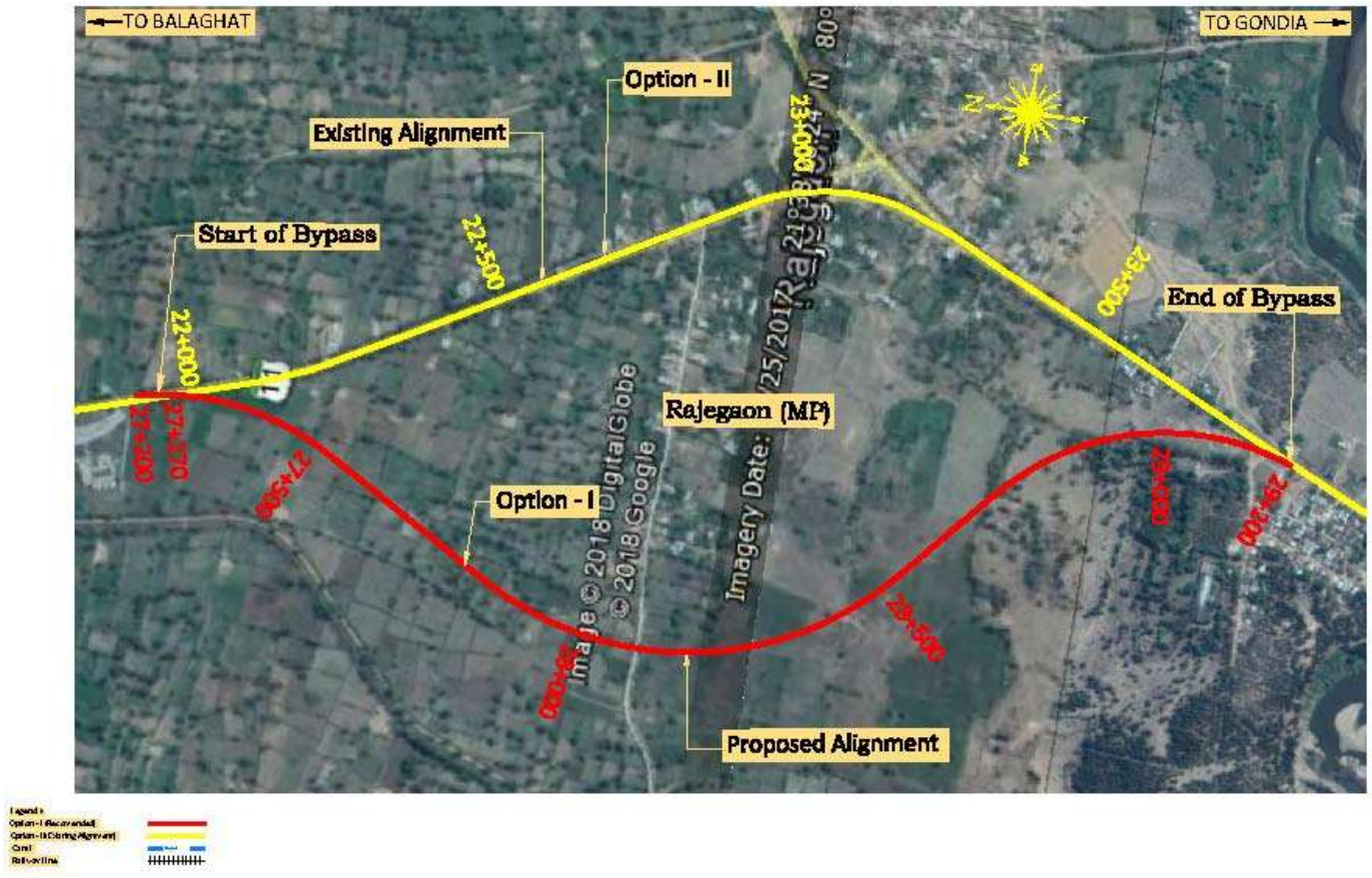


**Figure-2 Alignment proposal for Rajegaon Bypass in Madhya Pradesh**

The comparison of the bypass options on various parameters is given in **Table-3**.

**Table - 3 Comparison of different alignment proposal of Rajegaon Bypass in Madhya Pradesh**

| S. No. | Factor | Option I (recommended) | Option II (along existing) |
|---|---|---|---|
| 1 | Length (Km) | 1.93 | 1.90 |
| 2 | Lane Configuration | 4 Lane | 4 Lane with service road |
| 3 | Service road/ slip (Km) | 0.8 | 1.4 |

| S. No. | Factor | Option I (recommended) | Option II (along existing) |
|---|---|---|---|
| 4 | Geometrics | Good. Design speed 100 Kmph | Poor Design Speed 60 Kmph |
| 5 | PROW (m) | 70 | 45 |
| 6 | Land Acquisition (ha) | 13.50 | 8.55 |
| 7 | Bridges/ structures | LVUP-1, MNB-1 | VUP-1, MNB-1 |
| 8 | Major Junctions | Nil | 1 |
| 9 | Water bodies | No impact | No impact |
| 10 | Land use | Large Scale | Medium Scale |
| 11 | Forest | No impact | No impact |
| 12 | Impact on Trees | **Approx. 100** trees to be felled | **Approx. 190** numbers of trees along existing road to be felled |
| 13 | Protected Areas (NP/ WLS/ BR etc.) | No Protected Areas within 10 km | No Protected Areas within 10 km |
| 14 | Eco Sensitive Zone (ESZ) | No ESZ within 10 km | No ESZ within 10 km |
| 15 | Environmentally Sensitive Receptors | No impact | **2 religious structures, 4 hospitals & 2 educational institutions are to be demolished** |
| 16 | Structures Impacted | Nil | **1120** |
| 17 | Utility Relocation | Negligible | Large scale |
| 18 | Social Impact | Cultivation / barren land acquisition | Land acquisition is not feasible due to thick built up |
| 19 | Civil Construction Cost (Rs. in Crores) | **22.40** | **24.02** |

Civil construction cost of Option II is higher than Option I and 1120 structures are to be demolished in Option-II. Therefore, considering the social impact, impact on environmentally sensitive receptors and construction cost involved with option II, the **bypass option on left side i.e. Option I is recommended.**

## 4.3 Realignment

After crossing Bagh River, the alignment enters in Maharashtra. The existing Bridge over Bagh River is in good condition but the Maharashtra side approach is having sub-standard geometries. As per local inquiry, it was observed that, there are many accidents occurred. Hence to improve the safety of traffic a small realignment (Km 29+860 to Km 30+780 has been proposed.

## 4.4 Rajegaon Bypass (Maharashtra)

The alignment cross village Changera and Rajegaon within 2.5km length. There are heavy commercial as well as residential developments along the existing road. Improvement along existing road will involve demolition of private structures and resulting to increase of social unrest and loss of livelihood. Considering the above facts, a bypass has been proposed from Km 33+755 to Km 36+570 (length 2.815 km). Three options have been explored as shown in **Figure-3.**

- Option I - Bypass on Left side
- Option II - Bypass on Right side
- Option II - Up gradation of existing road

The comparison of the bypass options on various parameters is given in **Table-4**.

**Table - 4 Comparison of different alignment proposal of Rajegaon Bypass in Maharashtra**

| S. No. | Factor | Option I (recommended) | Option-II | Option III (along existing) |
|---|---|---|---|---|
| 1 | Length (Km) | 2.815 km | 3.5 km | 2.655 km |
| 2 | Lane Configuration | 4 lane | 4 lane | 4 lane with Service Road |
| 3 | Service road/ slip (Km) | 0.890 km | 0.900 km | 1.550 km |
| 4 | Geometrics | Good | Good | Poor |
| 5 | PROW (m) | 70 | 70 | 45 |
| 6 | Land Acquisition (ha) | 19.71 ha | 24.5 ha | 11.95 ha |
| 7 | Bridges/ structures | LVUP-1, MNB-2, SVUP-1 | LVUP-1, MNB-2, SVUP-1 | LVUP-2, MNB-2 |
| 8 | Major Junctions | 1 | 1 | 2 |
| 9 | Water bodies | No impact | No impact | No impact |
| 10 | Land use | Large Scale | Large Scale | Medium Scale |
| 11 | Forest | 3.7 ha (Zupdi Jungle) | ≅ 3.5 ha (Zupdi Jungle) | ≅ 1.0 ha (Zupdi Jungle) |
| 12 | Impact on Trees | **Approx. 225** trees to be felled | **Approx. 300** trees to be felled | **Approx. 100** trees to be felled |
| 13 | Protected Areas (NP/ WLS/ BR etc.) | No Protected Areas within 10 km | No Protected Areas within 10 km | No Protected Areas within 10 km |
| 14 | Eco Sensitive Zone (ESZ) | No ESZ within 10 km | No ESZ within 10 km | No ESZ within 10 km |
| 15 | Environmentally Sensitive Receptors | No impact | No impact | **5 religious structures are to be demolished** |
| 16 | Structures Impacted | No impact | No impact | Large scale |
| 17 | Utility Relocation | Negligible | Negligible | Large scale |
| 18 | Social Impact | Cultivation / barren land acquisition | Cultivation / barren land acquisition | Land acquisition is not feasible due to thick built up |
| 19 | Civil Construction Cost (Rs. in Crores) | **31.53** | **39.70** | **31.86** |

Civil construction cost of Option I is less than Option II and Option-III. Therefore, considering the social impact, impact on environmentally sensitive receptors and construction cost, the **bypass option on left side i.e. Option I is recommended.**

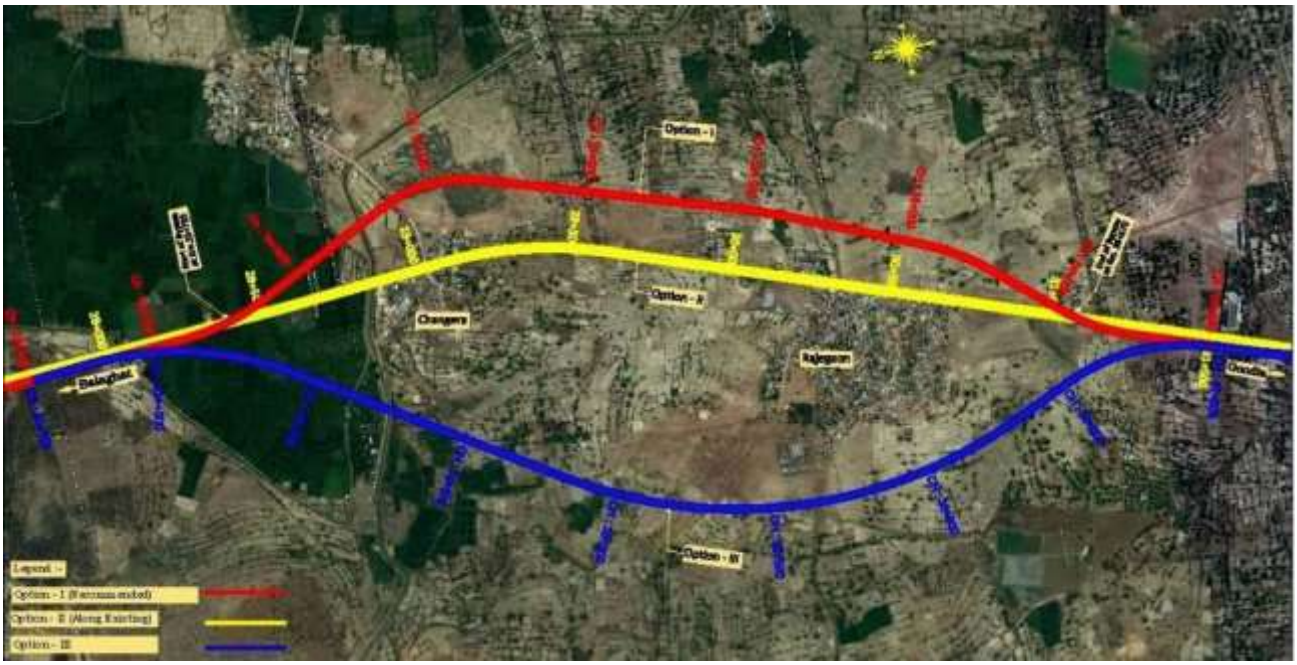


**Figure-3 Alignment proposal for Rajegaon Bypass in Maharashtra**

## 4.5 Rawanwadi Bypass

Rawanwadi is a major commercial place in Gondia district of Maharashtra. The available land between building lines is about 22m. Hence improvement inside the market area will involve large scale demolition of private structures. This option will increase social unrest and loss of livelihood. Hence to avoid these hindrances for improvement a bypass option has been explored. The layout of the proposed bypass options is shown in **Figure-4**.

- Option I : Bypass on Right side (West side of existing Km 33+000 to Km 36+000)
- Option II : Bypass on Left side (West side of existing Km 32+900 to Km 36+000)
- Option III : Up gradation of Existing road.

The comparison of the bypass options on various parameters is given in **Table-5.**

**Table - 5 Comparison of different alignment proposal of Rawanwadi Bypass**

| S. No. | Factor | Option I (recommended) | Option II | Option III (along existing) |
|---|---|---|---|---|
| 1 | Length (Km) | 3.19 | 3.56 | 3.0 |
| 2 | Lane Configuration | 4 Lane | 4 Lane | 4 Lane with service road |
| 3 | Service road/ slip (Km) | 0.6 | 0.8 | 1.0 |
| 4 | Geometrics | Good. Design speed 100 Kmph | Good. Design speed 100 Kmph | Poor Design Speed 60 Kmph |
| 5 | PROW (m) | 70 | 70 | 45 |
| 6 | Land Acquisition (Hect.) | 22.33 | 24.92 | 13.50 |
| 7 | Bridges/ structures | SVUP-1, LVUP-2 | VUP-1, LVUP-2 | VUP-1 |

| S. No. | Factor | Option I (recommended) | Option II | Option III (along existing) |
|---|---|---|---|---|
| 8 | Major Junctions | 1 | 1 | 2 |
| 9 | Water bodies | No impact | No impact | No impact |
| 10 | Land use | Large Scale | Large Scale | Medium Scale |
| 11 | Forest | Diversion of **3.3938 ha** of Forest Land | No impact | No impact |
| 12 | Impact on Trees | **Approx. 200** trees to be felled | **Approx. 350** trees to be felled | **Approx. 120** numbers of trees along existing road to be felled |
| 13 | Protected Areas (NP/ WLS/ BR etc.) | No Protected Areas within 10 km | No Protected Areas within 10 km | No Protected Areas within 10 km |
| 14 | Eco Sensitive Zone (ESZ) | No ESZ within 10 km | No ESZ within 10 km | No ESZ within 10 km |
| 15 | Environmentally Sensitive Receptors | No impact | No impact | **2 religious structures & 2 educational institutions are to be demolished** |
| 16 | Structures Impacted | Nil | Nil | 110 |
| 17 | Utility Relocation | Negligible | | Large scale |
| 18 | Social Impact | Cultivation/ barren land acquisition | Cultivation/ barren land acquisition | Land acquisition is not feasible due to thick built up |
| 19 | Civil Construction Cost (Rs. in Crores) | 32.98 | 38.12 | 33.06 |

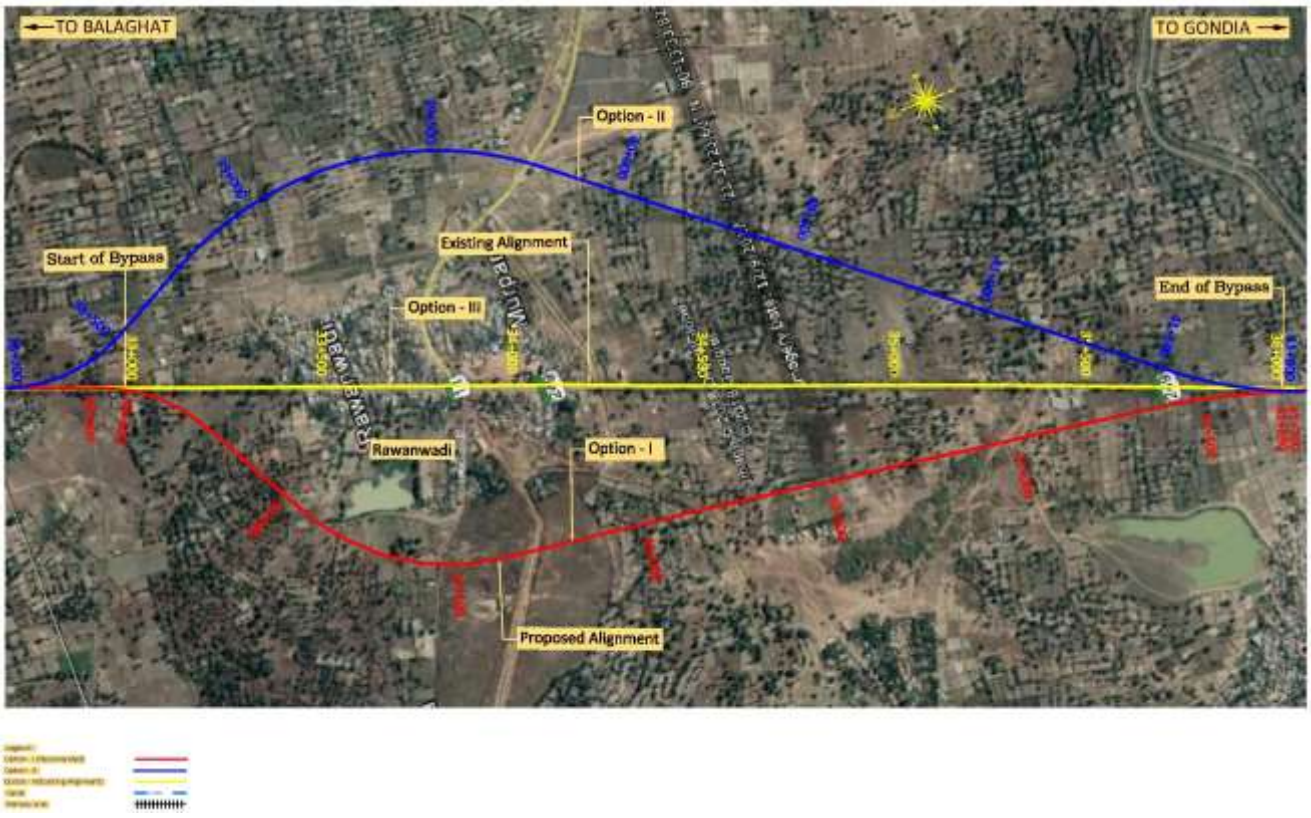


**Figure-4 Alignment Proposal for Rawanwadi Bypass in Maharashtra**

Civil cost of option I is less and considering the social impact & other constraints involved with option II & III, the bypass option on Right side **(Option I) is recommended**.

## 4.6 Vijaynagar Bypass

Due to urbanization of Vijaynagar, out skirt of Gondia town, the existing road passes through dense developed built up area. Hence improvement inside the market area will involve large scale demolition of private structures. Further there is one bypass for Gondia on east side which connects the National highway on south side. Avoiding the built-up area for demolition due to improvement along existing road, a bypass has been proposed from existing Km 36+915 (Design Km 42+600 to Km 47+500). A layout map on Google imagery for this bypass is given in **Figure-5**.

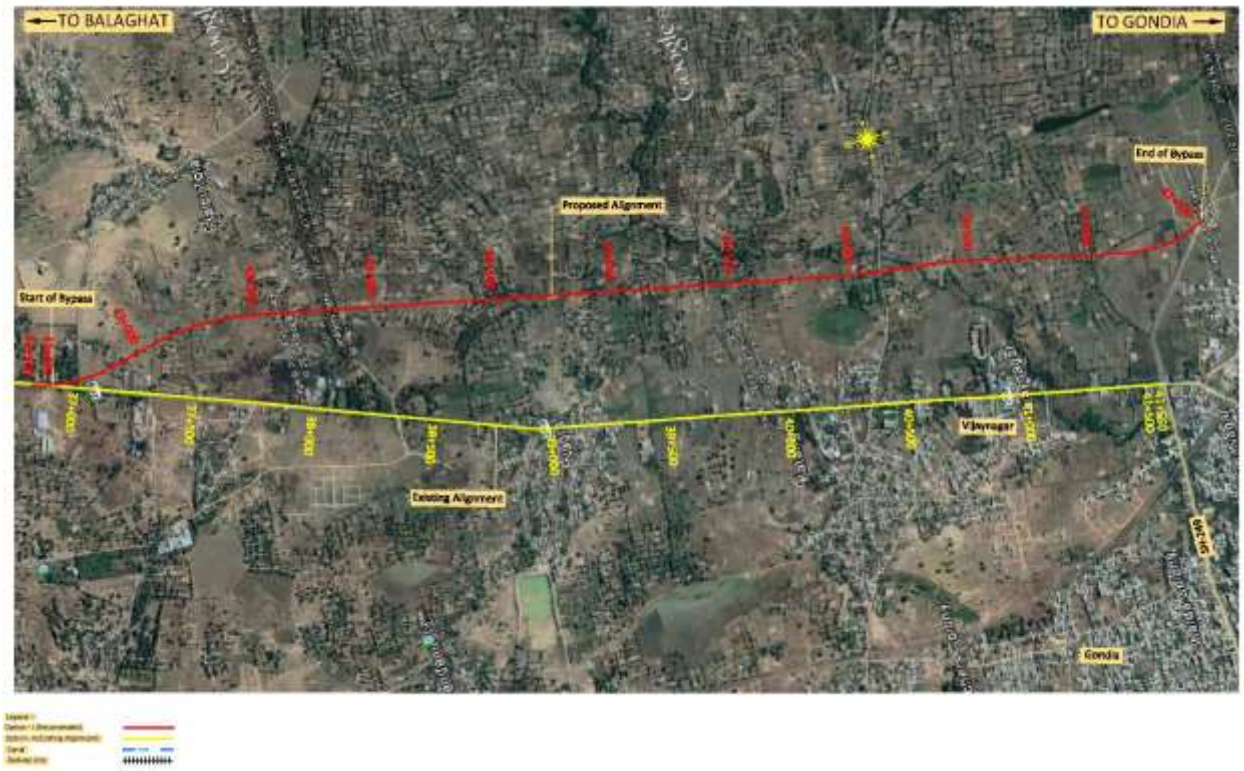


**Figure-5 Alignment proposal for Vijaynagar Bypass in Maharashtra**

Excluding the above bypasses and realignments, there are 15 locations where the existing substandard curves have been proposed for improvement as per IRC standard.

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