



2 PROJECT DESCRIPTION

2.1 INTRODUCTION

National Highways Authority of India (NHA) is engaged in the development of National Highways. As a part of this endeavour, NHA has decided to upgrade and strengthen the existing two lane State Highway MSH-3 between sections AUSA – Waranga Phata and Wardha – Butibori into four lane configuration. In this regard, NHA retained the services of M/s. Aarvee Associates Architects Engineers & Consultants Pvt. Ltd. for preparation of the Detailed Project Report for upgradation and strengthening of the existing two lane State Highway MSH-3 between sections AUSA – Waranga Phata and Wardha – Butibori into four lane configuration. The different stretches of the project road that are proposed for the above said development are:

Project Stretch and its Packages

S. No	Package Name	Existing Chainage	Design Chainage	NH No.	State
1	AUSA – Chakur	Km 470.00 to Km. 528.200	Km. 55.835 to Km. 114.600	361 (Old MSH3)	Maharashtra
2	Chakur - Loha	Km. 528.200 to Km. 504 on MSH2	Km. 114.600 to Km. 176.800		
3	Loha - Waranga	Km. 504 on MSH2 to 611.920 on MSH3	Km. 176.800 to Km. 244.369		
4	Wardha – Butibori	Km 85.374 to 28.800	Km. 465.500 to Km. 524.690		

Note:

* In Loha – Waranga Package i.e from Km.504.000 on MSH2 to Km.611.920 on MSH3, Overlap section of MSH2 from Km 503.000 to Km 534.000 and From Km. 548.000 to Km 554.000 of NH222 is observed. The section includes Nanded Bypass from Km 0.000 to Km 8.750.



2.2 LOCATION OF THE PROJECT AREA

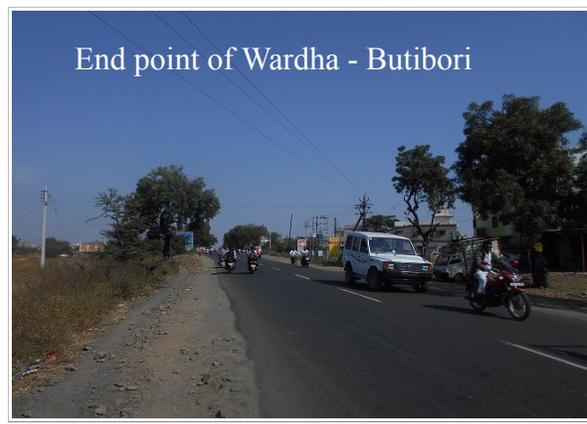
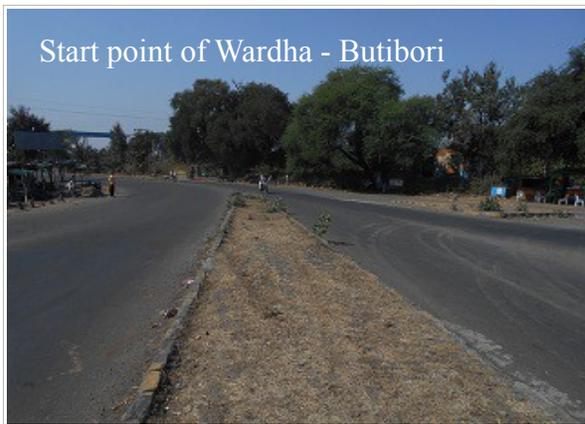
MSH-3 originates from Ratnagiri and passes through several districts of Maharashtra like Kolhapur, Sangli, Solapur, Tuljapur, Latur, Nanded, Hingoli, Yeotmal, Wardha and terminates at Nagpur, having overlaps with several NH and other State Highways.

The **National Highway No. 361** starts at Tuljapur and passes important towns AUSA, Latur, Chakur, Sirur Tajband, Ahmedpur, Loha, Nanded, Hadgaon, Umardhed, Mahagaon, Arni, Yavatmal, Kalamb, Deoli, Wardha and ends at Butibori on NH-44.

The Wardha-Butibori section starts at Butibori (Km 28.800 at MSH3) in Nagpur district and ends at Salod (Km 85.374) in Wardha District. The entire wardha – butibori stretch passes through Nagpur and Wardha districts. The following table – 1 represents the section details. The location map of project stretch is shown in FIG – 1.

Table – 1: Section Details

S. No	Section	Chainage	Length (Km)	Geo Co-ordinates	
				From	To
1	Wardha – Butibori	Km 85.374 to Km 28.800 (including wardha existing bypass)	59.474	20°41'23.00"N 78°32'24.35"E	20°54'38.67"N 78°59'21.21"E



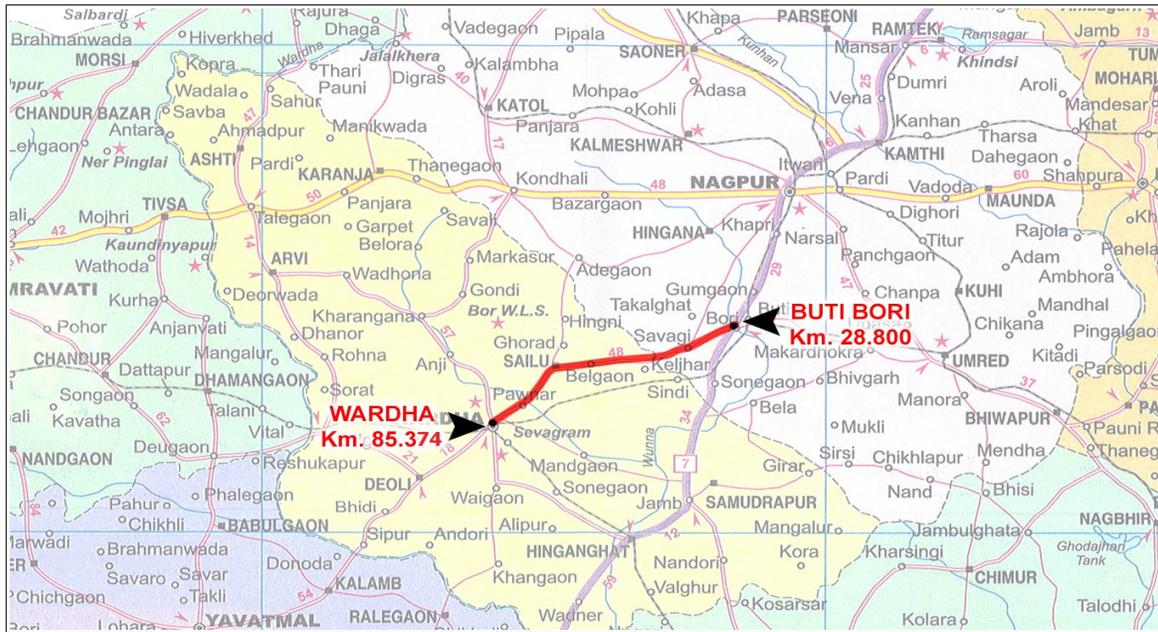


FIG:1 INDEX MAP OF THE WARDHA - BUTIBORI

WARDHA – BUTIBORI:

The Section starts at Km 28.800 at Butibori which is a major junction with NH-44 and ends at Km 85.374 near Salod village. The total length of the section is about 59.574 Km. The section passes through MIDC, Seldoh, Kelzar, Selu, Pavanar and Wardha. The existing pavement is entirely of flexible type. The project road is characterised by two lane carriage way with a varying width from 6.7m to 7.1m and earthen shoulder width varies from 1.5m to 2.5m and approximately 2.1 Km of the project road is having 4 lane of 7m each carriageway width with 1.2m earthen shoulders. The major portion of the project corridor passes through plain terrain and the predominant land observed is agriculture followed by barren/waste land and Built up sections. Part of the adjacent land along the project stretch from Km. 47.500 to Km. 48.900 is observed to be forest land on Wardha – Butibori section. About 12.14 hectares (App.) of forest land is required to be diverted (Acquired) for improving the alignment in Wardha – Butibori section. The project crossing the Dham river at Pavnar and Selu and also it crosses many streams, and canals. Approximately 15.6 Km length of the project road comes under the jurisdiction of Nagpur and remaining length of the section comes under the jurisdiction of Wardha district. The height of the embankment varies between 0.5m to 2m. There are 3 major junctions along the project stretch.



2.3 CLIMATE

The climate of the region is characterized as tropical. The climate, wind and wave pattern are governed by the annually changing monsoons and transition periods between them, dividing the year into four seasons as given below.

Seasons of the region

Season	Months	Characteristics
Summer	March–May	Hottest part of the year, occurrence of dust storms
South-West monsoon	June–Sept	Characterised by predominantly SW winds. Generally strong and persistent winds prevail.
North-East monsoon	Oct–Nov	Characterised by predominantly NE winds. Fair weather with the variable winds.
Winter	Dec–Feb	Cool season of the year

Cyclonic storms/depressions do occur in Maharashtra state mainly due to disturbances occurred in Bay of Bengal and partly due to disturbances occurred in Arabian Sea. However, the impact from these is minimal.

- The mean temperature of the area is 15°C minimum & 41°C maximum.
- The relative humidity of the area varies between 22% to 81%.
- The wind speed normally ranges between 6.7Kmph to 19kmph and the wind direction is predominant in NE, W & NW directions.
- Maximum annual rainfall is received during the south-west monsoon season. July & August are being the peak rainy months. The average annual rainfall is 751.5 mm and 1087.7 mm in the south-east and north-east regions respectively.

In order to analyse the past meteorological and climatological data near to the proposed project site, the following data was collected.



Comparison of Mean Monthly Meteorological Parameters, Wardha Station (1971 – 2000)

Month	Temperature (°C)		Rainfall (mm)
	Max	Min	
January	13.9	28.7	16.7
February	16.0	31.4	14.9
March	19.9	36.4	9.9
April	24.5	41.1	6.4
May	27.5	42.8	11.4
June	25.3	36.9	176.9
July	23.3	31.6	284.1
August	22.8	30.2	275.0
September	22.5	31.6	162.8
October	20.6	32.6	74.7
November	17.2	30.2	14.9
December	13.8	28.7	17.2

Source: www.imd.gov.in

2.4 TERRAIN

Terrain is classified by the general slope of the country across the highway alignment. The general topography of the area along the project corridor is a combination of plain and rolling terrain shown in Table – 2.

Table – 2: Terrain Details

Type of Terrain	Wardha-Butibori
	Percentage
Plain	89
Rolling	11
Hilly	-

2.5 LAND USE ALONG THE PROJECT ROAD

The project stretch passes through important settlements like Pavnar, Selu, Kelzar, and Seldoh. The majority of adjoining land is agricultural area and built up sections. The



important crop grown along the project stretch is cotton. The type of land use pattern that exists along the project stretch is presented in Table – 3.

Table – 3: Land Use Pattern

Type of Land Use	Wardha-Butibori	
	Percentage of Road length	
	LHS	RHS
Agricultural	37	41
Built-Up	19	24
Barren	28	26
Forest	16	9

2.6 VILLAGES AND TOWNS

This Section passes through Pavnar, Selu, Kelzar and Butibori. Further there are more number of villages and hamlets with less density along the project stretch and the list of village names are given in Table – 4.

Table – 4: List of Villages

S.no	Name of the village	S.no	Name of the village
1	Salod	9	Aamgaon
2	Wardha	10	Khadki
3	Dattapur	11	Seldoh
4	Pavnar	12	Wadgaon
5	Kanhapur	13	Sawangji
6	Selu	14	Asola
7	Mahabala	15	Dawalpeth
8	Kelzar	16	Butibori



2.7 INTERSECTIONS

The project highway crosses National Highway, State Highways, Major District roads and village roads etc. The details of intersections are given in Table – 5.

Table – 5: Major Intersections

Sl. No	Existing Chainage (Km.)	Type of Junction	Leads to (LHS)	Leads to (RHS)
1	72.750	+	Arvi	Wardha city
2	59.880	T	Ghorad	-
3	45.700	T	-	Sindhi
4	28.800	T	Nagpur	Hyderabad

The complete analysis of the turning movement surveys with the impact of each junctions is duly presented in the traffic report. It can be inferred that the traffic pattern at most of the major junctions changes significantly, delays at these junctions are longer than usual and hence need to be improved geometrically and should be developed in a way to accommodate all types of movements in an organised manner.

2.8 EXISTING ALIGNMENT OF PROJECT ROAD

It is observed that the project highway has a straight/curved alignment and traverses through plain and rolling terrain throughout its length. Part of the stretch is passing along the forest zones. All the horizontal curves confirm to acceptable geometric standards in terms of super elevation. The project stretch has number of horizontal and vertical curves as the existing ground profile is uneven in nature. The geometric alignment of the prevailing project stretch may have been designed as per State Highway standards and may not meet the present NH standards. The design is deficient in terms of sight distance, curve radii and super elevation at many of the locations. Further, there are various curves near to the village limits which might require improvement.

2.9 EXISTING ROW

The Right of Way pillars were observed at few locations along the project stretch. The Right of Way details shall be ascertained from the revenue records to clarify on the exact



land availability for construction. Based on the field verification, the existing ROW is 25m-45m for the entire project road except in built-up area.

2.10 CROSS DRAINAGE STRUCTURES

As part of upgradation of the project, it is required to make an assessment of existing structures with regard to their adequacies to ensure that they meet the objectives of the project. The existing structures in the project corridor are as follows:

- Major bridges
- ROB/RUB/Underpasses
- Minor bridges
- Slab Culverts
- Hume Pipe Culverts

Structure	Pipe Culverts	Box & Slab culverts	Minor Bridges	Major Bridges	ROB/RUB/ Underpasses
No.	61	1 & 17	13	2	1/1/3

2.11 CONDITION SURVEY OF EXISTING STRUCTURES

The aim of carrying out the condition survey is to ascertain the condition of the existing bridges and their ability to ensure the safe and smooth movement of the traffic especially on the structural portion with or without widening. As a component of the condition survey, visual observations were made keeping in view the requirements of IRC: SP-35 and IRC: SP-40. Visual observations carried out during the condition survey were mainly made to find out the shortcomings / distresses in the structures listed above. In addition to the superstructures, RCC / masonry substructures were inspected to locate cracks and loose mortar in joints, especially for piers and abutments. Condition survey of the existing bridges has been carried out by the Consultants' senior rehabilitation expert by visual inspection of various visible parts of the structures to observe the snags and to find out whether any sign of structural distress is exhibited in any of the bridges. The most commonly observed snag in RCC bridges/ structures are as follows:



- Cracking, cracks of different types
- Scaling
- Spalling of concrete
- Leaching
- Rust stain
- Delamination

Based on the inspection it is concluded that the most of the existing bridges are in good condition. With regular maintenance these bridges will perform well for a long time to come. However, because of lack of maintenance or otherwise, affected portions of the structure can be repaired, strengthened or maintained. Some of the bridges needs to widened or repaired or rehabilitated due to structural or other consideration. The detailed description of every structure with its condition and recommendation is incorporated in the Bridge Inventoty and condition survey report.

There is 1 ROB, 1 RUB and 1 VUP in Wardha-Butibori Section. Also, for each pipe culvert an inventory cum condition survey sheet has been filled up after visual observation and measurement with tapes. The locations of the cross drainage structure as noted in the inventory sheet depended on the actual existant kilometer stones. Most of the existing pipe culverts are in good to fair condition and must be widened in order to meet the the project requirement. Most of the Slab culverts are RCC slab type with RCC/ PCC abutment and wing walls. The detailed condition of Pipe and Slab culverts are described in Bridge inventory and Condition survey report.

2.12 EXISTING BYPASSES

There is one existing bypass in project stretch which is shown below.

S.no	Section	Chainage		Length in km	Name of Village	Lane Configuration
		From (Km)	To (Km)			
1	Wardha - Butibori	0	11.400	11.400	Wardha	2 lane Carriageway

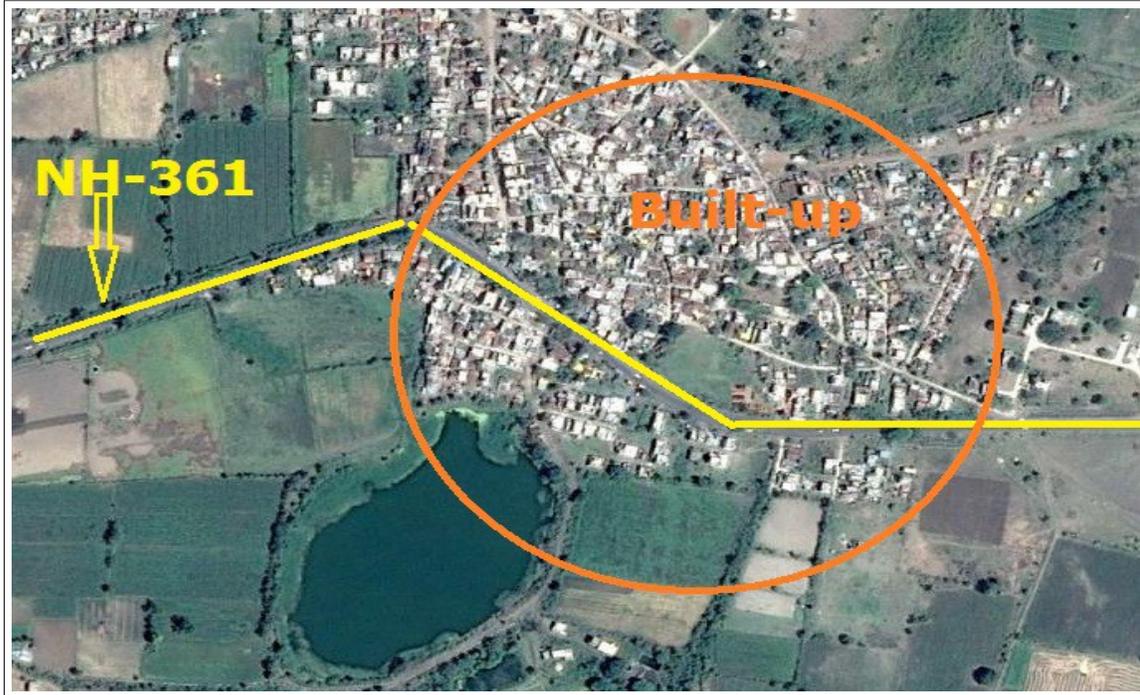


2.13 ALTERNATIVE ALIGNMENTS/BYPASSES

Project road passes through some congested locations and built-up areas, alternative alignment/Bypasses have finalized in consultation with NHAI. Bypassed villages are Salood ,Selu, Kelzar in Wardha-Butibori sections.

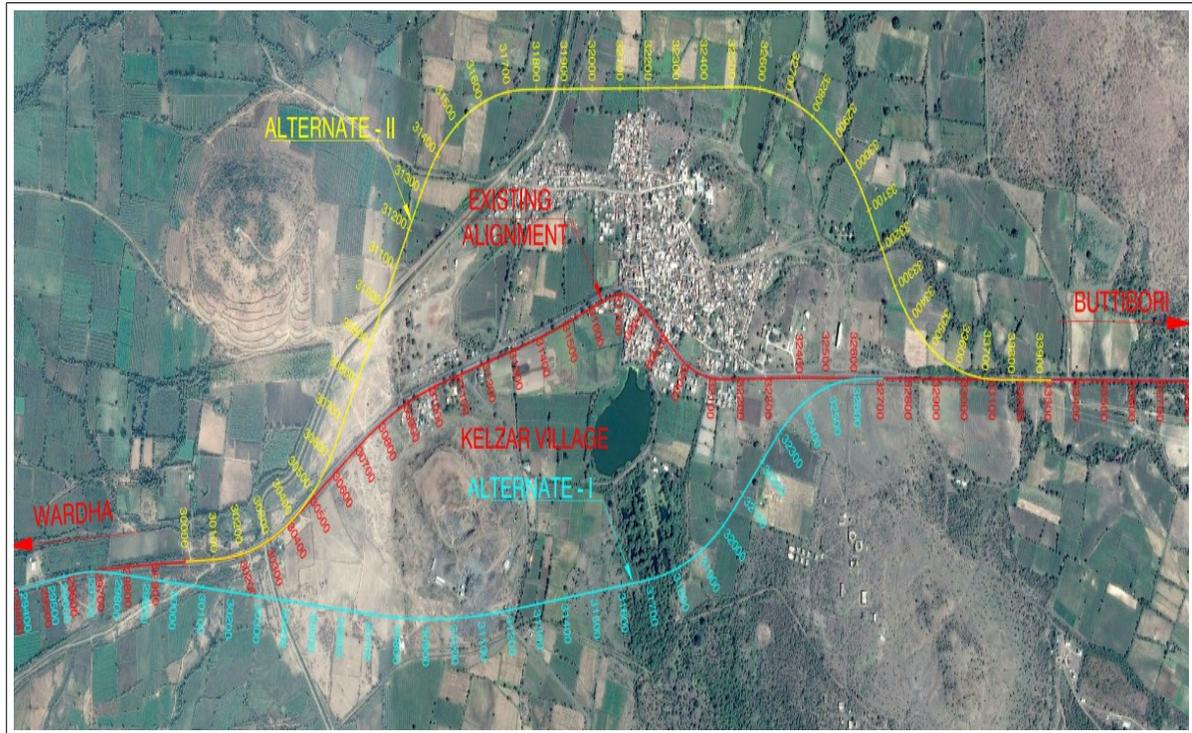
PROPOSED BYPASSES ON WARDHA – BUTIBORI SECTTION

KELZAR: Kelzar is famous for its historical place, Sidhi Vinayaka Temple and the Bor National Tiger Reserve & Bird sanctuary. The highway from Km.49.000 to Km.53.200 passes through the Kelzar Village. There is traffic congestion in city due to densely built-up areas, local movement to traffic along/across the Highway. It is difficult to acquire enough land, to accommodate four lane highway. The geometrics of the existing alignment is poor and improvement to existing alignment leads to demolition of structures Considering the above two alternates are proposed for Kelzar village. In case geometric corrections and widening is done through the Kelzar village, around 138 Pakka, 31 Semipakka and 49 Others are to be dismantled for land acquisition. Considering the profile of the study area, benefits that accrue and important factors in terms of cost of land acquisition, new structures including culverts, bridges and finally the length of the bypass, which are the guiding parameters in arriving at the most feasible and viable bypass alignment. Various alternatives of alignment were studied and the following section details the set of options studied for kelzar bypass:



Alternate – I: The Proposed alignment passing on left side of existing alignment, traverses through cultivated lands and barren lands. The length of bypass will be around 2.95 km. The village is extending towards right side of the existing alignment. The length of the proposed alignment is less than the existing alignment.

Alternate – II: The proposed alignment traverses on right hand side of the existing road. The entire alignment is passing through wet lands. Due to the presence of left canal of the Bor Reservoir, the alignment has to cross the canal twice. Hence CD works in this alternative is more as compared with alternative -I. The length of this proposal is more as compared with Alternate – I due to presence of Water bodies.



The details of the both the alignment options are as follows:

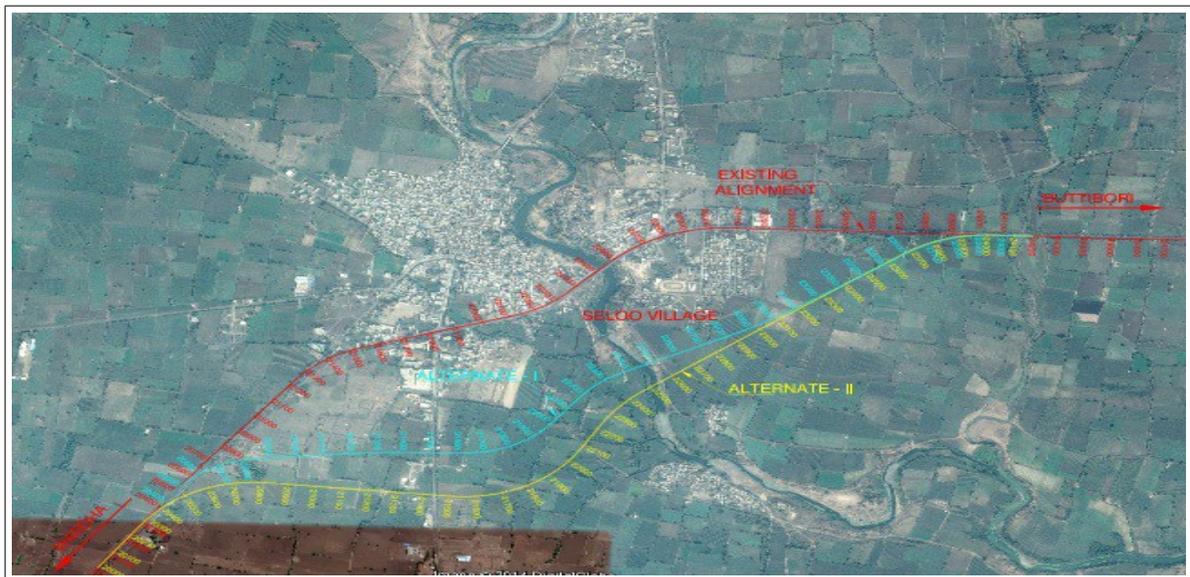
KELZAR	ALTERNATE – 1	ALTERNATE – 2
LENGTH(Km)	2.95	4
MNB	2	3
VUP	2	2
COST(Rs.)	40 Cr.	55 Cr.

The consultants were discussed on the proposed alternative bypass alignments, proposals with NHA authorities. After discussions had with authorities and based on the techno-economical considerations, Alternate-1 has been finalised.

SELU: Selu is a tehsil in Wardha District. The Section from Km.57.000 to Km.63.100 passes through the Selu village is congested due to the presence of built-up areas and local traffic. For geometric correction and widening the existing alignment in Selu village, around 157 pakka, 58 Semipakka and 56 Other structures are to be dismantled for acquisition of 60m ROW. The village is extending on right hand side of the existing road.



Proposed Bypass: Two alternative bypasses are proposed on left hand side of the existing alignment. Two alternatives are almost equivalent in length to the existing alignment.



As it is observed from the field verification the bypass on right hand side is not feasible due to extended built-up of the village and a number of water bodies resulting in increase in the length of the bypass. Hence, alternate to the bypass on right hand side is not considered for the comparison and studying the feasibility.

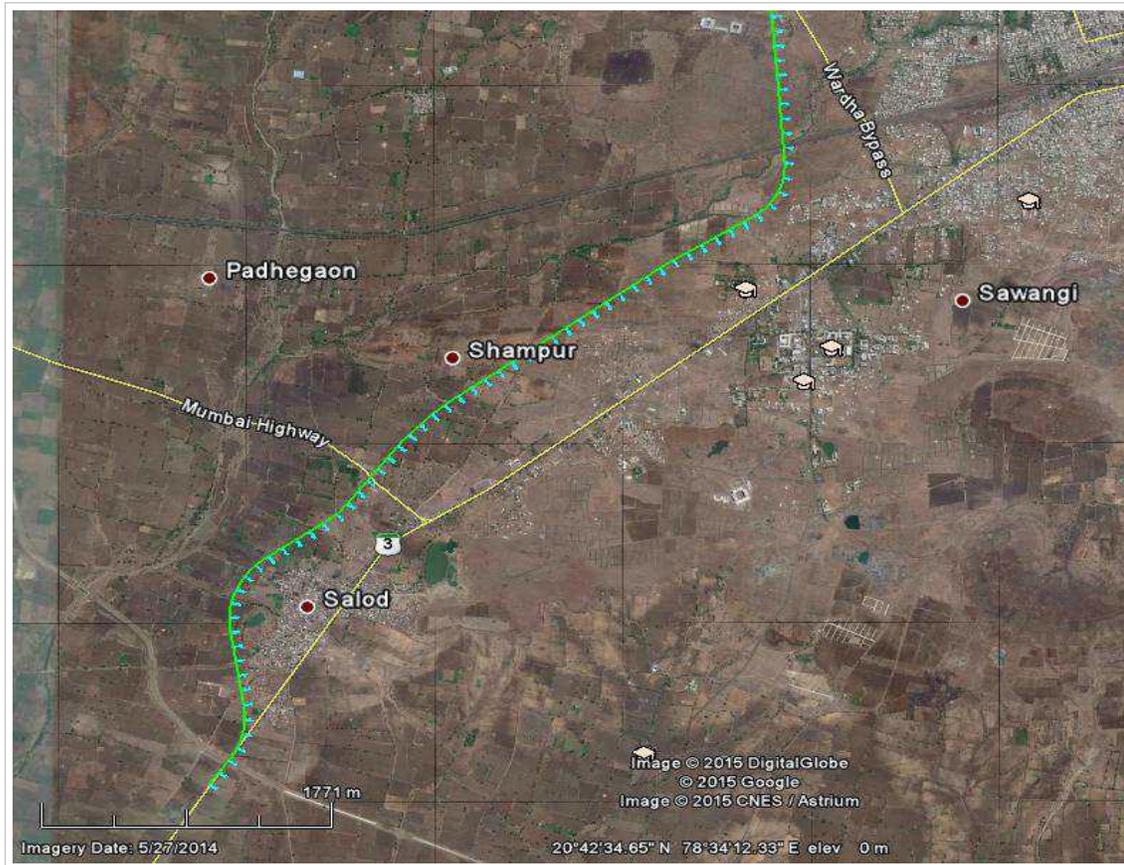
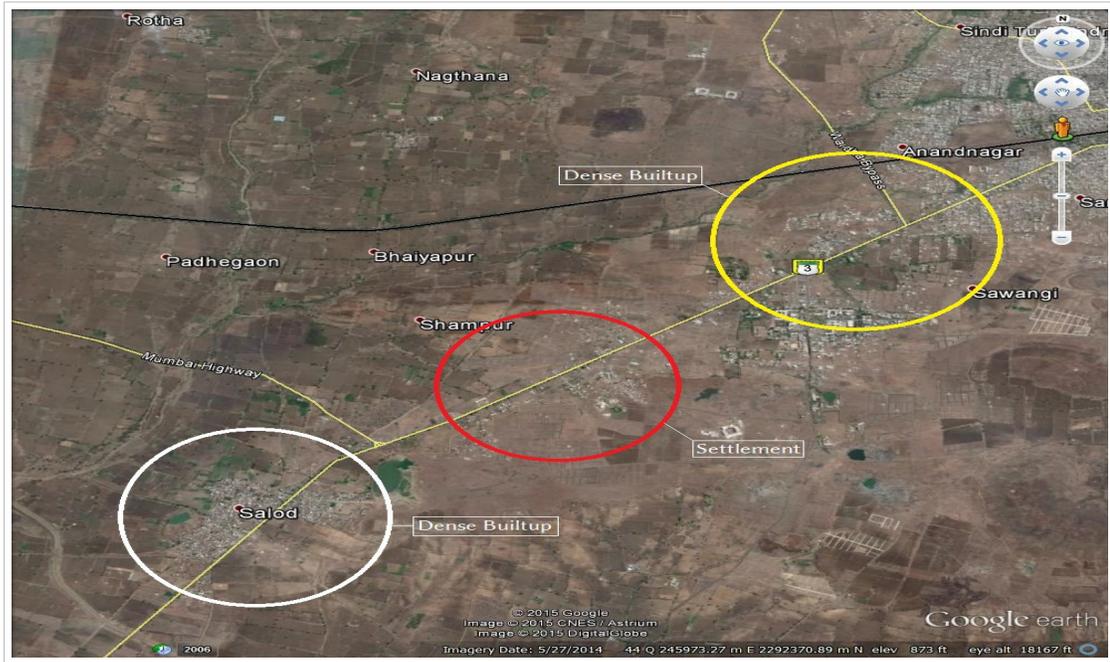
The details of Proposed alignment are given below.



SELU	Alternate - I	Alternate - II
LENGTH(Km)	3.700	4.170
MNB	2	3
MJB	1	1
VUP	2	2
COST(Rs.)	51 Cr.	58 Cr.

After reviewing the feasibility of the above bypass alternates, as in consideration of length, structures and in terms of cost also alignment No.1 was recommended by the consultant and the same was finalised by NHA authorities.

SALOD: Salod is village in outskirts of the Wardha city with a huge settlements and dense builtup areas. Salod village is bounded by Shampur, Sawangi and Selsura with megre built up areas. In order to avoid the junction between Wardha bypass and city road which is poor in geometrics and creating accident prone area. Besides this, around 312 pakka, 145 semi pakka and around 92 kiosks are to be dismantled for land acquisition and geometric correction. In addition to this, State Highway 243 is joining with NH361 near Shampur Village which adds traffic to NH361 making the built up areas congested with traffic. Keeping the point in view a bypass is proposed for salod in previous package of Yavatmal – Wardha. Considering the above constraints and proposals, the proposed salod bypass is extended upto wardha bypass.





The proposed alignment will take off at Km 85.340 and lands at Km 78.000 on Wardha bypass and measures around 7.400 km.

2.15 REALIGNMENTS

Realignment is proposed due to the presence of a sub standard curves and insufficient geometric standards, and in order to avoid demolition of private and religious structures. Realignments are proposed at locations listed below.

S. No.	Design Chainage		Length (m)	Remarks
	From(Km)	To(Km)		
1	476.270	476.620	350	Realignment due to Geometric Correction
2	481.780	482.400	620	Realignment due to Geometric Correction
3	483.130	483.600	470	Realignment due to Mosque
4	485.350	485.580	230	Realignment due to Temple
5	486.110	486.270	160	Realignment due to Geometric Correction
6	505.660	506.600	940	Realignment due to Built-Up
7	515.210	515.520	310	Realignment due to Geometric Correction