Alternative/optional Study and Project Improvement Proposal

Name of Project: - Forest Land Diversion proposal for "Improvement and Up-gradation to 4-lane configuration of Meerut-Nazibabad section of NH-119 between KM. 39.165 (Ex. Km. 39+240) TO Km 78.635 (Ex. Km. 86+590) in the state of Uttar Pradesh".

1.1 General

The concept of development improvement & construction of the project highway to Four Lane divided Carriageway is for reduction in transport cost, enhanced safety & Level of Service for road users, with superior operation & maintenance enabling enhanced operation efficiency, minimal adverse impact on the local population, minimal adverse impact on environment, forest, wildlife, minimal land acquisition by appropriate engineering solutions. The preliminary designs of the major components are carried out for the alternative alignment options of project road.

Project Hastinapur WL area is around 85 km liner length both side of river Ganga and to avoid laying of project road alignment along existing road a new alignment measuring about 50 km to be constructed to connect existing road (NH119) outside Wildlife Area. In such situation and keeping in view of viability / feasibility of project optional study for different realignment and bypass has been done which is inside of wildlife area.

ESZ is 1 km outside from boundary of Hastinapur Wildlife Sanctuary. From km 39+165 to km 76+800 (37.635km), proposed project road alignment traverse in ESZ and WL area "Hastinapur Wildlife Sanctuary".

Total project road length is 39.470 km and out of 39.470 km road length around 37.635 km road length is located inside Wildlife area and its ESZ.

The objective of this chapter is to spell about topographical features, identification of geometric deficiencies in the existing alignment of project road, discuss on proposed geometric improvements including alternative bypass alignments for safe and speedy movement of traffic and safety of users.

The existing alignment covers under Toposheet No. of (Scale: 1:50000) 53G12, 53G15, 53G16, 53K3, 53K6

The existing NH road is of 2-lane carriageway configuration with good to Fair geometrics, geometric deficiencies are mainly in town portions. For the improvement of existing alignment, realignments & bypasses are required due to congested City/Town/Village portions with geometric deficiencies.

The road passes through urban area/villages has constraint of improvement to 4 lane with paved shoulders as available ROW width is very less about 24m to 30m & with very poor geometrics. The possibility to improve these stretches to 4 lane divided carriageway with footpaths, covered drains or with service road is not feasible at many stretches as it requires additional land acquisition in urban area which disturbs the habitants. The best option is that to improve the alignment by small realignments or bypasses with new additional land acquisition which improves the geometrics to NH standards, as well as minimize the R&R issues; in addition to safety of road users.

The alignment is proposed to be improved to account for the following features:

1. To remove kinks in the alignment
2. To improve the sub-standard curves to geometrical standards.
3. To provide realignment required for location of bridges and its approaches to suit geometrical and design standards.
4. To raise the existing road sections subjected to inundation due to submergence.

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5. To bypass the existing built up / urban developments at, Ramraj & Mirapur and also for other deficit curve locations, as required.

Improvements and realignments are necessary where there are sharp bends or sharp curves on the approaches of the existing bridge either proposed to be dismantled and construction of new bridge is required as per requirements. The preliminary proposal is to improve the existing road to Four Lane divided carriageway with Paved Shoulders configuration.

1.1.1 Eccentric widening & concentric widening:

The options are dictated by the following considerations:

1. Limit of ROW width
2. Fouling of Utilities
3. Fouling with courses of nalla/parallel flows
4. Location of water bodies
5. Built-up areas requiring 4 lane widening.
6. Important properties / monuments abutting the road.
7. Constructability and traffic management

The widening is proposed both concentric & occentric as per above considerations

1.1.2 New Alignment/Realignment/Bypasses

New alignment/alternative bypass alignments have been proposed keeping in view following objectives:

1. Shall avoid marshy ground, steep terrain, unsuitable hill features and areas subject to severe climatic conditions, flooding and inundation
2. The length should be as short as possible
3. It shall have minimum impact on the existing public utilities and settlements
4. It shall not disturb the existing drainage system and drainage channels.
5. The alignment shall avoid of sharp curves and it shall have better geometrical shape.
6. The alignment shall be located away from the existing built-up area and shall not conflict with future planned development and traffic hazards.
7. The alignment shall preserve environmental and maintain ecological balance including wild life protection.
8. The land acquisition shall be minimal.

1.2 Methodology adopted for finalizing the alignments

Satellite Imageries, Topographical maps of Survey of India & actual topographic survey of existing alignment were studied to understand the terrain, water bodies, forest areas and any major channel etc. at macro level on both sides of stretches to be bypassed. Besides, thematic maps relative to soils, land capability, drainage, relief etc. were also scanned to have better appreciation of these factors. Generalized information from maps, topographic plans and site visits were collected to study the details at micro level. Site visits included thorough inspections of areas on both sides of urban stretches covering the study of terrain, land uses, environmental sensitive features and developmental activities along with public contact residing in the localities.

The coordinates of the features were taken as control points by high precision GPS instrument. This exercise enabled the Consultants to identify the potential alignments for bypass alternatives. These were marked on maps prepared on the basis of Satellite Imageries, topographic maps and village maps. This was followed by another site visit by multidisciplinary expert's team consisting of Highway Engineer, Sociology and R&R Expert, Geotechnical Engineer and Environmental Expert to verify the feasibility of these alternative alignments and to record impacts on natural environment (water bodies / wet lands / rivers / water crossings, forests etc.), social environment (agricultural land, intensity of development, resettlement problems etc.), cultural environment (archeological properties, temples/shrines

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etc.). This process was repeated and refinements made in alternative alignments.

Detailed information such as land use, type of soil, rock cutting, No. of trees to fell, irrigation canals and wells, utilities, river, nallahs and stream crossings, structures, road junctions and railway crossings, details of pond etc. were collected. Preliminary discussions with local administration and local public were conducted to gather more details on probable alignment options. Detailed topographical survey of bypass alignments approved by the client will be carried out in the next phase of the project. It is quite likely that some modifications in the approved alignment might be necessitated due to site conditions during detailed topographical survey and design, to fulfill the geometrical standards.

1.3 Alignment Options and Selection

Alignment selection was carried out on the basis of evaluation of various alternatives for geometric improvements, realignments and bypasses. Both qualitatively and quantitatively evaluation has been done for various factors influencing the selection process. These factors can be broadly grouped under main heads such as geometrics, land use though which the alignment is passing, water bodies, forests and sensitive areas etc., cost, and economic benefits, social and environmental impacts. The geometric improvement was proposed considering Terrain, Geometrics, Land acquisition required, forest land, Resettlement and Rehabilitation, shifting of utilities, Major structures required etc. All these factors are rated for evaluating the merits of each alignment options.

the main findings for various options of Bypasses are summarized as under and recommendations are proposed bypass alignments is given on following merits:

1. Optimum Cost
2. Optimum Land Acquisition & no property acquisition
3. Good Geometrics
4. Avoiding Habitat Area
5. High safety and Low R&R issues.

The proposed alignment options are elaborated in detail under various paragraphs below. The package wise options are enlisted with respective package wise reports.

1.3.1 Alternatives to Behsuma Bypass

From km 40+500 to km 42+150 the existing alignment is passing through Behsuma town. Improvement along existing road is difficult at this location as the existing ROW available is ranging from 30 m & constructions and developments are all along. The widening & geometric improvements of the existing road from 2-lane to 4-lane divided carriageway with Service Road as per manual, at town portion would involve significant land acquisition with property acquisition. Hence alternative bypass with geometric improvements is proposed for Behsuma town to avoid congestion within the town and accidents in habitat areas as well as to guard pedestrian safety; hence the alternative routes are studied & presented below.

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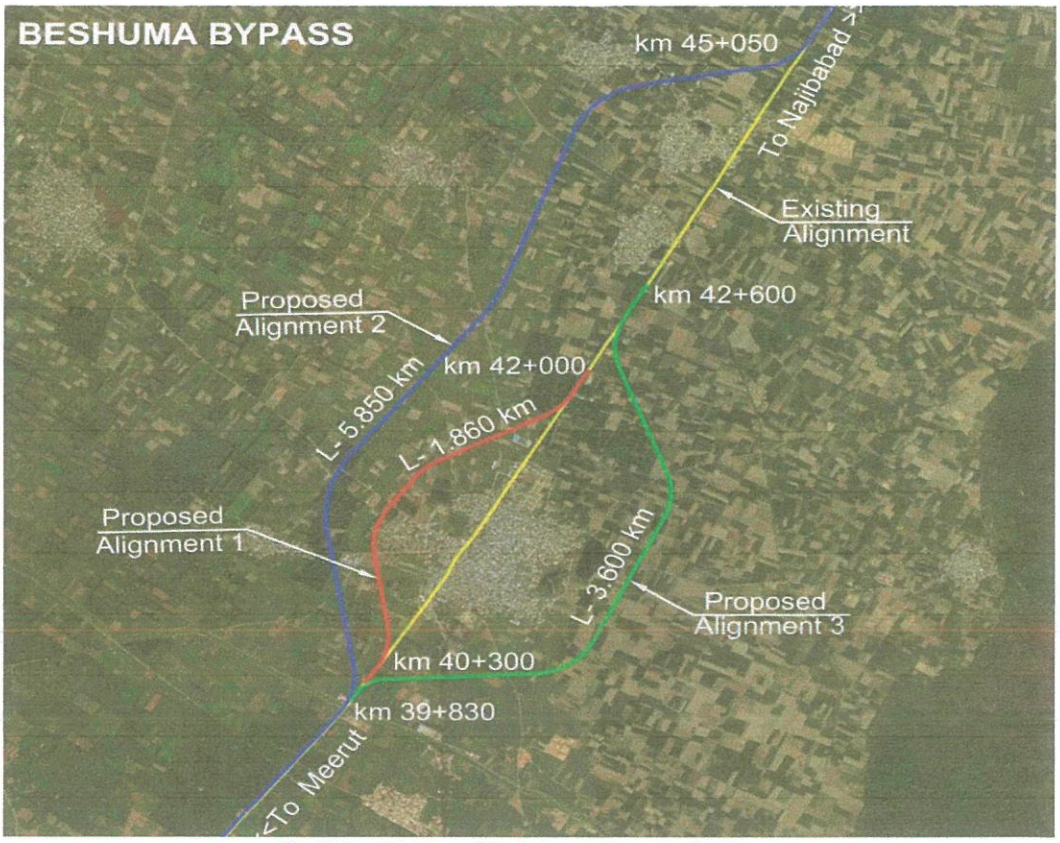

Fig 0.1: Proposed Behsuma Bypass Options

Option-1

Option-1 is proposed on Western side i.e. on LHS of existing NH-119. This proposed option study was previously carried out in 2 lane DPR project. The proposed alignment takes off from the existing NH at km 40+300 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 42+000.

The total length of alignment under this option is 1.860 km In general, the terrain can be classified as plain terrain and the alignment is having a good geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment does not require constructing any Major/Minor Bridge. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

Option-2

Option-2 is proposed on Western side i.e. on LHS of existing NH-119. The proposed alignment takes off from the existing NH at km 39+830 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 45+050.

The total length of alignment under this option is 5.850 km In general, the terrain can be classified as plain terrain and the alignment is having a good geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment does not require constructing any Major/Minor Bridge. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

Option-3

Option-3 is proposed on Eastern side i.e. on RHS of existing NH-119. The proposed alignment takes off from the existing NH at km 39+900 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 42+600.

The total length of alignment under this option is 3.600 km In general, the terrain can be

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classified as plain terrain and the alignment is having a good geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment crosses one canal requires constructing Minor Bridge. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

The Comparative studies of bypass options are shown below:

Table 0.1: Comparison of Behsuma Bypass

Sr. No.	Description	Option 1	Option 2	Option 3
1	Take off Chainage on NH 119	40+300	39+830	39+900
2	End Chainage on NH 119	42+000	45+050	42+600
3	Length (in km)	1.86 Km	5.850 Km	3.60 Km
4	Route Alignment	LHS	LHS	RHS
5	Terrain	Plain	Plain	Plain
6	Land Use	Revenue	Revenue	Revenue
7	Geometrics	Good	Good	Good
8	Land Acquisition	11.16 Heat	35.10 Heat	21.6 Heat
9	Forest Land (in hect)	Nil	Nil	Nil
10	Right of Way (ROW)	60	60	60
11	Resettlement & Rehabilitation	Required	NA	Moderate
12	ROB	Nil	Nil	Nil
13	Grade Separator	Nil	Nil	Nil
14	VUP/PUP	2 No.	2 No.	2No.
15	Major at Grade junction	Nil	Nil	Nil
16	Minor at Grade junction	1 Nos.	3 Nos.	2 Nos.
17	Major Bridge	Nil	Nil	Nil
18	Minor Bridge	Nil	Nil	1 No
19	Slab Culvert / HP Culvert	4 Nos.	8 Nos.	6Nos.
20	HT Line	Yes	Yes	Yes
21	Water Pipe Line	Yes	-	-
22	Civil Construction Cost	55.80 Crs	117.00 Crs	90.00 Crs
23	Recommendation	No	Yes	No

Recommended Option 2 for Behsuma Bypasss (L= 5.85 Km) is considered.

The all three alternatives for Behsuma Bypass were discussed & the Alternative Alignment (2) on LHS side of NH-119 of about 5.850 Km in Length was agreed as its covering extended built-ups of Sadarpur and Morekhurd.

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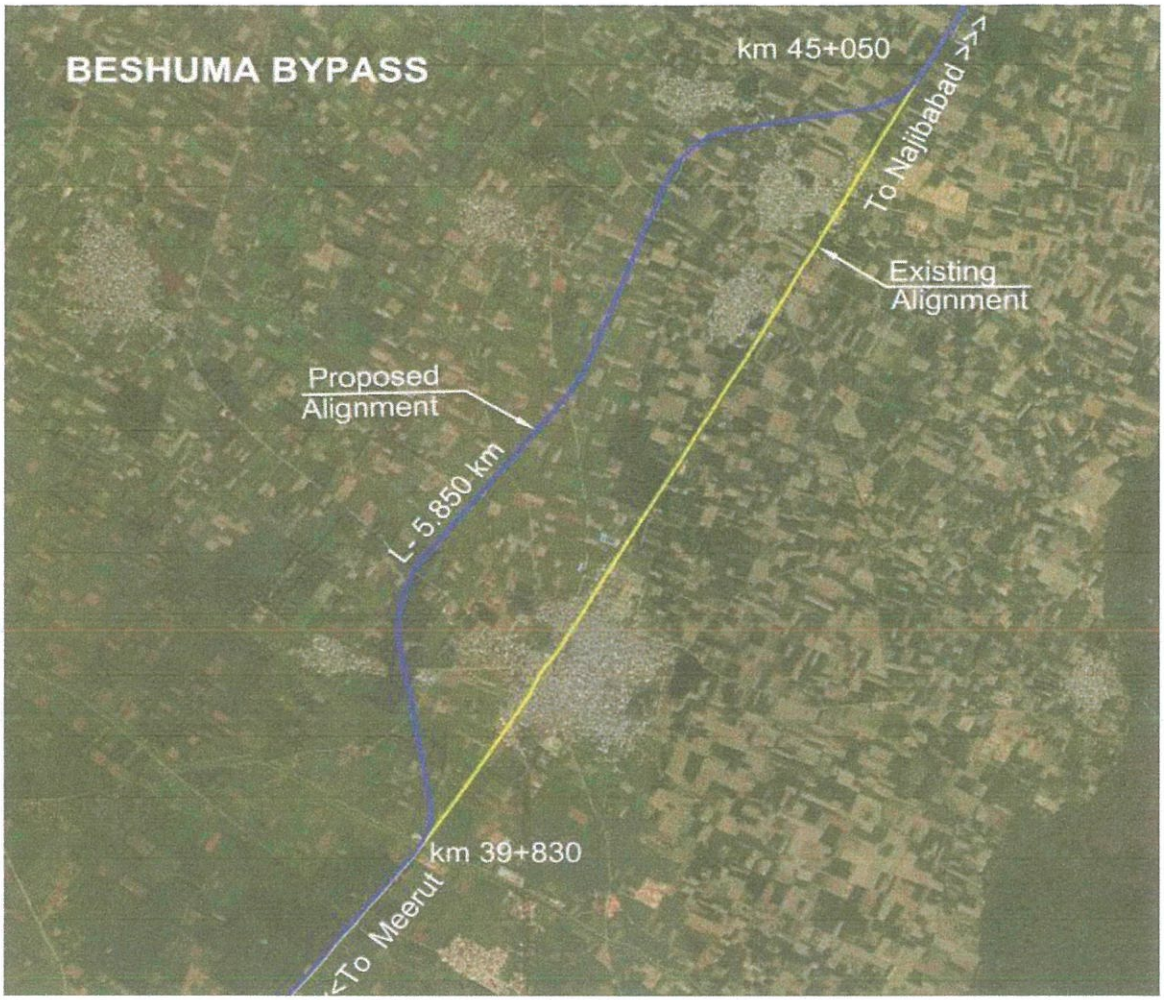

FINAL APPROVED ALIGNMENT FOR BEHSUMA BYPASS

1.3.2 Alternatives to Ramraj Bypass

From km 46+800 to km 49+100 the existing alignment is passing through Ramraj Village. Improvement along existing road is difficult at this location as the existing ROW available is ranging from 24 to 30 m & constructions and developments are all along. The existing alignment also navigates through acute curve of 30m radius with 90^0 deviation angles. The widening & geometric improvements of the existing road from 2-lane to 4-lane divided carriageway with Service Roads as per manual, at village portion would involve significant land acquisition with property acquisition. Hence alternative bypass with geometric improvements is proposed for Ramraj village to avoid congestion within the village and accidents in habitat areas as well as to guard pedestrian safety, the alternative routes are studied & presented below.

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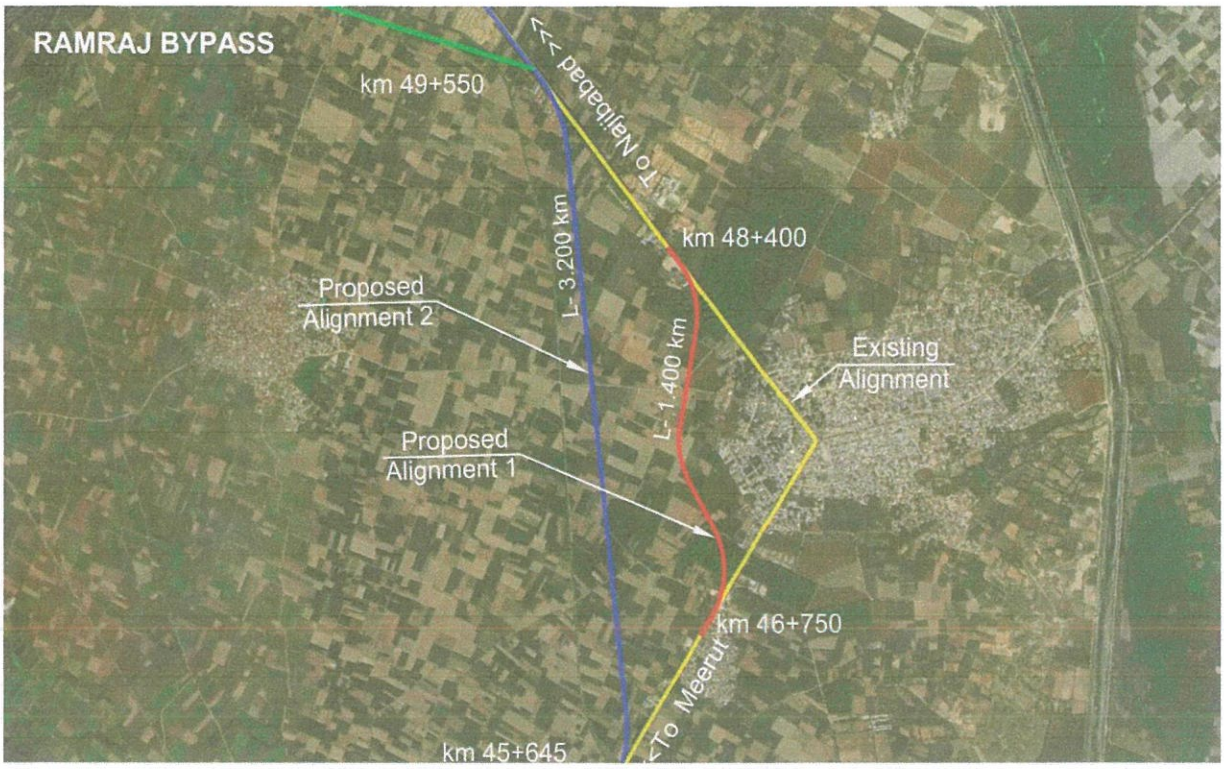

Fig 0.2: Proposed Ramraj Realignment Bypass options

Option – 1

Option – 1 is proposed on the Western side i.e. on LHS of existing NH-11 9. The proposed alignment takes off from the existing NH at km. 46+750 and passes through agricultural land in the north direction, avoiding built-up areas and joins at km. 48+400. The alignment option is nearer to Ramraj Village portion.

The total length of alignment under this option is 1.40 km. in general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment does not require constructing any Major/Minor Bridge. The subgrade stratum is of murum sandy soil type. For the entire length land acquirition is required as the route follows the agriculture land. There is not forest land to be acquired.

Option – 2

Option – 2 is proposed on the Western side i.e. on LHS of existing NH-11 9. The proposed alignment takes off from the existing NH at km. 45+645 and passes through agricultural land in the north direction, avoiding built-up areas and joins at km. 49+550. The alignment option is bypasses Saifpur Village portion also.

The total length of alignment under this option is 3.20 km. in general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment does not require constructing any Major/Minor Bridge. The subgrade stratum is of murum sandy soil type. For the entire length land acquirition is required as the route follows the agriculture land. There is not forest land to be acquired.

The comparative studies of bypass options are shown below:

Table 0.2: comparison of Ramraj realignment Bypass

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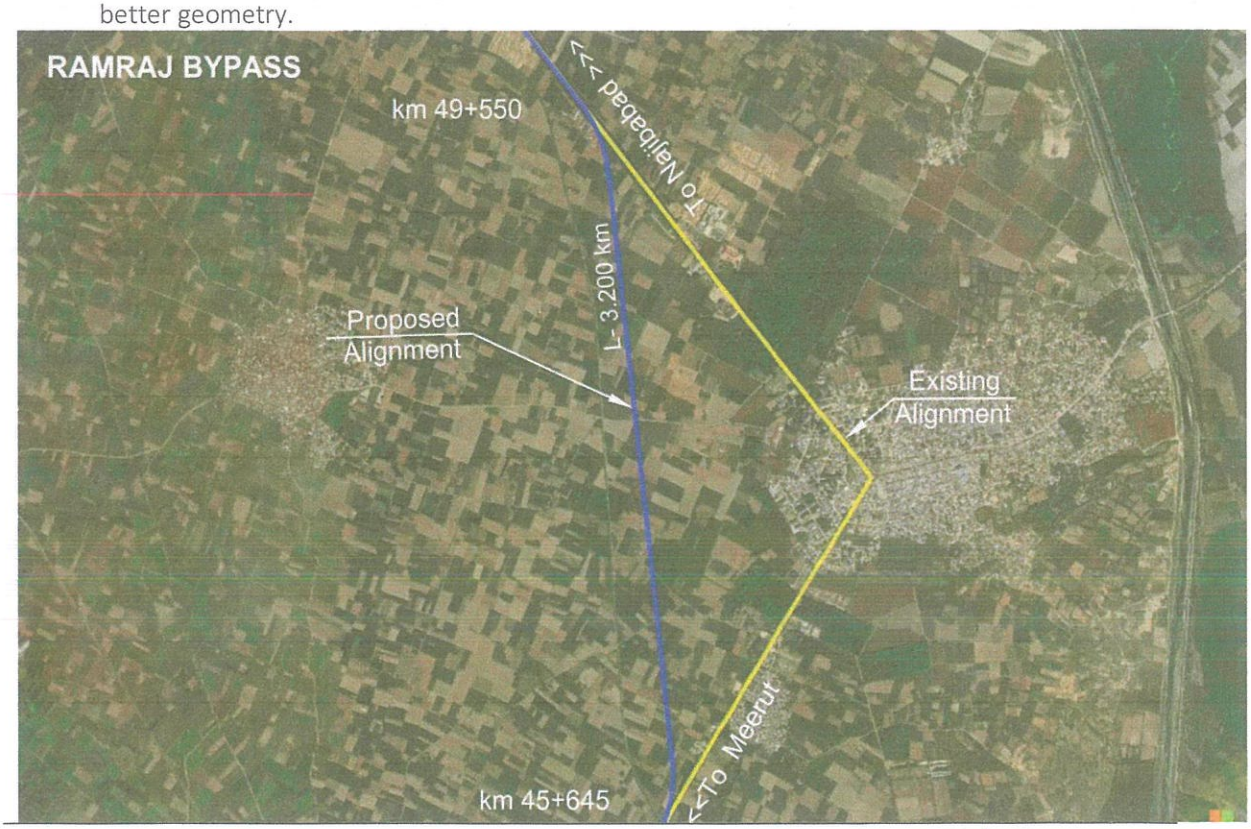
Sr. No.	Description	Option 1	Option 2
1	Take off Ex.Chainage on NH 119	46+750	45+645
2	End Ex.Chainage on NH 119	48+460	49+550
3	Length(in km)	1.40 Km	3.20 Km
4	Route Alignment	LHS	LHS
5	Terrain	Plain	Plain
6	Land Use	Revenue	Revenue
7	Geometrics	Fair	Good
8	Land Acquisition	8.40	19.20
9	Forest Land (in hect)	Nil	Nil
10	Right of Way (ROW)	60	60
11	Resettlement & Rehabilitation	**Required**	**NA**
12	ROB	Nil	Nil
13	Grade Separator	Nil	Nil
14	VUP/PUP	2 Nos.	3 Nos.
15	Major junction	2	2
16	Minor at Grade Junction	1	1
17	Major Bridge	Nil	Nil
18	Minor Bridge	Nil	Nil
19	Slab Culvert / HP Culvert	2 Nos.	5 Nos.
20	HT Line	Yes	Yes
21	Water Pipe Line	Yes	Yes
22	Civil Construction Cost	**42.00 Crs**	**64.00 Crs**
23	Recommendation	No	Yes

Recommended Option 2 for Ramraj Bypasss (L= 3.20 km) is considered.

The two alternatives for Ramraj Bypass were discussed & the Alternative Alignment (2) on LHS side of NH-119 of about 3.20 Km in Length was agreed as its covering extended builtups and better geometry.



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1.3.3 Alternatives to Bypass Putthi Village & Mirapur Town

From km 50+100 to km 51+300 the existing alignment is passing through Putthi Village & from km 53+400 to 57+00 passes through Mirapur town and Valipura built-up. Improvement along existing road is difficult at these locations as the existing ROW available is ranging from 24 to 30 m & constructions and developments are all along. The existing alignment also navigates throughout with acute & sharp curves of 30m to 50m radius and with 90^0 deviation angles. The widening & geometric improvements of the existing road from 2-lane to 4-lane divided carriageway as per manual, at village/town portion would involve significant land acquisition with property acquisition. Hence alternative bypass including both Putthi village & Mirapur town with geometric improvements is proposed to avoid congestion within the village/town portions and accidents in habitat areas as well as to guard pedestrian safety, the alternative routes are studied & presented below.

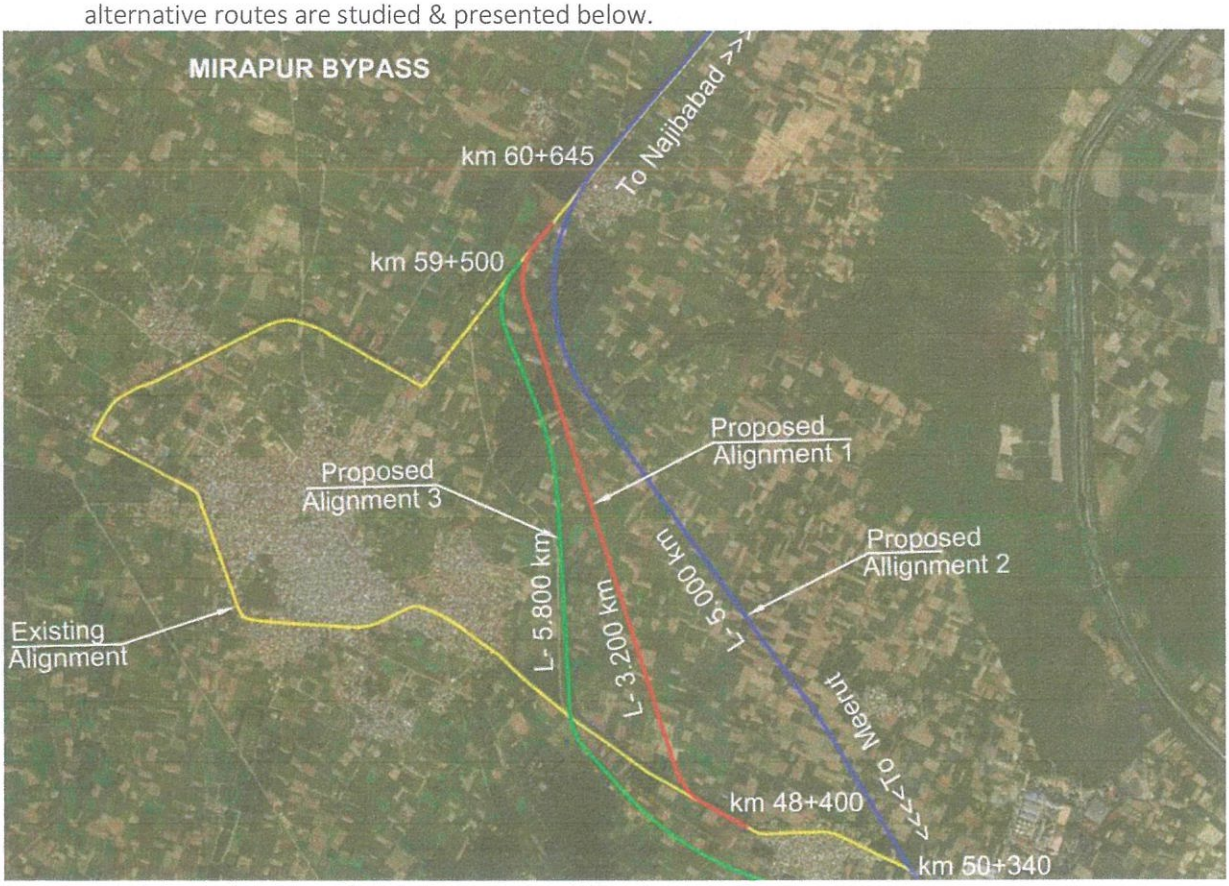

Fig 0.3: Proposed Putthi & Mirapur Bypass options

Option-1

Option-1 is proposed on Eastern side i.e. on RHS of existing NH-119. This proposed option study was previously carried out in 2 lane DPR project. The proposed alignment takes off from the existing NH at km 52+200 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 59+850.

The total length of alignment under this option is 3.200 km In general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment does not require constructing any Major/Minor Bridge. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

Option-2

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Option-2 is proposed on Eastern side i.e. on RHS of existing NH-119. The proposed alignment takes off from the existing NH at km 50+340 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 60+645.
The total length of alignment under this option is 5.000 km In general, the terrain can be classified as plain terrain and the alignment is having a good geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment does not require constructing any Major/Minor Bridge. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

Option-3
Option-3 is proposed on Western side i.e. on LHS of existing NH-119 for Putthi village then crossing NH-119 (*with grade separation*) it is proposed on Eastern side i.e. on RHS side of NH-119. The proposed alignment takes off from the existing NH at km 49+500 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 59+500.

The total length of alignment under this option is 5.800 km In general, the terrain can be classified as plain terrain and the alignment is having a good geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment crosses two canals requiring construction of Minor Bridges. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

The comparative studies of bypass options are shown below:

Table 0.3: comparison of Putthi & Mirapur Bypass

Sr. No.	Description	Option 1	Option 2	Option 3
1	Take off Chainage on NH 119	52+200	50+340	49+500
2	End Chainage on NH 119	59+850	60+645	59+500
3	Length(in km)	3.20 Km	5.000 Km	5.80 Km
4	Route Alignment	RHS	RHS	RHS
5	Terrain	Plain	Plain	Plain
6	Land Use	Revenue	Revenue	Revenue
7	Geometrics	Fair	Good	Good
8	Land Acquisition	19.2	30.00	34.80
9	Forest Land (in hect)	Nil	Nil	Nil
10	Right of Way (ROW)	60	60	60
11	Resettlement & Rehabilitation	Required	NA	Required
12	ROB	Nil	Nil	Nil
13	Grade Separator	Nil	Nil	Nil
14	VUP/PUP	Nil	Nil	1 Nos.
15	Major junction	2 Nos.	2 Nos.	3 Nos.
16	Minor at Grade junction	Nil	1 No.	1 No.
17	Major Bridge	Nil	Nil	Nil
18	Minor Bridge	Nil	Nil	2 Nos.
19	Slab Culvert / HP Culvert	6 Nos.	10 Nos.	15 Nos.
20	HT Line	No	No	No
21	Water Pipe Line	No	No	No
22	Civil Construction Cost	96.00 Crs	100.00 Crs	145.00 Crs

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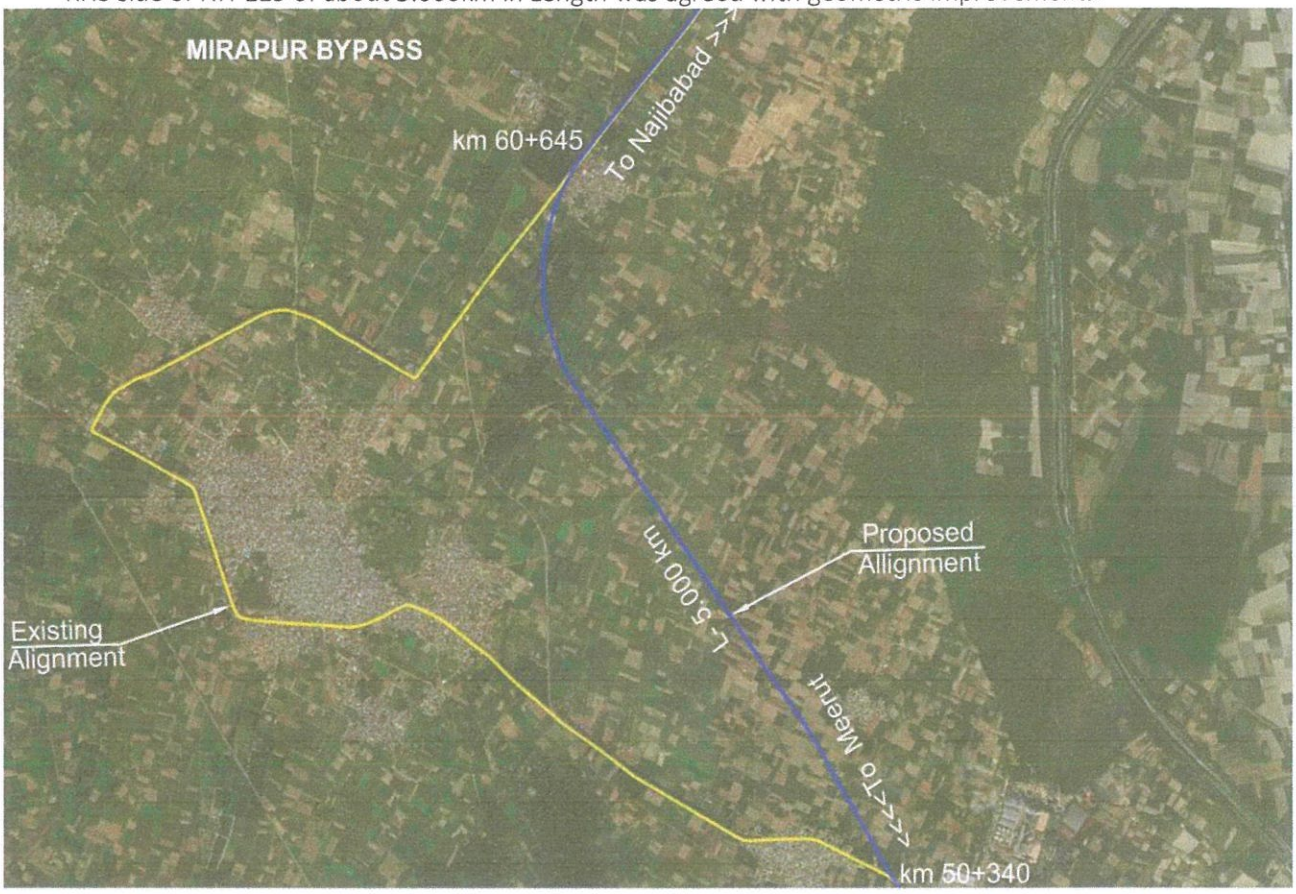
Sr. No.	Description	Option 1	Option 2	Option 3
23	Recommendation	No	Yes	No

Recommended Option 2 for Mirapur Bypasss (L= 5.000km) is considered.

The all three alternatives for Mirapur Bypass were discussed & the Alternative Alignment (2) on RHS side of NH-119 of about 5.000km in Length was agreed with geometric improvements.



Final Approved Alignment for Mirapur Bypass

1.3.4 Alternatives to Ganga River Barrage

The project road alignment is passing through downstream Bridge of Ganga River Barrage across Ganga River at km 71+000. Ganga River Barrage is with Spillway of 28 No. of Gates (2 x 20.50 m 26 x 21.30 m. The widening of existing bridge to 4 lane with additional brige for 2 lane on adjacent to existing bridge is not possible due on LHS i.e. on U/S barrage was constructed & on D/S protection works are exists. Hence to construct additional 2 lane new bridge for another lane traffic alternative studies are carried out with required geometric improvements.

Wildlife Institute of India (WII) Vide Letter No. WII/Hastinapur_Road/2021-01/2022-01, has issued Mitigation Measures which includes Realignment of Wild Life stretch from Existing Km.67+500 to 72+400 with elevated Corridor.

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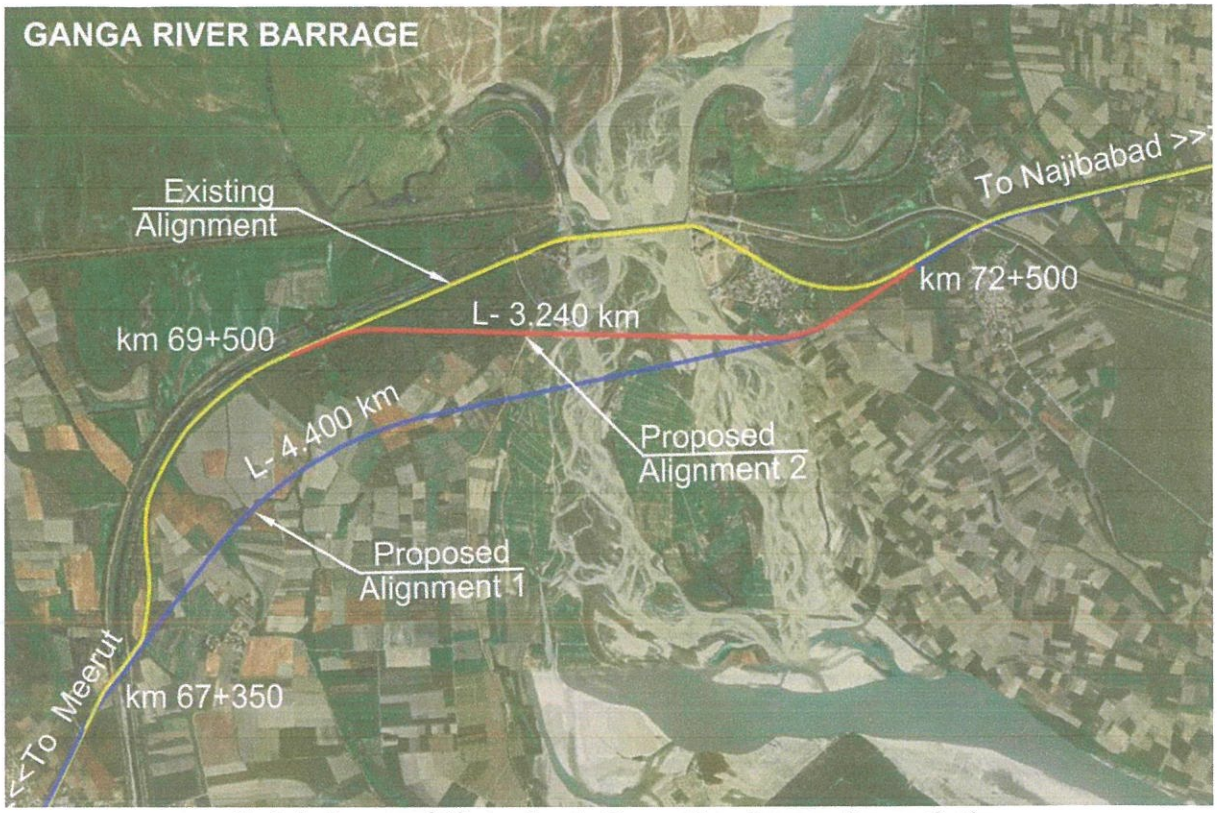

Fig 0.4: Proposed Alternative to Ganga River Barrage Bypass Options

Option-1

Option-1 is proposed on Eastern side i.e. on RHS of existing NH-119. The proposed alignment takes off from the existing NH at km 69+500 and passes through agricultural land in the West to East direction, avoiding built-up areas near river barrage and joins at km 72+500.

The total length of alignment under this option is 3.240 km In general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. The alignment passes through areas of Hastinapur Wild Life Sanctuary.

Option-2

Option-2 is proposed on Eastern side i.e. on RHS of existing NH-119. The proposed alignment takes off from the existing NH at km 67+350 and passes through agricultural land in the West to East direction, avoiding built-up areas near river barrage and joins at km 72+500.

The total length of alignment under this option is 4.400 km In general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment crosses 2 nallas requiring construction of Minor Bridges. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. The alignment passes through areas of Hastinapur Wild Life Sanctuary.

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The Comparative studies of bypass options are shown below:

Table 0.4: Comparison of Alternative Ganga River Barrage Bypass

Sr. No.	Description	Option 1	Option 2
1	Take off Chainage on NH 119	69+500	67+350
2	End Chainage on NH 119	72+500	72+500
3	Length(in km)	3.240 Km	4.40 Km
4	Route Alignment	RHS	RHS
5	Terrain	Plain	Plain
6	Land Use	River	River
7	Geometrics	Fair	Fair
8	Land Acquisition	4.44 hect	9.66 hect
9	Forest Land (in hect)	Yes	Yes
10	Right of Way (ROW)	60	60
11	Resettlement & Rehabilitation	Passing through Wildlife Area	Nil
12	ROB	Nil	Nil
13	Grade Separator	Nil	Nil
14	VUP/PUP	Nil	Nil
15	Major at Grade junction	2 Nos.	2 Nos.
16	Minor at Grade junction	Nil	Nil
17	Major Bridge	1 No.	1 No.
18	Minor Bridge	Nil	2 Nos.
19	Slab Culvert / HP Culvert	6 Nos.	6 Nos.
20	HT Line	No	No
21	Water Pipe Line	No	No
22	Civil Construction Cost	464.8 Crs	502.2 Crs
23	Recommendation	No	Yes

Recommended Option 2 for Ganga River Barrage (L= 4.40km) is considered.

As per Wildlife Institute of India (Wil) 's Mitigation Measures which alignment is finalized avoiding Wild Life / Forest site with elevated Corridor.

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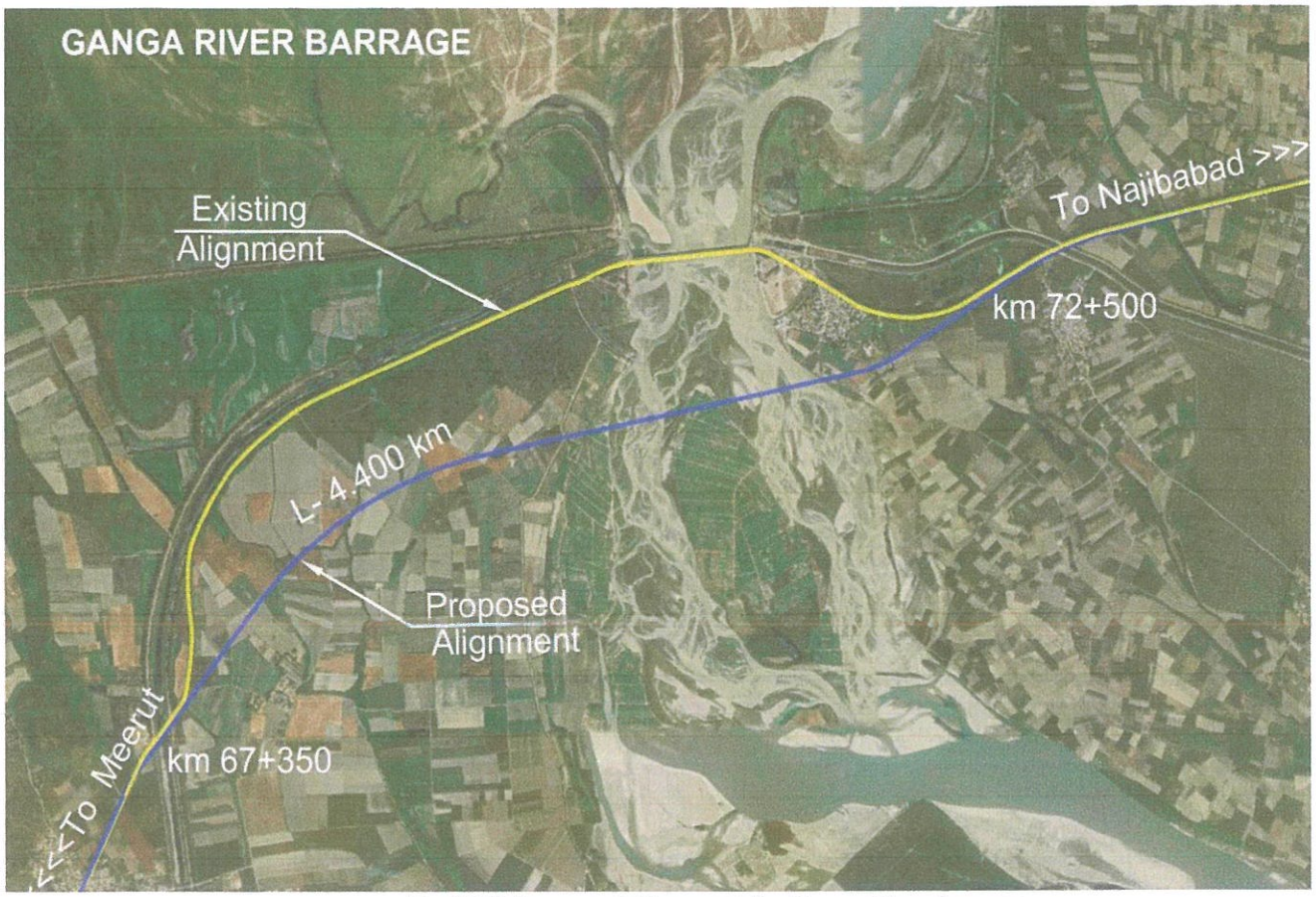

Final WII Approved Alignment for Ganga River Barrage

1.3.5 Alternatives to Bijnor Bypass

From km 79+500 to km 84+000 the existing alignment is passing through Bijnor town. Improvement along existing road is difficult at this location as the existing ROW available is ranging from 24 to 30 m & constructions and developments are all along. The widening & geometric improvements of the existing road from 2-lane to 4-lane divided carriageway with Service road as per manual, at town portion would involve significant land acquisition with property acquisition. There is also an existing Bypass to this town connecting from km 79+800 to km 83+500 on LHS side of town, this Bypass is with very less available Land width from 15m to 24m & poor geometrics it is not possible to widen this existing bypass to 4 Lane, Hence alternative bypass with geometric improvements is proposed for Bijnor town to avoid congestion within the town and accidents in habitat areas as well as to guard pedestrian safety, the alternative routes are studied & presented below

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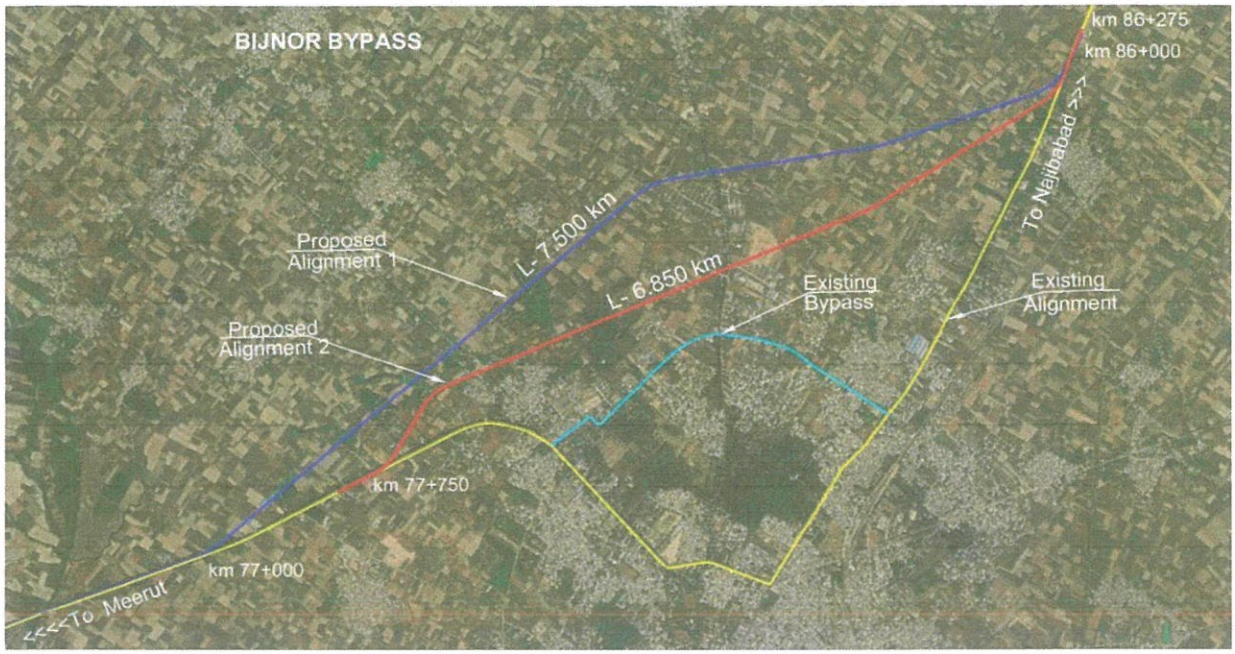

Fig 0.5: Proposed Alternative Bijnor Bypass options

Option-1

Option-1 is proposed on Western side i.e. on LHS of existing NH-119. This proposed option study was previously carried out in 2 lane DPR project. The proposed alignment takes off from the existing NH at km 77+750 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 86+000.

The total length of alignment under this option is 6.850 km In general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment requires constructing one Minor Bridge on canal crossing. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

Option-2

Option-2 is proposed on Western side i.e. on LHS of existing NH-119. The proposed alignment takes off from the existing NH at km 77+000 and passes through agricultural land in the South to North direction, avoiding built-up areas and joins at km 86+275.

The total length of alignment under this option is 7.500 km In general, the terrain can be classified as plain terrain and the alignment is having a fair geometric profile. The alignment does not use any of existing village road or pandhan road. The alignment requires constructing one Minor Bridge on canal crossing. The subgrade stratum is of sandy soil type. For the entire length land acquisition is required as the route follows the revenue/ agricultural land. There is no forest land to be acquired.

The comparative studies of bypass options are shown below:

Table 0.5: comparison of Alternatives Bijnor Bypass

Sr. No.	Description	Option 1	Option 2
1	Take off Chainage on NH 119	77+750	77+000
2	End Chainage on NH 119	86+000	86+275
3	Length(in km)	6.850 Km	7.500 Km
4	Route Alignment	LHS	LHS
5	Terrain	Plain	Plain

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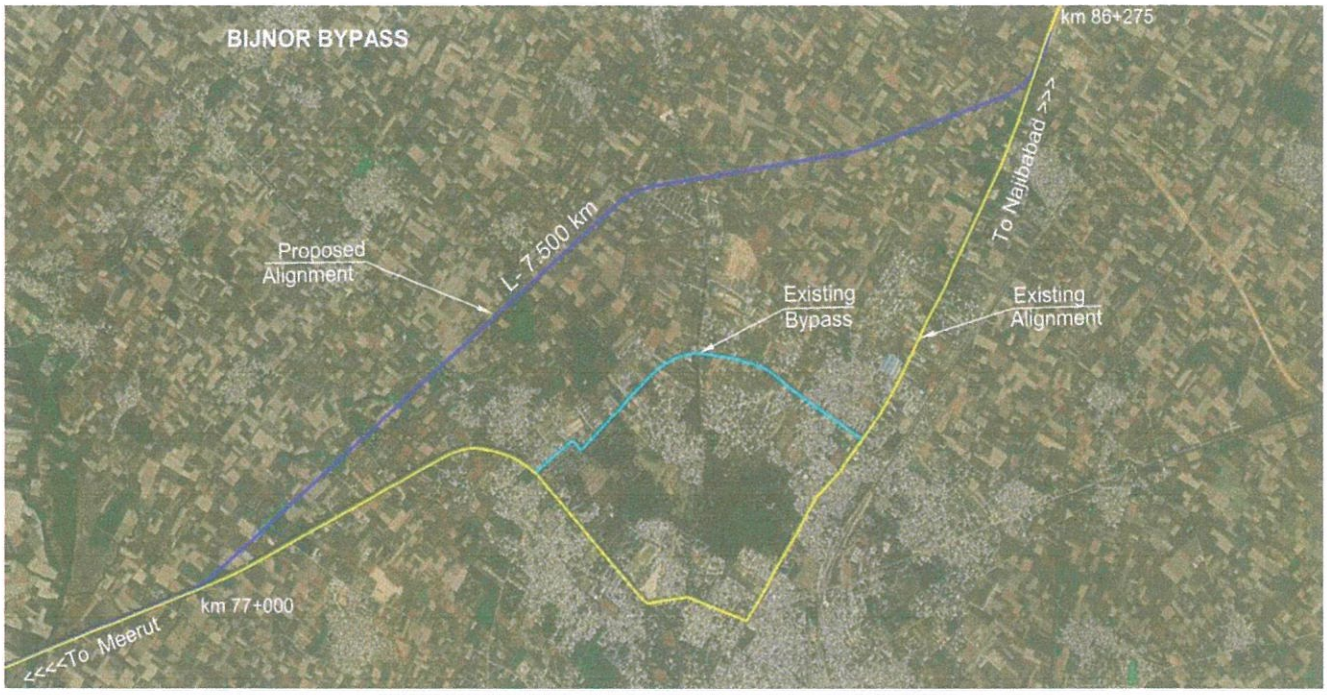
Sr. No.	Description	Option 1	Option 2
6	Land Use	Revenue	Revenue
7	Geometrics	Good	Good
8	Land Acquisition	41.100 hect	45.000 hect
9	Forest Land (in hect)	Nil	Nil
10	Right of Way (ROW)	60	60
11	Resettlement & Rehabilitation	NA	NA
12	ROB	Nil	Nil
13	Grade Separator	Nil	Nil
14	VUP/PUP	2 No	2 No
15	Major at Grade junction	3 Nos.	3 Nos.
16	Minor at Grade junction	8 Nos.	10 Nos.
17	Major Bridge	Nil	Nil
18	Minor Bridge	1 No.	1 No.
19	Slab Culvert / HP Culvert	10 Nos.	12 Nos.
20	HT Line	No	No
21	Water Pipe Line	No	No
22	**Civil Construction Cost**	**171.25 Crs**	**168.75 Crs**
23	Recommendation	No	Yes

Recommended Option 2 for Behsuma Bypasss (L= 7.500km) is considered.



FINAL APPROVED ALIGNMENT FOR BIJNOR BYPASS

Date: - 30/09/2022

Place: - Meerut

Project Director
Project Implementation Unit
Meerut, Uttar Pradesh.
Name: - Santosh Kumar Bajpai
Santosh Kumar Bajpai
Project Director
National Highways Authority of India
PIU - Meerut
Signature & Seal