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SALIENT FEATURES

- The total length of the package of project corridor is approximately 154.00 Km.
- Proposed project Corridor start from Jalna/Buldana District Boarder (Km 00.00) to Aurangabad/Nashik District Boarder (Km 154.00)
- The proposed Access Controlled Expressway Corridor traversing through two districts i.e. Jalna and Aurangabad of the Maharashtra State
- The project road falls within the jurisdiction of Tehsils of Jalan, Bandanpur, Aurangabad, Gangapur and Vaijapur
- About 75 village are likely to be affected by the proposed alignment in term of land acquisition, tree felling and rehabilitation
- Land use pattern within 10 km on either side of the corridor project area is agriculture, forest, residential, industrial, urban & rural.
- It is a green field project and the proposed right of way (RoW) is kept as 120 m.
- About 2000 hac land will be identified for development of node/township in five/six location along the project corridor.
- Approximately 1848.39 hectares of land is proposed to be acquired
 - i. Forest Land- 78.18 hac
 - ii. Waste/barren land -187.42 hac
 - iii. Agriculture land – 1582.39 hac
- There is no National Park or Sanctuaries located within the 10km radius of the project corridor.
- Bibi ka Maqbara, Daulatabad Fort and Aurangabad Caves are located vicinity of the project corridor. However, these are away from the prohibited zone about 7.00km, 1.50km and 4.30km respectively.
- Construction materials such as stone/aggregates about 27 lac Cum, Earth/Soil- 2.8 Cr. Cum and Sand -4lac Cum likely to be used for the construction of proposed road.
- The above monuments are quite away from proposed corridor which is not falling within the prohibited Zone
- No sensitive receptors are likely to be affected by the project
- Aurangabad is notified as critically polluted area and there are four MIDC zones are located within vicinity of the project corridor and their details with distance from project corridor are given below
 - 1. MIDC Waluj-5.00 km
 - 2. MIDC Ral St.-11.00km

3. MIDC Chikalthana- 5km

4. MIDC Shendra- 0.300 km

- Except above there is no other major source of pollution and area subject to environmental damage
- Project corridor crosses 3 rivers namely Dudhana River, Girja River, Shivna
- Plantation will be done on the available space in the RoW
- The soil is mostly formed from igneous rocks and are black, medium black, shallow and calcareous types having different depths and profiles
- Climate of the project area is a semiarid climate and is characterized by a hot summer and a general dryness throughout the year except during the south west monsoon season
- The rainfall occurs in the monsoon season from June to September
- Thunderstorms occur between Novembers to April and average annual rainfall is 710 mm
- To make the project environmentally sound and sustainable, the cost of mitigation of Environmental Impact will be worked out in terms of compensation and it will be incorporated in (EMP) Environmental Management Plan and (RAP) Resettlement Action plan

PROJECT DESCRIPTION

1.1 GENERAL

Maharashtra State Road development Corporation Ltd. Mumbai has been entrusted with the assignment of Project Management including preparation of Feasibility Study/Detailed Project Report of access controlled Nagpur –Mumbai Communication Super Expressway. At Present Nagpur is connected with Mumbai through various sections of State Highway which passes through Wardha – Malegaon – Jalna – Aurangabad – Sinnar – Thane. This route has poor geometry at many locations and also congested at few location. Apart from this route, other connectivity through National Highway are also available but distance is more.

To provide fast and direct connectivity MSRDC has taken-up development of access controlled expressway between Nagpur and Mumbai. Apart from direct connectivity this will also provide all round development of Marathwada and Vidarbha region. Greenfield alignment will also help in development of new industrial/educational/ tourism hub in vicinity of expressway.

MSRDC has appointed M/s Louis Berger, as consultants to carry out the preparation of feasibility cum detailed project report for construction of Package III of Nagpur – Mumbai access controlled Expressway. Letter of Acceptance was given by MSRDC vide Letter No. MSRDC/01/JMD(I)/NMSCE/PKG-III/2099/2016 dated 12th April, 2016.

1.2 PROJECT DESCRIPTION

MSRDC intends to construct Nagpur Mumbai Access Controlled Expressway. The whole project has been divided into 5 packages for Feasibility cum Detailed engineering Report. Details of Design Packages are given below

- PACKAGE 1 - NAGPUR SECTION OF 128 KMS
- PACKAGE 2 - AMRAVATI SECTION OF 256 KMS
- **PACKAGE 3 - AURANGABAD SECTION OF 154 KMS**
- PACKAGE 4 - NASHIK SECTION OF 115 KMS
- PACKAGE 5 – MUMBAI SECTION OF 80 KMS

The Package III of access controlled expressway starts from Jalna/Buldana District Boarder (Km 00.00) to Aurangabad/Nashik District Boarder (Km 154.00). In this section the Project Road runs parallel to SH-30 and NH- 753A. The Project Road passes through districts of Jalna and Aurangabad. Important places in this section are Jalna, Sendra Industrial Zone, Aurangabad, Daultabad, Lasur and Vaijapur. Manmad – Jalna section of railway line also runs parallel to Project Road. Project road passes through hilly section near Sendra industrial Zone and Daultabad. In rest of the length Project Road passes through rolling and plain terrain.

Major existing roads near Aurangabad are:

- NH-753A (Aurangabad-Jalna)
- NH-211 (Chalisgaon- Aurangabad-Beed (Solapur)
- SH-30 (Aurangabad-Lasur-Vaijapur)
- SH-16 (Aurangabad-Deogaon Rangari (Nandgaon)
- MSH-8 (Aurangabad-Jalgaon)

Project Location: The Project Location and Index Map are given in Fig. 1.1 and Existing Road Network is given in Fig. 1.2.

1.3 PROJECT OBJECTIVES

The main objective of the consultancy services is to establish the technical feasibility of the project and to prepare Feasibility cum Detailed Project Report. The feasibility of the project shall be established after studying various alternatives of bypass alignment taking into account following factors

- Extent and spread of human habitation
- Major industrial/commercial/educational units
- Urban limits of municipal area
- Utilizing any existing facility
- Providing access to other important roads and cities
- Suitability of locations near expressway for development of commercial/residential hubs.
- Avoiding as far as possible any environmentally/socially sensitive area.

The requirements for selecting most feasible alignment as given in ToR in a manner which ensures:

- Establish the technical, economic and financial viability of the project and prepare feasibility report for construction of expressway.
- Prepare feasibility report incorporating/studying for various components of Highways; i.e. road, bridges and other structures, costing, tender documents and environmental and social report.
- Feasibility study should ensure preparation of report incorporating aspects of value engineering, quality audit and safety audit requirement in design and implementation.
- The Feasibility Report should clearly bring out through financial analysis the preferred mode of implementation on which the civil works are to be taken up.

1.4 SCOPE OF SERVICES

As far as possible, the construction of expressway will be designed in such a way that it will require minimum agricultural land and as per requirement given in Manual of Specifications and Standards for Expressway (IRC:SP:99-2013). The Consultant shall furnish land acquisition details as per revenue records/maps for further processing.

The general scope of services is given below, however, the entire scope of services would, inter-alia, include the items mentioned in the Letter of Invitation and the TOR.

Environmental Impact Assessment, Environmental Management Plan and Rehabilitation and Resettlement Studies shall be carried out by the Consultant meeting the requirements of the TOR.

The scope of service as given in TOR is as follows

1. Expressway alignment studies
2. Traffic surveys and demand assessment
3. Engineering surveys and investigations
4. Design of alignment and other highway elements
5. Preparation of GAD of structures and preliminary design.
6. Design of Pavement
7. Drainage system
8. Toll Plaza
9. Way-side Amenities
10. Identification and planning of nodes
11. Social Impact Assessment
12. Environment Impact Assessment
13. Preparation of Land Plan schedule and Utility relocation plan
14. Preparation of BOQ and Cost Estimates
15. Economic and Financial Analysis
16. Suggesting preferred mode of implementation of civil works.

Wherever required, consultant will liaise with concerned authorities and arrange clarifications. Consultant will also obtain necessary clearances from Ministry of Environment and Forest and also incorporate the estimates for shifting of utilities of all types involved from concerned local authorities. Consultant is also required to prepare all Land Acquisition papers (i.e. all necessary schedules as per L.A. act) for acquisition of land either under NH Act or State Act.

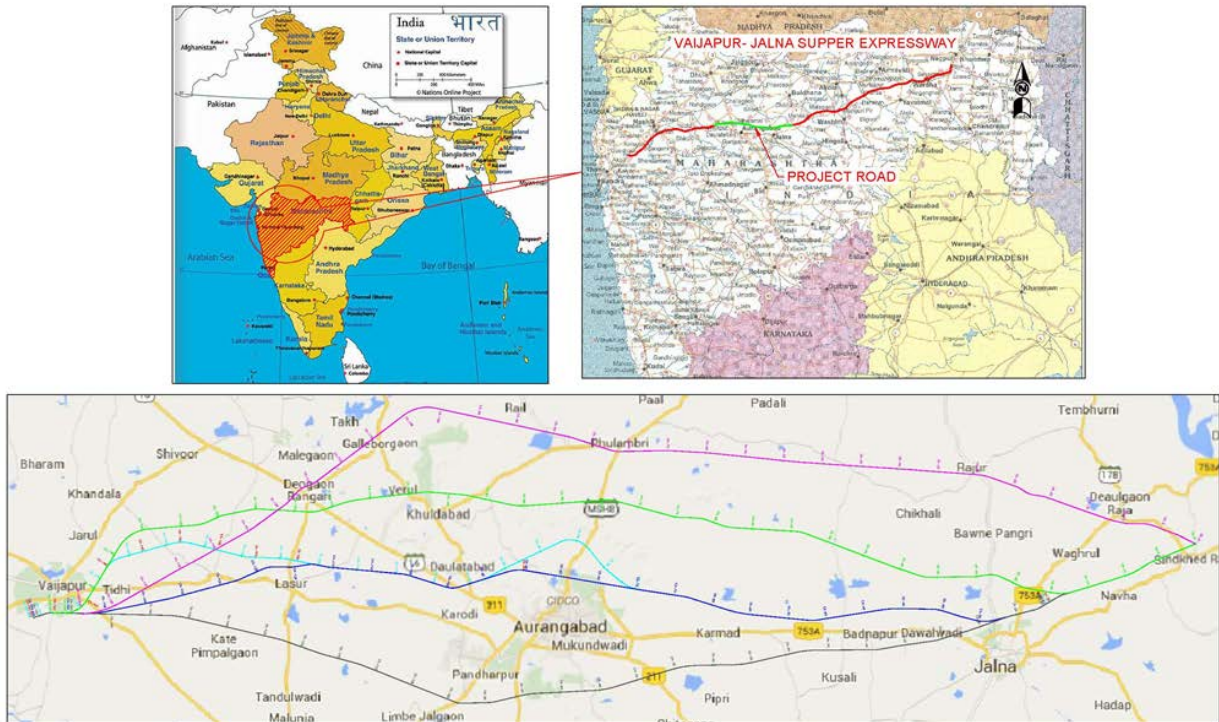


Fig. 1.1: Project Location Map

1.5 ALIGNMENT ALTERNATIVES: SELECTION APPROACH & METHODOLOGY

Following important points have been considered in defining the alignments:

- The highway should be as direct as possible between the two points to be linked, thereby satisfying the major desire lines. A direct highway link results in economy in construction, maintenance and operation.
- The location should result in minimum interference to agriculture and industry.
- As far as possible, the construction of expressway will be designed in such a way that it will require minimum land acquisition as per requirement given in manual of specification. The Proposed ROW envisaged at inception stage is 120.0m.
- Where the proposed location interference with utility services like overhead transmission lines, water supply lines etc., decision between changing the highway alignment and shifting the utility services should be based on study of the relative economics and feasibility.
- An important obligatory point in the selection of the route is the location of river crossings. While crossing of major rivers as far as possible right angles crossing will be preferred. Crossing of medium/ minor streams should be generally governed by the requirements of the highway alignment. If necessary, such small stretches could be made skew and located on flat curves.
- Alignment should not fall within Municipal limits of towns.
- Availability of land for development of Nodes.
- Alignment option study should consider already identified/studied corridor.

1.6 BYPASS ALIGNMENT ALTERNATIVES

This section presents a detailed discussion of the alternative options. The road network around are shown in **Fig. 1.2** and all the six alignment options has been shown in **Fig. 1.3**. The four bypass alternative studied are-

- Option 1 – North of Jalna and Aurangabad and South of Vaijapur, after crossing Lasur village alignment goes in south-west direction. Total length of this option is 153.600 km.
- Option 2 – North of Jalna, after crossing Jalna moves southward and alignment is south of Aurangabad and Vaijapur. Total length of this option is 151.140 km.
- Option 3 – Further north of Option 1. Total length of this option is 155.369 km.
- Option 4 – Further north of Option 3. Total length of this option is 158.855 km.

Comparison of all alignment options in tabular form is given below.

TABLE A
COMPARATIVE FEATURES OF THE ALTERNATIVE ALIGNMENTS OF ACCESS CONTROLLED NAGPUR – MUMBAI EXPRESSWAY

Parameters	Option 1	Option 2	Option 3	Option 4
Total Length of road (km)	153.601	151.140	155.369	158.855
Road Land Width (mt)	100.000	100.000	100.000	100.000
Area of Land required (Ha)	1575.753	1550.787	1567.525	1539.480
Agricultural land (%)	83.769	89.632	82.933	100.034
Barren land (%)	11.899	7.351	6.635	3.118
Forest land (%)	4.347	3.256	10.214	4.060
Defence land (km)	0.000	0.000	0.000	0.000
Tunnel length (km)	1.000	1.450	3.500	0.000
Railway Crossing	1.000	1.000	1.000	1.000
Major Bridges (nos.)	3	6	3	5
Flexible Roadwork Cost (in Rs. Crores)	2062.585	2016.935	2053.538	2156.204
Tunnel Cost (in Rs. Crores)	120	210	156	0
Cost of Structures (in Rs. Crores)	796.07	896.24	1211.32	965.22
Total Cost (in Rs. Crores)	4889.76	5018.92	5372.28	5068.64

Table B

COMPARATIVE ANALYSIS OF ALTERNATIVE ALIGNMENTS

Based on Engineering Aspects

Alignment	Flexible road Length, (km)	Relative Marking	Major Horizontal curves, (Nos.)	Relative Marking	Tunnel Length, (km)	Relative Marking	Underpass, (Nos.)	Relative Marking	At Grade / Interchanges, (Nos.)	Relative Marking	ROB, (Nos.)	Relative Marking	Major Bridges, (Nos.)	Relative Marking	Total Marking
Option 1	153.601	98.397	22	100	1	75.00	75	100	5	100	1	100	3	100	673.397
Option 2	151.140	100	22	100	1.45	51.72	75	100	5	100	1	100	6	50	601.72
Option 3	155.369	97.2780	25	88	3.5	21.43	75	100	5	100	1	100	3	100	606.708
Option 4	158.855	95.1433	25	88	0	100.00	75	100	5	100	1	100	5	60	643.143

Table C
COMPARATIVE ANALYSIS OF DIFFERENT ALTERNATIVE ALIGNMENTS
Based on Environment & Social Aspects

Alignment	Flexible road Length, (km)	Relative Marking	Forest Land, (%)	Relative Marking	Agricultural Land (%)	Relative Marking	Barren Land (%)	Relative Marking	Total Marking
Option 1	153.601	98.397	4.347	74.909	83.769	99.002	11.899	100.000	371.609
Option 2	151.140	100	3.256	100.000	89.632	92.526	7.351	61.779	353.576
Option 3	155.369	97.2780	10.214	31.883	82.933	100.000	6.635	55.758	285.852
Option 4	158.855	95.1433	4.060	80.211	100.034	82.905	3.118	26.203	289.319

Table D
COMPARATIVE ANALYSIS OF ALTERNATIVES ALIGNMENTS
Based on Indicative Cost Aspects

Alignment	Flexible road Length, (km)	New 6 Lane Road Cost per Km (Cr.)	Sub-Total Construction Cost (Road), (Cr)	Tunnel Cost per Km, (Cr.)	Sub-Total Construction Cost (Structures), (Cr.)	Relative Marking	Total Marking
Option 1	153.601	31.031	2062.585	120	796.072	97.698	100
Option 2	151.140	32.364	2016.935	210	896.236	99.271	97.426
Option 3	155.369	34.272	2053.538	156	1211.318	98.211	91.0.18
Option 4	158.855	30.719	2156.204	0	965.222	100.000	96.470

Table E
COMPARATIVE ANALYSIS OF ALTERNATIVES ALIGNMENTS
ALIGNMENT RANK MATRIX

Parameters	Option 1	Option 2	Option 3	Option 4
Flexible Length of Alignment	98.40	100.00	97.28	95.14
Intersection (At-Grade/Grade Separated)	100.00	100.00	100.00	100.00
ROB	100.00	100.00	100.00	100.00
Major Bridges	100.00	50.00	100.00	60.00
Minor Bridges	73.91	100.00	85.00	70.83
Forest Land	73.72	100.00	31.54	80.80
Agricultural Land	98.49	93.53	100.00	84.42
Barren Land	100.00	60.80	55.47	25.60
Approx. Civil Cost	100.00	97.43	91.02	96.47

Table F
COMPARATIVE ANALYSIS OF ALTERNATIVES ALIGNMENTS
ALIGNMENT EVALUATION MATRIX

Parameters	Weights	Option 1	Option 2	Option 3	Option 4
Flexible Length of Alignment	0.20	19.68	20.00	19.46	19.03
Intersection (At-Grade/Grade Separated)	0.10	10.00	10.00	10.00	10.00
ROB	0.05	5.00	5.00	5.00	5.00
Major Bridges	0.10	10.00	5.00	10.00	6.00
Minor Bridges	0.05	3.70	5.00	4.25	3.54
Forest Land	0.10	7.37	10.00	3.15	8.08
Agricultural Land	0.10	9.85	9.35	10.00	8.44
Barren Land	0.10	10.00	6.08	5.55	2.56
Approx. Civil Cost	0.20	20.00	19.49	18.20	19.29
TOTAL SCORE	1.00	95.60	89.92	85.61	81.95
RANK		1	2	3	4

RECOMMENDED : ALIGNMENT Option-1

SUMMARY OF COST

Bill NO.	ITEM OF DESCRIPTION	Option-1		Option 2		Option 3		Option 4	
		Length (Km)	153.600	Length (Km)	151.140	Length (Km)	155.369	Length (Km)	158.855
		With Flexible	Rigid	With Flexible	Rigid	With Flexible	Rigid	With Flexible	Rigid
i	CIVIL WORK COST								
1	SITE CLEARANCE	5.03	5.03	4.90	4.90	5.00	5.00	5.30	5.30
2	EARTHWORKS	1266.55	1266.55	1240.63	1240.63	1260.77	1260.77	1325.52	1325.52
3	SUB-BASE COURSE & BASE COURSE	227.81	151.88	223.15	148.78	226.77	151.19	238.42	158.96
4	CONCRETE PAVEMENT	0.00	1284.77	0.00	1250.78	0.00	1279.56	0.00	1339.87
5	Bituminous work	563.19		548.26		561.00		586.96	
5 & 6	STRUCTURE (CULVERTS & CROSS DRAINAGE, BRIDGES, UNDERPASSES, OVERPASSES, FLYOVERS, ROB'S ETC).	796.07	796.07	896.24	896.24	1211.32	1211.32	965.22	965.22
7	DRAINAGE AND PROTECTIONS WORK	512.74	517.62	496.34	496.34	512.66	512.66	504.67	504.67
8	TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES	66.11	66.11	64.84	64.84	65.81	65.81	69.10	69.10
9	ELECTRICAL	17.21	17.21	17.21	17.21	17.21	17.21	17.21	17.21
10	MAINTANANCE OF ROAD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	TRAFFIC SAFETY DURING CONSTRUCTION PERIOD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Service Road, Project facilities (Junction)	471.89	471.89	460.37	460.37	460.90	460.90	493.92	493.92
13	INTERCHANGE	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00
14	Toll Plaza	88.00	88.00	88.00	88.00	88.00	88.00	88.00	88.00
15	TUNNEL	120.00	120.00	210.00	210.00	156.00	156.00	0.00	0.00
16	MISCELLLANEOUS & other unseen	580.15	658.22	593.99	669.37	631.85	709.01	599.32	680.13
	TOTAL COST FOR CIVIL WORKS	4889.76	5618.35	5018.92	5722.44	5372.28	6092.42	5068.64	5822.90
	Length (Km)	157.575	157.575	155.079	155.078651	156.753	156.752549	165	165
	Civil Cost (Per Km)	31.03	35.66	32.36	36.90	34.27	38.87	30.72	35.29
	Flexible Option (Thickness) With 50 MSA /10 CBR	BC	DBM	WMM	GSB	Sub Grade	Embk		
		50 mm	90mm	250mm	200mm	500mm	2.5 m		
	Rigid Option (Thickness)	PQC	DLC	GSB	Sub Grade	Embk			
		300 mm	150mm	150mm	500mm	2.5 m			



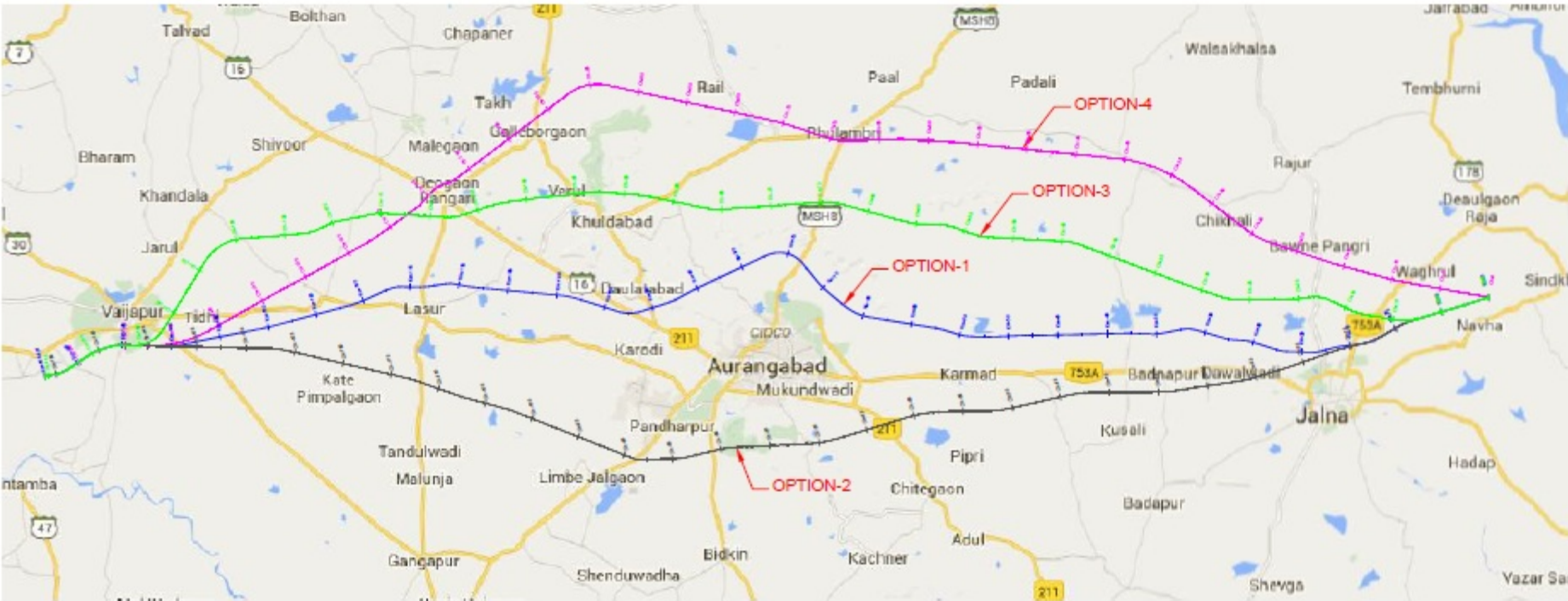


Fig. 1.3: Bypass Alternatives

1.7 ENVIRONMENTAL CONSIDERATION

1.7.1 Climate and Geology of the Project Area

Climate of the project area is a semiarid climate and is characterized by a hot summer and a general dryness throughout the year except during the south west monsoon season, which is from June to September while October and November constitute the post monsoon season.

The annual mean temperatures range from 17 to 33 °C, with the most comfortable time to visit in the winter – October to February. The highest maximum temperature ever recorded was 46 °C and the lowest recorded temperature was 2 °C (36 °F).

The most of the rainfall occurs in the monsoon season from June to September. Thunderstorms occur between November to April. Average annual rainfall is 710 mm.

The entire area is covered by the Deccan Traps lava flows of Upper Cretaceous to Lower Eocene age.

1.7.2 Seismicity

As per the seismic zoning map of India (IS: 1893, Part-1, 2002), the project is located in the Zone II, classified as MSK VII i.e., area having low damage risk zone. The design of the project design would take into account the required seismic resistance.

1.7.3 Soil of the Area

The study area is covered with mostly red sand and gravel with moderate amounts of Red-loam and occasional black loam tracts.

1.7.4 Soil Resources

Three major impacts on soil resources that are generally associated with construction activities. These include: soil erosion, soil compaction and soil contamination. The construction activities will include site clearing and earthwork which will result in top soil removal and will disturb the soil surfaces.

1.7.5 Water Resources and Quality:

As per studies by Central Ground Water Board, the scope of groundwater development in project area is about 55% and falls under Safe category.

1.7.6 Air and Noise Quality

The proposed project is located in green field so that the air and noise quality of the area is within the prescribed limit.

1.7.7 Ecological Environment

The ecological assessment carried out within the area delineated as the project site as well as the area extending 10 km outwards from the boundary of this project site and except forest land no other ecologically sensitive area (wildlife/National Park/Wetland etc.) is located.

Generally the main ecological impacts during the construction phase of any project result from removal of the present vegetation cover, alteration of the existing topography, and other environmental facets like air, water and soil quality, ambient noise and vibrations etc.

1.7.8 Reconnaissance Surveys

A reconnaissance survey has been carried out in the 2nd week of April 2016 along the proposed alignment to record the major feature are likely to be affected and the probability to avoid and mitigate affected feature with at least up to minimum level.

1.7.8.1 Preliminary Environmental Screening

The objective behind the strategic environmental screening was to delineate affected environmental features / issues, e.g. waterways, forest areas, plantations / trees, cultural heritage, market places / human settlements, agricultural land, air, water, natural resources, noise etc. within the 100 meters corridor in the project area, in order to define impacts and to minimize the adverse environmental impacts by suggesting best engineering solutions / options at optimal costs and further to categorize and define the scope of Environmental Impact Assessment (EIA) study to be conducted.

1.7.8.2 Likely affected Eco-sensitive Zones /

There is no notified National Park/Wildlife sanctuaries are located with the 10km radius from the proposed expressway. The proposed alignment traversing through green field area covering agriculture/forest/barren land.

1.7.8.3 Critically Polluted area

Aurangabad is notified as critically polluted area because four MIDC zones are located in vicinity of Aurangabad which are given below

- i. MIDC Waluj-5.00 km
- ii. MIDC Ral St.-11.00km
- iii. MIDC Chikalthana- 5km
- iv. MIDC Shendra- 0.300 km

Except above there is no other major source of pollution and area subject to environmental damage. The proposed project will likely have some minor/short term localized pollutions which will be associated with civil work and suitable mitigation measures will be designed/proposed in EMP to reduce/eliminate these associated impact at acceptable level.

1.7.8.4 Archeological sites

Three archeological sites are located within the 10 km radius of the proposed expressway viz. Bibi ka Maqbara, Daulatabad Fort and Aurangabad Caves are located within vicinity of the project corridor. However, these are located away from the prohibited zone about 7.00 km, 1.50 km and 4.30 km respectively.

These monuments are quite away from proposed corridor which is not falling within the prohibited Zone.

1.7.8.5 Water Resources,

Project Highway crosses three major river viz., Dudhana, Girja and Shivna River and few small drains at different locations where structures are proposed

1.7.9 Approach and Methodology for Environmental and Social Impact Assessment

1.7.9.1 Environmental Impact Assessment

The Environmental Impact Assessment (EIA) is a valuable tool used to examine the potential adverse environmental impact and beneficial consequences of a proposed development project, so that due consideration can be given to these aspects in further stages of project planning and design, and eventually during construction and operation.

The EIA involves identification and evaluation of the potential direct and indirect effects of a project on the individual environmental and social components, as well as any interactions between these. It also identifies ways and means through which unacceptable impacts can be avoided, offset, or minimized, and beneficial impacts enhanced.

The overall objective of the EIA is to ensure that potential environmental problems are recognized at an early stage in project preparation, so that these can be properly addressed during subsequent stages.

The EIA shall be used as a key management tool used to shape a project in such a way as to optimize its environmental performance in much the same way as engineering and economic studies are used in project preparation. It shall also play a major role in the decision-making process when project alternatives are being compared.

The proposed project may pose direct and indirect impacts on the environment. The overall objective of the Environmental Impact Assessment is to identify major environmental issues associated with the proposed project and to propose mitigation measures to avoid or minimize their adverse impact.

The following principle tasks will be undertaken for the EIA study of the proposed project:

- Preparation of Form 1 and TOR,
- Preparation of document and submission of proposal for tree felling and land diversion
- Collection and review of documents, policies and establishing liaison with the Environmental authority like MHPCB, Wildlife, Forest, Revenue Department
- Public/Stakeholder consultation,
- Environmental screening & scooping,
- Collection of baseline environmental data,
- Determination of the major impacts on the environment and analysis of alignment alternatives,
- Development of management plan to mitigate negative impacts, preparation of Environmental monitoring plan and cost estimate.

- Identification of institutional and monitoring needs to implement the environmental management plan.

1.7.10 Phase 1 – Project Preparation:

1.7.10.1 Preparation of Form 1 and TOR

After award of the assignment a preliminary screening and scoping exercise will be carried out to identify and to highlight the key environmental issues, such as wildlife sanctuaries, national parks, landslides, soil erosion, RF, PF, sensitive receptors etc. and the impacts likely to occur during the pre-construction, construction, operation and maintenance phases of the project. On the basis of this preliminary exercise, the scope of EIA will be determined and accordingly Form 1 and TOR will be prepared and submitted for approval to State Environment Impact Assessment Authority Maharashtra.

1.7.10.2 Collection and Review of Documents, Policies and Establishment of Liaison

The consultant will collect and study the following and any other documents pertaining to the proposed project and assess the availability of data:

- Environmental policy, Acts including legal and administrative framework applicable to the project from various authorities,
- Requirements of the MOEF &CC/MPCB/ MSRDC/ State Environment Impact Assessment Authority Maharashtra
- Data and maps about project areas,
- Consultation with environmental authorities,
- Relevant documents maps and aerial photographs and,

Applicability of various rules, regulations and guidelines with respect to the road project will be determined in order to follow the same during the EIA study and Report preparation.

1.7.10.3 Public consultation

Public consultation will be carried out especially with project affected persons, NGOs and stakeholders. Their views/outcome will be incorporated in the report with suitable suggestions for compensation, if any.

1.7.10.4 Environmental Screening and Scoping

The study area will comprise the road corridor and the surrounding area that may be affected by the project. The boundaries of the study area will be established as per the MPCB/MOEF &CC guidelines.

A screening exercise will be carried out based on the reconnaissance survey to identify and to highlight major environmental issues and risks which will have negative environmental effects caused by the project such as soil erosion, wetland, ponds, flood area, water quality, air quality, noise level, natural habitats, biological diversity, vegetation, plantation, RF, PF, trees along the road/within the road corridor etc. On the basis of associated environmental impact and discussion with stakeholders, NGOs, public representatives, government officers, prioritization and categorization of the project will be made.

1.7.11 Detailed Engineering:

1.7.11.1 Collection of Baseline Data

Based on the available base map of the project area, topography and other available information from official and the non-official sources on environmental issues stemming from existing roads, on field investigation and consultation with stake holders, representative baseline data on physical and biological environment (such as climate, and meteorology, air, noise, surface water quality and topography, flora and fauna, rare and endangered species, significant natural habitats, biological diversity sites, sensitive habitats including parks and reserves, cultural property/religious places, educational institutions, induced development and health) will be generated. All the information collected from the field and secondary sources will be collated and incorporated in the Report.

1.7.11.2 Baseline Surveys

The baseline data required by Ministry of Environment & Forests, GoI includes the following components and will be generated along the ROW and adjacent areas:

- Boundary and other facilities of the proposed project site
- Presentation of Maps in 1:25000 and 1:4000 scale with all the above details
- Water, land, noise and air (natural physical resources);
- Fisheries, forestry, major trees, wildlife, and eco-systems (biological resources);
- Sensitive receptors like Forest, Sanctuaries, notified Polluted areas, School and hospitals, religious and archeological monuments and places
- Flood control and land use (human use values); and
- Socio economic, aesthetic and cultural heritage (quality of life values)

The environmental resources and features will broadly cover the following:

1.7.11.3 Identification of Issues and Hot Spots

For the project corridor, the environmental features will be tabulated along with their kilometer location and level of sensitivity. Using this approach, hotspots will be identified to help focus mitigation plans. This method will be used for all stretches that require future environmental analysis.

1.7.11.4 Pollution Indicators

Although virtually all of the information required establishing the environmental mapping of the project in the initial environmental screening is derived from secondary sources, the preliminary identification of the critical issues in the project area is understood more fully by carrying out well determined pollution monitoring. In addition, to review and assess the correctness of key information, it has to be checked through field observations.

Such pollution monitoring surveys are proposed to be taken up at pre-selected locations (depending on the earlier established environmental capacity of road sections) with the objective

of attaining a comprehensive picture of the whole corridor. Since this task is cost effective, the selectivity of the quantum of survey will be very important.

It is proposed to conduct the following surveys:

- Air quality surveys which include monitoring pollution levels in terms of sulphur dioxide (SO₂), oxides of nitrogen (NO_x), Carbon monoxide (CO),
- In particular near urban areas, a dust accumulation survey will be carried out with respect to total Respirable Suspended Particulate Matter (RSPM) and PM_{2.5}
- Noise level survey
- Water quality survey of important surface water bodies and drinking water sources

1.7.11.5 Determination and evaluation of major impacts and analysis of alignment alternatives

The potential impacts will be assessed based on available maps, surveys and discussions with local officials, NGOs and the public.

(i) Impact due to project location

Deforestation and loss of vegetation cover, deterioration of ecologically sensitive areas, soil erosion, impact on biological diversity, natural habitats, and cultural properties, effect on water resources and other biophysical and physical issues will be assessed to find out the project location impact.

(ii) Impact due to project design

Environmental implications such as disruption of natural drainage pattern, impact on cultural property, impact on surface water, landslides, soil erosion, agricultural land, interference with movement of wildlife, livestock, and road crossing for animals due to design of road alignment and pavement as well as bridges and culverts will be assessed.

(iii) Impact due to project construction

Stream and water bodies, sedimentation, water logging of borrow pits and quarries, disposal of construction spoils, air and water pollution, noise level, fuel and oil spills, sanitary conditions and health risks associated with construction camps and workers camping in the area will be assessed. Construction impact on indigenous people, cultural property, biological diversity and induced development such as development of markets, residential settlements, temporary shacks and tourism will also be assessed.

Air and water quality, noise pollution and vibration from blasting will be assessed and suitable mitigation plan along with guidelines will be prepared.

(iv) Impact due to project operation

Surface spills and surface runoff, pollution, roadside waste, traffic safety issues will be analyzed based on traffic growth projection and mitigation measures will be incorporated in EA Report.

(v) Health and potential health impacts due to the project

During the design, construction and operation phases associated impacts on the health will be assessed and feasible and cost effective remedial measures to minimize health risks will be explored.

(vi) Evaluation of impact

Each parameter (such as biological diversity, pollution, natural habitats, indigenous people, cultural property, induced development) of the environmental impact will be assessed according to its relative importance. The matrix method will be used for evaluation and assessment of the associated impacts.

(vii) Analysis of alignment alternatives

During the feasibility study three alignments have been analyzed out of that the best feasible option has been selected. This assessment also considered alignment design, construction technology and operative / implementing procedures.

The alignment selection was based on:

- Minimum disturbance to ecology / geology,
- Minimum removal of vegetation and trees,
- Improvement to road geometrics,
- Minimization of land acquisition.

1.7.12 Environmental Management Plan, Monitoring Plan and Cost Estimate

1.7.12.1 Management plan to mitigate negative impacts

The environmental impact of the project during construction and after its completion will be reviewed. The review will include, among other things, effect on peoples livelihoods, noise, air quality, biological diversity, natural habitats, landscape and protected areas as well as temporary and permanent damage to the environment, particularly forests, areas with known archeological value along the proposed alignment/project impact zone, potential risks from toxic and hazardous chemicals and indirect environmental impacts such as induced industrial development along alignment. Data will be derived from existing published data, field survey and consultation with key stake holders groups.

The consultant will take an overview of studies under the EIA Report taken up for this region and check out various issues by integrating environment and an Environmental Management Plan will be formulated to mitigate or minimize environmental impacts.

Appropriate mitigation measures for all identified adverse impacts and alternative approaches, if any, will be proposed. A short and concise EMP will be designed suggesting the relevant mitigation measures, institutional responsibility for implementation and monitoring during and after construction. The mitigation plan will include feasible and cost effective measures to prevent or reduce significant negative impacts such as those to land, water, air, biological diversity, natural habitats, protected areas, buffer zones, wild life reserves, national parks and historical/cultural monuments, drainage, soil and road safety to acceptable levels.

1.7.12.2 Environmental Monitoring Plan

A monitoring plan will be prepared to help in monitoring the implementation of the recommended mitigation measures and the impact of the proposed road work during construction and after completion. The plan will define certain indicators of environmental performance that can be monitored on regular basis. The Environmental Monitoring Plan must detail but not limited to:

- Requirement of monitoring facilities and methods adopted
- Frequency, location, parameters of monitoring as per CPCB or MPCB norms
- Compilation and analysis of data
- Reporting system for monitoring results, which must specify frequency of Report submission (half yearly or quarterly) to higher management and also other stakeholders (i.e., panchayats).
- Location for display of the monitoring results, i.e., Project site office, concerned Panchayats, district administration office etc.
- Records on action or corrective measures taken if any non-compliance is found.

1.7.12.3 Identification of institutional and monitoring needs to implement Environmental Management Plan

The capability of Project Implementation Authority particularly at local and regional level will be reviewed to ensure that the proposed management and monitoring plan based on the EA will be properly implemented. The sectorial arrangement, management procedures and training, staffing budget and financial support will also be assessed. Institutional Strengthening and Monitoring Framework will be suggested as required.

1.7.12.4 Cost estimate

Incremental costs for mitigating/minimizing adverse environmental impacts including cost for landscaping, maintaining biological diversity and natural habitats, pollution control (air, water, and noise), environmental monitoring, training, compensatory and avenue plantation and supervision will be estimated and grouped in a separate bill of quantities (BOQ) for the project.

1.7.13 Compliances of all the points of the TOR

All the points of the approved TOR (from EAC) will be incorporated into the EIA Report and will be submitted to the MPCB for conducting public hearing.

1.7.13.1 Public Hearing

The draft comprehensive EIA Report will be prepared as per the guidelines of MOEF & CC followed by approved TOR and submitted to State Environment Impact Assessment Authority Maharashtra for conducting public hearing in all the concerned districts. On the basis of received minutes of public hearing, all the point will be suitably incorporated in the Final EIA Report.

1.7.13.2 Clearance

We will be assisting MSRDC in obtaining Environmental clearance by preparing final EIA along with salient features, checklists of the project and will be submitted to the SEAC, presentations

will be done to the State Environment Impact Assessment Authority Maharashtra for Environmental clearance and their suggestion will be incorporated if, required.