PRE-FEASIBILITY REPORT

DEVELOPMENT OF 4 LANE ACCESS CONTROL NEW GREENFIELD HIGHWAY FROM WARANGAL (Ch: 112+240) TO KHAMMAM (Ch: 220+480) SECTION (TOTAL LENGTH 108.24 KM) IN THE STATE OF TELANGANA

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1 EXECUTIVE SUMMARY

This project is"Development of 4 lane access control new greenfield highway from Warangal (Ch: 112+240) to Khammam (Ch: 220+480) section (Total length 108.24 km) in the state of Telangana". The 45m Right of Way is proposed for this project.

The project starts Ch: 112+240 (18°02'37.12"N, 79°41'08.16"E) from near Agrampahad village in Warangal district and ends at Ch: 220+480 (17°15'12.13"N, 80°12'42.87"E) in outskirts of Khammam in the state of Telangana.

Project alignment is passing through the districts of Warangal, Mahabubabad, and Khammamin the state of Telangana.

National Highway Authority of India (NHAI) is the project proponent for the proposed highway project. The proposed project is covered under schedule '7-f – Category A', based on MoEF&CC's EIA Notification (14thSept 2006) and its subsequent amendments. The project involves submission of the Environmental Impact Assessment Report to Ministry of Environment, Forest and Climate Change (MoEF&CC), GOI, New Delhi as a pre-requisite to obtain Environmental Clearance.

This pre-feasibility report is a part of the application process for grant of Terms of Reference (ToR) to conduct EIA studies.

2 INTRODUCTION TO THEPROJECT

2.1 Project Proponent

National Highway Authority of India (NHAI) is responsible for management of national highways and it is the nodal agency of Ministry of Road Transport and Highways (MoRTH), Government of India. NHAI aims at provision and maintenance of national highways network to meet user expectations in the most time-bound and cost-effective manner within the strategic policy framework. NHAI is the nodal authority/proponent for the Development of 4 lane access control new greenfield highway from Warangal (Ch: 112+240) to Khammam (Ch: 220+480) section (Total length 108.24 km) in the state of Telangana.

2.2 Project Brief

The proposed project starts at near Agrampahad village (Ch: 112+240) in Warangal district and ends at outskirts of Khammam (Ch: 220+480) in the state of Telangana.Total length of the project is 108.24 Km with 45 m Right of Way (RoW).

The proposed greenfield alignment passing through 22 villages in Warangal, 17 villages in Mahbubabad and 8 villages in Khammam district in state of Telangana. District wise details of start and end chainage is mentioned in the table below:

Table 2-1: District-wise Chainage Details

S. No.	Name of District	Name of Mandal	Chainage (Km)	
			To	From
1.	Warangal	Damera	Ch: 112+240	Ch:112+510
			Ch: 114+400	Ch:115+700
		Atmakur	Ch:112+510	Ch: 114+700
			Ch: 115+700	Ch: 117+100
		Geesugonda	Ch:117+100	Ch: 126+000
		Sangem	Ch:126+000	Ch: 140+100
		Nekkonda	Ch:140+100	Ch: 140+300
			Ch: 142+400	Ch: 153+200
		Parvatgiri	Ch: 140+300	Ch: 142+400

S. No.	Name of District	Name of Mandal	Chainage (Km)	
			To	From
2.	Mahabubabad	Kesamudram	Ch:153+200	Ch: 160+700
		Nellikudur	Ch:160+700	Ch: 168+300
		Mahabubabad	Ch: 171+200	Ch: 175+900
			Ch: 179+300	Ch: 182+800
		Kuravi	Ch:175+900	Ch: 179+300
			Ch: 182+800	Ch: 192+600
		Dornakal	Ch:192+600	Ch: 203+800
3.	Khammam	Khammam Rural	Ch:203+800	Ch: 209+000
		Ragunadhapalem	Ch:208+900	Ch: 214+500
			Ch: 215+900	Ch: 218+900
			Ch:219+000	Ch:220+480
		Khammam Urban	Ch:214+100	Ch: 215+600
			Ch: 215+600	Ch: 219+000

The salient features of the Project are mentioned in the table below:

Table 2-2: Project Salient Features

S. No.	Particular	Details
1	Project Name	Development of 4 lane access control new greenfield highway from Warangal (Ch: 112+240) to Khammam (Ch: 220+480) section (Total length 108.24 km) in the state of Telangana
2	Configuration	The project is 4/6 lanes with paved shoulders configuration
3	Location of project stretch	The proposed project starts at near Agrampahad village (Ch: 112+240) in Warangal district and ends at outskirts of Khammam (Ch: 220+480) in the state of Telangana. Total length of the project is 108.24 Km with 45 m Right of Way (RoW)
4	Geographical Coordinates	Start 18°02'37.12"N, 79°41'08.16"E End 17°15'12.13"N, 80°12'42.87"E.
5	Land Details	Proposed highway mostly follows plain terrain
		The land use pattern along the road alignment is agriculture.
6	Water demand	30 KLD for 24 months
7	Source of water	Tanker Supply
8	Nearest Railway Station	Mallemadugu Railway station- 0.36 km
9	Intersection with State Highway /National Highway	NH-365
10	Nearest airport	Warangal Airport- 13 km
11	Seismic Zone	Proposed alignment falls under Seismic Zone III.

2.3 Project Need and Importance

The proposed road is essential as it is a part of the Nagpur -Vijaywada corridor. The Nagpur to Vijaywada is being developed as Economic corridor by National Highways Authority of India under Bharatmala Pariyojna. The key highlights of the scheme are:

- Improving the quality of existing roads
- Construction of direct new roads to complete 34000 km
- Better connectivity to ports, coastal regions, etc.

- The main stress will be given on the construction and development of Green Field highway for better management of traffic and freight.

Further, the proposed project will have multi-fold benefits for the local and regional economies as follows:

- Connectivity to the important towns namely Warangal, Khammam etc.
- Lower transport costs for freight and passengers of motorized and non-motorised vehicles;
- Improved Road network connectivity to the villages in the vicinity of the road;
- Enhanced traffic facilities and volume in the project road;
- Enhancement in economic opportunities/activities of the local people;
- Enhanced basic amenities to the villages along the proposed road;
- Rural prosperity of the project influence area;
- Elevate tourism
- Improve the economy of the area like agriculture, commerce, education, health, social welfare and public safety

2.4 Market Analysis

The proposed highway will benefit the district of Warangal, Mahabubabad and Khammam in Telangana State. The details about each district are as follows:

2.5 Warangal District

- Warangal is most famous for its agricultural industry. Grain production is the main resource of income here and it stands at second position in the entire world in the market of grain.
- **Major economic activities in the district** – Agriculture, Livestock, export of stone monuments, brassware and silk (handloom weaving) handicrafts etc.
- **Tourism:**Warangal Fort, Thousand Pillar Temple, Khush Mahal, Ramappa Temple, Phakal Lake,
- **Major Crops** – Paddy, Cotton, Maize, Groundnut, Chillies, Greengram, Mangoes, Turmeric.
- **Industries-** Kinnera Seeds Pvt. Ltd., Sri Shanti Rice Mill, Surya Industries and Balaji Stake Rice Industries etc.

2.6 Mahabubabad District

- District has been carved out of erstwhile Warangal district. Mahabubabad District has all along been one of the Districts in the state with a creditable performance in agricultural production with the farmers relatively more responsive and receptive to changing technologies and market forces.
- **Major economic Activities**- Agriculture and allied activities.
- **Major crops-** Paddy, cotton, Maize, Pulses and Chilli
- **Tourism–**KuraviVeerabhadraSwamy Temple, Bheemunipadam Waterfalls.
- **Industries–**Veerabhadra stone crusher, Srinivasa industries ananthram, Balaji Polymers, Ameer Engineering works, Mamatha Engineering Works etc.

2.7 Khammam District

- The district has good number of large, medium and small scale industrial towns. Currently, the district is having 19 large and medium scale industries most of which are mineral bared industries. The granite tiles, slabs and monuments (stones / blocks) manufactured in the district are exported to Japan, USA, Germany and Singapore thus earning a good amount of foreign exchange.
- **Major economic Activities**-Agriculture, animal husbandry, horticulture etc.
- **Major crops-** Paddy, cotton, Maize, Mangoes, Greengram, Groundnut, Blackgramand Chilli
- **Tourism–**KuraviVeerabhadraSwamy Temple, Bheemunipadam Waterfalls.

- **Industries–**SingareniColleries, Kothagudem thermal power station and ITC Ltd., Sponge Iron India Ltd. Etc.
  The proposed highway will support the local businesses and economy along the proposed corridor. It will facilitate rapid growth of the small, medium and large-scale industries mentioned above, by streamlining transport of raw materials and finished goods. Apart from this, the project would help in quicker movement of agricultural commodities to the consumption centers and provide enhanced accessibility to tourists, helping in the overall development of the region.

2.8 Demand and Supply Gap and Benefits

The demand for the proposed project is as follows:

- Saturation and poor condition of existing road:

Hence, requirement of widening of existing road / new highway is arise. The existing Warangal-Khammam section connectivity is mostly via intermediate or 2 lane configuration and used mainly by local traffic. The condition of the existing roads are not upto the mark and there are many deficiencies found along the corridor, like bad geometry, over topping, encroachment etc.

2.9 Imports vs Indigenous Production

Not Applicable.

2.10 Export Market

The project will have no direct impact on export market. However, the project will enhance the connectivity leading to several indirect benefits like promotion of trade and augmentation of export market for regional goods.

2.11 Employment Generation (Direct and Indirect)

Highway construction broadly encompasses the process of construction and maintenance, including the design, contracting, implementation, supervision, and maintenance of highways and related structures, such as bridges and interchanges. These stages include public works, private contracting of civil works and labor-based construction.

Direct employment: During the construction phase, manpower will be required for various project activities. Employment will be generated for skilled, semi-skilled and unskilled laborers during the construction phase. Post construction phase, it is expected that the project will provide social benefits to local people in terms of direct employment through commercial and industrial development of the area.

Indirect Employment: The project will generate indirect employment for cleaners, guards, local vendors, operation and maintenance workers etc. Further, the highway will also create considerable indirect employment opportunities in form of transportation of construction materials, greenbelt development and ancillary facilities like canteens, dhabas etc.

3 PROJECT DESCRIPTION

3.1 Interlinked and Interdependent Project

Not applicable

3.2 Project Location and description

The proposed project starts near Agrampahad village at Ch: 112+240 in Warangal district and ends at Ch: 220+480 in outskirts of Khammam in the state of Telangana.

3.3 Alternative Analysis

Three alignment options were studied and compared in order to finalize the proposed alignment. Comparative statements between the options are detailed in the following table

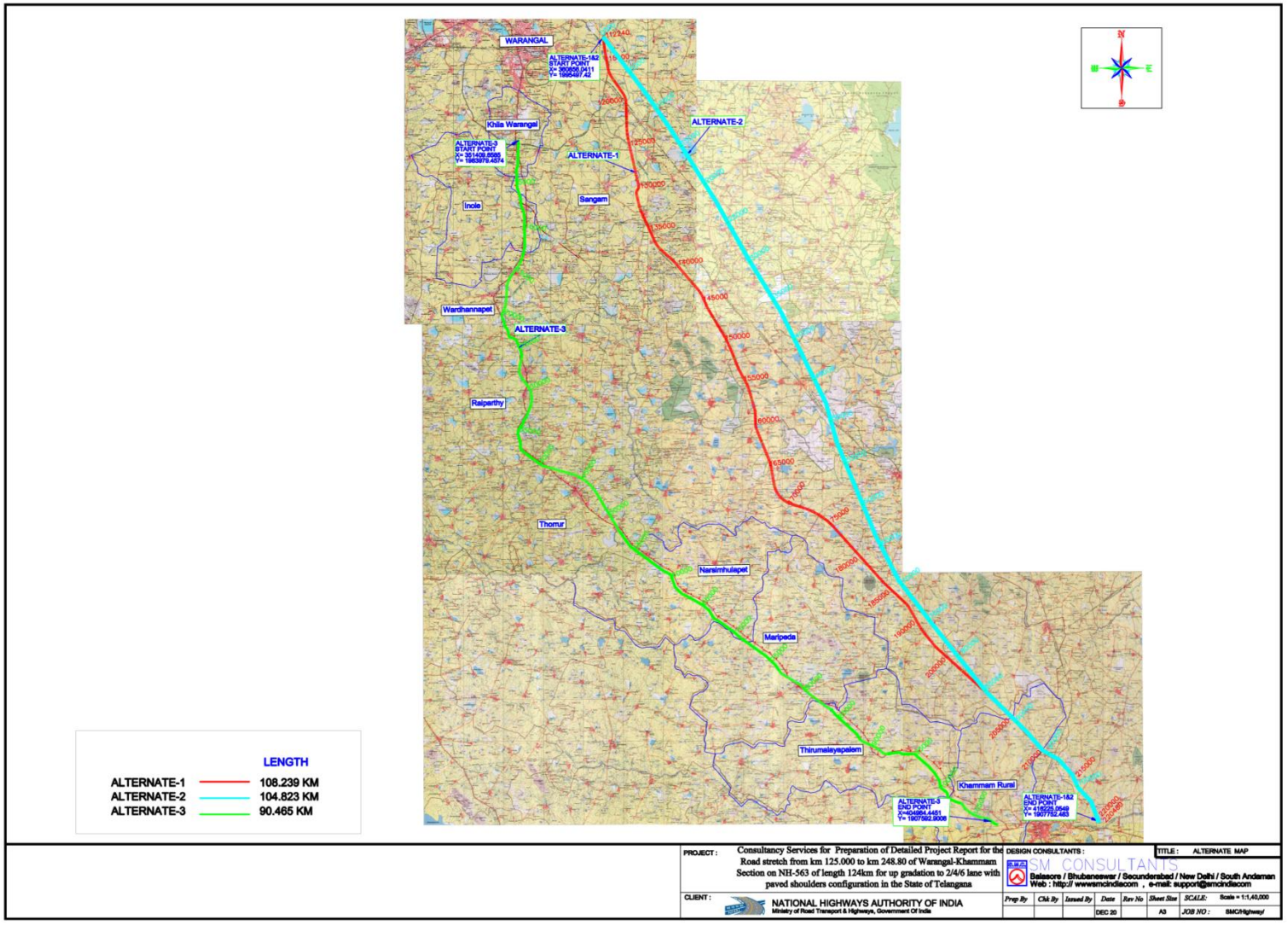

Figure 1: Route Map of Proposed Alignments

Table 3-1: Comparative Analysis of Alignment Option

S. No.	Description	Option 1	Option 2	Option 3
1.	Length of alignment	108.240 Km	106 Km	124 Km
2.	Built up stretch	Nil	5.4km	33.7 Km
3.	Start point	Near outskirts of Waranagal	Near outskirts of Warangal	Near outskirts of Waranagal
4.	End point	Outskirts of Khammam	Outskirts of Khammam	Outskirts of Khammam
5.	Districts	Warangal, Mahabubabad and Khammam districts in Telangana	Warangal, Mahabubabad and Khammam districts in Telangana	Warangal, Mahabubabad and Khammam districts in Telangana
6.	Terrain	Plain	Plain	Plain
7.	Speed	100 kmph	100 kmph	80 kmph
8.	Geometrics	Very good and supports 100 kmph design speed	Very Good except for the built-up locations	Fair except for the built-up locations
9.	ApproxTravel Time (Hrs/Mins)	1 Hours 5 Minutes	1 Hours 4 Minutes	1 Hours 33Minutes
10.	No. of NH crossings	NH-365	NH-365	NH-563,NH-365
11.	Access Control	Access Control	Not Access Control	Not Access Control
12.	Land use pattern	Agricultural and barren	Agricultural and built up land	Agricultural and built up land
13.	Existing ROW	Nil	Nil	20-30 m
14.	Proposed ROW	45 m	45 &30m	45m
15.	Total additional land required (Acre)	1405.09	1297.3	790.737
16.	Approx. Nos of affected Properties (Residential & Commercial)	Nil	131	223
17.	Nos. of settlement Affected	Nil	11	36
18.	ROB	2	2	0
19.	Major Bridge	1	2	2
20.	Minor Bridge	38	40	22
21.	Affected water bodies	17	21	20
22.	Project Cost (Crores)	2899	3026	3065
23.	Affected Forest Area (Ha)	Nil	Nil	Nil
24.	Eco-sensitive/Protected Area	No Within 10 km radius	Laknavaram forest Within 10 km radius	No Within 10 km radius
25.	Merits	• It avoids all the major towns • La cost less • No dismantling of structures	• Alignment is shortest • La cost less	• The alignment has fair geometry with speed of 80kmph. • No railway crossing is required

S. No.	Description	Option 1	Option 2	Option 3
		• Avoiding forest land		• Land requirement will be less as this proposal will use the part of existing ROW. • Crust material can be utilized
26.	Recommendation	Recommended	Not Recommended	Not Recommended

The above-mentioned comparisons and alignments were discussed with MoRTH and NHAI in several meetings. After various rounds of discussion in NHAI office final alignment was accepted. Presentation on the various alignments of the projects and final alignment was arrived at after discussion on various aspect of the alignment. The Alignment of the proposed highway starts from near Agrampahad village in Warangal district (18°02'37.12"N, 79°41'08.16"E) and ends near outskirts of Khammam (17°15'12.13"N, 80°12'42.87"E) in the state of Telangana.

This section has starting point at near Agrampahad village in Warangal district and near outskirts of Khammam in the state of Telangana.

Further Details about the stretch are as follows-

Route Description	This section has starting point at near Agrampahad village in Warangal district and near outskirts of Khammam in the state of Telangana
Route Length (in km)	108.24 km
Start Chainage	112+240
End Chainage	220+480
Districts	Warangal, Mahabubabad, Khammam
RoW (in m)	45
Lane Configuration	4 Lane
Terrain	Plain
Design Speed (kmph)	100
No of NH crossings	1
Access Control	Yes

3.4 Size and Magnitude of Operation

The total length of the proposed project section is108.24 km with 45m ROW. The project entails 4/6 lane configurations with paved shoulders. The total land to be acquired for is approximately 568.62 Ha.

3.5 Raw materials

The construction materials like aggregates, sand, stone, etc. for the highway will be procured from nearby approved quarries. Environmental approval will be sought for any new quarry, if proposed later. Quantity of the construction material required for the proposed highway is calculated considering 4/6 lane highway with paved shoulder (Length: 108.24 km) as follows:

Table 3-2: ROW Material Requirement

S. No.	Materials	Unit	Quantity	Source
1	Soil	Cum	5972825.25	Local
2	Bitumen	MT	15	Vizag
3	Emulsion	MT	3	Vizag
4	Cement	MT	75	Warangal
5	Steel reinforcement	MT	12	Warangal
6	Aggregates	cum	720104	Muripirala
7	Sand	cum	288572	Bhadrachalam

3.6 Resource Optimization / Recycling and Reuse

The project will reuse the soil and material excavated for construction of bridges and other structures as follows:

- Topsoil from the agriculture land shall be stored separately for utilization inavenue and median plantation. The earth material excavated from the high-rise area to be used for backfilling of low laying area and embankment

- Sewage routing through portable STP or diversion into soak pit. Treated water from STP to be used for sprinkling or gardening

3.7 Water and Energy – Source and AvailabilityWater

Rainfall and seasonal rivers are the major source of ground water recharge in the state. The project districts receive rainfall during south-west monsoon and North-East monsoon. Detailed water availability and quality of surface and sub-surface sources along the project highway will be discussed in EIA report.

About 30 KLD of water will be required during construction (24 months) of proposed highway. Water source during construction shall be as below:

Sourcing of water will be preferably from surface water bodies, rivers, canals and tanks in the project area

- Only at locations where surface water sources are not available, extraction of ground water, after intimation and consent from respective department held responsible at state level can be sought.
- Water sourcing will be following the requirements of Central Ground Water Authority.

3.8 Power

Power shall be required for construction and operation of the project, which will be sourced from local power distribution authority. DG sets as alternative arrangement will also be arranged in construction camp.

3.9 Waste Quantity and Management

Waste management shall be done as per Solid Waste Management Rules, 2016 and Construction and Demolition Waste Management Rules 2016.

3.10 Schematic Representations of the Feasibility Drawings

Typical Cross Section Drawings are given as Appendix I with this feasibility Report.

4 SITE ANALYSIS

4.1 Connectivity

The proposed highway passes through Warangal, Mahabubabadand Khammam district in the state ofTelangana. The proposed alignment is crossing the National highways.

4.2 Land Use and Ownership

Broadly the Land use forms identified around the proposed corridor includes Agricultural Land. The indicative land use along the Project highway is represented in figure below.

Figure 2: Land use along proposed highway Stretch

4.3 Forest and Wildlife Area

4.4 Forest

No forest area to be affected due to proposed development considering 45m RoW.

4.5 Flora and Fauna

Warangal and Mahabubabad District

The forests in the district come under the category of Tropical dry deciduous and Tropical Thorny forest types. The entire forest area is divided into two divisions Viz. North Warangal Division and South Warangal Division. The Cane type of forest is found in palampet block of Warangal North Division. Teak is predominant in deep loamy and alluvial soils; whereas mixed teak type is found on loamy and alluvial soil with more percentage of sand or clay. The mixed type of forests is found on eroded sandy soils, sandy loam, loamy clay and clay soils. The height of the trees varies from 15 feet to 80 feet. The important and valuable species commonly found are teak, bijasal, nallamaddi, boja, channangi, tiruwam, Shisham, Satin, Bandar bamboo, anduk and abnus varieties. Wildlife of all categories used to appear in the district and the scenario of wildlife has been changed considerably. In the extensive forest, large game is abundant, such as Tigers, Leopards, Cheetahs, Bears, Wolves, Hyenas, Wild-dogs, spotted deer, Bison and antelope. The Pakhal forest is declared as reserve forest. The wild birds like Duck, Simple blue and green Pigeons, Partridges and Quails are also seen. Besides this, the Green Pigeons, Peacocks, Pea fonts, Water ducks, Snipes, Red jungle fowls, Kingfishers, Bulbuls, Doves, Crows, Mynas, Parakeets, Woodpeckers and common pigeons etc., are seen in this district. In addition to these Mongoose, Rabbits, Porcupines, Bandicoots, Foxes and Jackals are also found.

Khammam District

The flora of the district can be broadly classified into Timber, Firewood and Bamboo. These are the main forest produces which gained considerable market in the district. Of these, the important timber species found in the district are teak (Tectonagrandis), Bijasal or yegi (Pterocarpus marsupium), Tunki

(Diospyrosmelanoxylon), Sandra (Acacia sundra). Among the softwood species Anduk (Boswellia Serrata), Tapsi (Sterculiaurens), Burugu (Bombaxmalabarcium), Gumpena (Lanneagrandis), Garuga (Garugapinneta), Punki (Givotia rattlers - formis), palakodsheorRepela (Wrightiatinctoria) etc. Bongu Veduru or MulluVeduru (Basbusaarundinacea) and SadanapuVeduru or Sadanam (DendrocalamusStrictus) are two important species of Bamboos in the district. The commonly found varieties of shrubs in the district are Danti (Gymnosporiamontana), Nulthada (Helicteresisora), Pala Bariki (Holarrhenaantidysenterica), chittita (Phoenix humilis), Vempali (Tephrosiapurpurea), Panchothkam (BrideliaHamiltoniana), Chittijana (Grewiahirsuta), Jaji (woodfordia floribunda) and Papadi (Pavettaindica). Indigenous upland flora like Guruginja, Gachchatiga (Ceasalpinia crista), Sugandhapala (Hemidesmusindicus), TippaTigaTinosporacardifolia), Pariki, Pala tiga (Cryptolepisbuchanani), Kondagurvatiga (Smilax macrophylia) Korinta(Acacia-Intsia), Palligaddalu (Asparagusracemosus), BonthaTiga (Calycopteris floribunda), Tumki (Beedi leaf), Karakkaya or Halela (Terminalia- Chebula), Tamarind (Tamarindus indica) etc., are worth mentioning species yielding a little forest produce in the district.

4.6 Topography

The proposed alignment mostly follows 'plain' terrain. The elevation varies from~114 m to ~277 m above MSL at different locations. Average elevation of the project stretch is ~196 m above MSL.

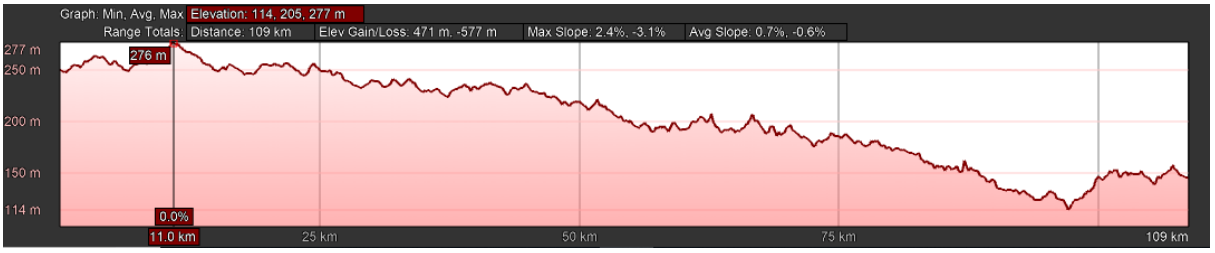

Figure 3: Elevation Profile of Proposed highway

4.7 Existing Infrastructure

There are no commercial and residential structures on and along the proposed alignment. The details of the structures will be provided in the EIA report.

4.8 Soil Classification

Geology and Soil status as observed in project districts are defined in table below.

Project District	Soil
Telangana State	
Warangal and Mahabubabad	The soil of the district comprises of sandy loam with patches of shallow black cotton soils. Medium and deep black cotton soils are also seen at various places. The steep slopes and marginal lands boarding hillocks face acute erosion in time of heavy rains. The lands alongside of the Godavari are silted heavily when the Godavari overflows its banks. The soils in general are found deficient in nitrogen and phosphoric acid.
Khammam	The soil in the district is mostly sandy loams in the South of river Godavari, the black soil in Madhiramandal and the areas adjoining the river Godavari are fertile and rich like the delta lands of Godavari The predominant soil in the district is Chalaka (43%), Dubba (28%) and Black soil (29%)

4.9 Climatic Data

The climate of region is tropical with hot and humid conditions. The climate of project region can be divided into three major conventional seasons as follows:

- Hot- Weather Season (mid-March to end of June)
- Monsoon Season (End of June to September)
- Mild Winter Season (October to February)

The climate conditions prevalent in project influence districtsare presented in table below.

Table 4-1: Climatic Conditions of Project Districts

ProjectDistrict	Climatic Condition
Telagana State	
Warangal	Warangal has a predominantly hot and dry climate. Summer starts in March, and peak in May with average high temperatures in the 42 °C (108 °F) range. The monsoon arrives in June and lasts until September with about 550 mm (22 in) of precipitation. A dry, mild winter starts in October and lasts until early February, when there is little humidity and average temperatures in the 22–23 °C (72–73 °F) range.
Mahabubabad	Mahabubabad temperature in summers rises up to 48 °C. The month of May is considered to be the warmest month of year and December is the coldest month of the year in town. In winters temperature varies between 12 °C to 27 °C. It receives north east and south west monsoon from June to September and from October to November respectively.
Khammam	The climate is comparatively equitable and although it is very hot in May with mercury rising upto 40.7°C. During the year 879.1 mm Rainfall is received as against a Normal of 1124.0 mm in Khammam while observing 21.78% of deficiency.

The Indian Meteorological Department's (IMD) observatories in vicinity of proposed highway alignment is located at Khammam. Long-Term climatological data (Years 1981 – 2010) has been analyzed for assessment of prevailing meteorological scenario in the project region and is shown in the table below.

Table 4-2: Long-Term Climatological Conditions at IMD Observatory Khammam(1981-2010)

Month	Temp Monthly (°C)		Humidity (%)		Avg. Wind Speed (kmph)	Avg. Rainfall (mm)
	Max	Min	Mor.	Eve.		
January	31.4	14.1	77	49	1.8	11.4
February	34.9	16.6	74	43	2.6	8.4
March	38.3	19.7	72	36	3.1	7.4
April	41.2	22.2	70	35	3.5	10.8
May	44	22.9	61	35	3.8	36.6
June	42.3	22.9	65	50	4.3	105.5
July	37	22.3	77	66	3.4	240.9
August	34.9	22	80	71	2.9	246.7
September	35	22.3	80	70	1.8	156.6
October	34	19.6	79	67	1.4	137.1
November	32	15.6	73	58	1.5	23.9
December	30.2	13.7	73	52	1.6	5.6
Total / Avg.	**44.3**	**13.6**	**73**	**52**	**2.6**	**991**

Source: Climatological Normals 1981-2010, India Meteorological Department

4.10 Social Infrastructure

A large part of the proposed highway is passing through agriculture land affecting approximately 48 villages along the entire stretch. The available social infrastructure in these villages are very basic in nature consisting facilities like primary health care facilities, basic education, etc.

5 PLANNING BRIEF

The proposed highway is in feasibility study stage. After having undertaken the feasibility study and the grant of Terms of Reference (ToR), Detailed Project Report (DPR) shall be completed. The DPR shall comprise of the planning brief including planning concept, land use planning, assessment of infrastructure demand and amenities/facilities.

6 PROPOSEDINFRASTRUCTURE

6.1 Industrial Area

Not applicable

6.2 Residential Area

Not applicable

6.3 Green Belt

Greenbelt will be developed on both sides of the highway. Compensatory plantation and avenue plantation will be undertaken on both sides of the highway for landscape improvement and increasing the aesthetic quality. Avenue plantation will be provided as per the guidelines of Green Expressway (Plantation and Maintenance) policy and Green Expressways (Plantation Trans-plantation beautification and Maintenance) policy 2015. It will be ensured that the plant species used for plantation are local. Detailed plantation scheme shall be provided in EIA report.

6.4 Social Infrastructure

Not applicable

6.5 Connectivity

The proposed route will be accessed through 05 locations within the 108.24 km of length of the highway.

6.6 Drinking Water Management

No permanent installation of drinking water facilities is being planned for the project. Drinking water will be arranged from local vendors / water tankers for construction workers with prior consent.

6.7 Sewerage System

Portable bio-toilets or septic tanks with soak pit will be provided for construction and operational workers.

6.8 Industrial Waste Management

Not Applicable

6.9 Solid Waste Management

Waste management will be done as per Solid Waste Management Rules, 2016 and Construction and Demolition Waste Management Rules, 2016.

6.10 Power Requirement — Supply and Source

The power required during construction phase will be sourced through the Telangana State Electricity Board and DG sets will also be installed as power backup source.

7 REHABILITATION AND RESETTLEMENT PLAN

Most of the land falling in the alignment of the proposed highway is agricultural land. Along with this, the alignment of the proposed highway passes through barren land, and water bodies. The land required for the construction of highway will be acquired by NHAI before the commencement of construction work as per the provision of the LARR, 2013 and NH Act, 1956 (with its amendments).

8 PROJECT SCHEDULE AND COST ESTIMATES

The construction work of the project will start after fulfillment of the following activities:

- Finalization and approval of Detailed Project Report;
- Receipt of Environmental Clearance and Forest Clearance from MoEF&CC, NewDelhi
- Selection and on-boarding of contractor for implementation works

The estimated project cost is about INR 2899Cr.Detailed cost break-up and project schedule shall be discussed in the EIA report.

2 ANALYSIS OF PROPOSAL

The overall benefits of the project are multi-fold. In addition to the improved connectivity, it will also provide a boost to the economic status of the villages / towns falling in the dedicated project area.

Overall improvement will be expected in local area in terms of:

- Better connectivity to economic, social and political hubs of the country;
- Faster growth and outreach to better and improved facilities;
- Fast and safe connectivity resulting in savings in fuel, travel time and total transportation cost;
- Reduction in accidents;
- Better approach to medical and educational services;
- Faster transportation of perishable goods like fruits, vegetables, and dairy products
- Better opportunities for transporting, processing and marketing of agricultural products;
- Development of local agriculture and handicrafts;
- Opening of opportunities for new occupations and trade on the route;
- Direct and indirect employment opportunity to people from all skilled, semi-skilled and unskilled streams;
- Improved quality of life for people and soon;
- Development of backward areas through rapid industrialization and access to distant markets;
- Creation of ancillary ecosystem through highway amenities, support services and industrial / manufacturing areas *etc.*

It is assumed that the overall project will boost the socio-economic development in the entire region. Accordingly, the proposed highway will contribute towards this objective.

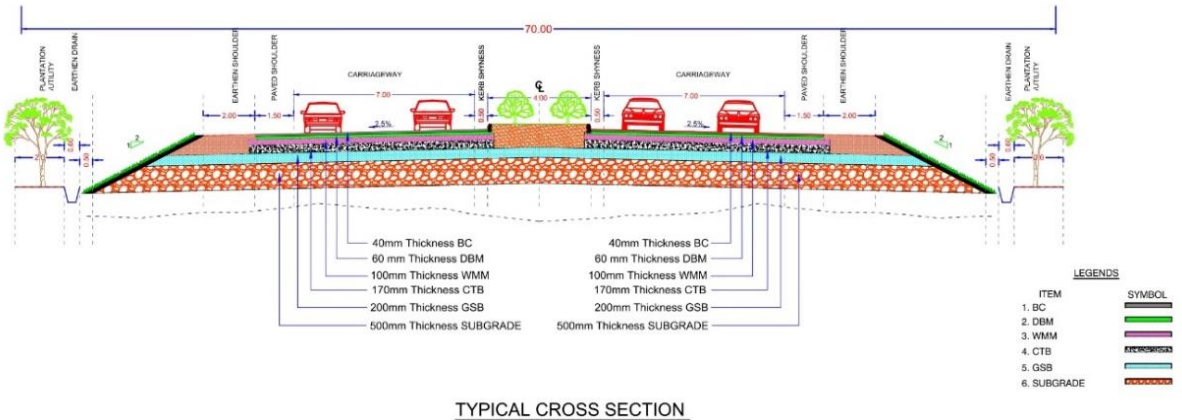

Figure 4: Typical Cross-Section