

Executive Summary

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1.0 Executive Summary

1.1 Project Background

NHAI has been entrusted with the development of the Bharat Mala Project comprising over 65,000 km of National Highways and State Highways with major component being 26,000 km Economic Corridors. These roads have been identified primarily to enable end to end seamless freight movement in the entire Country.

At the outset, the National Highway Authority of India(NHAI) has been assigned the work of "Consulting Services for the Preparation of DPR for Development of Economical Corridors, Inter Corridors and Feeder Routes to Improve the Efficiency of the Freight Movement in India under BharatmalaPariyojana – Lot 5, Package-3"

The following are the stretches proposed for the DPR Preparation in the original scope.

Table 1.1: Stretches for DPR

SI No	EC No	Nomenclature of the Road	Road Corridor No.	Length in Kms	The Stretch Proposed in DPR
1	EC 20	Hasan - Raichur	NH167	30	AP/KN Border to Raichur

The National Highway Authority of India(NHAI) has appointed Feedback Infra Pvt Ltd in association with Prasuna Infra Pvt Ltd for providing consultancy services for carrying out feasibility study and preparation of DPR for the economic corridors EC-20, EC-10 & EC-37. The total length of the Project road is 444Km in the State of Karnataka.

The Letter of Award (LOA) was given to the consultant on 28thDecember 2017 and the Contract Agreement for the assignment was signed on 21stMarch 2018 and NHAI through letter no. NHAI/Bharatmala/DPR/Lot5/Package3/2017/114815 Dated 21/03/2018 instructed the consultants to commence the assignment, and the project activities thereafter.

The scope of the project is to establish an Economic Corridor or Industrial Corridor i.e. to connect the economically important production and consumption centers. In India 44 Corridors are identified in a scientific manner i.e. based on commodity wise survey, freight movement across 600 districts, mapping of shortest routes for 1200 routes carrying 90% of the freight. Technology based traffic survey over 1500+ points across the country, satellite mapping of corridors to identify the upgradation requirement was undertaken.

The Economic Corridors are identified primarily to enable end to end seamless freight movement in the entire country. These stretches are developed to the minimum of 4 lane NH standards especially Economic Corridors. Since end to end Economic corridors need to be developed for the high speed on the Highways, provision for segregation of slow moving local traffic, controlled access to the Highway through provision of service roads and mitigating of severance of communities through liberal provision of underpasses/viaducts shall be made.

The final alignment report is prepared based on Terms of Reference (TOR) class 10.3 and submitted to NHAI for perusal.

1.2 Project Location

The Economic Corridors assigned to M/S Feedback Infra Pvt Ltd in association with Prasuna Infra Pvt Ltd, runs in southern India state of Karnataka. The economic corridor No 20 (EC-20) Raichur district.

During the presentations held (at the time of Draft Inception Report Submission) with the Project Director, Hospet and Regional Officer, Bangalore on 24th & 25th April 2018 and 3rd May 2018 respectively, the following suggestions were made:

- For EC20 corridor, AP/KN Border – Raichur project road stretch it was suggested to include new bypass for Raichur in south western quadrant connecting EC10 corridor of Hungund - Raichur project road stretch. This bypass will be part of KN/AP Border – Raichur - EC20 corridor.

In addition, a presentation on Draft Inception Report was made by the consultants before Member (P) in NHAI Head Quarters, New Delhi on 24th May 2018. During the discussions NHAI has made following comments on the project road stretches. The same has been communicated by NHAI vide letter no. NHAI/Bharatmala/DPR/Lot-5/Package-3/2017/118461 dated 1st June 2018.

- For EC 20 corridor, AP/KN border to Raichur project road stretch, it was advised by NHAI to prepare DPR for 4/6 laning of existing road from KN/AP border-Raichur-KN/TS border with bypasses to Gillesugur, Yaragera and Raichur towns.

Incorporating the above comments made by NHAI on draft inception report, the consultants submitted Final Inception Report on 8th June 2018 and the same has been approved by RO vide their letter no. NHAI/RO-BNG/17030/01/2018-19/842.

Based on the alignment approved at Inception Stage the consultants prepared the Draft Alignment Report and submitted to NHAI on 27th July 2018 for approval.

A presentation on Draft Alignment Report was made before Member (T) in NHAI Head Quarters, New Delhi on 17th October 2018 and the member made following comments and the same has been communicated to the consultants by NHAI vide letter no. NHAI/KNT/DPR/BM/Lot-5/Pkg-III/2018-19/25397. The observations/directions given by NHAI on Draft Alignment Report are as follows.

- For EC 20 corridor, AP/KN border to Raichur project road stretch the consultant shall coordinate with Raichur Municipal Corporation/Urban Development Authority Planning Department to ascertain the requirement of bypass on south western quadrant for Raichur to avoid duplication of road. At tie-in point at the end of project road stretch the consultant was advised to work upon the alignment such that the EC10 corridor following North Western part of ring road and EC20 corridor following South Eastern part of ring road meet smoothly on northern side of ring road and only one economic corridor should continue up to KN/TS border without kinks. Further, opinion of local

authority may be taken regarding the alignment. The consultant shall also coordinate with the consultant for adjacent stretch on AP side and decide on who shall do the Tungabhadra bridge. The Member (T) advised the consultant to avoid proposing elevated corridor and instead shall look at proposing bypasses for habitat areas.

As advised by NHAI (during the presentation of Draft Alignment Report) to consult local authority of Raichur administration regarding proposals for ring options for Raichur, the consultant along with the Project Director, PIU Hospet met with District commissioner, Additional District Commissioner, MPs (Member of Parliament) of Raichur and Koppaland MLAs (Member of Legislative Assembly) of Raichur constituency on 22nd November 2018 and presented the alignment of Hungund – Raichur, EC10 corridor and AP/KN border – Raichur – KN/TS border, EC20 corridor including ring road options for Raichur and all other bypasses being proposed for both corridors.

The local Raichur administration has accepted the proposal for AP/KN border – Raichur – KN/TS border.

Accordingly, the consultants have incorporated the above changes and the same has been considered in the Final Alignment Report. The Final Alignment Report was submitted to NHAI on 26th November 2018 and the same has been approved by NHAI vide letter no.NHAI/Ro-BNG/17030/01/2018-19/2774, dated 04.12.2018.

Following approval of the Final Alignment Report by NHAI, the consultants conducted various surveys & investigations including traffic, detailed road and bridge inventory and condition surveys, soil & material investigations in the months of December 2018, January, February & March 2019. Based on the surveys and investigations the consultants prepared the Draft Feasibility Report and the various findings are discussed in the following chapters.

The following is the revised/updated roads list as per the NHAI HQ meeting held on 24th May 2018, Secretary (MoRTH) meeting held on 9th August 2018 and NHAI HQ meeting held on 17thOctober 2018 with the details of the Economic Corridor that run in different districts of Karnataka and Maharashtra.

Table 1.2: Updated Project Road Stretch Details with Districts

Sl. No	Roads in Original Scope	Revised Roads	Districts	EC No.	Actual Road No.	Actual Length in Kms (with the changes proposed in NHAI HQ meeting of 24 th May 18, Secretary (MoRTH) meeting of 9 th Aug 18 & NHAI HQ meeting of 17 th Oct 18)
1	AP/KN Border to Raichur	AP/KN Border - Raichur- KN/TS Border, to be referred as Road No.2	Raichur	EC 20	NH167	30 (AP/KN border- Raichur)+24.48 (new greenfield alignment from Raichur to KN/TS border) = 54.48

The project road stretch will now be renumbered and referred as per the list below:

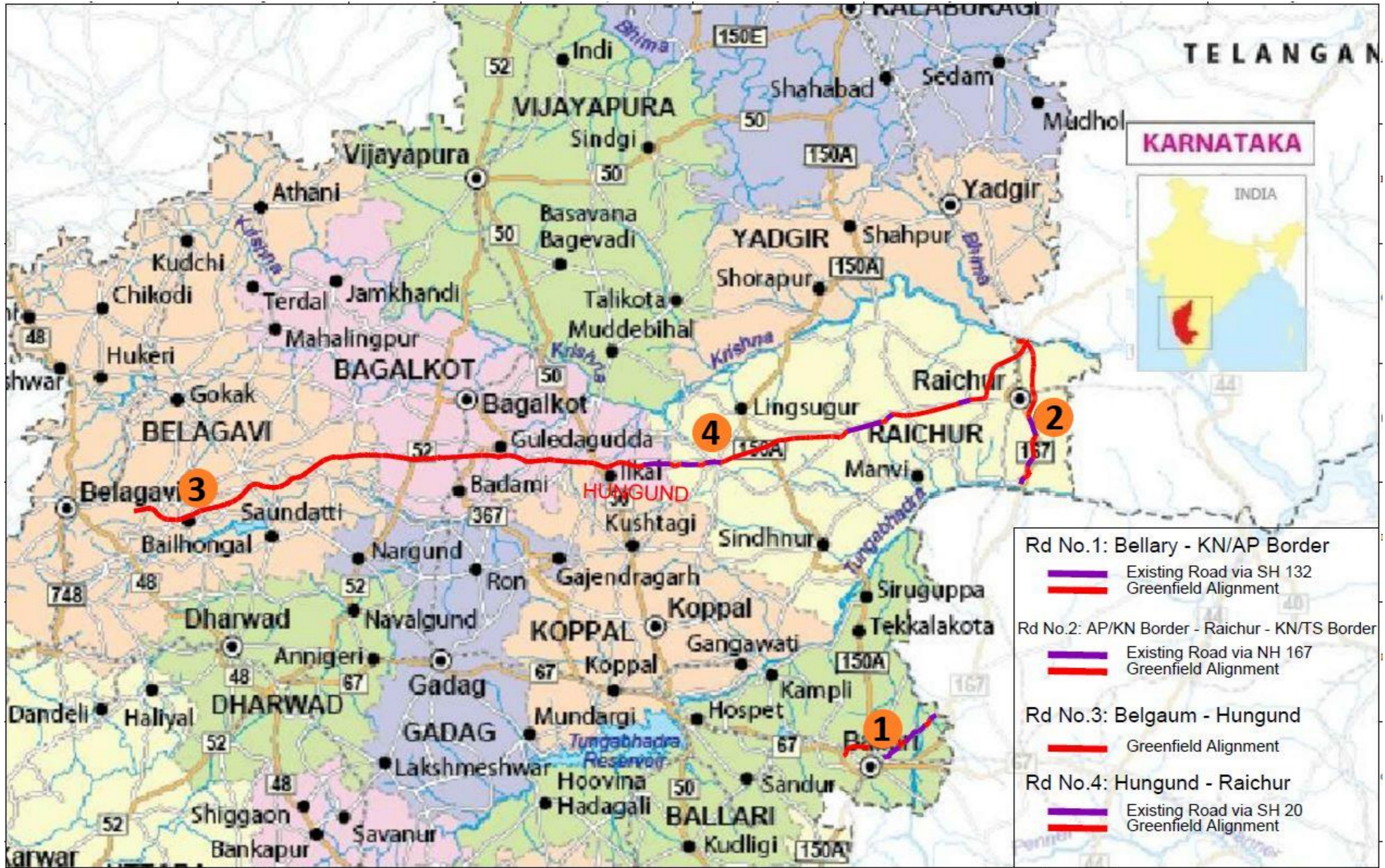
1. AP/KN Border – Raichur - KN/TS Border (EC20), **now referred as Road No.2**

The start and end points of different roads given in TOR fall in the middle of the bridge, city or overlap with an existing National Highway.

For feasibility and detailed design purposes the consultants adopted the following strategy.

For Road no.2-EC20, AP/KN border – Raichur – KN/TS border project road the start point will be taken from the start of Tungbhadra bridge (as per TOR it falls in the middle of the bridge) and the end point will be extended up to KN/TS border near proposed Krishna Bridge being planned by State PWD. It was communicated to the consultants that the Tungbhadra bridge shall be designed as part of Lot 5, Package-3.

However, the start and end points for different roads may further change during detailed design and also with provision of bypasses.



1.3 Current Status of Project Road Stretches

The following is the current status of the Project Road Stretch.

- **AP/KN Border - Raichur – KN/TS Border**, EC20 – the existing NH167 has recently been widened by Karnataka State Public Works Department (KS PWD) National Highway (NH) Division. The Works Contractor was Sri SM Autade Constructions Pvt. Ltd. As per NHAH instruction of 24th May 2018 and 17th Oct 2018 a greenfield alignment to Raichur will be provided on right side (eastern side) and the project road stretch will be further extended/continued up to KN/TS border to meet new bridge on River Krishna proposed by State PWD.

Table 1.3: Details of Project Stretches

Sl. No	Revised Roads	EC No	Actual Road No.	Actual Length in Kms (with the changes proposed in NHAH HQ meeting of 24 th May 18, Secretary (MoRTH) meeting of 9 th Aug 18 & NHAH HQ meeting of 17 th Oct 18)
1	AP/KN Border - Raichur-KN/TS Border, to be referred as Road No.2	EC 20	NH167	30 (AP/KN border-Raichur)+24.48 (new greenfield alignment from Raichur to KN/TS border) = 54.48

The total length of the project road stretches as per the Draft Feasibility Report works out to be 412.80 kms. The contract length is 444km, however, as the change in total length falls within less than 10% of the original scope, no change of scope (COS) is applicable and COS (without change of consultancy fees) was approved by NHAH vide letter no. NHAH/RO-BNG/17030/01/2018-19/2774, dated 04.12.2018.

1.4 Project Appreciation

Terrain

The terrain for project road stretch AP/KN Border – Raichur – KN/TS Border Plain to Rolling.

Land Use

For Road no.2 the built-up has been avoided and the land use pattern varies from agriculture to barren.

Towns/Villages

The project road stretches pass through several villages and the details are given in Chapter 4. Land maps have been collected to ascertain the affected villages and 3a has been prepared and submitted to the client.

Existing Carriageway Width

The carriageway width for four project road stretches varies from two lane road two with paved shoulder.

- AP/KN Border – Raichur – KN/TS Border

The existing NH167 has been recently widened from intermediate lane to two plus paved shoulder.

Right of Way

- AP/KN Border – Raichur – KN/TS Border

For majority of section ROW is 30m and at built-up areas ROW is 15m. the built-up sections where there limited ROW available bypasses have been proposed.

Utilities

Several utilities exist along the existing road in all four project road stretches. These are electrical lines/poles, OFC, HT line, water tanks etc. Proposals for relocation of the same is being prepared.

Sensitive Locations

Sensitive location such as temples, church, mosque, dargah, graveyard and archaeological monuments etc. exist in the project road stretch. While design the widening scheme of existing road care has been taken to avoid acquisition or encroachment of these sensitive structures.

Water bodies

Water bodies such as drinking water reservoir, water tanks, lakes exist along the existing road of the project road stretch. Encroachment into these water bodies has been avoided during the design of widening proposals of the project road stretch.

Environmental Features

- AP/KN Border – Raichur – KN/TS Border

Forest nursery exist along the project road stretch and there may require acquisition of part of nursery land to design widening of the existing NH167.

Railway Crossing/ROB

- AP/KN Border – Raichur – KN/TS Border

The proposed Raichur greenfield alignment bypass crosses existnt railway at Des Ch.34+665.

1.5 Surveys and Investigations

Various surveys and investigations listed below have been carried out and the details are given Chapter 4, Methodology Adopted.

- Topographical Surveys (Refer to Drawings)
- Traffic Surveys (Refer to Chapter 7)
- Soil & Material Investigations (findings have been taken to design pavement etc)
- Road & Bridge Inventory and Condition Surveys (Findings are given in Annexures to Main Report)
- Preliminary Environmental Screening (Refer to Chapter 8)
- Preliminary Social Surveys (Refer to Chapter 9)

Detailed surveys such geotechnical investigations will be carried out after the approval of Feasibility Report.

1.6 Traffic Survey and Analysis

Following traffic surveys were conducted at different locations along project road stretch. To capture traffic flow characteristics and travel pattern of users passing through the project road and other characteristics related to miscellaneous requirements as per the TOR.

- Classified Traffic Volume Count (MCC) using ATCC.
- Junction Volume or Intersection Turning Movement Count (TMC)
- Origin-Destination and Commodity Movement Survey (OD)
- Axle Load Survey
- Speed and Delay Survey
- Pedestrian Survey

Homogenous Sections

Homogenous Sections – KN/AP Border – Raichur – KN/TS Border

Sl. No	Homogeneous Section no.	H.S Chainage (km)	Length (km)
1	H.S 1	AP/KN border at Tungabhadra to Raichur	24.95
2	H.S 2	Raichur to KN/TS border (New alignment)	29.53
Total length			54.48

Forecasted Traffic& Capacity Augmentation

Forecasted Traffic – KN/AP Border – Raichur – KN/TS Border

Year	HS 1		HS 2	
	Vehicles	PCUs	Vehicles	PCUs
2019	9,312	9,300	3,432	5,754

1.7 Proposed Lane Configuration

For almost all the project road stretches the projected traffic indicates that four laning is required by 2030. However, as per Design Principles of 'Policy for design of full access control Economic Corridor under BharatmalaPariyojana', the corridors are to be made with minimum four lanes. Hence four lanes are recommended. Typical cross sections, TCS I – TCS XVII have been prepared for different scenarios and are given in Chapter 6, Indicate Design Standards, Methodologies and Specifications.

1.8 Geometric Design

As the alignment for all four project road stretches has been approved by NHAI the geometric design has been carried out considering various directions / instructions given by the client during various presentations. The site constraints such as HT lines, structures (houses/property), water bodies, utilities and trees have also been taken into account while fixing the horizontal curves. The design has been carried out for absolute minimum radius have been adopted. The project road stretches have been designed for 100kph design speed as specified in the policy guidelines for Economic Corridors. Proposed ROW has been kept as 70m. As far as possible all built-ups/villages/towns have been bypassed to avoid acquisition of habitat areas. The details of horizontal curve details are given in tables 6.2.11 – 6.2.14 in Chapter 6. The following bypasses have been proposed in different project road stretches.

From Chainage	To Chainage	Length in Km	Bypass Name
AP/KN Border – Raichur – KN/TS Border			
1500	7150	5650	Gillesugur Bypass
11200	18450	7250	Yeragera&Gunjhalli Bypass
24950	54480	29530	Raichur Bypass(Green Field)

1.9 Culvert and Bridge Proposals

Based on inventory and condition survey of the culverts and bridges the following proposals have been arrived at. Refer to tables given chapter 4 for detailed proposals for overpasses, ROB, minor bridges, major bridges, VUPS, flyovers, ROB and box culverts.

MJBR: Major Bridge; MNBR: Minor Bridge; VUP: Vehicle Underpass; SVUP; Small Vehicle Underpass; LVUP: Low Vehicle Underpass; PUP: Pedestrian Underpass; ROB: Rail Overbridge

AP/KN Border – Raichur – KN/TS Border

S.N.	Structure	No. of Structures
1	LIST OF STUCTURE	-
2	NEW CONST. OF MJBR	1
3	Widening & Parallel Construction of New MJBR	1
4	NEW CONST. OF MNBR	5
5	Widening & Parallel Construction of New MNBR	2
6	WIDENING OF HPC	-
7	WIDENING OF BOX CULVERT	-
8	Existing Retained New Culverts	30
9	NEW CONST. OF BOX CULVERT	100
10	HPC CONVERTED TO BOX CULVERT	-
11	Flyover	4
12	NEW CONST. OF VUP	15
13	NEW CONST. OF LVUP	1
14	NEW CONST. OF SVUP	16
15	NEW CONST. OF TRUMPET	-
16	NEW CONST. OFROB	1
	Total Structures	176

1.10 Pavement Design

The pavement design for four project road stretches is given below.

Homogeneous section	Section			Effective sub-grade CBR in %	Design life (yrs)	Design MSA	Bitumen grade	SG (mm)	Crust composition				
	From (km)	To (km)	Length (km)						GSB (mm)	WMM (mm)	DBM (mm)	BC (mm)	Total (mm)
Road-2 AP/KN Border-Raichur-KN/TS Border													
HS1	0	30	30	10	15	30	30	500	200	250	60	40	550
HS2	30	54	24	10	15	20	30	500	200	250	60	40	550

1.11 Junctions

The list of major intersection along project road stretches is given in tables 4.2.4.1 – 4.2.4.4 in Chapter 4. As the project is access controlled corridor as per Economic Corridor policy no direct access to the mainline from these cross/side roads will be provided. Entry and exit ramps shall be provided for major crossings with important roads like State Highways and National Highways. Where the project road stretches meet or cross the National Highways interchange is proposed.

1.12 Project Facilities

The facilities for project road stretches is given in the following table.

S.No	Name of the Road	Truck Lay Bye	Rest Area	Toll Plaza
1	AP/KN Border - Raichur - KN/TS Border	45+500	27+600	9+300

1.13 Environmental Screening

As the first step towards a detailed EIA and corresponding to the Feasibility studies, an environmental screening and scoping exercise was carried out to define boundaries (spatial and temporal) of the EA, limitations and constraints, stake holder consultations, determine significant "hotspots". The findings of the same are presented in the chapter 8.

The Reserved Forest along the project road is as follows:

- Project Road No. 2, AP/KN Border – Raichur – KN/TS Border Project Road Stretch - Forest Nursery on either side of the alignment

1.14 Land Acquisition

For this road, the Proposed RoW is 60m and for a length of about 8.66Km existing road, an Existing RoW of 30m is already available with the Government. Now, the additional land to be acquired is **314.788 Ha**.

1.15 Cost Estimate

Total Project Civil Cost is given as the following:

- For road no.2, AP/KN border – Raichur – KN/TS Border the total civil cost (including GST and 10% over SOR) is **Rs.1132.25 Crores** and total capital cost (including land acquisition, R&R, environmental, utilities & other contingencies etc) works out to **Rs.1871.04 Crores**

AP/KN Border-Raichur			
SUMMARY OF THE PROJECT COST			
S.No	Description	In Rupees	In Cr
1	TOTAL CIVIL COST	11,32,24,57,657.28	1132.25
2	TOTAL PROJECT COST	14011546850.12	1401.15
3	TOTAL CAPITAL COST	18710368625.29	1871.04

1.16 Economic and Financial Analysis

Economic Analysis

The EIRR for the project road stretch is given below.

AP/KN Border – Raichur – KN/TS Border

Total Package	EIRR (%)		NPV (Cr.)	
	20 Year	30 Years	20 Year	30 Years
AP/KN Border – Raichur – KN/TS Border	16.5	18.1	275.5	509.9

From the results of the Economic Analysis, it can be seen that the improvement scheme, the EIRR is higher than minimum threshold value of 12% in this the cases. Hence the project is economically viable and recommended for implementation.

Financial Analysis

FIRR for the project road stretch is given below.

Construction package	Grant (%)	Concession Period	Project FIRR (%)	Equity FIRR (%)
AP/KN Border – Raichur – KN/TS Border	40%	20 Years	(-)ve	(-)ve

A minimum return on equity of around 15% could be considered satisfying the requirement of prospective concessionaire. In view of this, it can be concluded that the project road stretch is financially not viable with a maximum grant of 40% and a general concession period of 20 year.

Hence, it is proposed to let out the package for development under EPC Mode or Hybrid Annuity Mode.

1.17 Conclusions and Recommendations

Based on economic analysis all the four project road stretches are recommended for implementation as the EIRR is more than 12%. The financial viability of all the four project road stretches is not feasible, hence it is suitable to be implemented as EPC Mode or Hybrid Annuity Mode.