CHAPTER - 3

SOCIO-ECONOMIC PROFILE OF THE PROJECT INFLUENCE AREA

SOCIO-ECONOMIC PROFILE OF THE PROJECT INFLUENCE AREA

3.1 INTRODUCTION

Road project always influences the whole of the district through which it passes, bringing prosperity, safety and faster accessibility for all road users.

NH-24B connects **Lucknow** with **Allahabad** in Uttar Pradesh. From km 82+650 to km 124+00 i.e. length 42 km in Raebareli District, km 124+000 to km160+00 i.e. length 36 km in Pratapgarh district and km 160+00 to km 188+600 i.e. km 28+600 lies in Allahabad district. The Project study corridor starts from km 82+650 of NH-24B located near Civil Line circle of Raebareli and ends at km 188+600 of NH-96 Junction with in Proximity of Allahabad City. Total length of project road is approx. 106 km.

Government of India felt the necessity of partially access controlled corridor between Raebareli and Allahabad through up gradation of Raebareli section of NH-24B. The proposed improvements of Raebareli-Allahabad highway aims for:

- Important Interstate connectivity between Raebareli to Allahabad.
- Connectivity to many headquarters/taluka place developed as business centre and Agriculture Marketing Yard.
- Better connectivity to important towns Unchahar, Kunda, Lalgopal Ganj and Nawab Ganj along the project corridor.
- Provide a platform for better economic and Industrial growth of the region

This chapter contains the socio-economic profile for the state of Uttar Pradesh as well as the project-impacted districts for the purpose of providing a contextual background to understand the social impacts of the proposed Project. The remaining information has been provided as a supplement for the contextual background. The Key Map depicting the project road is presented in **Figure 1.1 in Chapter-1.**

3.1.1 Existing Road

The existing road alignment passes through 3 district of the Uttar Pradesh state namely; Raebareli, Pratapgarh and Allahabad districts. The project highway passes through major towns Unchahar, Kunda, Lalgopal Ganj and Nawab Ganj etc.

3.1.2 Right of Way

As per the details obtained from the State PWD, and Site road inventory, the Right of Way varies from 20m to 30m.

3.2 DEMOGRAPHIC FEATURES

Uttar Pradesh, abbreviated as UP, is the most populous state in the Republic of India as well as the most populous country subdivision in the world. It was created on 1 April 1937 as the United Provinces during British rule, and was renamed Uttar Pradesh in 1950. Lucknow is the capital city of Uttar Pradesh. Ghaziabad, Kanpur, Gorakhpur, Allahabad, Raebareli, Moradabad, Bareilly, Aligarh, Sonbhadra, and Varanasi are known for their industrial importance in the state.

On 9 November 2000, a new state, Uttarakhand, was carved out from the Himalayan hill region of Uttar Pradesh. The state in the northern region of the Indian subcontinent has over 200 million inhabitants. The state is bordered by Rajasthan to the west, Haryana and Delhi to the northwest, Uttarakhand and Nepal to the north, Bihar to the east, Madhya Pradesh to the south and touches the states of Jharkhand and Chhattisgarh to the south east. It covers 243,290 square kilometres (93,933 sq mi), equal to 6.88% of the total area of India, and is the fourth largest Indian state by area. Hindi is the official and most widely spoken language in its 75 districts.

Uttar Pradesh is the third largest Indian state by economy, with a GDP of $9,763 billion (US$150 billion). Agriculture and service industries are the largest parts of the state's economy. The service sector comprises travel and tourism, hotel industry, real estate, insurance and financial consultancies. Uttar Pradesh was home to powerful empires of ancient and medieval India. The two major rivers of the state, the Ganges and Yamuna, join at Allahabad and then flow as the Ganges further east.

The state has several historical, natural, and religious tourist destinations, such as, Agra, Varanasi, Piprahwa, Raebareli, Kaushambi, Kanpur, Ballia, Shravasti, Gorakhpur, Unnao, Chauri Chaura situated in Gorakhpur, Kushinagar, Lucknow, Jhansi, Allahabad, Budaun, Meerut, Mathura, Jaunpur and Muzaffarnagar.

3.2.1 Population

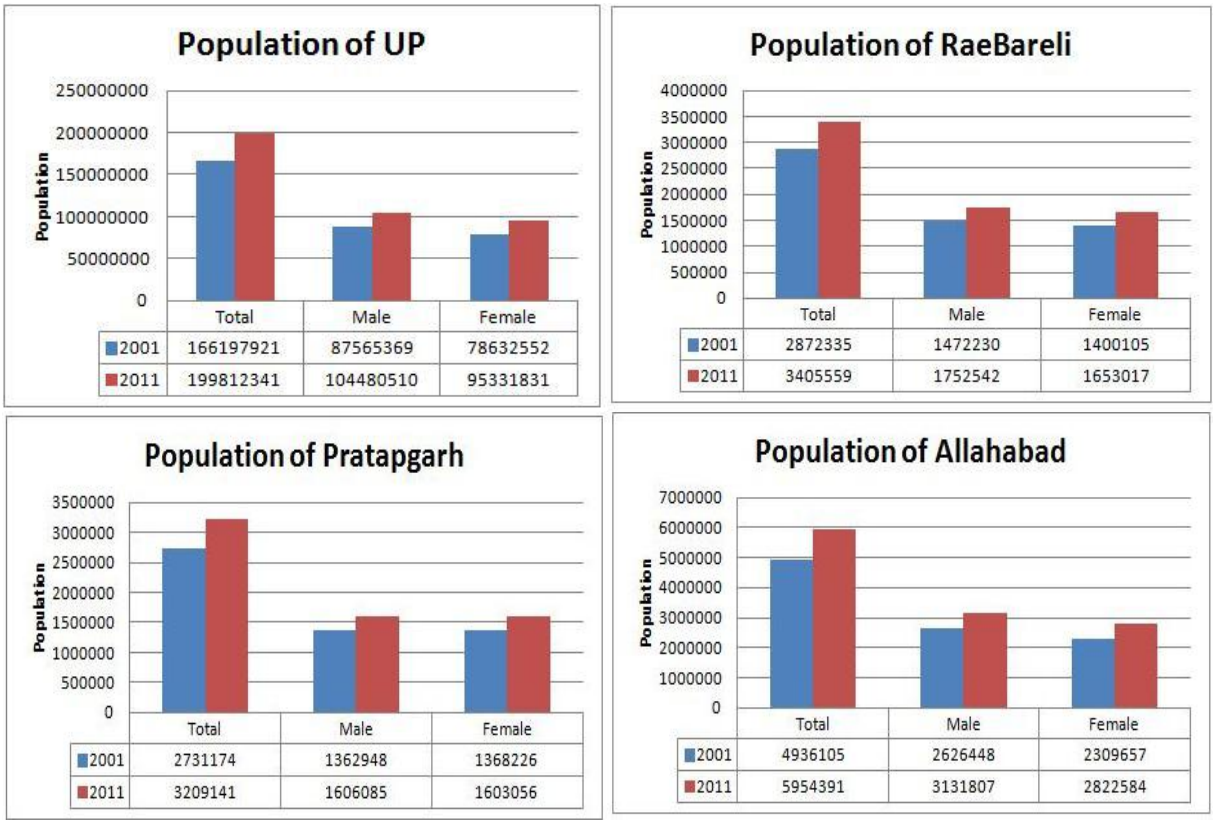
Uttar Pradesh is India`s most populous state. It has a population of about 199,812,341 as per the 2011 census. If it were a separate country, Uttar Pradesh would be the world's fifth most populous nation, next only to China, India, the United States of America and Indonesia. There is an average population density of 828 persons per km² i.e. 2,146 per sq mi. The capital of Uttar Pradesh is Lucknow. Hindus and Muslims consider the state as a holy place.

Table 3.1: Demography of Project Influenced Districts and State in 2011

Section Allahabad-Raebareli	Project Area	Raebareli	Pratapgarh	Allahabad	Uttar Pradesh
Area km^2	-	4609	3717	5482	240928
Population	194722	3,405,559	3,209,141	5,954,391	199,812,341
Population density per sq. km.	-	739	863	1086	829
Decadal Growth	-	18.56%	17.50%	20.60%	20.23 %

Section Allahabad-Raebareli	Project Area	Raebareli	Pratapgarh	Allahabad	Uttar Pradesh
Male	99775	1,752,542	1,606,085	3,131,807	104,480,510
Female	93897	1,653,017	1,606,085	2,822,584	95,331,831
Sex Ratio	941	943	998	901	912
Literacy Rate	57.13	67.25%	70.09%	72.32%	67.68%
Male Literacy	59.49	77.63%	81.88%	82.55%	77.28%
Female Literacy	40.50	56.29%	58.45%	60.97%	57.18%
Scheduled Caste Population (%)	30.89%	30.26%	22.10%	22%	20.7
Scheduled Tribe Population (%)	0.032%	0.05%	0.02%	0.13%	0.57%
Urban Population	-	9.05%	5.47%	24.74%	22.23%
Rural Population	-	90.95%	94.53%	75.26%	77.73%
Main working population (in %)	17.89%	18.91%	17.23%	21.61%	22.34%
Marginal working population (in %)	17.67%	16.44%	16.00%	13.86%	10.6%
Non-workers (in %)	64.44%	64.63%	66.76%	64.53%	67.06%

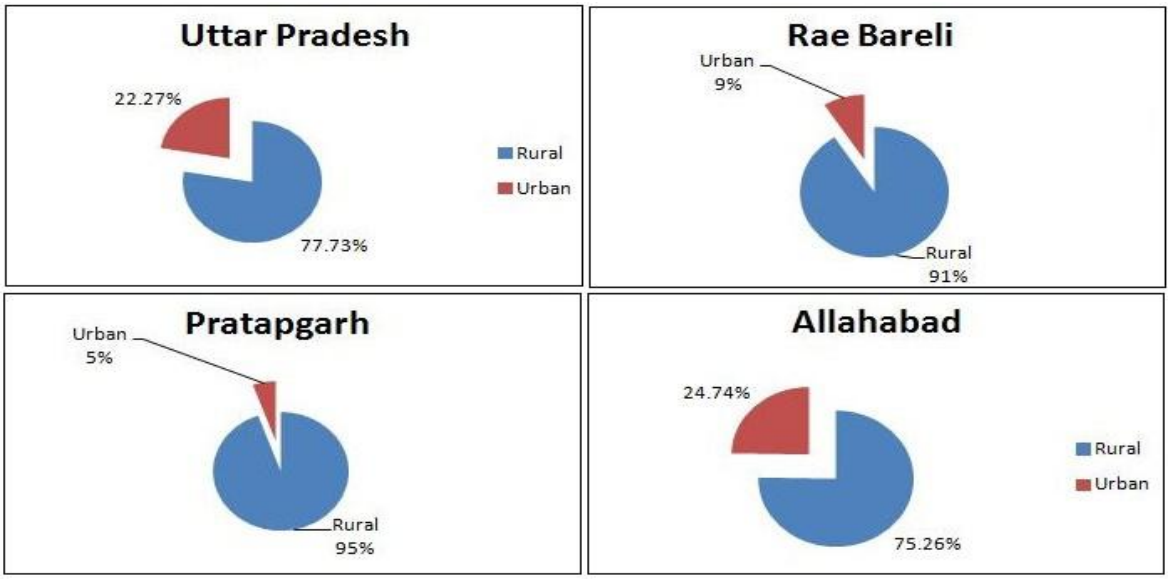
Source: *Primary Census Abstract 2011*



Source: *Primary Census Abstract 2011*

Figure 3.1: Demography of Project Districts and State

Total area of Uttar Pradesh is 243,286 Sq.km. Density of Uttar Pradesh is 829 per sq.km which is approximately thrice the National average 382 per sq.km. Census 2011 shows that density of Allahabad district is 1,086 people per sq.km, density of Raebareli district is 739 people per sq.km and density of Pratapgarh district is 863 people per sq.km. Of the total population of Uttar Pradesh, around 77.73 percent live in the villages of rural areas. The population of rural areas of Uttar Pradesh was 199,812,341. As per 2011 census, 75.26% population of Allahabad districts lives in rural areas of villages. The total population living in rural areas of Allahabad district is 4,481,518. In 2011 census 90.96% population of Raebareli district and 94.54% population of Pratapgarh lives in rural areas of village. **Figure 3.2** shows Rural & Urban population of the districts where project road traverses.



Source: *Primary Census Abstract 2011*

Figure 3.2: Rural & Urban population of Project Districts and State

Uttar Pradesh had 22.27% people living in the urban regions. The total figure of population living in urban areas is 44,495,063. In 2011, Allahabad district had 24.74% living in urban regions, 9.04% in Raebareli district and 5.46% in Pratapgarh district according to census 2011.

Sex ratio in Uttar Pradesh is 912 i.e. for each 1000 male which is below national average of 940 as per census 2011. With regards to sex ratio in Allahabad, it stood at 901 per 1000 male compared to 2001 census figure of 879. Sex ratio in Raebareli, it stood at 943 per 1000 male compared to 2001 census figure of 951. Sex ratio in Pratapgarh, it stood at 998 per 1000 male compared to 2001 census figure of 1004.

The total population growth in this decade was 20.23 percent while in previous decade it was 25.80 percent. The population of Uttar Pradesh forms 16.50 percent of India in 2011. In the census of India, 2011, Allahabad district recorded increase of 20.63 percent to its population. Raebareli district recorded increase of 18.56 percent to its population compared to 2001. And Pratapgarh district recorded increase of 17.50 percent to its population compared to 2001.

Literacy rate in Uttar Pradesh has been upward trend and is 67.68 percent as per 2011 population census. Of that, male literacy stands at 77.28% while female literacy is at 57.18 percent. The literacy rates for both sexes in urban areas are, as expected, much higher than for those in rural areas.

3.2.2 Vulnerable Population

The vulnerable population of the project districts and state is analyzed and given in this section.

Allahabad district had 1,309,851 schedule cast populations. In Raebareli district, schedule cast population was 10,30,367 and Pratapgarh district, schedule cast population was 709,252. A per 2011 census, Uttar Pradesh had 41,357,608 scheduled caste population, which is 6.74 percent of the total population.

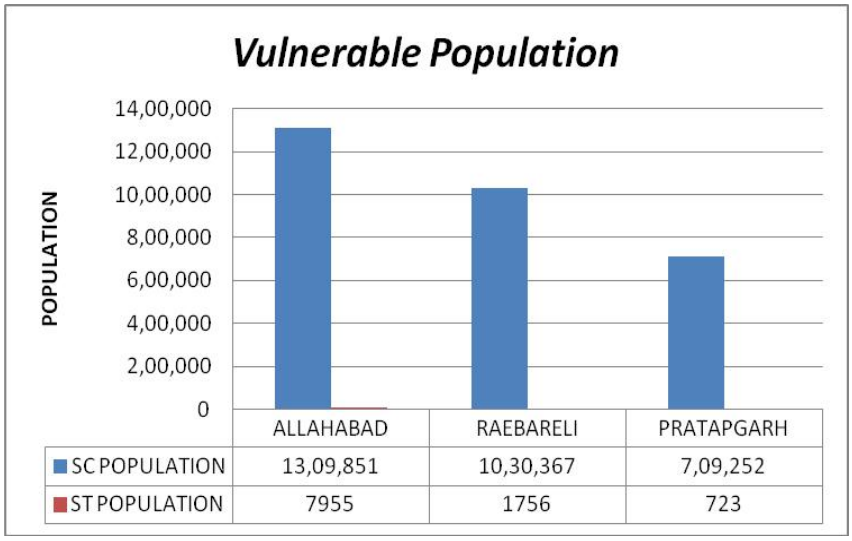


Figure 3.3: Vulnerable Population

Allahabad district has 7,955 schedule tribe populations which is 0.13% of the total population. District of Raebareli has 1,756 of scheduled tribe population which is 0.6% of the total population. District of Pratapgarh has 723 of scheduled tribe population which is 0.6% of the total population. The Scheduled Tribe population of Uttar Pradesh had 1,134,273.

3.3 THE SOCIAL SERVICES

In order to strengthen various basic amenities either area based or population based, the Social and Community Programs are required to be geared up at State level as well as district level so as the life of the people can be improved, Additional efforts in important sectors like health, education, women & child welfare, labor, environment, water supply, and sanitation, social welfare, rural housing, village & cottage industries etc. are required to bring significant improvement in the Human Development of the State. With a view to achieve the above mentioned objectives, various initiatives have been taken by the State Government.

In terms of overall social development, Uttar Pradesh has many more miles to cover to ensure that its economic growth translates into improved and sustainable human development. Although there has been significant improvement in terms of health and education infrastructure over the years, the challenge remains to further improve the access to these basic services to by communities in remote and marginalized rural areas.

- In recent years, social infrastructure in areas such as health and education has improved significantly. This can, to some extent, be attributed to the increased presence of the private sector in the state. However, it is crucial to ensure that access to services is enhanced for those who need it the most, especially the marginalized tribal communities living in hard-to-reach areas.

- Issues of quality and access to basic services by the poor have emerged as a priority for the State Government. Responding to this, Uttar Pradesh's 12th Five Year plan has enhanced allocations for the social sector by 20 per cent. This will not only help address the infrastructural gaps, but will also be instrumental in meeting the critical needs and entitlements of children and women.

3.3.1 Education Infrastructure

The education department of the state pays special attention to the improvement of elementary education in Uttar Pradesh. The state government has also launched the district primary education program for making primary education compulsory and free for all students up to a certain age limit. It has also taken up several measures for checking the rate of dropout at schools in Uttar Pradesh. The same uniform structure of 10+2 education is followed in the schools.

Allahabad has many schools including private, government granted schools. Primary Schools 3228, Secondary Schools 1854, and Higher Secondary are 767. Motilal Nehru National Institute of Technology is considered to be one of the top colleges in India for Engineering. The Allahabad and Lucknow University is considered to be one of the best universities in North India has students from all around the globe. Besides this, there are several colleges for arts, commerce and science.

Raebareli district had Primary Schools 2428, Secondary Schools 42, and Higher Secondary is 30. There are 3 Engineering Colleges in the district.

Pratapgarh district had Primary Schools 2158, Secondary Schools 380, and Higher Secondary is 176.

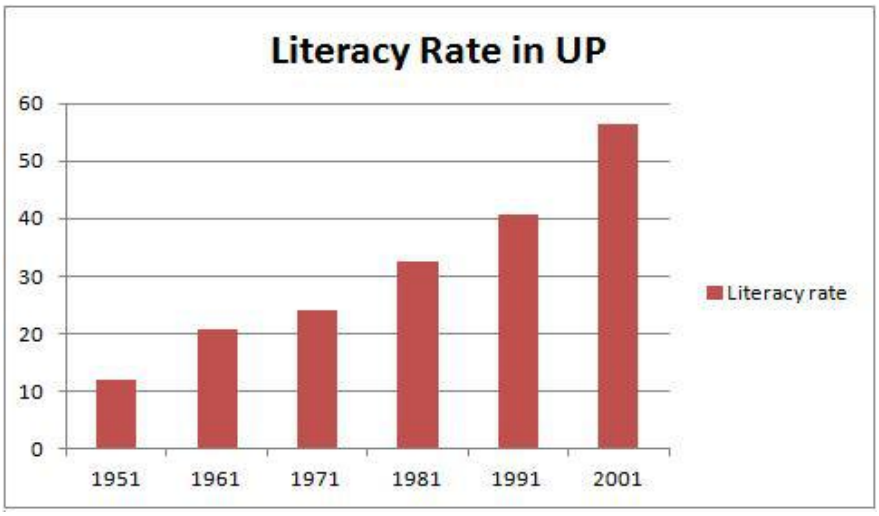
3.3.2 Literacy

The Literacy rate of Uttar Pradesh is 67.68 % which is lower than the all India average of 68.84%. The state has 122,000 recognized schools with primary and upper primary grades. The state is having total enrolment of 93 percent at the primary level.

Average literacy rate of Allahabad in 2011 was 72.32% compared to 62.11% of 2001. If things are looked out at gender wise, male and female literacy were 82.55% and 60.97% respectively.

In Raebareli district literacy rate in 2011 were 67.25% compared to 53.79% of 2001. Gender wise male and female literacy were 77.63% and 56.29%.

In Pratapgarh district literacy rate in 2011 were 70.09% compared to 57.60% of 2001. Gender wise male and female literacy were 81.88% and 58.45%. Literacy rates in Uttar Pradesh over the years(1961-2011) is Shown in **Figure 3.4** below.



***Source**: Statistical Abstract of Uttar Pradesh- 2011*

Figure 3.4: Literacy in Uttar Pradesh (1961-2011)

One, improvements in literacy have been quite impressive especially among girls in the Decade of 1991-2001 and one can surmise optimistically that at long last a corner has been turned. The achievement is both because the demand for education has increased and the supply has also improved in most parts of the state.

3.4 ECONOMIC FEATURES

State Domestic Product (SDP) in Common Parlance know ad “State Income” is a measure in monetary terms of the volume of all goods and services produced during a given period of time within the geographical boundaries of the state, accounted without duplication. This is the most important single economic indicator used to measure the growth and study the structural changes taking place in the economy. SDP estimates over a period of time reveal the extent and direction of the changes in the level of economic development. Sectoral composition of SDP gives an idea about the relative position of different sectors in the economy over a period of time, which not only indicates the real structural changes taking place in the economy, but also facilitates in formulation of the plans for overall economic development.

The Per Capita Net State Domestic Product, also Known as per capita income is used to determine both the absolute and relative performance of the state economy. It is also considered as an important tool to measure the regional disparities.

The state is the third major state economics and it contributes about 8.24 percent to the GDP at National level during the year 2013-14, though the states share to India's population is about 16.50 percent. For the Twelfth Five Year plan, a very high growth target of 10 percent has been set for Uttar Pradesh by Planning commission Government of India. The State economy has been measured in terms of the Gross State Domestic Product (GSDP) at factor cost at constant prices as well as at Current prices. This is the most important single economic dictator used to measure the growth and to study the structural changes taking place in the economy

Gross State Domestic Product (GSDP) at factor cost at constant (2004-05) prices in 2009-10 has been estimated at Rs.294836 crore as against Rs. 276677 crore in 2008-09 registering a growth of 6.6 percent during the year. At current prices, GSDP at factor cost in 2009-10 has been estimated at Rs. 491302 crore as against Rs. 412151 crore in 2008-09, registering a growth of 19.2 percent during the year. The higher growth in the economy during the year 2009-10 can be mainly attributed to manufacturing electricity, construction and communication sectors, which have contributed 11 to 35 percent growth during 2009-10 at constant (2004-05) prices.

The performance of the State economy in terms of GSDP in absolute values and percentage change over previous year at current and at constant (2004-05) prices are presented below:

Table 3.2: GSDP at Current and Constant (2004-05)

Year	Gross State Domestic Product			
	Current Prices	Growth	Constant Price	Growth
2004-05	260841	-	260841	-
2005-06	293172	12.39	277818	6.51
2006-07	336317	14.72	300225	8.07
2007-08	383026	13.89	322214	7.32
2008-09	444685	16.10	344726	6.99
2009-10	521930	17.37	365761	6.10
2010-11	595055	14.01	394499	7.86
2011-12	676083	13.62	419090	6.23

***Source**: State Domestic Product, Uttar Pradesh (Prices Value in Rs. Crore and Growth in percent)*

Uttar Pradesh is very strong in the agriculture sector and is considered the agriculture capital of India. Partly this is due to the fertile regions of the Indo-Gangetic plain and partly owing to irrigation measures such as the canals and tube-wells. Western Uttar Pradesh is more advanced in terms of agriculture as compared to the other regions in the state. Majority of the state population depends upon farming activities. Wheat, rice, pulses, oil seeds and potatoes are the major agricultural products. Sugarcane is the most important cash crop throughout the state. Uttar Pradesh is one of the most important state in India so far as horticulture is concerned.

3.4.1 Distribution of Population by Workers and Non-Workers

Work participation rate is 32.94% of the total population in **Uttar Pradesh** and in view of districts **Allahabad, Raebareli & Pratapgarh work participation** is 2,111,907, 12,04,710 and 1,066,601 respectively. The percentage scenario of Non-Workers in State of Uttar Pradesh is 67.06% and in districts of Allahabad, Raebareli & Pratapgarh are 64.53%, 64.63% and 66.76% respectively. **Table 3.3** show the Uttar Pradesh Work Participation in 2011.

Table 3.3: Work Participation in Project Affected Districts and State

Section	Work Participation	Uttar Pradesh	Allahabad	Raebareli	Pratapgarh
Allahabad - Raebareli	Work Participation Rate	32.94%	35.47%	35.37%	33.24%
	Total Worker	32.94%	35.47%	35.37%	33.24%
	Main Worker	22.34%	21.61%	18.94%	17.23%
	Marginal Worker	10.60%	13.86%	16.44%	16%
	Non Worker	67.06%	64.53%	64.63%	66.76%

***Source**: Statistical Abstract of Uttar Pradesh- 2011*

3.5 INFRASTRUCTURE

Infrastructure refers to the fundamental facilities and systems serving a country, city, or area, including the services and facilities necessary for its economy to function. It typically characterizes technical structures such as roads, bridges, tunnels, water supply, sewers, electrical grids, telecommunications, and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions."

A discussion of infrastructural development has to recognize: (1) The regional specialization of the State's economy and hence of the space that is possible and desirable for the region in question; and also (2) the level of overall economic development as indicated by the per capita income GDP and assess whether infrastructural services like those which are final consumption goods drinking water, municipal infrastructure, road services and such like are adequate. It would also have to outline the actions required for the adequate development of infrastructure.

3.5.1 Infrastructure in Uttar Pradesh

Uttar Pradesh also known for its excellent civil aviation infrastructure with Chaudhary Charan Singh International Airport in Lucknow and Lal Bahadur Shastri International Airport in Varanasi, providing international service and four domestic airports located at Agra, Allahabad, Gorakhpur and Kanpur. The Lucknow Airport is the second busiest airport in North India after the Indira Gandhi International Airport, New Delhi. The state has also proposed creating the Taj International Airport at Kurikupa near Hirangaon, Tundla in Firozabad district.

The world's longest railway platform is at Gorakhpur Railway Station (NER) which is about 1.34 km long. The state has the largest railway network in the country and the sixth highest railway density. As of 2011, there were 8,546 km (5,310 mi) of rail in the state. Allahabad is the headquarters of the North Central Railway and Gorakhpur is the headquarters of the North Eastern Railway. The Lucknow Metro is also being constructed in the city of Lucknow as an alternative mode of transport.

Uttar Pradesh has a robust Infrastructure and is pioneer in Public-Private partnership. Uttar Pradesh state have strategically developed very efficient and cost affective infrastructure which boost states Urban and Industrial growth. It also gives access to three World Heritage Sites: the Taj Mahal, Agra Fort, and the nearby Fatehpur Sikri.

Uttar Pradesh is well-known for its economic growth, which is much higher than the national growth rate besides providing excellent infrastructure and basic services to its citizen. The State has excellent road connectivity to all villages, large number of small and 24 hours power supply, State-wide water supply grid, excellent educational institutions, healthcare facilities, marketing yards etc. With developing infrastructure at this rate, coupled with Good Governance, Uttar Pradesh has become the hot destination for investors not only in the country but in this part of world. Its relentless quest for a larger image of Uttar Pradesh with all round development is foreseen bearing fruits of success.

EXECUTIVE SUMMARY

PROJECT BACKGROUND

The National Highway Authority of India (NHAI) has awarded the work of Phase–I of Project management consultancy including preparation of detail project report for Raebareli-Allahabad section of NH-24B (from Km 82+650 to Km 188+600) in the state of Uttar Pradesh to four lane.

The Existing Highway is a part of Lucknow-Raebareli-Allahabad NH-24B and presently work for 2 lane to 2 lane paved shoulder upgradation is under progress. The existing concession agreement has been signed between NHAI and SPV M/s Raebareli-Allahabad Highway Pvt. Ltd. on 31.03.2012. M/s VIL Lucknow has been awarded EPC contract for construction of project highway.

The Existing Concessionaire appointed date is 18th July 2012 having 16 year concession period including 18 month Construction period. The length of project highway as per Present Concession agreement is 106.600 km and construction cost of the project on Present concession agreement of two lane paved shoulder is 291.36 Cr.

In present scenario, the DPR consultant has been appointed for making four lane proposal on above mentioned project highway where already two lane paved shoulder upgradation work is under progress.

Consulting Engineers Group Ltd (The Consultant) having their registered office at CEG Tower, B-11 (G) Malviya Industrial Area, Malviya Nagar Jaipur-302017, has been appointed as DPR Consultant by National Highway Authority of India, New Delhi vide letter no. DPR/ Raebareli-Allahabad/NH-24B/UP(Tech-Div)/2015/82204 Dated 06.05.2016 for preparing Detailed Project Report.

CEG commenced its services from 16.05.2016 in accordance to the requirement of TOR (Ref. CEG/129/66 Dated 13/05/16).

After detail reconnaissance survey and preliminary option study a Draft Inception Report with QAP was submitted as per deliverable schedule of contract document chapter 6, Enclosure-III, Submission schedule and reporting Requirement vide CEG/D-129/2016/112 dated 04.06.2016. The presentation meeting to review Inception Report and QAP has been conducted on 15.06.2016 at Regional Office Lucknow. Option Study Report on the requirement of Bypasses has been discussed. As per TOR requirement, Final Inception Report with QAP documents after incorporating the comments on Draft Inception Report was submitted, Submission schedule and reporting Requirement vide CEG/D-129/2016/160 dated 25.06.2016. Accordingly after completion of all Survey and Investigations, Draft Feasibility Report for the complete project has been submitted vide CEG/D-129/2016/271 dated 29.08.2016. The various presentations on Draft Feasibility Report for finalization of alignment and pavement options have been executed and final comments on Draft Feasibility Report were given by CGM-NHAI vide DPR/Raebareli-Allahabad/NH-24B/UP (Tech Div.)/2016/90176 dated 25.10.2016. This report contains Final Feasibility Report based on comments received from NHAI.

PROJECT DESCRIPTION

The National Highway No. 24B (NH-24B) is situated in western–Northern Part of India in the state of Uttar Pradesh. The Project study corridor starts from km 82+650 of NH-24B located

near Civil Line circle of Raebareli and ends at km 188+600 of NH-96 Junction with in Proximity of Allahabad City in the state of Uttar Pradesh. Presently the construction work of two lane paved shoulder is under progress on PPP mode. The existing length of the project highway based on present development of two lane paved shoulder work is 106.000km. The existing road alignment passes through three district of the Uttar Pradesh state namely; Raebareli, Pratapgarh and Allahabad. The project highway traverses rural section as well as urban built-up areas and passes through important towns of Unchahar, Kunda, Lalgopalganj and Nawabganj and runs through the districts of Raebareli, Pratapgarh and Allahabad. The district Boundaries of all three districts are:

From km 82+650 to km 124+00 i.e. length 42 km in Raebareli District, km 124+000 to km 160+00 i.e. length 36 km in Pratapgarh district and km 160+000 to km 188+600 i.e. km 28+600 lies in Allahabad district.

SOCIO-ECONOMIC PROFILE OF THE PROJECT INFLUENCE AREA

It is expected that about 194722 persons are likely to be benefited in adjoining districts of the project area. The Project area is having 896 persons per sq.km, sex ratio 941, literacy rate 57.13%, 30.89% schedule caste population and 0.032% of schedule tribe population.

TRAFFIC STUDIES AND ANALYSIS

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 Traffic survey has been conducted in Month of June 2016. The CVC has been conducted at Km 104+000, Km 140+000 and Km 179+500. OD Survey & Axle Load at Km 104+000 & Km 140+000 & TMC has been conducted at seven locations.

Classified Traffic Volume Counts

The Annual Average Daily Traffic (AADT) in terms of Vehicles and PCU for both directions traffic is shown in **Table ES.1** given below:

Table ES.1: Annual Average Daily Traffic (AADT)

Categories	Km 104+000		Km 140+000		Km 179+500	
	AADT (Both Direction)		AADT (Both Direction)		AADT (Both Direction)	
	Vehicles	PCU	Vehicles	PCU	Vehicles	PCU
2 Wheeler	2975	1488	4145	2073	5925	2963
3 Wheeler	183	183	387	387	1877	1877
Passenger Car	2710	2710	2712	2712	3246	3246
Mini LCV	100	100	736	736	839	839
Mini Bus	63	95	16	27	72	109
Standard Bus	202	605	198	593	304	913

Categories	Km 104+000		Km 140+000		Km 179+500	
	AADT (Both Direction)		AADT (Both Direction)		AADT (Both Direction)	
	Vehicles	PCU	Vehicles	PCU	Vehicles	PCU
LCV - 4 Tyre	439	660	159	239	130	196
LCV - 6 Tyre	389	584	373	560	323	485
2-Axle	423	1269	196	589	371	1112
3-Axle	410	1230	948	2844	1116	3348
MAV (4 to 6)	576	2592	782	3520	589	2653
OSV (7++ Axle)	0	0	0	0	0	0
HCM/EME	3	14	5	23	7	32
Tractors-With Trailer	49	221	66	298	159	716
Tractors-Without Trailer	28	43	13	20	40	61
Bi-Cycle	967	484	1819	910	1061	531
Cycle-Rickshaw	2	4	14	28	17	34
Animal-Drawn	11	66	69	414	44	264
Hand-Drawn	0	0	10	30	20	60
Exempted Vehicle	200	200	192	192	166	166
Total Commercial Traffic	**2505**	**7049**	**2677**	**8395**	**2912**	**8848**
Total Tollable Traffic	**5315**	**9859**	**6125**	**11843**	**6997**	**12933**
Total Traffic	**9730**	**12548**	**12840**	**16195**	**16306**	**19605**

It is observed that the total traffic at km 179+500 is maximum of the three locations due to the proximity traffic of Allahabad district. The total traffic is seen to be continuously increasing as we move from Raebareli to Allahabad. The increase in the traffic from km 104+000 to km 140+000 is due to converging traffic from Kanpur and Fatehpur via SH-38 near Unchahar on the project road and NTPC at Unchahar district. Further, the traffic increases from km 140+000 to km 179+500 due to proximity to Allahabad district region. From the above data it is understood that at all the locations 50% to 70% traffic composes of 2 Wheelers, 3 Wheelers & Cars, while 10% to 30% is commercial traffic.

Turning Movement Survey

The turning movement survey was conducted at seven major intersections on the project highway to obtain information on directional movement of traffic at intersections along the highway. The 24 hour count data for each location has been analyzed for the total & peak hour traffic volume and cross road traffic.

Table ES.2: Cross Road Traffic at all the Major Intersections (in PCU)

S.	Location	Type of	Cross Road	Cross Road Traffic

No.		Junction		(in PCU's)		
				Slow	Fast	Total
1	km 82+000	4 Arm Junction	Towards Raebareli	1094	16319	17413
			Towards Salon	2316	13152	15468
			Towards Lalgopalganj	2557	24381	26938
			Towards Allahabad	2111	19760	21871
2	km 85+300	3 Arm Junction	Towards Raebareli	1,946	14,552	16,498
			Towards Fatehpur	1,837	5,538	7,375
			Towards Allahabad	1,893	12,364	14,257
3	Km 86+300	3 Arm Junction	Towards Raebareli	1,561	14,408	15,969
			Towards Salon	892	6,808	7,700
			Towards Allahabad	1,303	9,172	10,475
4	Km 114+000	3 Arm Junction	Towards Raebareli	491	6907	7398
			Towards Kanpur	267	5,187	5,454
			Towards Allahabad	674	11,396	12,070
5	Km 179+600	3 Arm Junction	Towards Raebareli	515	10415	10930
			Towards Allahabad bypass	27	1,913	1,940
			Towards Allahabad	502	9,056	9,558
6	Km 179+900	3 Arm Junction	Towards Raebareli	953	8,088	9,041
			Towards Allahabad bypass	192	2238	2430
			Towards Allahabad	945	7,012	7,957
7	Km 188+000	3 Arm Junction	Towards Raebareli	500	10,335	10,835
			Towards Soron	766	8,461	9,227
			Towards Allahabad	1,082	17,870	18,952

It is understood from the data as shown above that maximum cross traffic movement is at km 82+000 and at km 188+000 due to the proximity of Raebareli and Allahabad city respectively.

Axle Load Survey

The primarily objective of axle load survey is to determine the Vehicle Damaging Factor (VDF) of commercial vehicles and over loading. The survey was conducted at km 104+000 & km 140+000 for 2 day (24 hrs.) on random sampling basis to cover directional traffic for both empty and loaded commercial vehicles using portable weighing pads. The summarized VDF values are presented in **Table ES.3** given below:

Table ES.3: Recommended VDF

Vehicles	Km 104+000		Km 140+000		Remarks
	(Raebareli-Allahabad)	(Allahabad-Raebareli)	(Raebareli-Allahabad)	(Allahabad-Raebareli)	
LCV	1.41	0.70	0.70	0.70	The value is revised based on the past experience.
Bus	0.80	0.80	0.80	0.80	At both the locations, the value is revised based on the past experience.
2T	2.70	3.40	1.90	2.28	Values adopted as per the findings.
3T	3.20	8.50	3.55	5.80	Values adopted as per the findings.
MAV	3.84	9.06	4.34	8.26	Values adopted as per the findings.

Speed and Delay Surveys

The survey was conducted by adopting moving car observer method. The study corridor was demarcated into two homogeneous sections. The range of speed found along the project corridor is 42km/hr to 48 km/hr.

Table ES.5: Traffic Forecast as per Most Likely Growth Rate

S. No.	FY	Total AADT (PCU)		
		Km 104+000	Km 140+000	Km 179+500
1	2017	12,545	16,195	19,605
2	2018	13,522	17,459	21,134
3	2019	14,604	18,856	22,826
4	2020	15,771	20,365	24,652
5	2021	17,034	21,995	26,624
6	2022	18,311	23,644	28,619
7	2023	19,684	25,416	30,765
8	2024	21,161	27,321	33,072
9	2025	22,472	29,014	35,119

S. No.	FY	Total AADT (PCU)		
		Km 104+000	Km 140+000	Km 179+500
10	2026	23,865	30,811	37,297
11	2027	25,346	32,722	39,610
12	2028	26,918	34,749	42,065
13	2029	28,587	36,904	44,673
14	2030	30,188	38,972	47,175
15	2031	31,879	41,154	49,816
16	2032	33,665	43,459	52,607
17	2033	35,550	45,893	55,553
18	2034	37,539	48,464	58,664
19	2035	39,415	50,888	61,597
20	2036	41,386	53,434	64,679
21	2037	43,455	56,106	67,913
22	2038	45,628	58,913	71,310
23	2039	47,910	61,859	74,874
24	2040	50,305	64,952	78,620
25	2041	52,821	68,200	82,549
26	2042	55,462	71,612	86,676
27	2043	58,234	75,193	91,011
28	2044	61,147	78,953	95,562
29	2045	64,203	82,902	1,00,341
30	2046	67,414	87,047	1,05,358
31	2047	70,784	91,398	1,10,624

ENGINEERING SURVEYS AND INVESTIGATIONS

The consultants have carried out engineering surveys and investigations that include Topographic Surveys, Road Inventory and Pavement Condition Surveys, Alignment Studies, Pavement Surface Roughness Survey, Environmental Screening and Assessment, Social Screening Assessment, Pavement Composition Investigations, Preliminary Material Investigations for Construction Materials, Inventory and Condition Surveys for Bridges, Culverts and other Structures.

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Generally the land use is agricultural with commercial establishment coming in patches as project road passes through the built up areas. Extensive plantation cover of mango trees and

other species could be observed along the road. Occasionally barren patches also appear within the plantation cover as well as pockets of agricultural land. There is a Thermal Power Plant at Unchahar. The project road passes through the plain terrain with and dense trees situated along the project highway.

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Rae Bareilly has a semi-arid climate with high variation between summer and winter temperatures. Summer are from April to July, Monsoon season is between July to October and winter starts in October and peaks in January and ends in March. Winters are notorious for its heavy fog. Temperatures range from 4°C to 49°C. The project road lies in the area of medium to high rainfall zone in India the average annual rainfall is 1200 mm.

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Some of the location where two lane paved shoulder work has been completed by Existing Concessionaire but where work has not been taken up yet existing project road has a 2 lane carriageway configuration with earthen shoulders and project corridor has flexible type of a pavement all along the length. The existing pavement carriageway width for most of the stretch of project highway is 10.0m with paved shoulder of 1.5m on both sides.

Existing Junctions

There are about 6 Major Junctions along the project highway. Out of which, 4 are three arm junctions and 2 are four arm junction. Out of these three junctions are with National Highways viz. NH-231,NH-2 and NH-96; two no. Junctions are with State Highways viz. SH-13A, SH-38 and one no with MDR.

Table ES.6: List of Existing Major Junctions

S. No.	Existing km	Design Chainage	Type of Junction	Direction	Type of Cross Road
1	85.080	2.400	Y	RHS	SH-13A
2	Munshiganj bypass	4.260	Y	LHS	NH-231
3	100.800	Jagatpur bypass	X	Both	MDR
4	114.630	32.350	Y	RHS	SH-38
5	179.500	102.300	X	Both	NH-2
6	188.600	111.160	Y	LHS	NH-96

*(**NH:** National Highway, **SH:** State Highway, **MDR:** Major District Road)*

There are about 210 minor junctions where cross roads are mostly village roads, and few MDRs/ ODRs and city roads. Out of these 210 Junctions, 108 are T Junctions, 48 are X Junctions and 54 are Y Junctions.

Existing Pavement Condition

The existing pavement is flexible type having mostly paved shoulders. Though, at few locations, earthen shoulders and granular shoulders are present in the road section. Pavement condition is mostly good in the entire stretch between Raebareli to Allahabad. The summary of the condition of pavement is given in **Table ES.7.**

Table ES.7 Summary of Pavement Condition

S. No.	Pavement Condition	Length (km.)	Percentage Distribution (%)
1	Good	91.20	86.04%
2	Fair	1.400	1.32%
3	Under-Construction	13.400	12.64%
4	Poor	0.000	0.00%
Total		**106.000**	**100.00%**

Roughness of the Existing Road

Roughness survey depicts the pavement condition in terms of good, Average & Poor as per ICR-SP-16-2004. According to the Roughness survey, 73% length is having good surface, 15% average, 1% poor road condition and 11% of the road is under construction where roughness could not be recorded.

Existing Pavement Strength

Benkelman Beam deflection tests of identified stretch 106.000 km length of the project road were conducted to evaluate the structural strength of the existing pavement. The tests were carried out in accordance with the guidelines of IRC: 81-1997. The characteristic deflection values obtained for the stretches identified are varies between 0.56mm to 1.84mm.

Pavement Composition

The pavement composition details of the existing pavement were obtained from the examination of test pits excavated at regular intervals along the project road. The average total pavement crust thickness is **565 mm,** consisting average Bituminous Thickness of **125mm**, average Granular base and Subbase thickness (WBM/WMM+GSB) **435 mm.**

Characteristics of the Existing Subgrade/Borrow Soil

Detailed investigations of the existing subgrade soil & borrow area material were carried out to determine strength and other engineering properties. The results of these investigations are given in Volume-II, Part-II of the Draft Feasibility report. The results depict that subgrade soil along the alignment is predominantly Sandy Silt of Low Plasticity in nature. OMC value

varies from 8.00% to 13.00% and those of MDD vary from **1.89 gm/cc to 2.20 gm/cc**. Further soaked CBR values vary from 4% to 17%.

During the field investigations, 4 borrow areas were identified and evaluated in the laboratory. Test results of Soil in borrow areas are generally Fine to Medium Sand at Ch. 82+000 and Sandy Silt of Low plasticity at Ch. 155+00 & 188+600. 2 off 4 No's collected borrow area samples are plastic in nature. OMC values vary from 10.00 % to 12.00 % and those of MDD vary from 1.72 gm/cc to 1.96 gm/cc. The Soaked CBR value generally ranges from **8 % to 15 %.**

EXISTING CROSS DRAINAGE STRUCTURE

Detailed inventory and condition survey was carried out along the project stretch, during which 204 culverts, 01 ROB, 15 Minor bridges and 01 Major bridge were observed as existing Structures to cater for drains, streams, canals & rivers.

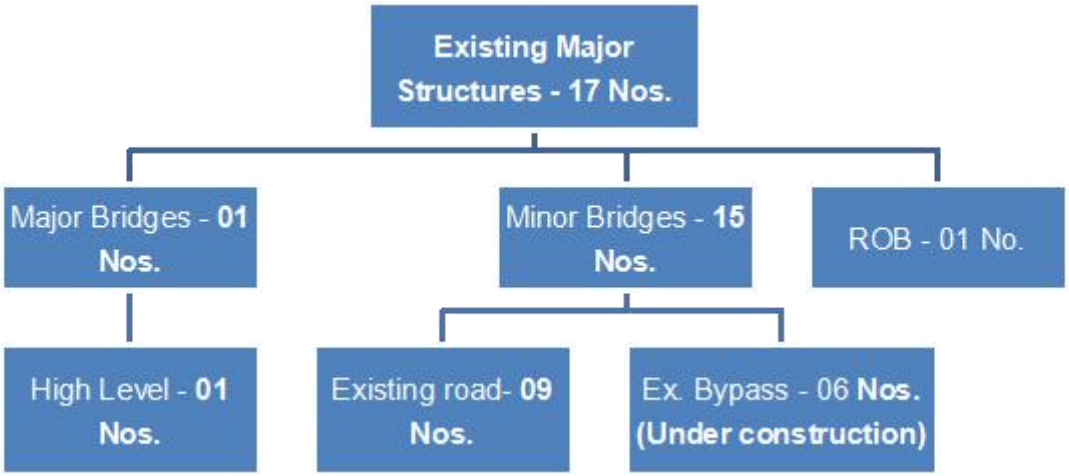

Figure ES.1: Details of Existing Bridges

Major Bridge

There is only **01 existing Major Bridge** on the project road catering for Sai River. The Existing Major Bridge over Sai River is having a total length of 80m. The existing bridge has 1 x 10 + 3 x 20.0 + 1 x 10.0 spans with Balance Cantilever type of superstructure resting on RCC Sub-Structure. The overall width of the bridge is 7.4m. The bridge was found to be high level in fair condition with damaged railing. The superstructure was observed to be resting on the roller rocker type bearing.

Minor Bridges

There are **15 Minor Bridges** lying on the project stretch, out of which 09 Nos of bridge are on existing road & 06 Nos. of bridges are on existing bypass which are under construction. The types of superstructures for the Minor Bridges were found to be RCC Solid Slab & Arch type superstructure resting on Stone Masonry Sub-Structure. Some common distresses that were observed was exposed and corroded reinforcement in slabs; spalling of concrete,

damaged/missing railing and growth of vegetation on pier caps and in vent ways, damaged wearing coat, damaged expansion joints & settlem

EXECUTIVE SUMMARY

PROJECT BACKGROUND

The National Highway Authority of India (NHAI) has awarded the work of Phase–I of Project management consultancy including preparation of detail project report for Raebareli-Allahabad section of NH-24B (from Km 82+650 to Km 188+600) in the state of Uttar Pradesh to four lane.

The Existing Highway is a part of Lucknow-Raebareli-Allahabad NH-24B and presently work for 2 lane to 2 lane paved shoulder upgradation is under progress. The existing concession agreement has been signed between NHAI and SPV M/s Raebareli-Allahabad Highway Pvt. Ltd. on 31.03.2012. M/s VIL Lucknow has been awarded EPC contract for construction of project highway.

The Existing Concessionaire appointed date is 18th July 2012 having 16 year concession period including 18 month Construction period. The length of project highway as per Present Concession agreement is 106.600 km and construction cost of the project on Present concession agreement of two lane paved shoulder is 291.36 Cr.

In present scenario, the DPR consultant has been appointed for making four lane proposal on above mentioned project highway where already two lane paved shoulder upgradation work is under progress.

Consulting Engineers Group Ltd (The Consultant) having their registered office at CEG Tower, B-11 (G) Malviya Industrial Area, Malviya Nagar Jaipur-302017, has been appointed as DPR Consultant by National Highway Authority of India, New Delhi vide letter no. DPR/ Raebareli-Allahabad/NH-24B/UP(Tech-Div)/2015/82204 Dated 06.05.2016 for preparing Detailed Project Report.

CEG commenced its services from 16.05.2016 in accordance to the requirement of TOR (Ref. CEG/129/66 Dated 13/05/16).

After detail reconnaissance survey and preliminary option study a Draft Inception Report with QAP was submitted as per deliverable schedule of contract document chapter 6, Enclosure-III, Submission schedule and reporting Requirement vide CEG/D-129/2016/112 dated 04.06.2016. The presentation meeting to review Inception Report and QAP has been conducted on 15.06.2016 at Regional Office Lucknow. Option Study Report on the requirement of Bypasses has been discussed. As per TOR requirement, Final Inception Report with QAP documents after incorporating the comments on Draft Inception Report was

submitted, Submission schedule and reporting Requirement vide CEG/D-129/2016/160 dated 25.06.2016. Accordingly after completion of all Survey and Investigations, Draft Feasibility Report for the complete project has been submitted vide CEG/D-129/2016/271 dated 29.08.2016. The various presentations on Draft Feasibility Report for finalization of alignment and pavement options have been executed and final comments on Draft Feasibility Report were given by CGM-NHAI vide DPR/Raebareli-Allahabad/NH-24B/UP (Tech Div.)/2016/90176 dated 25.10.2016. This report contains Final Feasibility Report based on comments received from NHAI.

PROJECT DESCRIPTION

The National Highway No. 24B (NH-24B) is situated in western–Northern Part of India in the state of Uttar Pradesh. The Project study corridor starts from km 82+650 of NH-24B located near Civil Line circle of Raebareli and ends at km 188+600 of NH-96 Junction with in Proximity of Allahabad City in the state of Uttar Pradesh. Presently the construction work of two lane paved shoulder is under progress on PPP mode. The existing length of the project highway based on present development of two lane paved shoulder work is 106.000km. The existing road alignment passes through three district of the Uttar Pradesh state namely; Raebareli, Pratapgarh and Allahabad. The project highway traverses rural section as well as urban built-up areas and passes through important towns of Unchahar, Kunda, Lalgopalganj and Nawabganj and runs through the districts of Raebareli, Pratapgarh and Allahabad. The district Boundaries of all three districts are:

From km 82+650 to km 124+00 i.e. length 42 km in Raebareli District, km 124+000 to km 160+00 i.e. length 36 km in Pratapgarh district and km 160+000 to km 188+600 i.e. km 28+600 lies in Allahabad district.

SOCIO-ECONOMIC PROFILE OF THE PROJECT INFLUENCE AREA

It is expected that about 194722 persons are likely to be benefited in adjoining districts of the project area. The Project area is having 896 persons per sq.km, sex ratio 941, literacy rate 57.13%, 30.89% schedule caste population and 0.032% of schedule tribe population.

TRAFFIC STUDIES AND ANALYSIS

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 Traffic survey has been conducted in Month of June 2016. The CVC has been conducted at Km 104+000, Km 140+000 and Km 179+500. OD Survey & Axle Load at Km 104+000 & Km 140+000 & TMC has been conducted at seven locations.

Classified Traffic Volume Counts

The Annual Average Daily Traffic (AADT) in terms of Vehicles and PCU for both directions traffic is shown in **Table ES.1** given below:

Table ES.1: Annual Average Daily Traffic (AADT)

Categories	Km 104+000		Km 140+000		Km 179+500	
	AADT (Both Direction)		AADT (Both Direction)		AADT (Both Direction)	
	Vehicles	PCU	Vehicles	PCU	Vehicles	PCU
2 Wheeler	2975	1488	4145	2073	5925	2963
3 Wheeler	183	183	387	387	1877	1877
Passenger Car	2710	2710	2712	2712	3246	3246
Mini LCV	100	100	736	736	839	839
Mini Bus	63	95	16	27	72	109
Standard Bus	202	605	198	593	304	913
LCV - 4 Tyre	439	660	159	239	130	196
LCV - 6 Tyre	389	584	373	560	323	485
2-Axle	423	1269	196	589	371	1112
3-Axle	410	1230	948	2844	1116	3348
MAV (4 to 6)	576	2592	782	3520	589	2653
OSV (7++ Axle)	0	0	0	0	0	0
HCM/EME	3	14	5	23	7	32
Tractors-With Trailer	49	221	66	298	159	716
Tractors-Without Trailer	28	43	13	20	40	61
Bi-Cycle	967	484	1819	910	1061	531
Cycle-Rickshaw	2	4	14	28	17	34
Animal-Drawn	11	66	69	414	44	264
Hand-Drawn	0	0	10	30	20	60
Exempted Vehicle	200	200	192	192	166	166
Total Commercial Traffic	**2505**	**7049**	**2677**	**8395**	**2912**	**8848**
Total Tollable Traffic	**5315**	**9859**	**6125**	**11843**	**6997**	**12933**
Total Traffic	**9730**	**12548**	**12840**	**16195**	**16306**	**19605**

It is observed that the total traffic at km 179+500 is maximum of the three locations due to the proximity traffic of Allahabad district. The total traffic is seen to be continuously increasing as we move from Raebareli to Allahabad. The increase in the traffic from km 104+000 to km 140+000 is due to converging traffic from Kanpur and Fatehpur via SH-38 near Unchahar on the project road and NTPC at Unchahar district. Further, the traffic increases from km 140+000 to km 179+500 due to proximity to Allahabad district region. From the above data it is understood that at all the locations 50% to 70% traffic composes of 2 Wheelers, 3 Wheelers & Cars, while 10% to 30% is commercial traffic.

Turning Movement Survey

The turning movement survey was conducted at seven major intersections on the project highway to obtain information on directional movement of traffic at intersections along the highway. The 24 hour count data for each location has been analyzed for the total & peak hour traffic volume and cross road traffic.

Table ES.2: Cross Road Traffic at all the Major Intersections (in PCU)

S. No.	Location	Type of Junction	Cross Road	Cross Road Traffic (in PCU's)		
				Slow	Fast	Total
1	km 82+000	4 Arm Junction	Towards Raebareli	1094	16319	17413
			Towards Salon	2316	13152	15468
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4	Poor	0.000	0.00%
Total		**106.000**	**100.00%**

Roughness of the Existing Road

Roughness survey depicts the pavement condition in terms of good, Average & Poor as per ICR-SP-16-2004. According to the Roughness survey, 73% length is having good surface, 15% average, 1% poor road condition and 11% of the road is under construction where roughness could not be recorded.

Existing Pavement Strength

Benkelman Beam deflection tests of identified stretch 106.000 km length of the project road were conducted to evaluate the structural strength of the existing pavement. The tests were carried out in accordance with the guidelines of IRC: 81-1997. The characteristic deflection values obtained for the stretches identified are varies between 0.56mm to 1.84mm.

Pavement Composition

The pavement composition details of the existing pavement were obtained from the examination of test pits excavated at regular intervals along the project road. The average total pavement crust thickness is **565 mm,** consisting average Bituminous Thickness of **125mm**, average Granular base and Subbase thickness (WBM/WMM+GSB) **435 mm.**

Characteristics of the Existing Subgrade/Borrow Soil

Detailed investigations of the existing subgrade soil & borrow area material were carried out to determine strength and other engineering properties. The results of these investigations are given in Volume-II, Part-II of the Draft Feasibility report. The results depict that subgrade soil along the alignment is predominantly Sandy Silt of Low Plasticity in nature. OMC value varies from 8.00% to 13.00% and those of MDD vary from **1.89 gm/cc to 2.20 gm/cc**. Further soaked CBR values vary from 4% to 17%.

During the field investigations, 4 borrow areas were identified and evaluated in the laboratory. Test results of Soil in borrow areas are generally Fine to Medium Sand at Ch. 82+000 and Sandy Silt of Low plasticity at Ch. 155+00 & 188+600. 2 off 4 No's collected borrow area samples are plastic in nature. OMC values vary from 10.00 % to 12.00 % and those of MDD vary from 1.72 gm/cc to 1.96 gm/cc. The Soaked CBR value generally ranges from **8 % to 15 %.**

EXISTING CROSS DRAINAGE STRUCTURE

Detailed inventory and condition survey was carried out along the project stretch, during which 204 culverts, 01 ROB, 15 Minor bridges and 01 Major bridge were observed as existing Structures to cater for drains, streams, canals & rivers.

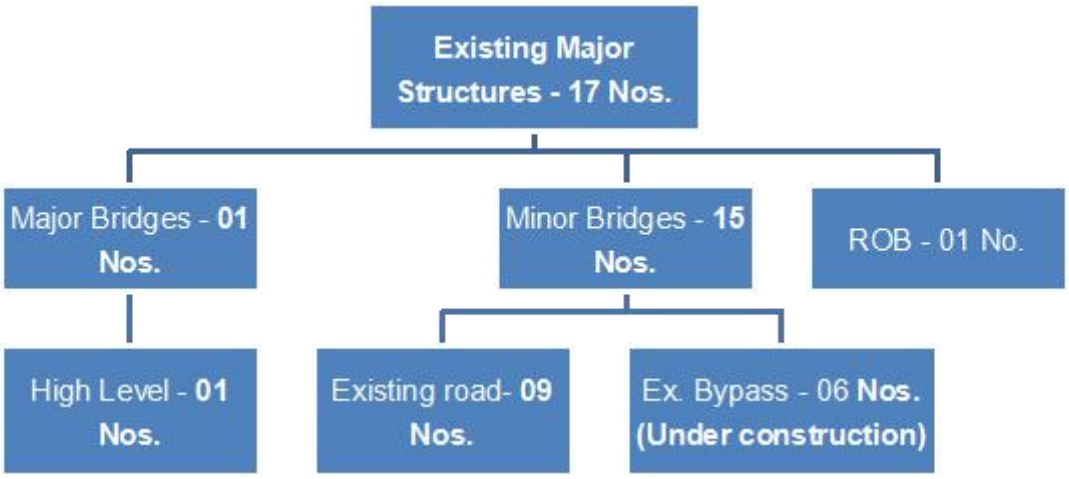

Figure ES.1: Details of Existing Bridges

Major Bridge

There is only **01 existing Major Bridge** on the project road catering for Sai River. The Existing Major Bridge over Sai River is having a total length of 80m. The existing bridge has 1 x 10 + 3 x 20.0 + 1 x 10.0 spans with Balance Cantilever type of superstructure resting on RCC Sub-Structure. The overall width of the bridge is 7.4m. The bridge was found to be high level in fair condition with damaged railing. The superstructure was observed to be resting on the roller rocker type bearing.

Minor Bridges

There are **15 Minor Bridges** lying on the project stretch, out of which 09 Nos of bridge are on existing road & 06 Nos. of bridges are on existing bypass which are under construction. The types of superstructures for the Minor Bridges were found to be RCC Solid Slab & Arch type superstructure resting on Stone Masonry Sub-Structure. Some common distresses that were observed was exposed and corroded reinforcement in slabs; spalling of concrete, damaged/missing railing and growth of vegetation on pier caps and in vent ways, damaged wearing coat, damaged expansion joints & settlem