Brief Summary of Project Road

1. INTRODUCTION

BRT Scheme envisages construction of roads by providing NH connectivity to Backward areas/ Religious/Tourist places all over India. The National Highways Authority of India (NHAI) has been entrusted with the assignment of Project Management Consultancy including preparation of Feasibility Study/ Detailed Project Report of selected road stretches/ for NH connectivity to Backward areas/Religious/Tourist places. NHAI now invites proposal from Technical consultants for carrying out feasibility study/detailed project report and render consultancy services for proper structuring and implementation of projects on EPC/PPP mode.

The consultancy assignment for carrying out Project Management including Preparation of Feasibility Study/Detailed Project Report for 4-laning of Manikpur to Sahebganj (Km 0+000 to km 42+800) section of NH 139W (old SH-74) in the State of Bihar has been awarded to M/s. Feedback Infra Pvt Ltd, in joint venture with M/s. Mukesh & Associates.

DESCRIPTION OF THE PROJECT CORRIDOR

Manikpur (Existing Ch. Km 39/940) is the starting point of the package, which passes through Chak Alisher Urf basu Chak, Nema Patti Pakauli Urf Lalu Ch, Pakauli urf Lalu Chhapra, Jalil Nagar and ends at Bijdhari Mafi (Existing Chainage 84/847) (Design Chainage from Manikpur Km 0+000 to Sahebganj Km 42+800 of Total Design Length 42.800 Km) in the state of Bihar.

This project road traverses in plain terrain passing through rural areas as well as many intermittent semi-urban settlements. The land use pattern along both sides of the project road is predominantly of agricultural lands and agriculture fallow lands and built-up areas were also found at the Major Junctions / Chowk. The abutting land use in rural areas is Agriculture, Barren lands in bypass portion and the built-up areas are predominantly of residential area and commercial area.

The Widening will be either on the left hand side or on the right hand side of the existing road to keep acquisition of structures and shifting of utilities to the minimum as far as possible. Based on the existing traffic conditions and land use pattern, Symmetrical or eccentric widening of the existing carriage way has been proposed at most of the locations (along maximum built ups to minimize the land acquisition) along the project corridor. Left hand side and right hand side

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Bypass Proposal :

Bypass proposals should be considered wherever in urban areas, improvement to two lanes of the existing road is not possible. Locations where alignment is passing through congested areas and roadway improvements would have several social impact and difficulty in acquiring required ROW, have been resolved by providing short bypasses and the same is discussed below. Locations not confirming to design standards for the design speed limit as per IRC standards, sharp right angle turns and sections prone to accidents have been improved by short realignment.

Selection Criteria

Various factors that influence selection of Bypass alignment are as given below. After careful evaluation, preferred option is recommended for the proposed Highway alignment.

1. Length of Proposed Option
2. Road Geometric Standards
3. Spread of the town i.e. left side or right side
4. Type of Land Acquisition
5. Structures – Minor Bridges, Major Bridges
6. Environmental Constraint like ponds, trees etc.
7. Social Impact – Relocation and Rehabilitation costs.
8. Construction Problem
9. Cost

The Bypass locations in Manikpur to Sahebganj stretch are as follows:

Sl. No	Existing Chainage (Km)		Design Chainage (Km)		Length (Km)	Name of Bypass
	From	To	From	To		
1	53/330	66/270	14+000	25+767	11.767	Deoria Bypass
2	73/156	84/847	32+485	42+800	10.315	Sahebganj Bypass

Details of proposed bypasses in Manikpur to Sahebganj section are given below,

01. Deoria Bypass :

As Muzaffarpur is a major District with various town having builtup locations, a Bypass has been proposed which starts in Kodaria village at Design chainage Km 14+000, traverses through Anandpur Kharauni, Chandpur Chihuta, Bishunpur Saraiya, Deoria and ends at design chainage Km 25+767 in Pakri Basharat village of Muzaffarpur district for a length of 11.767Km.

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TRAFFIC SURVEYS, ANALYSIS AND FORECAST

For any highway development, the first most thing is to know about the traffic and travel characteristics on the project road. Design of any highway facility depends on the volume and intensity of traffic likely to flow on the design year. The estimation of the likely traffic scenario in the design year requires basic information regarding the current level of traffic on the highway proposed for improvement. Therefore, the collection of basic data on the nature and extent of different traffic parameters present on the existing project road assumes greater significance.

Daily traffic volumes for all the 7-days have been summarized and the arithmetic mean of all the 7-day traffic counts has been taken as Average Daily Traffic and is furnished as given below,

Average Daily Traffic Volume (ADT) and Annual Average Daily Traffic Volume (AADT)

Location	ADT				AADT			
	Motorized		Non-Motorized		Motorized		Non-Motorized	
	Veh/day	PCU	Veh/day	PCU	Veh/day	PCU	Veh/day	PCU
Deoria (Km 62/250)	Manikpur - Sahebganj							
	6434	12069	1186	940	7608	14788	1186	940

PCU values were calculated according to IRC: 64-1990 guidelines. Seasonal Factor calculations were done using the Diesel, Petrol consumption data pertaining to Bihar, obtained from the competent authorities along the project.

PCU Equivalent factors

The data obtained from the traffic volume count has been converted into Passenger Car Units (PCU) on the basis of the following equivalency factors derived from IRC: 64 – 1990, "Guidelines for capacity of roads in rural areas (first revision)". Adopted equivalent car units for the study have been presented below,

PCU factors adopted for vehicles

S.No	Type of vehicle	PCU factor
1	2-wheeler	0.5
2	3-wheeler	1
3	Passenger Car	1
4	Utility Vehicle (Jeep, Van)	1
5	Standard Bus	3
6	LCV - Passenger freight	1.5

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Projected Traffic volume

The classified traffic volume of 2017 has been used for forecasting the traffic to 2047 using the growth rates is given in below tables. Forecasting has been done for all the three locations for the three scenarios. The projected traffic volumes in total and in terms of PCU are as follows.

Year	Deoria (Km 62/250) Optimistic Scenario		Deoria (Km 62/250) Most Likely Scenario		Deoria (Km 62/250) Pessimistic Scenario	
	Vehicles	PCU	Vehicles	PCU	Vehicles	PCU
2017	4,883	12,990	4,883	12,990	4,883	12,990
2018	5,207	13,901	5,160	13,774	5,115	13,656
2019	5,555	14,882	5,453	14,611	5,359	14,362
2020	5,927	15,937	5,765	15,504	5,616	15,108
2021	6,326	17,073	6,097	16,457	5,887	15,897
2022	6,733	18,244	6,425	17,412	6,149	16,663
2023	7,168	19,503	6,774	18,429	6,425	17,473
2024	7,634	20,854	7,143	19,512	6,716	18,328
2025	8,132	22,307	7,535	20,666	7,022	19,233
2026	8,665	23,867	7,950	21,896	7,344	20,189
2027	9,186	25,360	8,345	23,037	7,635	21,038
2028	9,740	26,952	8,762	24,244	7,939	21,928
2029	10,328	28,648	9,201	25,518	8,257	22,861
2030	10,953	30,457	9,663	26,866	8,589	23,838
2031	11,618	32,386	10,150	28,290	8,936	24,862
2032	12,236	34,198	10,594	29,607	9,245	25,776
2033	12,888	36,114	11,059	30,988	9,565	26,728

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Vehicle Type	2017-2021	2022-2026	2027-2031	2032-2036	2037-2041	2042+
vans, jeep						
LCV's	7.00	6.50	6.00	5.00	5.00	5.00
Mini Buses	3.50	3.50	3.50	3.50	3.50	3.50
Buses	3.50	3.50	3.50	3.50	3.50	3.50
Trucks of 2 Axle	4.00	3.50	3.50	3.50	3.50	3.50
Trucks of 3 Axle	7.00	7.50	6.00	5.50	5.00	5.00
Multi-Axle Trucks	9.00	8.50	7.50	6.50	5.50	5.00

Traffic Growth Rates - 2017-2046 - Project Road –Most Likely

Vehicle Type	2017-2021	2022-2026	2027-2031	2032-2036	2037-2041	2042+
Cars, passenger vans, jeep	5.0	4.5	5.0	4.0	4.0	4.0
LCV's	6.0	5.5	5.0	4.0	4.0	4.0
Mini Buses	3.0	3.0	3.0	3.0	3.0	3.0
Buses	3.0	3.0	3.0	3.0	3.0	3.0
Trucks of 2 Axle	3.0	2.0	2.0	2.0	2.0	2.0
Trucks of 3 Axle	6.0	6.5	5.0	5.0	4.0	4.0
Multi-Axle Trucks	8.0	7.5	6.5	5.5	4.5	4.0

Traffic Growth Rates - 2017-2046 - Project Road – Pessimistic

Vehicle Type	2017-2021	2022-2026	2027-2031	2032-2036	2037-2041	2042+
Cars, passenger vans, jeep	4.00	4.00	4.00	3.50	3.50	3.50
LCV's	5.00	4.50	4.00	3.00	3.00	3.00
Mini Buses	2.00	2.00	2.00	2.00	2.00	2.00
Buses	2.00	2.00	2.00	2.00	2.00	2.00
Trucks of 2 Axle	2.50	1.00	1.00	1.00	1.00	1.00
Trucks of 3 Axle	5.00	5.50	4.00	4.00	3.00	3.00
Multi-Axle Trucks	7.00	6.50	5.50	4.50	3.50	3.50

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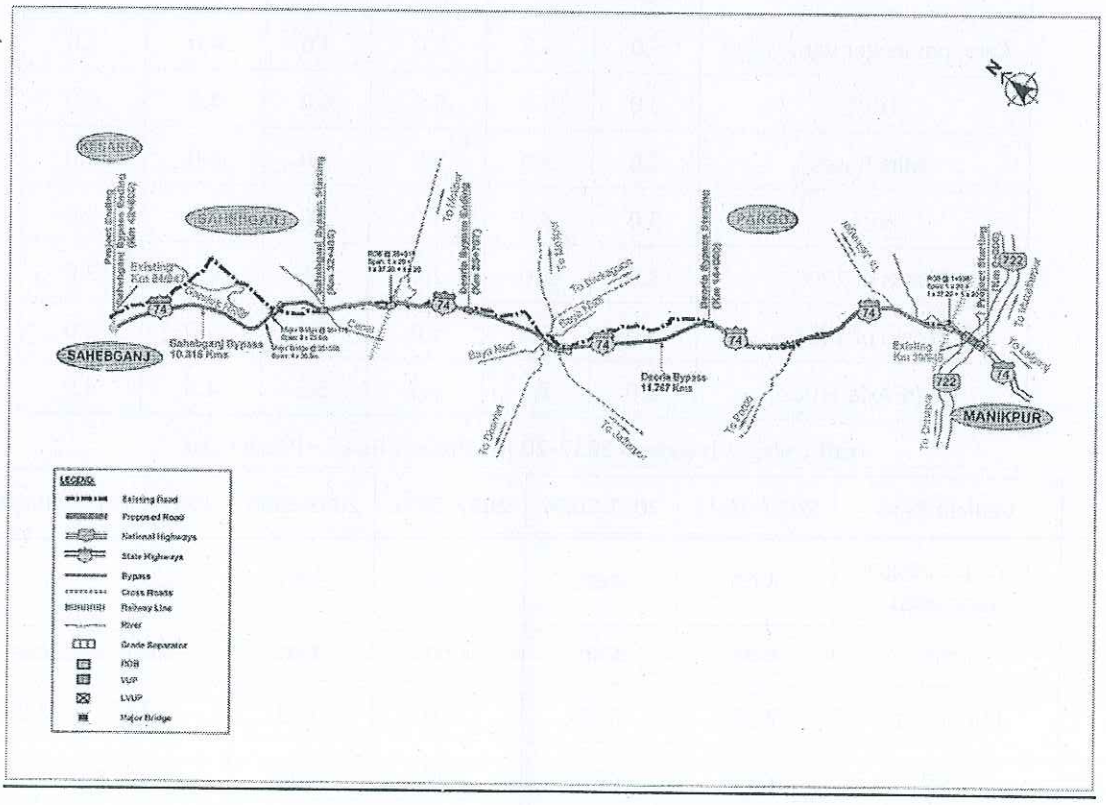
widening has also been proposed based on the existing site conditions. The widening proposal for the project has been studied as to have Four laning of the project road with paved shoulders.

Proposed road is passing through three tehsils. Paroo, Sahebganj tehsils under Muzaffarpur district and Kesariya tehsil under Purbi Champaran district in the state of Bihar. Project road traverses through villages like Manikpur, Chak Alisher Urf basu Chak, Nema Patti Pakauli Urf Lalu Ch, Pakauli urf Lalu Chhapra, Jalilnagar, Harshankarpur urf Moti Chhapra, Gariba urf Pearepur, Paru Khas, Chhapra As, Jagdishpur Dharam, Kodaria, Anandpur Kharauni, Chandpur Chihuta, Bishunpur Saraiya, Deoria, Pakri Basharat, Daha Chhapra, Dhania Hazaratpur, Chiknauta Asli, Daria Chhapra, Simra Nizamat, Bishunpur Patti, Halimpur, Rajwara, Lodia, Karnaul Chaturbhuj, Karnaul Nilkanth, Deosara Asli, Basdeopur Sarai, Baijnathpur, Parsauni Jahangir, Khursaida, Dharampur, Bhatandi, Ehiapur, Jagirha and Bijdhari Mafi.



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02. Sahebganj Bypass :

Rajwara is the major town in Sahebganj taluk of Muzaffarpur District in the state of Bihar. The necessity of Bypass for Rajwara town is very much essential for the uninterrupted flow of Traffic. Bypass starts at design chainage Km 32+485 in Halimpur village of Sahebganj Taluk, traverses through major towns Lodia, Basdeopur Sarai, Baijnathpur, Parsauni Jahangir, Khursaida, Dharampur of Sahebganj Taluk and ends at design chainage Km 42+800 in Bijdhari Mafi village of Kesariya Taluk of Purbi Champaran district. The total length of Sahebgnaj bypass is 10.315Km.

S.No.	Factor	Deoria Bypass	Sahebganj Bypass
1.	Length	11.767 Km	10.315 Km
2.	Geometric	Design Speed 80 - 100 Kmph	Design Speed 80 - 100 Kmph
3.	**Bridges :** Major Bridge Minor Bridge	 - 1 No.	 2 Nos. 3 Nos.
4.	**Junctions :** Major Junction Minor Junction	 3 Nos. 3 Nos.	 3 Nos. 4 Nos.
5.	Grade Separator VUP LVUP	1 No. 2 No. -	1 No. 2 Nos. -
6.	Culverts	22 Nos.	22 Nos.
7.	Environmental Constraints	Only Agricultural land will get affected	Only Agricultural land will get affected

Details of Structures :

Sr. No.	Particulars	Existing	Widening	Reconstruction	New Construction	Total of Proposed Structures
1	Culverts	72	03	05	79	87
2	Minor Bridges	05	0	02	04	6
3	Major Bridges	0	0	0	02	2
4	ROB	0	0	0	02	2
5	VUP	0	0	0	04	4
6	LVUP	0	0	0	01	1
7	Grade Separator	0	0	0	03	3
8	Toll Plaza	0	0	0	01	1
	Summation	**77**	**3**	**7**	**96**	**106**

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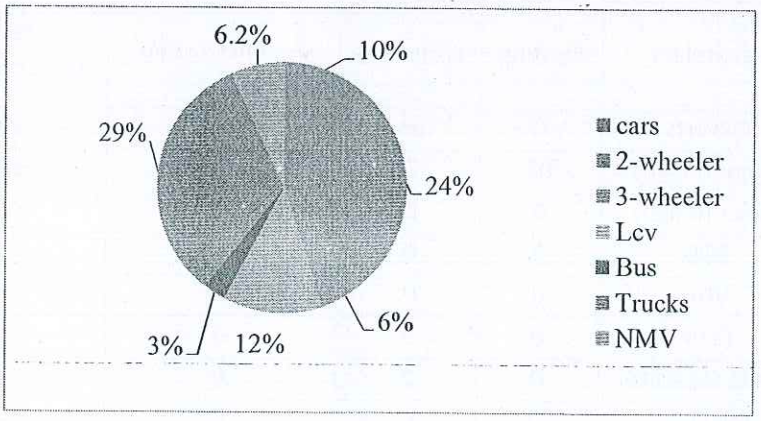
S.No	Type of vehicle	PCU factor
7	Truck	3
8	MAV - Semi Articulated & Articulated	4.5
9	Bicycle	0.5
10	Cycle Rickshaw	2
11	Animal drawn vehicle	8
12	Hand cart	3

4.6.1 Directional distribution of traffic

Direction wise volumes of traffic, i.e., total volume of traffic towards (Manikpur – Sahebganj, and Sahebganj – Manikpur) are shown in Table 4.4, which indicates the directional split for up and down direction and the traffic are nearly equal in both ways.

Manikpur to Sahebganj				
S. No	Chainage	Day	Total Traffic Volume	
			Areraj – Manikpur	Manikpur – Areraj
1.	62/250 (Deoria)	Friday	4137	3342
		Saturday	4207	3750
		Sunday	3967	3840
		Monday	4115	3602
		Tuesday	3887	3932
		Wednesday	3505	3341
		Thursday	3776	3937

Directional distribution of traffic



Traffic Composition @ Deoria (Km 62/250)

2034	13,576	38,143	11,545	32,439	9,897	27,718
2035	14,302	40,289	12,054	33,961	10,242	28,748
2036	15,067	42,559	12,587	35,559	10,599	29,820
2037	15,814	44,708	13,083	36,989	10,919	30,729
2038	16,599	46,966	13,598	38,478	11,248	31,667
2039	17,423	49,341	14,134	40,030	11,589	32,635
2040	18,289	51,838	14,692	41,646	11,939	33,635
2041	19,198	54,463	15,273	43,329	12,302	34,668
2042	20,122	57,081	15,853	44,970	12,675	35,734
2043	21,091	59,828	16,455	46,674	13,061	36,834
2044	22,107	62,707	17,080	48,445	13,459	37,970
2045	23,173	65,727	17,729	50,284	13,870	39,144
2046	24,290	68,894	18,404	52,195		

Projected Traffic Growth

The State level data is moderated to reflect conditions in the road influence area by comparison with district–wise factors, thereby accounting for the impact of the following:

- Macro-economic scenario growth rate(s) and composition of NSDP
- Road influence area economy, sectional production and potential
- Spatial distribution of economic activities along the corridor
- Road influence area - population size and urbanization
- Reduction in track overloading and changes in trucking fleet
- Increase in vehicle productivity due to improved road condition
- Shift in personalized travel modes over time
- Changes in the inter-modal share of passenger and freight demand

The scenario considered in terms of growth rates of economic indicators are given below,

Traffic Growth Rates - 2017-2046 - Project Road – Optimistic

Vehicle Type	2017-2021	2022-2026	2027-2031	2032-2036	2037-2041	2042+
Cars, passenger	6.00	5.50	6.00	5.00	5.00	5.00

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Origin – Destination And Commodity Movement Survey

To determine the amount of by-passable traffic that enters a town and thus establishes the need for a by-pass. To determine the extent to which the present highway system is adequate and to plan for new facilities.

Origin – Destination surveys determine and relate the pattern of traffic flows to trip purpose and commodities transported. The information provided by the surveys enables estimates of the growth of future flows to be made on a more rational basis.

O – D survey is usually done by Roadside interview method. O – D survey was carried out for one day (24 hrs both directions) at finalized one location. The locations at which O – D survey were done was same as the classified volume count locations. All categories of commercial vehicles were surveyed for their trip origin destination trip purpose occupancy and weight of commodity carried. The survey crew was organized into 3 by 8 hours shifts with sufficient enumerators for each direction of flow. These enumerators were fully trained in the use of standard interview sheets. Police help was sought to ensure smooth flow of traffic and stoppage of randomly selected vehicles. A sample size of 15% to 30% for different types of vehicles was collected. O – D survey yields a vast amount of data. Hence to understand the data it is necessary to present them in convenient tabular or pictorial form.

The analysis of the data provides passenger characteristics and the proportions of through and inter-state passenger and goods vehicle categories. This information facilitates the projection of traffic flow and review capacity and the formulation of proposals for new routes and bypasses. The composition of Through/by passable traffic for Sahebganj is given in the table 4.15.

Origin & Destination – By passable / through Traffic

S.No	O-D Location	Car/Jeep	LCV	Truck	MAV	Bus
1	Sahebganj	95.71%	77.25%	97.73%	100.00%	55.00%

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