Chapter -1
Executive Summary

1.1 Introduction

Good transportation systems are lifeline to the area they serve. Roads bring about all-round development in the region. A good road network helps in the success of all development activities. It is in the sphere of movement of people and goods, agriculture, commerce, education, health, and social welfare, or even maintenance of law and order and security.

Chhattisgarh Road Development Corporation Limited (CGRDC), the Government of Chhattisgarh, has started the improvements of State highway road network for meeting the supply demand gap of the traffic in near future. As a part of this strategy CGRDC has taken up the construction of **LoharaRengadabriJunapaniChouki Road.**

CGRDC has commissioned *MSV INTERNATIONAL INC. GURGAON (HR)* for carrying out Detail Project Report of **LoharaRengadabriJunapaniChoukiRoad.**

1.2 Scope of Study

The project study consists of preparation of the following:
Stage 1 – Quality Assurance Plan & Inception Report;
Stage 2 – Strip Plan and Clearance & Land Acquisition Report
Stage 3 – Preliminary Project Report.
Stage 4 – (a) – Draft Detailed Project Report.
(b) – Final Detailed Project Report.

1.3 Socio - Economic Profile

The project road **LoharaRengadabriJunapaniChouki Road** has significant influence on the Rajnandgaon district. The state of Chhattisgarh was formed on 1st November 2000 by carving out the 16 Chhattisgarhi-speaking south-eastern districts of Madhya Pradesh. It covers an area of about 135,190 sq. km. which is 4.1% of the country's area. Chhattisgarh is a land locked state bordered by Madhya Pradesh in the north-west, Maharashtra in the south-west, Andhra Pradesh,Telangana in the south, Odisha in the east, Jharkhand in the north-east and Uttar Pradesh in the north. Administratively, the state comprises of 27 districts, which is further divided into 149 blocks and 9734 gram panchayats.

Average annual growth rate of NSDP is nearly 16.1% (Source*CMIE, 2004-05 to 2010-11, current prices). The vehicle registration data for Chhattisgarh shows annual growth of 10.70%. The State's economy is highly dependent on the primary sector with agriculture as the main source of livelihood of the population.

Index Map Enclosed Below

INDEX MAP

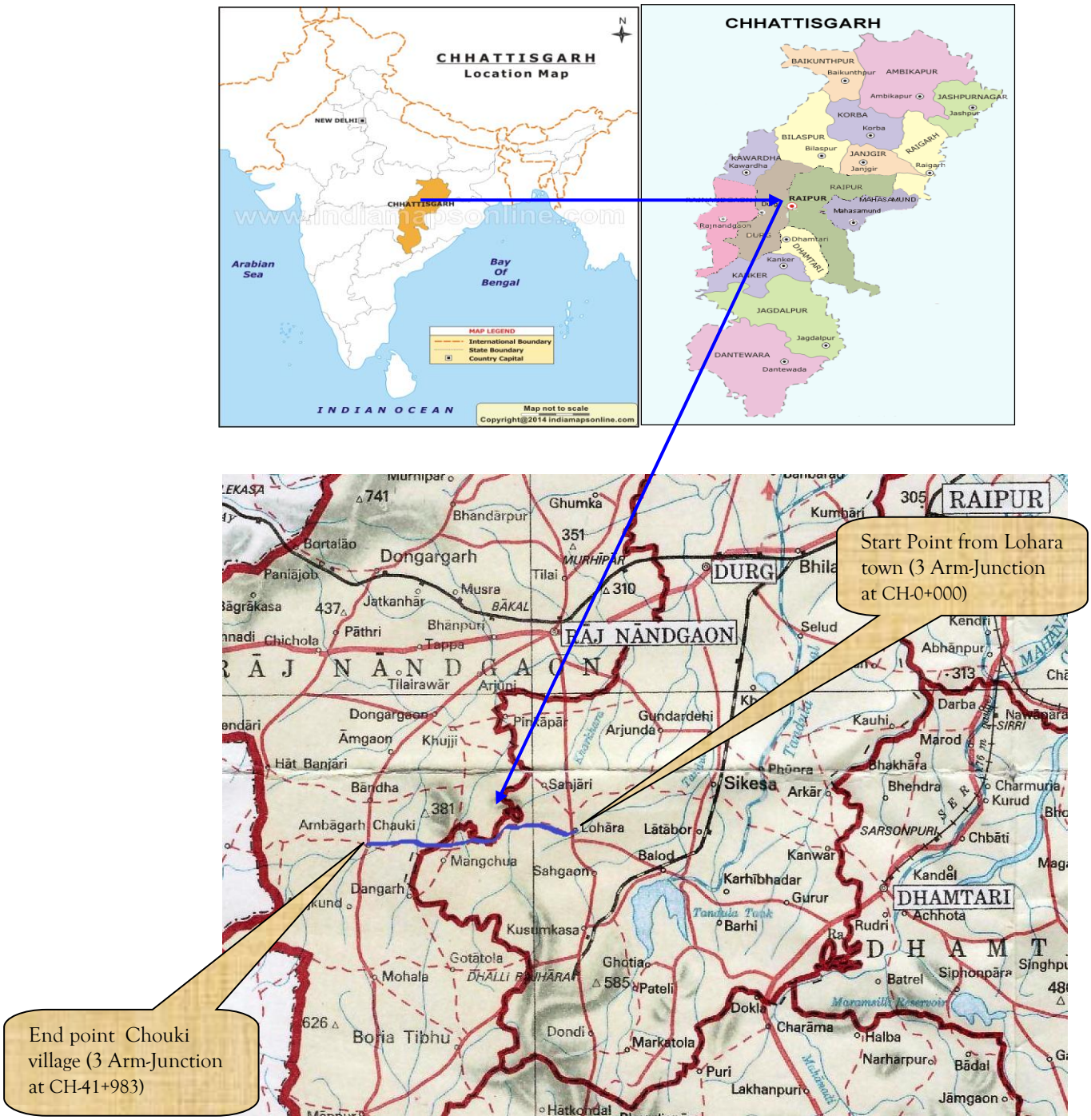


Fig-1-1 : Index Map of Project Road

1.4 Project Description

The project road starts from Lohara at Km 0.000 (20°45'40.69"N Latitude), (80°57'1.78"E Longitude) and ends at Chouki on km 42.010 (20°45'30.69"N Latitude) (80°44'39.82"E Longitude). The Project Road Lohara to Chouki is situated in central part of Chhattisgarh State having a total existing length 42.010 Kms and design length 41.983 Kms.

Start point of the project road:

Photo : Starting Point of Project Road

End point of the project road:

Photo : End Point of Project Road

Climate of Rajnandgaon District –

Rajnandgaon district, originally named as Nandgram is located in the central part of Chhattisgarh. The district came into existence in 1973 after it was carved out of Durg district. Kabirdham district was further bifurcated from the present Rajnandgaon district in 1998.

The district is a part of Durg division. It is surrounded by Kabirdham on the north, Bemetara on the north-east, Durg on the east, Balod on the south-east, Kanker on the south, Gadchiroli and Bhandara districts of Maharashtra state and Balaghat district of Madhya Pradesh state on the west. It extends over an area of 8070 sq. Km, which is 6.0% of the total state area. The district is divided into 5 divisions, 9 tehsils viz. Chhuikhadan, Khairagarh, Dongargarh, Rajnandgaon, Chhuriya, Dongargaon, Mohla, Manpur, Ambagarh, 1690 villages, 692 Gram Panchayats, 16 Revenue Circle, 283 Patwari Circle, 2 Nagar Palika, 5 Nagar Panchayat and 9 JanpadPanchayats. Rajnandgaon town is the district headquarters. The principal river of the district is Sheonath River, which is a tributary of the Mahanadi River. The main tributaries of Sheonath are Kharkhara, Sonbarsa, Amner, Surhi, Karra, Murkati, Sankari, Fonk and Hanf

Pavement Condition -

The existing road has a Single laneconfiguration from Km 0.00 to Km 42.010 Carriageway width varies from 2.80 m to 3.75 m bituminous surfaces and condition of the pavement is varies from poor to fair and having shoulder width of 0.5 m to 1.20 m on either side along the road and condition of shoulders is also poor and covered with vegetation. The entire project road traverses between plain terrains.

Photo : Map Cracking at CH – 21+000

Photo : Ravelling at km CH- 14+000

All major utilities follow the road alignment as the project road connects to Lahora, Ureda, Bhawrmara, Nangutola,Arajpuri,Punarkasa,Rengadabri,Bittytala,Junapani,Chikalakasa,Mahudmachandar,Gurra Tola,Bhansula,Pangari and Biharikala. Utilities like electric pole, Transformers,OFC, hand pumps etc. were observed on both sides of road.

Photo : Location of near Lohara

Photo : Location of Junapani Village

Table 1-1 List of Villages

Sr. No.	Existing Chainage		Length (m)	Name of Village/Town
	From	To		
I	II	III	IV	V
1	0+000	0+800	800	Lahora
2	2+660	4+400	800	Ureda
3	13+240	14+080	1740	Bhawrmara
4	14+880	15+900	840	Nangutola
5	15+900	18+200	1020	Arajpuri
6	20+080	20+400	2300	Punarkasa
7	22+520	23+600	320	Rengadabri
8	25+440	27+920	1080	Bittytala
9	27+920	28+360	2480	Junapani
10	30+960	31+840	440	Chikalakasa
11	32+760	33+400	880	MahudMachandar
12	34+480	35+000	640	GurraTola
13	36+640	37+080	520	Bhansulavill.
14	39+280	39+600	440	Pangarivill.
15	39+280	41+500	320	Biharikala

1.4.1 Geometrics

The horizontal alignment of the Project traverses through plain terrain. It is essential to improve substandard geometrics at various locations on project road. Geometric improvements shall be made as per standard and specifications.

In order to upgrade the road to the geometric requirements commensurate with the design speed, improvement has been proposed for the Project Road. The alignment passes through several villages and habitation areas of which some have built-up sections. The improvement works, consist of the existing Single lane carriageway to 2 lane carriageway (7.0 m width) of flexible pavement with hard shoulder of 2.5 m on either side of rural section and Intermediate lane to 2 lane carriageway (7.0 m width) of rigid pavement with paved shoulder of availability of ROW on either side on scattered built up section. The surface and sub surface drainage system shall be planned as per IRC SP: 42-1994. A camber of 2.5% shall be provided in main carriageway and minimum longitudinal gradient of 0.05% in rural areas and 0.2% in urban shall be provided for smooth surface runoff. Longitudinal lined/unlined drain shall be provided near ROW in scattered built up section with outlets to cross drainage structures.

Photo :***Horizontal alignment along the project road.***

Table 1-2: List of curves along the road.

Sr. No.	Start Chainage	End Chainage	Length (m)	Radius (m)
	From	To		
I	*II*	*III*	*IV*	*V*
1	0+874	0+949	75	140
2	1+439	1+476	37	200
3	2+641	2+644	3	120
4	2+659	2+692	33	50
5	2+766	2+772	6	100
6	2+830	2+930	100	60
7	4+807	4+882	75	80
8	5+004	5+017	13	50
9	5+071	5+098	27	60
10	5+964	6+136	172	100

Sr. No.	Start Chainage	End Chainage	Length (m)	Radius (m)
	From	To		
I	*II*	*III*	*IV*	*V*
11	8+410	8+461	51	100
12	8+489	8+505	16	80
13	8+810	8+890	80	70
14	10+565	10+582	17	85
15	11+285	11+360	75	100
16	12+264	12+374	110	110
17	12+478	12+492	14	35
18	12+919	12+987	68	55
19	13+142	13+163	21	18
20	13+224	13+289	65	25
21	13+525	13+553	28	28
22	13+918	13+954	36	60
23	13+980	14+141	161	12
24	15+732	15+823	91	30
25	15+906	15+927	21	45
26	16+173	16+196	23	80
27	16+324	16+434	110	120
28	17+538	17+576	38	120
29	17+696	17+716	20	110
30	17+947	18+035	88	120
31	18+080	18+100	20	100
32	18+195	18+208	13	22
33	18+947	18+951	4	120
34	18+967	18+993	26	100
35	19+921	19+934	13	100
36	19+966	19+982	16	100
37	20+049	20+095	46	100
38	20+269	20+280	11	100
39	20+364	20+379	15	70
40	20+578	20+601	23	100
41	20+657	20+800	143	80
42	22+726	22+744	18	25
43	22+765	22+838	73	30
44	23+335	23+349	14	15
45	23+622	23+662	40	40
46	24+649	24+715	66	150
47	25+569	25+611	42	60
48	25+755	25+763	8	140

Sr. No.	Start Chainage	End Chainage	Length (m)	Radius (m)
	From	To		
I	*II*	*III*	*IV*	*V*
49	26+360	26+370	10	120
50	26+408	26+454	46	80
51	26+572	26+591	19	80
52	26+737	26+810	73	80
53	27+632	27+650	18	60
54	27+660	27+729	69	60
55	28+221	28+227	6	140
56	28+255	28+298	43	100
57	28+494	28+515	21	60
58	28+516	28+535	19	60
59	28+997	29+036	39	150
60	31+775	31+805	30	140
61	31+841	31+928	87	140
62	32+711	32+740	29	110
63	32+797	32+835	38	60
64	32+920	32+972	52	100
65	33+853	34+055	202	140
66	34+354	34+447	93	120
67	34+509	34+519	10	50
68	34+715	34+745	30	50
69	35+566	35+666	100	140
70	36+282	36+367	85	150
71	36+529	36+596	67	140
72	37+065	37+095	40	80
73	38+995	39+138	143	100
74	39+680	39+790	110	100
75	41+368	41+432	64	45
76	41+811	41+835	24	60

As per IRC : SP :73 – 2015 page no 13 the Ruling Minimum Radii for plain terrain is 400m & absolute Minimum radii for plain terrain is 250 m. Also the details are given in table no 2.5 of Section 2 at Page no 13.

1.4.2 Road Junctions

The project road traverses through various habitations and villages. Various important cross roads also join the project road at different locations. Project road encountered with 2 Major and 28 Minor intersections. List of major and minor intersections is given in **Table 1.3** below.

Photo : Grade junction of R/S-Loharakasish (CH-0+800)

Photo : Grade junction of (CH-42+010

Table 1-3: List of Junctions.

Sr. No.	Existing Chainage (Km)	Destinations of Cross Road	Type of Junction	Road Side	Category of Junction(Major/Minor)
I	II	III	IV	V	VI
1	0+000	R/S Rajnandgaon L/S Bhanuprtapur	T-Junction	BHS	Major, SH-5
2	0+820	Madiyakatta	Y-Junction	RHS	Minor
3	2+290	Bagayikona	Y-Junction	RHS	Minor
4	3+060	Kamata	T-Junction	LHS	Minor
5	3+500	Kamta(PMGSY)	T-Junction	LHS	Minor
6	5+560	Killekoda	Y-Junction	LHS	Minor
7	7+860	Keriya Gondi	Y-Junction	RHS	Minor
8	10+590	Kholjar	Y-Junction	LHS	Minor
9	10+640	Raigarh	T-Junction	RHS	Minor
10	11+460	Mathri	T-Junction	RHS	Minor
11	11+700	dhamdighat	Y-Junction	LHS	Minor
12	13+640	Netamtola	T-Junction	RHS	Minor
13	13+980	Gotatola	T-Junction	RHS	Minor
14	14+400	Manchwa	Y-Junction	LHS	Minor
15	18+120	Kerkata	T-Junction	RHS	Minor
16	18+200	Kharkhara,Sanjari	Y-Junction	RHS	Minor
17	22+700	Chilamgota	T-Junction	LHS	Minor
18	23+640	Mangcho	Y-Junction	LHS	Minor
19	26+320	Bhimatola	T-Junction	RHS	Minor
20	28+250	Machawa	Y-Junction	LHS	Minor
21	28+540	Junapanibasti	T-Junction	LHS	Minor
22	30+930	Umarwahi	T-Junction	RHS	Minor
23	31+440	Uchayipur/Chikhala-kassa	T-Junction	LHS/RHS	Minor
24	33+040	Kachanpahari	T-Junction	RHS	Minor

Sr. No.	Existing Chainage (Km)	Destinations of Cross Road	Type of Junction	Road Side	Category of Junction(Major/Minor)
I	II	III	IV	V	VI
25	34+400	Aatragaon	T-Junction	LHS	Minor
26	36+410	Aatragaon	T-Junction	LHS	Minor
27	36+680	Chachandpahari	T-Junction	RHS	Minor
28	37+060	Kasaritola	T-Junction	LHS	Minor
29	40+250	Dongaghat	T-Junction	RHS	Minor
30	42+010	L/S Manpur R/S Rajnandgaon	T-Junction	BHS	Major, SH-24

1.4.3 Bridge & Cross Drainage Structures

There are 01 major bridge and 02 minor bridges along with 78culverts on the project road.

Table containing details about existing Major/ Minor Bridges and Culvertsfor this road may be seen in annexure-7.1.

Table 1-4: Summary of Existing Bridges and CD woks is as below:

Type of Structure	Major Bridges	Minor Bridges	Slab /Arch Culvert	Vented Causeway	Hume Pipe Culvert
I	II	III	IV	V	VI
Existing Structure 81 Nos.	1	2	3	7	68

Major Bridge at CH-12+335

Minor Bridge at CH-40+105

VCW at CH-6+655

Slab Culvert at CH-10+190

HPC at CH- 10+455

HPC at CH- 6+225

Photos : Structure along the project road

Table 1-5: Major Bridge

Sr. No.	Existing chainage	Details of Existing Structures			
		Type of Existing Structure	No of Span / Pipe x Length of Span / dia	Width of Structure	Condition of Structure
I	II	III	IV	V	VI
1	12+335	Box Girder	2 X 16.80 & 1 X 34.80	7.40	Good

Table 1-6: Minor Bridge

	Existing chainage	Details of Existing Structures			
		Type of Existing Structure	No of Span / Pipe x Length of Span / dia	Width of Structure	Condition of Structure
I	II	III	IV	V	VI
1	32+710	RCC BOX	5 X 5.0X 4.0&4 X 5.0X4.0	8.40	Good

2	40+105	Solid Slab	3 X 5.80	5.10	Poor

Table 1-7: - List Of Existing HPC/VCW/Pipe Culverts

Sr. No.	Existing chainage	Details of Existing Structures			
		Type of Existing Structure	No of Span / Pipe x Length Span / dia	Width of Structure	Condition of Structure
I	II	III	IV	V	VI
1	0+910	HPC	4 ROW 900	7.40	Fair
2	1+280	VCW	6 ROW 900	7.60	Poor
3	2+480	HPC (Canal)	1 ROW 900	7.50	Poor
4	3+365	HPC	1 ROW 900	7.50	Poor
5	3+800	HPC (Canal)	1 ROW 900	9.40	Poor
6	4+650	Pipe	1 ROW 900	7.50	Poor
7	4+850	VCW	6 ROW 900	7.60	Poor
8	5+900	HPC	1 ROW 900	7.30	Poor
9	6+525	HPC	3 ROW 900	7.55	Poor
10	6+655	HPC	6 ROW 1000	7.55	Fair
11	7+215	HPC	1 ROW 900	7.55	Poor
12	7+495	HPC	1 ROW 900	7.55	Poor
13	8+090	HPC	1 ROW 900	7.50	Poor
14	8+420	HPC	3 ROW 900	7.50	poor
15	8+585	HPC	1 ROW 900	7.60	Poor
16	9+260	HPC	3 ROW 900	7.65	Poor
17	9+440	HPC	3 ROW 900	7.50	Poor
18	9+560	HPC	6 ROW 1000	7.65	Fair
19	9+930	HPC	3 ROW 900	7.55	Poor
20	10+235	HPC	1 ROW 900	7.50	Poor
21	10+445	HPC	1 ROW 1000	7.55	Poor
22	10+655	HPC	3 ROW 900	7.60	Poor
23	11+875	VCW	6 ROW 900	7.50	Poor
24	12+180	HPC	1 ROW 900	7.55	Poor
25	12+835	HPC	6 ROW 1000	7.55	Fair
26	13+135	HPC	1 ROW 1000	7.45	Poor
27	14+110	HPC	1 ROW 900	7.55	Poor
28	15+625	HPC	1 ROW 1000	7.55	Poor
29	17+425	VCW	6 ROW 900	5.10	Poor
30	18+185	HPC	1 ROW 900	7.60	Poor
31	18+885	HPC	3 ROW 900	7.50	Poor
32	18+930	HPC	1 ROW 1000	7.60	poor
33	19+210	HPC (Canal)	1 ROW 450	12.55	Poor
34	19+620	HPC	1 ROW 900	7.55	Poor
35	19+825	HPC (Canal)	1 ROW 600	15.00	Poor
36	19+835	HPC	1 ROW 900	7.55	Poor
37	19+965	HPC	1 ROW 900	7.60	Poor

Sr. No.	Existing chainage	Details of Existing Structures			
		Type of Existing Structure	No of Span / Pipe x Length Span / dia	Width of Structure	Condition of Structure
I	II	III	IV	V	VI
38	20+235	HPC	1 ROW 900	7.60	Poor
39	20+380	HPC	1 ROW 900	7.60	Poor
40	20+455	HPC	1 ROW 900	7.60	Poor
41	20+500	HPC	6 ROW 1000	7.50	Fair
42	20+620	HPC	2 ROW 900	7.55	Poor
43	22+015	HPC	3 ROW 900	7.55	Poor
44	22+455	HPC	1 ROW 900	7.50	Poor
45	22+760	HPC	1 ROW 900	10.30	Poor
46	24+540	VCW	7 ROW 1000	7.55	Poor
47	24+880	HPC	2 ROW 900	7.55	Poor
48	25+790	HPC	2 ROW 900	7.50	Poor
49	25+950	HPC	2 ROW 600	7.60	Poor
50	26+235	HPC	1 ROW 600	7.55	Poor
51	26+625	HPC	2 ROW 900	7.55	Poor
52	26+790	HPC	1 ROW 600	7.65	Poor
53	27+650	HPC (Canal)	1 ROW 600	6.75	Poor
54	27+915	HPC	3 ROW 900	7.10	Poor
55	28+040	HPC	1 ROW 600	7.65	Poor
56	30+380	VCW	6 ROW 1200	10.20	Poor
57	30+490	HPC	1 ROW 1000	10.10	Poor
58	30+655	HPC	2 ROW 900	10.10	Poor
59	31+120	HPC	2 ROW 600	10.00	Poor
60	31+360	HPC	1 ROW 600	10.00	Poor
61	32+905	HPC	1 ROW 900	10.10	Poor
62	33+190	HPC	2 ROW 900	10.10	Poor
63	33+385	HPC	2 ROW 600	10.15	Poor
64	33+655	HPC	1 ROW 900	10.10	Poor
65	33+730	HPC	2 ROW 1200	10.30	Poor
66	34+785	HPC	1 ROW 900	10.10	Poor
67	34+920	HPC	2 ROW 900	10.10	Poor
68	36+300	HPC	2 ROW 1200	10.15	Fair
69	38+210	VCW	4 ROW 1200	5.00	Poor
70	39+240	HPC	3 ROW 900	10.25	Poor
71	39+605	HPC	1 ROW 600	10.10	Poor
72	39+715	HPC	1 ROW 600	7.60	Poor
73	41+185	HPC (Canal)	1 ROW 900	12.30	Poor
74	41+585	HPC (Canal)	1 ROW 900	12.40	Poor
75	41+940	HPC	1 ROW 600	10.25	Poor

Table 1-8: List Of Existing Slab/Arch Culverts

Sr. No.	*Existing chainage*	*Details of Existing Structures*			
		Type of Existing Structure	*No of Span / Pipe x Length of Span / dia*	*Width of Structure*	*Condition of Structure*
I	*II*	*III*	*IV*	*V*	*VI*
1	16+100	Slab	1 X 1.00	7.35	Poor
2	16+850	Slab	1 X 1.00	7.40	Poor
3	32+520	Box	2 X 3.0 X 2.50	8.45	Good

1.5 Railway line crossing

Along the project alignment there is no exists railway Level crossing.

Table 1-9: List Of Existing Level Crossing

S.No.	*Existing Chainage (Km)*	*Design Chainage (m)*	*No. of line*	*Type of line*
I	*II*	*III*	*IV*	*V*
NIL				

1.6 Traffic Survey Analysis and Forecast

To establish the traffic flow characteristics and travel pattern of the project corridor between **LoharaRengadabriJunapaniChouki Road**the following traffic surveys were carried out:

- *Classified Traffic Volume Count Survey*
- *Intersection Turning Movement Survey*
- *Axle Load Survey*
- *Origin Destination Survey*

1.6.1 Classified Traffic Volume Count Survey

The objective of classified traffic volume count survey is to estimate traffic intensity on the project road.

The classified volume count surveys have been carried out for 7 days, 24 hours. The traffic is counted in number of vehicles by vehicle category-wise in each direction over 24Hrs a day for 7 Days. The counts were recorded in the formats as per IRC specifications. Classified volume count survey has been carried out on two locations the details given in table 1-10.

Photo-11 At Ch-2+700 (TVC-1)

Photo-12 At Ch-41+200 (TVC-2)

Table 1-10 : Average Daily Traffic (ADT)

S.No.	*Chainage (km)*	*Location*	*Survey Dates*
I	*II*	*III*	*IV*
1	*2+700*	*Near Lohara Village*	*10.10.2015 to 16.10.2015*
2	*41+200*	*Near Chouki Village*	*10.10.2015 to 16.10.2015*

Reference: Details have been given in Annexure-4.1

1.6.2 Traffic Characteristics on Project Road

The summary of all data collected from traffic volume survey for the 2 locations on the Project Road is presented in annexure. Average Daily Traffic (ADT) for the month of October 2015 is summarized in Table 1-11. Traffic volume count summary sheets along with ADT tables are presented in Annexure to this report.

Table 1-11 Traffic Volume at Two Locations of the Project Road (ADT)

Type of Vehicles	Survey Location	
	(km 2+700)	(km 41+200)
I	II	III
2-Wheeler	2478	2183
3-Seater	0	0
Car/Vans/Jeeps(Taxi)	182	183
Mini Bus	0	0
Buses	34	39
LCVs	66	68
2-Axle Trucks	26	27
3-Axle Trucks	5	6
Multi Axle Trucks	0	1
Tractor	2	4
Tractor with Trailor	12	12
Cycle	1353	1459
Cycle Rickshaw	0	0
Others	0	0
Total	4160	3983

Source: Traffic Surveys ,October,2015

A. Near Lohara villageat Km. 2+700

Survey was carried out at Km 2+700 Near Lohara village. A selected location lie between Lohara and Chouki is away from urban section to avoid influence of local traffic.

ADT recorded at this station is 4160 nos. / 2454 PCU. Fast moving vehicles were recorded as 63.01% of the total traffic (in PCU). Peak hour traffic flow of 880 nos. formed around 19.49% of the total traffic. Peak hour is identified during 10.00 – 11.00 PM.

There will be variation of traffic for each day. The daily and hourly variation of traffic is presented graphically in Figure-1-2. Composition of traffic ADT and Composition of traffic PCU is presented in the form of pie-charts in Figure-1-3 and Figure-1-4 respectively is attached below.

Figure 1-2 Daily and Hourly Variation near Lohara village at Km 2+700

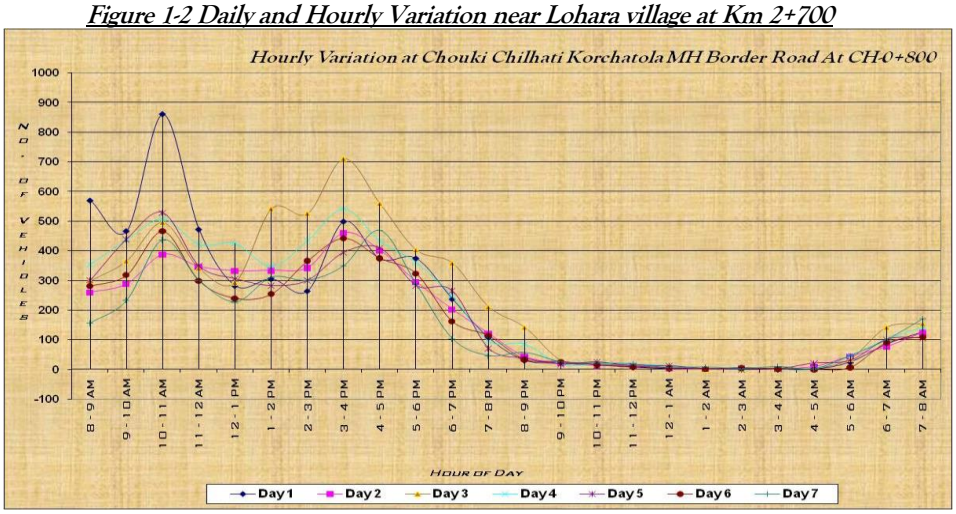


Figure-1-3: Composition of Average Daily Traffic nearLohara village at Km 2+700

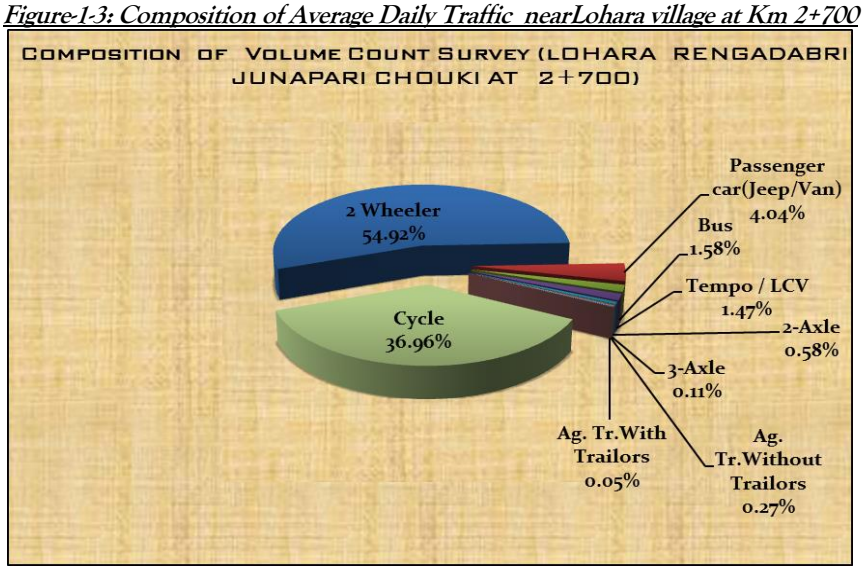
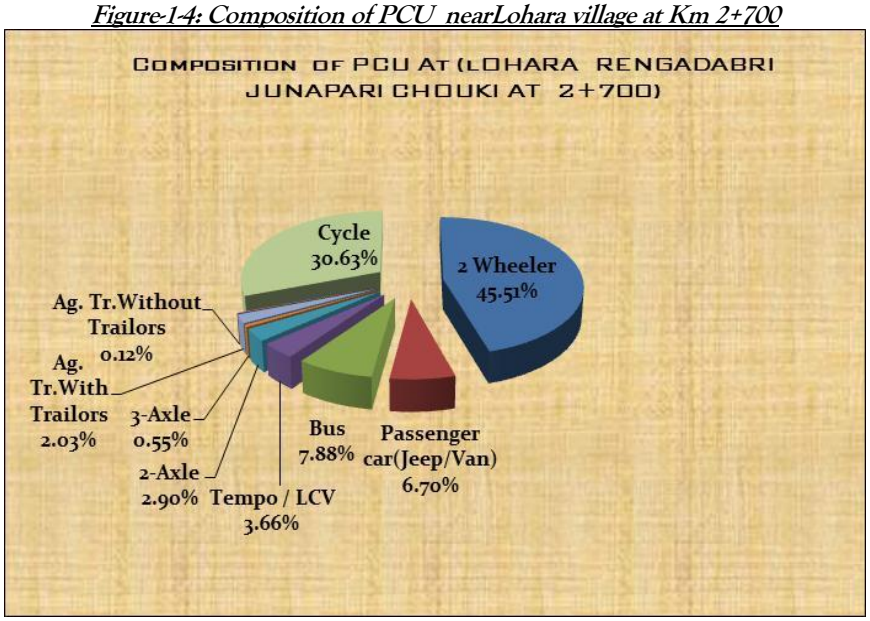


Figure-1-4: Composition of PCU nearLohara village at Km 2+700



B. Near Chouki village at Km. 41+200

Survey was carried out at Km 41+200 Chouki village. Selected location lies between **Lohara and Chouki and** is away from urban section to avoid influence of local traffic.

ADT recorded at this station is 3983 nos. / 2387 PCU. Fast moving vehicles were recorded as 63.28% of the total traffic (in PCU). Peak hour traffic flow of 630 nos. formed around 15.86% of the total traffic. Peak hour is identified during 10.00-11.00 AM.

There will be variation of traffic for each day. The daily and hourly variation of traffic is presented graphically in Figure-1-5. Composition of traffic ADT and Composition of traffic PCU is presented in the form of pie-charts in Figure-1-6 and Figure-1-7 respectively is attached below.

Figure 1-5 : Daily and Hourly Variation near Choukivillage at Km 41+200

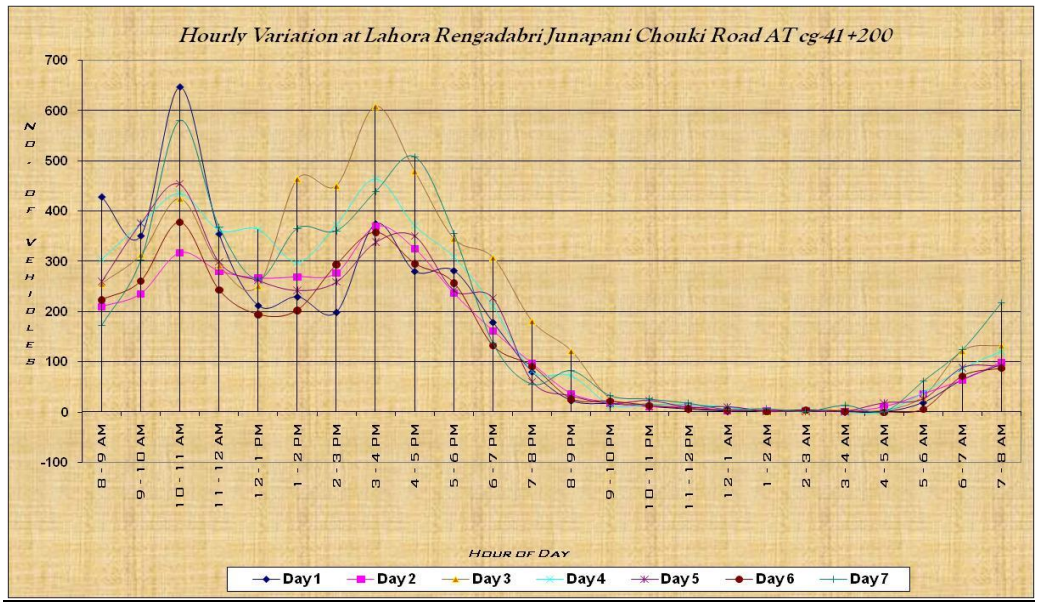


Figure-1-6 : Composition of Average Daily Traffic near Choukivillage at Km 41+200

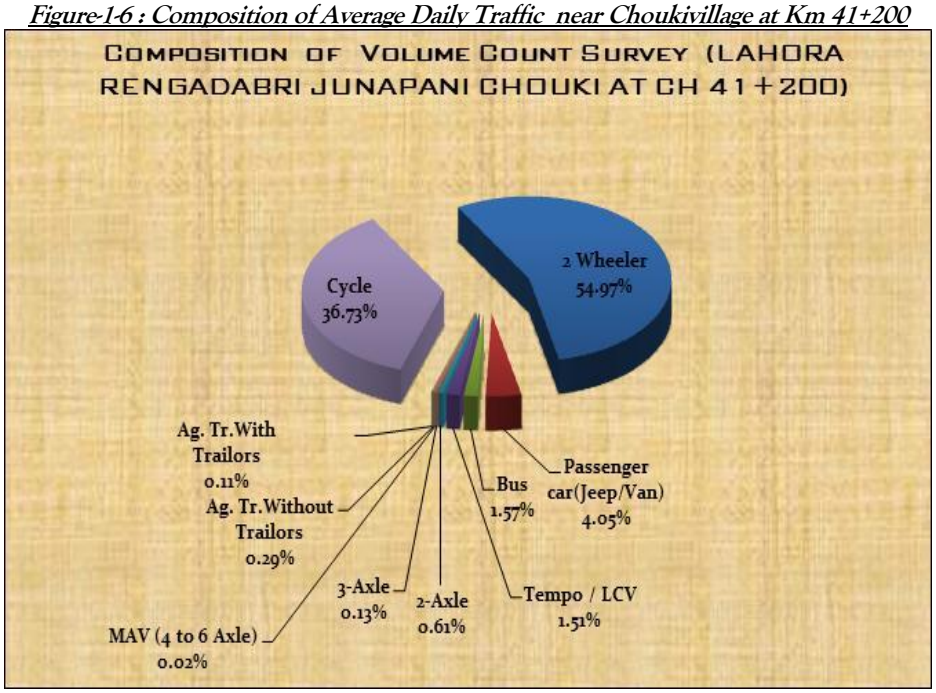
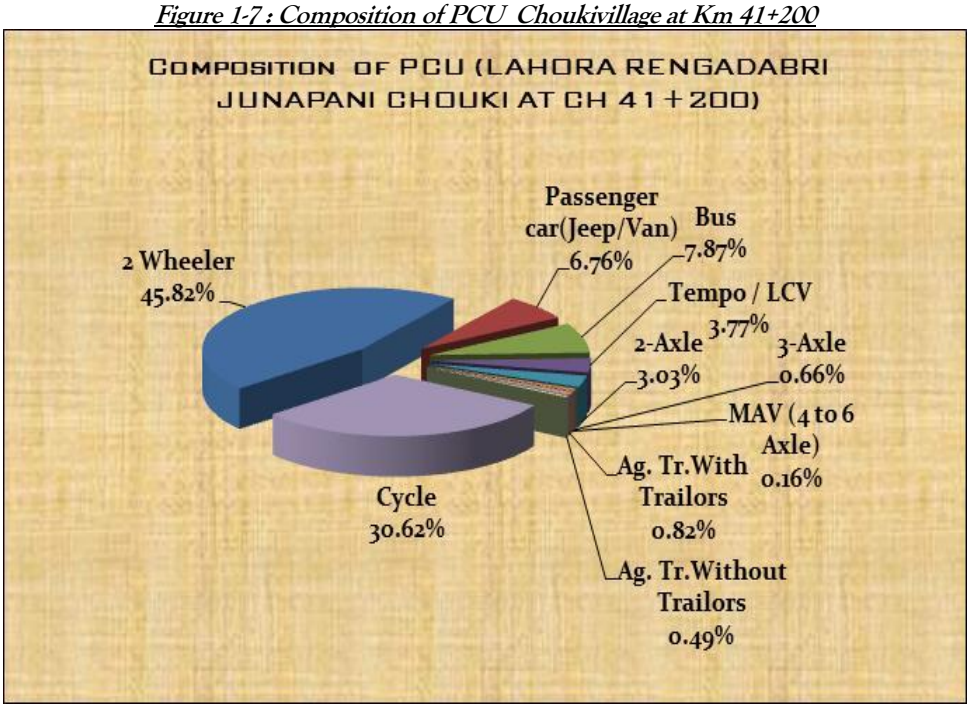


Figure 1-7 : Composition of PCU Choukivillage at Km 41+200



1.6.3 Turning Movement Count

The objective of turning movement count survey is to estimate the direction-wise movement of the traffic at all major intersections on the project road and thus to arriving at the contribution and diversion of the traffic from adjacent road network.

The survey data have been analysed to obtain the peak hours with flow of vehicles in each direction at the location of end point of project road.

Photo : -At Ch- 42+010 (TMC)

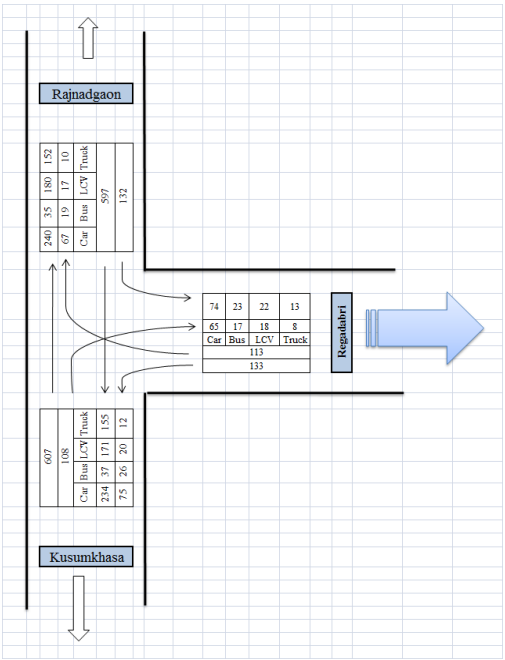


Figure : Ch-0+000 (TMC)

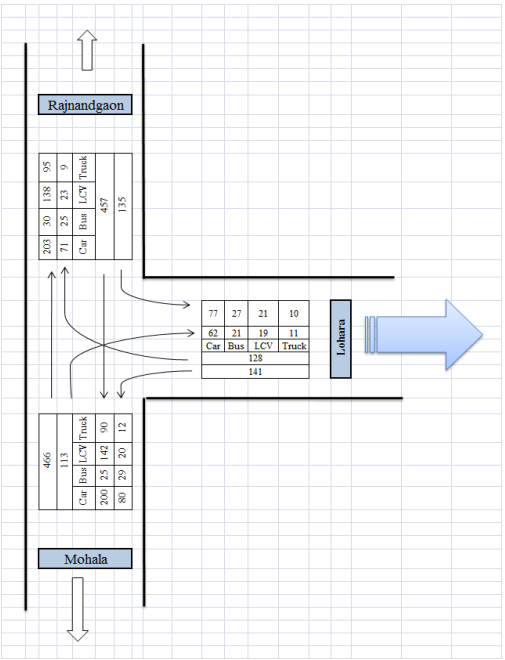


Figure : Ch-40+010 (TMC)

1.6.4 Origin Destination Survey

To capture the productions and attractions of passenger and goods movement, from the respective zones, OD survey was carried. Roadside Interview method, as detailed in IRC: 102-1988, was used for O-D survey. The survey was carried out for both passenger and goods vehicles for 24 hours (in both directions) and trip data was collected at the volume count locations by trained enumerators under the supervision of Transportation Engineers. From the O-D survey, travel characteristics like origin and destination, occupancy, trip purpose and length of trip by mode type are captured. For goods modes, the survey elicited characteristics like origin and destination, commodity type, trip frequency and length of trip.

A reasonable sample size (about 10%) of vehicles was collected. Travel patterns for were established on the basis of these surveys.

Zoning

To study the travel pattern the project corridor influence area is divided in to 11 Zones. Zoning is done in such a way that the characteristics of inter zonal as well as intra zonal trips could be clearly analyzed and their influence is assessed on the project corridor. For the easy understanding of the traffic assignment, small zones are avoided and clubbed together. The Project passing area i.e., Choukiis considered in one zone, Lohara&Bhansula are considered in another. The districts such as Rajnandgaon,Kanker, Bemetara,Balodare considered as separate zones. The trips from rest of Chhattisgarh are

considered in one zone. Similarly different zones for the trips coming from the states likeMadhya Pradesh, Maharashtra, Odisha and Telangana, Jharkhand are given. Adopted zoning scheme and Zone Map is presented below.

Table –1-12: Places covered under Zone

PlacescoveredunderZone	Zonecode
Lohara	1
Chouki	2
Dongargaon	3
Rajnandgaon	4
Bemetara	5
Dhamtari	6
Kanker	7
Mohala, Dongargaon	8
Manpur	9
RestofChhattisgarh	10
RestofIndia	11

The result of Origin Destination Survey is presented at separate annxure-V. at the end of the volume – 1 report.

Commodity Analysis

During the O-D surveys, information of goods pertaining to commodity and tonnage were recorded along with the origin destination details. The information so collected was analysed to assess the kind of goods movement on the project road. The commoditywise goods movement pattern at both locations across different vehicle categories in terms of share has been presented in Table

Table :Commodity Wise Goods Movement Pattern (at Average of Km 2.70)

Commodity Type	LCV	2-Axle	3-Axle	MAV	Total Commodity In %
1.Food Grains	3.10	9.66	4.67	1.94	19.35
2.Fruits and Vegetables	0.00	0.00	0.00	0.00	0.00
3.Fertilizers	0.00	0.00	0.00	0.00	0.00
4.Petroleum	0.00	0.00	0.00	0.00	0.00
5.Building Materials	0.00	0.00	0.00	0.00	0.00
6.Textiles	0.00	0.00	0.00	0.00	0.00
7.Household Goods	0.00	0.00	0.00	0.00	0.00
8.Mineral Oils	0.00	0.00	0.00	0.00	0.00
9.Heavy Machinery	0.00	0.00	0.00	0.00	0.00
10.Empty	6.71	20.92	10.12	4.19	41.94
11.Other	10.06	15.44	10.89	2.32	38.71
				Total Commodity	**100**

1.6.5 Axle Load Survey

The vehicle damage factor is a multiplier for converting the number of commercial vehicles of different axle loads to the number of standard axle load repetitions. Design of new pavement for additional lane or strengthening of existing pavement is based upon the cumulative number of 80 kN*(IRC-37-2012 clause no. 4.4.2)*equivalent standard axles (ESA) that will pass over during the 15 year design period. The classes of traffic which lead to significant axle loads (or damage) to the pavement and accordingly considered for design are: LCVs, two / three axle and multi axle trucks. Cumulative standard axles (CSA) are calculated in accordance with the guidelines provided in IRC: 37 – 2012 and IRC: 81 - 1997. The overloaded vehicles have serious adverse impact on performance of pavement. It has been ascertained that the damaging effect of axles on flexible pavement is approximately proportional to the fourth power of the axle load *(IRC-37-2012 clause no. 4.4.3)*.

The equivalent single axle loads (ESALs) have been calculated assuming that the project road will be opened to traffic in the year 2018.

Photo : At Ch-2+700 Axel Load Survey-1)

Table 1-13: Summary of VDF

LOCATION	DIRECTION	Commercial Vehicle			
		LCV	2AXLE	3 AXLE	MAV
I	II	III	IV	V	VI
KM 2+700	Lohara to Chouki	0.0037	2.7709	7.4929	0.0000
	Chouki to Lohara	0.0021	0.0372	6.7442	0.0000
Adopted Maximum VDF		0.0037	2.7709	7.4929	0.0000

Reference: Details have been given in Annexure-4.2

Table 1-13(a): Summary of MSA

Name of the road	MSA for 15th (2+700)	Adopted Design MSA
LoharaRengadabriJunapaniChouki Road	5.11	10

Reference: Details have been given in Annexure- 4.3

1.6.6 Homogeneous Section

The entire Project Road is considering as one homogeneous sections based on traffic volume and its characteristics.

Table 1-14 : Homogeneous Section

Sr. No.	*Homogenous Section*	*Existing Length (km)*	*Design Length (km)*
1	LoharaRengadabriJunapaniChouki Road	42.010	41.983

1.6.7 Growth Rate

Adopted growth rate is 5% **Ref. *IR-37, 2012 Page 6 clause 4.2.2*** for commercial vehicles along the project road. The growth of remain traffic moving vehicles is taken as 5% "Reference : Ministry of Shipping, Road Transport & Highways, (18th January, 2008 reference no. RW/NH-37011/57/2006-PIC) 5% traffic growth rate."

Summary of projected traffic based on adopted growth rate is provided in Table given below:

Table 1-15: Projected Traffic Volume, Veh/day and PCU/day
LoharaRengadabriJunapaniChouki Road

Project Road	Year 2015	Year 2018	Year 2025	Year 2030	Year 2032
I	II	III	IV	V	VI
Projection of ADT					
Total Fast Moving Vehicle (Motorised Traffic)	2665	3379	4755	6069	6691
Slow Moving Vehicle (Non-Motorised Traffic)	1406	1782	2508	3201	3529
Traffic (Number)	4071	5162	7263	9269	10220
Projection (PCUs/day)	(2421)	(3069)	(4318)	(5511)	(6047)

Note: Values in bracket indicate PCUs/day

1.6.8 Annual Average Daily Traffic

Seasonal Factor

Average daily traffic (ADT) from the volume counts where accounted for the monthly variations (within one year) to obtain the annual average daily traffic (AADT). Due to absence of monthly traffic data on the study corridor ,Month wise fuel sales data is collected from one fuel station on NH –05 for the past one year (From June 2014-May 2015) to estimate the seasonal factor. The seasonal factor has been calculated for the month of October. For care combined sale of petrol and diesel has been considered as there is petrol based and diesel based cars available in India for commercial vehicles diesel sale is taken into account based on the assumption that commercial vehicles use only diesel the seasonal factor is found to be 1.05 for car and 1.08 for commercial vehicles. A factor of 1.00 has been adopted for bus assuming that no seasonal variation is present for bus traffic on the corridor. A month wise seasonal factor for different types of modes is presented in below table some factor is used for all location.

Table : Seasonal Factor For AADT

Year	Fuel sale-2014		Total	Monthly Seasonal Factor-Petrol	Monthly Seasonal Factor-Diesel	Monthly Seasonal Factor-Combined
	Petrol	Diesel				
	(in Litres)	(in Litters)				
June 2014	21980	58738	80718	0.72	0.74	0.74
July 2014	26687	70978	97665	0.88	0.90	0.89
August 2014	33415	84511	117926	1.10	1.07	1.08
September 2014	31996	84782	116778	1.05	1.07	1.07
October 2014	31718	85644	**117362**	1.05	1.08	1.07
November 2014	32166	80470	112636	1.06	1.02	1.03
December 2014	28101	70969	99070	0.93	0.90	0.90
January 2015	28916	77248	106164	0.95	0.98	0.97
February 2015	34068	91122	125191	1.12	1.15	1.14
March 2015	33728	86710	120438	1.11	1.10	1.10
April 2015	27544	73683	101227	0.91	0.93	0.92
May 2015	24700	61768	86468	0.81	0.78	0.79
Average	**29585**	**77219**	**106803**			

Traffic survey were carried out in the month of October and AADT computed by multiplying the respective SCF the ADT. As seen from above Table the average consumption of petrol and diesel together for the month of October is 1.07. Therefore to arrive at Annual Average Daily Traffic (AADT), the average daily traffic figures of October are multiplied by 1.00.The summary of AADT for the project road is presented in below table

Type of Vehicles	Average of all Survey Location
I	II
2-Wheeler	2330
3-Seater	0
Car/Vans/Jeeps(Taxi)	183
Mini Bus	0
Buses	37
LCVs	67
2-Axle Trucks	27
3-Axle Trucks	6
Multi Axle Trucks	1
Tractor	3
Tractor with Trailor	12
Cycle	1406
Cycle Rickshaw	0
Others	0
Total	**4072**

1.7 Capacity Analysis

Capacity analysis for project road has been carried out in order to define the **Level of Service-B (LOS)** offered by road sections under the prevailing roadway and traffic conditions.

Capacity and level of service guidelines

Capacity and design service volumes for various lane configurations specified by IRC: 64 – 1990: 'Capacity of Roads in Rural Areas' has been adopted for determining the Level of Service offered by the road sections during design period.

Capacity augmentation proposals (lane requirement)

The observations on the traffic data and traffic projections are as below –

Table 1-16: Capacity Analysis

Homogeneous Section	Chainagein Km (Design length)	Year by which Single lane Capacity Terminates	Lane Width required	
			2 lane Proposed Year	2 lane with paved shoulders Proposed year
I	II	III	IV	V
LoharaRengadabriJunapaniChouki Road	0.0 to 41.983	Already exhausted	2016	2045

The above observations infer that road is the need to reconstruction the Single lane carriageway to two lanes (i.e. 7 m width) on 2016. The two lane width for existing road will be sufficient for expected traffic growth by year 2032. Hence two lanes proposed for this project road.

Table 1-17: Summary of ADT

AVERAGE DAILY TRAFFIC SURVEY OF LOHARA REGADABRI JANAPANI CHOUKI ROAD

(Date: 10.10.2015 to 16.10.2015)

Section : Lohara Regadabri Janapani Chouki Road

Direction : Bothways Location: **Average of all 2 locations**

Location	Motorised Traffic											Non-Motorised Traffic					Grand Total	
	Passenger Vehicles					Goods Vehicles				Agricultural		Passenger	Goods Vehicles					
							Ord. Trucks							Animal Drawn				
	Two Wheeler	Three Wheeler	Car/Jeep	Mini Bus	Bus	Tempo / LCV	2 Axle	3 Axle	M Axle	Tractor with Trailor	Tractor	Cycle	Cycle Rickshaw	Animal Drawn	Horse Drawn	Hand Cart	ADT	PCU
PCU Factor	0.5	1.0	1.0	1.5	3.0	1.5	3.0	3.0	4.5	4.5	1.5	0.5	2.0	8.0	4.0	3.0		
KM 2+700	2478	0	182	0	34	66	26	5	0	12	2	1353	0	0	0	0	**4160**	**2454**
KM 41+200	2183	0	183	0	39	68	27	6	1	12	4	1459	0	0	0	0	**3983**	**2387**
AVG OF ALL LOCATIONS	2330	0	183	0	37	67	27	6	1	12	3	1406	0	0	0	0	**4072**	**2421**

1.8 Results of Engineering Surveys and Investigations

1.8.1 Pavement Condition

The condition survey of existing pavement includes the assessment of pavement, shoulder, embankment and drainage condition. In pavement condition data regarding pavement distress like cracking, ravelling, potholes are recorded in terms of pavement affected. The edge break is measured in length and rutting is measured in mm depth. Shoulder Condition is assessed as earthen shoulder, corrugation or ruts development in mm and shoulder edge drop in mm.

Distresses like ravelling, Patching and Cracks are found during the investigation at many locations along the project road hence, entire project road goes under reconstruction from WBM layer, which is almost present in the entire project stretch Road. The existing crust WBM, GSB (murrum) subgrade all layers are consider as a part of thickness for proposed subgrade.The appropriate grade and profile correction is assumed in the reconstruction of existing pavement.

Photo : Pavement Condition at Rural Section

Photo : Pavement Condition at Built-up Section

1.8.2 Pavement Investigation

Summary of the layer thickness as recorded from test pits are as under:

Photo ; Existing Crust Thickness Survey

Table 1-18: Summary of Crust Thickness in mm

S.No.	Site Identification		Thickness (mm) of Pavement Layers and Material Type			Total Length (mm)
	Location(Km)	RHS/LHS	Combined BT	WBM/WMM	G.S.B.	
I	II	III	IV	V	VI	IX
1	0+190	LHS	20	140	150	100
2	2+440	LHS	30	130	140	90
3	5+890	RHS	25	140	150	90
4	7+450	RHS	35	150	150	80
5	9+760	RHS	40	160	140	90
6	11+915	LHS	45	150	130	100
7	14+550	RHS	30	140	140	100
8	16+800	RHS	20	150	150	110
9	19+050	RHS	35	140	160	100
10	21+600	RHS	40	130	170	90
11	23+750	LHS	30	140	150	90
12	28+780	LHS	40	150	160	80
13	30+950	LHS	45	160	170	80
14	33+200	RHS	30	150	170	70
15	35+635	RHS	35	140	160	80
16	37+200	LHS	30	140	150	90
17	39+150	RHS	25	130	160	80

1.8.3 Rigid Pavement

There is existing rigid pavement in following stretches shown in table below:

Table 1-19: Existing Rigid Pavement

Sr. No.	Chainage		Length (m)	Villages/Town	Width
	From	To			
I	II	III	IV	V	VI
Nil					

1.9 Improvement Proposals

The improvement proposals for proposed widening include the provisions for the following major items:

- Proposed Pavement Design
- Rearrangement of Junctions
- Traffic Control and Safety Measures
- Bridge and Cross Drainage Structures

1.9.1 Reconstruction Proposal

In order to meet future traffic requirement the existing carriageway is proposed to upgrade to achieve high speed of travel with comfort and safety. Concentric widening scheme shall be followed to minimise land acquisition issues and to ensure maximum utilisation of existing carriageway. Tables given below shows relation between existing and proposed chainage and section wise improvement proposed for the project road.

Table 1-20 : Existing – Proposed Chainage

Sr. No.	Section	Existing Chainage	Proposed Chainage
1	LoharaRengadabriJunapaniChouki Road	0+000 to 42.010	0+000 to 41+983

Table 1-21(A) : Pavement Proposal for Project Road

ROAD :- LAHORA RENGADABRI JUNAPANI CHOUKI												
Chainage From	Chainage To	Length (m)	Proposal	Design CBR (%)	Proposed Width (m)	Shoulder (BHS in m)		Proposed Pavement Composition (All Dimensions are in mm)				C/S Type
						Hard	Paved	BC	DBM	WMM	GSB	
0+000	0+800	800	Reconstruction Rigid Pavement With Drain	8	7.0	3.16	1.5	300 PQC	150 DLC		150	III
0+800	1+160	360	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
1+160	1+460	300	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
1+460	1+980	520	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
1+980	2+100	120	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
2+100	2+260	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
2+260	2+500	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
2+500	2+600	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
2+600	3+120	520	Reconstruction Rigid Pavement With Drain	8	7.0	3.16	1.5	300 PQC	150 DLC		150	III
3+120	3+360	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
3+360	3+580	220	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
3+580	4+760	1180	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
4+760	4+900	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
4+900	6+460	1560	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
6+460	6+740	280	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
6+740	7+520	780	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
7+520	7+580	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
7+580	8+080	500	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
8+080	8+120	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
8+120	8+280	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
8+280	8+440	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
8+440	8+540	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
8+540	8+600	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
8+600	9+200	600	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
9+200	9+280	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
9+280	9+880	600	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
9+880	9+940	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
9+940	10+200	260	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
10+200	10+280	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
10+280	10+620	340	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
10+620	10+680	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
10+680	10+920	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I

ROAD :- LAHORA RENGADABRI JUNAPANI CHOUKI												
Chainage From	Chainage To	Length (m)	Proposal	Design CBR (%)	Proposed Width (m)	Shoulder (BHS in m)		Proposed Pavement Composition (All Dimensions are in mm)				C/S Type
						Hard	Paved	BC	DBM	WMM	GSB	
10+920	11+000	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
11+000	11+220	220	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
11+220	11+300	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
11+300	11+780	480	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
11+780	11+900	120	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
11+900	12+140	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
12+140	12+200	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
12+200	13+280	1080	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
13+280	14+100	820	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
14+100	14+540	440	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
14+540	14+620	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
14+620	14+840	220	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
14+840	15+560	720	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
15+560	15+640	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
15+640	15+720	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
15+720	15+780	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
15+780	16+440	660	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
16+440	16+850	410	Reconstruction Rigid Pavement With Drain	8	7.0	3.16	1.5	300 PQC	150 DLC		150	III
16+850	17+340	490	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
17+340	17+480	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
17+480	17+640	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
17+640	17+740	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
17+740	18+160	420	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
18+160	18+200	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
18+200	18+680	480	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
18+680	18+780	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
18+780	18+940	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
18+940	19+560	620	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
19+560	19+600	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
19+600	19+860	260	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
19+860	19+960	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
19+960	20+080	120	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
20+080	20+300	220	Reconstruction Rigid Pavement With Drain	8	7.0	3.16	1.5	300 PQC	150 DLC		150	III
20+300	20+400	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
20+400	20+460	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
20+460	20+800	340	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I

ROAD :- LAHORA RENGADABRI JUNAPANI CHOUKI												
Chainage From	Chainage To	Length (m)	Proposal	Design CBR (%)	Proposed Width (m)	Shoulder (BHS in m)		Proposed Pavement Composition (All Dimensions are in mm)				C/S Type
						Hard	Paved	BC	DBM	WMM	GSB	
20+800	20+840	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
20+840	20+980	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
20+980	21+140	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
21+140	21+400	260	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
21+400	21+500	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
21+500	23+120	1620	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
23+120	23+180	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
23+180	23+240	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
23+240	23+600	360	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
23+600	24+100	500	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
24+100	24+220	120	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
24+220	24+500	280	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
24+500	24+660	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
24+660	24+800	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
24+800	24+880	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
24+880	25+680	800	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
25+680	25+840	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
25+840	25+920	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
25+920	25+960	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
25+960	26+200	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
26+200	26+240	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
26+240	26+540	300	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
26+540	26+660	120	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
26+660	26+740	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
26+740	26+820	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
26+820	27+360	540	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
27+360	27+460	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
27+460	27+860	400	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
27+860	27+900	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
27+900	27+920	20	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
27+920	28+360	440	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
28+360	29+220	860	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
29+220	29+260	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
29+260	29+540	280	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
29+540	29+580	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
29+580	29+880	300	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
29+880	30+100	220	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
30+100	30+320	220	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
30+320	30+680	360	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
30+680	30+860	180	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
30+860	30+940	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
30+940	31+080	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
31+080	31+180	100	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
31+180	31+240	60	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
31+240	31+800	560	Reconstruction Rigid Pavement With Drain	8	7.0	3.16	1.5	300 PQC	150 DLC		150	III

ROAD :- LAHORA RENGADABRI JUNAPANI CHOUKI												
Chainage From	Chainage To	Length (m)	Proposal	Design CBR (%)	Proposed Width (m)	Shoulder (BHS in m)		Proposed Pavement Composition (All Dimensions are in mm)				C/S Type
						Hard	Paved	BC	DBM	WMM	GSB	
31+800	32+760	960	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
32+760	33+360	600	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
33+360	33+660	300	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
33+660	33+800	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
33+800	34+040	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
34+040	34+080	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
34+080	34+480	400	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
34+480	34+900	420	Reconstruction Rigid Pavement With Drain	8	7.0	3.16	1.5	300 PQC	150 DLC		150	III
34+900	34+940	40	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
34+940	35+840	900	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
35+840	36+020	180	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
36+020	36+160	140	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
36+160	36+380	220	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
36+380	36+640	260	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
36+640	37+000	360	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
37+000	37+380	380	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
37+380	37+560	180	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
37+560	38+060	500	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
38+060	38+300	240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
38+300	38+660	360	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
38+660	38+740	80	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
38+740	39+120	380	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
39+120	39+280	160	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
39+280	39+600	320	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250	200	II
39+600	39+960	360	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
39+960	40+160	200	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	IV
40+160	41+400	1240	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
41+400	41+520	120	Reconstruction Flexible pavement With Drain	8.0	7.0	3.16	1.5	40	60	250.0	200	II
41+520	41+983	463	Reconstruction Flexible pavement	8.0	7.0	2.5	_	40	60	250	200	I
Total Length(m)		41983										

Table 1-21(B) : Summary of PavementProposal

S.No.	TCS	Proposal	Length (m)
1.	TCS-I	Flexible Pavement	28113
2.	TCS-II	Flexible Pavement With Drain	4220
3.	TCS-III	Rigid Pavement With Drain	2930
4.	TCS-IV	Flexible Pavement	6720
5.	**Total Length (m)**		41983

- The existing pavement is reconstructed on base layer of WBM, which is almost present in the entire project stretch Road. The existing crust WBM & GSB layers are consider as a part of thickness for proposed subgrade The appropriate grade and profile correction is assumed in the reconstruction of existing pavement.

- The project road is to be designed for 65 km/hr to 80 km/hr speed in entire project road length.

1.9.2 Pavement Design

The existing pavement is reconstructed on base layer of WBM, which is almost present in the entire project stretch Road. The appropriate grade and profile correction is assumed in the reconstruction of existing pavement.

The flexible pavement is adopted for proposed carriageway reconstruction. Design period of 15 year for bituminous layers & 30 for non-bituminous layers are adopted for carriageway. That has been designed as per **IRC 37:2012 Page no 27 Plate 6**. The proposed pavement design standard is presented in Table given below:

Table 1-22: Flexible Pavement Design

Homogeneous Section	(LoharaRengadabriJunapaniChouki Road) (Total length = 39.053 km)
Design Period	**15 Year**
MSA	**5.11**
Design MSA	**10**
Design CBR (%)	**8**
Design CBR (%) for Hard Shoulder	**12**
BC (mm)	**40**
Dense Bituminous Macadam (mm)	**60**
Wet Mix Macadam (mm)	**250**
Granular Sub-base (mm)	**200**
Sub grade (mm)	**500**

Table 1-22(B): Rigid Pavement Design

Homogeneous Section	((LoharaRengadabriJunapaniChouki Road) (Total length = 2.930 km)
Design Period	30 Year
Design CBR (%)	8
Design CBR (%) for Hard Shoulder	12
PQC (mm)	300
DLC (mm)	150
Granular Sub-base (mm)	150
Sub grade (mm)	500

1.9.3 Junction Improvement

Simplicity and uniformity is the guiding principle for intersection design to ensure safe passage maneuvers. The primary factors considered while proposing improvement to the geometry of the existing junctions are smooth turning of vehicles, reduction of conflicts, provision of corner sight distance and safety. The geometric design of junctions is based on IRC: SP 41: Guidelines for the Design of at grade Intersections in Rural & Urban Areas. The design and detailing of all intersections are based on the type designs as outlined in the document titled, .Type Designs for Intersections on National highways. Prepared by the MORTH New Delhi 1995.

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Few of the notable major junctions along the project road are mentioned at Table 1-23 (A). Apart from these, there are several minor roads that are intersecting the project road. Most of the roads are constructed under schemes namely PradhanMantri Gram SadakYojana (PMGSY) and National Rural Employment Guaranty Act (NREGA). Thus, adequate connectivity to surrounding habitations from the project road is found.

Photo ; Minor Intersection

Photo; Minor Intersection

Table 1-23: Improvement Proposed for at-Grade Intersections

Table 1-23 (A): Major Junction Details

Sr. No.	Existing Chainage (Km)	Design Chainage (m)	Major/Minor Junction	Destination		Surface Type	Type of Junction	Width (m)
				Left	Right			
I	II	III	IV	V	VI	VII	VIII	X
1	0+000	0+000	Major	Bhanuprtapur	Rajnandgaon	BT	T-Junction	2 lane
2	42+010	41+983	Major	Manpur	Rajnandgaon	BT	T-Junction	2 lane

Table 1-23 (B): Minor Junction Details

Sr. No.	Existing Chainage (Km)	Destinations of Cross Road	Type of Junction	Road Side	Category of Junction(Major/Minor)
I	II	III	IV	V	VI
1	0+820	Madiyakatta	Y-Junction	RHS	Minor
2	2+290	Bagayikona	Y-Junction	RHS	Minor
3	3+060	Kamata	T-Junction	LHS	Minor
4	3+500	Kamta(PMGSY)	T-Junction	LHS	Minor
5	5+560	Killekoda	Y-Junction	LHS	Minor
6	7+860	Keriya Gondi	Y-Junction	RHS	Minor
7	10+590	Kholjar	Y-Junction	LHS	Minor
8	10+640	Raigarh	T-Junction	RHS	Minor
9	11+460	Mathri	T-Junction	RHS	Minor
10	11+700	dhamdighat	Y-Junction	LHS	Minor
11	13+640	Netamtola	T-Junction	RHS	Minor
12	13+980	Gotatola	T-Junction	RHS	Minor
13	14+400	Manchwa	Y-Junction	LHS	Minor
14	18+120	Kerkata	T-Junction	RHS	Minor
15	18+200	Kharkhara,Sanjari	Y-Junction	RHS	Minor
16	22+700	Chilamgota	T-Junction	LHS	Minor
17	23+640	Mangcho	Y-Junction	LHS	Minor
18	26+320	Bhimatola	T-Junction	RHS	Minor
19	28+250	Machawa	Y-Junction	LHS	Minor
20	28+540	Junapanibasti	T-Junction	LHS	Minor
21	30+930	Umarwahi	T-Junction	RHS	Minor
22	31+440	Uchayipur/Chikhala-kassa	T-Junction	LHS/RHS	Minor
23	33+040	Kachanpahari	T-Junction	RHS	Minor
24	34+400	Aatragaon	T-Junction	LHS	Minor
25	36+410	Aatragaon	T-Junction	LHS	Minor
26	36+680	Chachandpahari	T-Junction	RHS	Minor
27	37+060	Kasaritola	T-Junction	LHS	Minor

Sr. No.	Existing Chainage (Km)	Destinations of Cross Road	Type of Junction	Road Side	Category of Junction(Major/Minor)
I	II	III	IV	V	VI
28	40+250	Dongaghat	T-Junction	RHS	Minor

1.9.4 Geometric Improvement

In order to upgrade the road to the geometric requirements commensurate with the design speed, improvement has been proposed for the Project Road. The alignment passes through several villages and habitation areas of which some have built-up sections.

In order to utilize the existing carriageway to the maximum extent, the proposed center line has been aligned within the existing carriageway (with necessary correction to geometry.

Properly designed horizontal curves have been provided commensurate with design speed. All super-elevated curves have been provided with designed transition lengths. The existing geometry (both horizontal and vertical) is found to be inadequate. The alignments of the curves in these locations have been suitably corrected as per IRC standards. At the location of structures and back-to-back occurrence of summit and valley curves, correction of vertical profile is also carried out keeping in view the available and adequate sight distances.,

Photo ; Horizontal alignment along the project road.

Table 1-24: List Of Curve

Sr. No.	Start Chainage	End Chainage	Length (m)	Radius (m)
	From	To		
I	*II*	*III*	*IV*	*V*
1	0+874	0+949	75	140
2	1+439	1+476	37	200
3	2+641	2+644	3	120
4	2+659	2+692	33	50
5	2+766	2+772	6	100
6	2+830	2+930	100	60
7	4+807	4+882	75	80
8	5+004	5+017	13	50
9	5+071	5+098	27	60
10	5+964	6+136	172	100
11	8+410	8+461	51	100
12	8+489	8+505	16	80
13	8+810	8+890	80	70
14	10+565	10+582	17	85
15	11+285	11+360	75	100
16	12+264	12+374	110	110
17	12+478	12+492	14	35
18	12+919	12+987	68	55
19	13+142	13+163	21	18
20	13+224	13+289	65	25
21	13+525	13+553	28	28
22	13+918	13+954	36	60
23	13+980	14+141	161	12
24	15+732	15+823	91	30
25	15+906	15+927	21	45
26	16+173	16+196	23	80
27	16+324	16+434	110	120
28	17+538	17+576	38	120
29	17+696	17+716	20	110
30	17+947	18+035	88	120
31	18+080	18+100	20	100
32	18+195	18+208	13	22
33	18+947	18+951	4	120
34	18+967	18+993	26	100
35	19+921	19+934	13	100
36	19+966	19+982	16	100
37	20+049	20+095	46	100
38	20+269	20+280	11	100

Sr. No.	Start Chainage	End Chainage	Length (m)	Radius (m)
	From	To		
I	*II*	*III*	*IV*	*V*
39	20+364	20+379	15	70
40	20+578	20+601	23	100
41	20+657	20+800	143	80
42	22+726	22+744	18	25
43	22+765	22+838	73	30
44	23+335	23+349	14	15
45	23+622	23+662	40	40
46	24+649	24+715	66	150
47	25+569	25+611	42	60
48	25+755	25+763	8	140
49	26+360	26+370	10	120
50	26+408	26+454	46	80
51	26+572	26+591	19	80
52	26+737	26+810	73	80
53	27+632	27+650	18	60
54	27+660	27+729	69	60
55	28+221	28+227	6	140
56	28+255	28+298	43	100
57	28+494	28+515	21	60
58	28+516	28+535	19	60
59	28+997	29+036	39	150
60	31+775	31+805	30	140
61	31+841	31+928	87	140
62	32+711	32+740	29	110
63	32+797	32+835	38	60
64	32+920	32+972	52	100
65	33+853	34+055	202	140
66	34+354	34+447	93	120
67	34+509	34+519	10	50
68	34+715	34+745	30	50
69	35+566	35+666	100	140
70	36+282	36+367	85	150
71	36+529	36+596	67	140
72	37+065	37+095	40	80
73	38+995	39+138	143	100
74	39+680	39+790	110	100
75	41+368	41+432	64	45
76	41+811	41+835	24	60

As per IRC : SP :73 – 2015 page no 13 the Ruling Minimum Radii for plain terrain is 400m & absolute Minimum radii for plain terrain is 250 m. Also the details are given in table no 2.5 of Section 2 at Page no 13.

1.9.5 Bus Lay bays

There are nolocation proposed for Bus lay-Bay.

1.9.6 Truck Lay bays

There are nolocation proposed for Truck lay-Bay.

1.9.7 Road Marking & Traffic Signs

Appropriate road markings are provided with stop signs, give-way signs, traffic merging and diverging signs, lane closure signs, compulsory keep left/right signs or any other signs as per IRC-67. Advance cautionary signs are proposed for sharp curves along with chevron signs at the outer edge of the curves with appropriate delineators.

1.9.8 Major Bridge/ Minor Bridge & Cross Drainage Structures

There are existing 01 Major &02 Minor bridges along with 78numbers of culverts. During inventory and condition survey, the details of bridge Proposal containing Rehabilitation, Widening or Reconstruction is given in table : 1-26.

Table 1-25 Summary of Existing Bridges and CD woks is as below

Type of Structure	Major Bridges	Minor Bridges	Slab/ Arch Culvert	Vented Causeway	Hume Pipe Culvert
I	II	III	IV	V	VI
Existing Structure 81 Nos.	1	2	3	7	68

Table 1-26 : Summary of Improvement

Summary of Improvement								
S.No	Type of Structure	Existing Nos.	New Proposals				Total	Remark
			Rehabili-tation	Widening	Reconstr-uction	New Proposed		
1	Hume Pipe Culverts	68	1	5	40	1+31	78	22 HPC upgrade to Slab Culvert
2	Vented Causeway	7	Nil	Nil	Nil	Nil	Nil	5 VCW upgrade to MNB +2 VCW upgrade to Slab Culvert
3	Slab/Arch Culverts	2	Nil	Nil	2+22+2	Nil	26	
4	Box Culverts	1	1	Nil	Nil	Nil	1	
5	Minor Bridge	2	1	Nil	1+5	Nil	7	
6	Major Bridge	1	1	Nil	Nil	Nil	1	
Total Structures							81+32 =113	32 new proposed HPC

(a) *Table 1-27: Details of Major Bridge*

Details of Existing Major Bridge						Details of Proposed Major Bridge		
Sr. No	Existing Chainage	Design Chainage	Type of Existing Structure	No of Span / Pipe x Length Span / dia	Existing Width (m) Over all	Type of Structure Proposed	Arrangement No of Span / Pipe x Length Span / dia	Proposal & Proposed width
I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	-
1	12+335	12+324	SLAB (MJB)	2 X 16.80 & 1 X 34.80	7.40	SLAB (MJB)	2 X 16.80 & 1 X 34.80	Rehabilitation

(b) *Table 1-28: Details of Minor Bridge*

Details of Existing Minor Bridge						Details of Proposed Minor Bridge		
Sr. No	Existing Chainage	Design Chainage	Type of Existing Structure	No of Span / Pipe x Length Span / dia	Existing Width (m) Over all	Type of Structure Proposed	Arrangement No of Span / Pipe x Length Span / dia	Proposal & Proposed width
I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*X*
1	32+710	32+688	BOX (MNB)	1 Unit 5.0 X 5.0 and 1 Unit 4X5.0	8.40	BOX (MNB)	1 Unit 5.0 X 5.0 and 1 Unit 4X5.0	Rehabilitation
2	40+105	40+081	SLAB (MNB)	3 X 5.80	5.10	SLAB (MNB)	3 X 10.00	Reconstruction

(c) ***Table 1-29: DETAILS OF HUME PIPE CULVERTS***

Details of Existing Culvert						Details of Proposed Culvert		
Sr. No	Existing Chainage	Design Chainage	Type of Existing Structure	No of Span / Pipe x Length Span / dia	Existing Width (m)	Type of Structure Proposed	Arrangement No of Span / Pipe x Length Span / dia	Proposal & Proposed width
I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*X*
1	0+910	0+910	HPC	4 ROW 900	7.40	HPC	4 ROW 900	Widening
2	2+480	2+480	HPC - Canal	1 ROW 900	7.50	HPC - Canal	1 X 2.00	Reconstruction
3	3+365	3+365	HPC	1 ROW 900	7.50	HPC	1 ROW 1200	Reconstruction
4	3+800	3+800	HPC - Canal	1 ROW 900	9.40	HPC	1 X 2.00	Reconstruction
5	4+650	4+650	Pipe	1 ROW 900	7.50	HPC	1 ROW 1200	Reconstruction
6	5+900	5+897	HPC	1 ROW 900	7.30	HPC	1 ROW 1200	Reconstruction
7	6+525	6+522	HPC	3 ROW 900	7.55	SLAB	1 X 3.0	Reconstruction
8	6+655	6+652	HPC	6 ROW 1000	7.55	HPC	6 ROW 1000	Widening
9	7+215	7+211	HPC	1 ROW 900	7.55	HPC	1 ROW 1200	Reconstruction
10	7+495	7+491	HPC	1 ROW 900	7.55	HPC	1 ROW 1200	Reconstruction
11	8+090	8+086	HPC	1 ROW 900	7.50	HPC	1 ROW 1200	Reconstruction
12	8+420	8+416	HPC	3 ROW 900	7.50	SLAB	1 X 3.0	Reconstruction
13	8+585	8+581	HPC	1 ROW 900	7.60	HPC	1 ROW 1200	Reconstruction
14	9+260	9+254	HPC	3 ROW 900	7.65	SLAB	1 X 3.0	Reconstruction
15	9+440	9+434	HPC	3 ROW 900	7.50	SLAB	1 X 3.0	Reconstruction
16	9+560	9+554	HPC	6 ROW 1000	7.65	HPC	6 ROW 1000	Widening
17	9+930	9+924	HPC	3 ROW 900	7.55	SLAB	1 X 4.00	Reconstruction
18	10+235	10+228	HPC	1 ROW 900	7.50	HPC	1 ROW 1200	Reconstruction
19	10+445	10+438	HPC	1 ROW 1000	7.55	HPC	1 ROW 1200	Reconstruction
20	10+655	10+648	HPC	3 ROW 900	7.60	SLAB	1 X 4.00	Reconstruction
21	12+180	12+173	HPC	1 ROW 900	7.55	HPC	1 ROW 1200	Reconstruction
22	12+835	12+827	HPC	6 ROW 1000	7.55	HPC	6 ROW 1000	Widening
23	13+135	13+127	HPC	1 ROW 1000	7.45	HPC	1 ROW 1200	Reconstruction
24	14+110	14+098	HPC	1 ROW 900	7.55	HPC	1 ROW 1200	Reconstruction
25	15+625	15+612	HPC	1 ROW 1000	7.55	HPC	1 X 2.00	Reconstruction
26	18+185	18+170	HCP	1 ROW 900	7.60	HPC	1 X 2.00	Reconstruction
27	18+885	18+870	HPC	3 ROW 900	7.50	HPC	1 X 4.00	Reconstruction
28	18+930	18+930	HPC	1 ROW 1000	7.60	SLAB	1 X 2.00	Reconstruction
29	19+210	19+195	HPC - Canal	1 ROW 450	12.55	HPC	1 X 2.00	Reconstruction
30	19+620	19+614	HPC	1 ROW 900	7.55	HPC	1 ROW 1200	Reconstruction
31	19+825	19+809	HPC - Canal	1 ROW 600	15.00	HPC	1 X 2.00	Reconstruction
32	19+835	19+819	HPC	1 ROW 900	7.55	HPC	1 ROW 1200	Reconstruction
33	19+965	19+959	HPC	1 ROW 900	7.60	HPC	1 ROW 1200	Reconstruction
34	20+235	20+218	HPC	1 ROW 900	7.60	HPC	1 ROW 1200	Reconstruction

Details of Existing Culvert						Details of Proposed Culvert		
Sr. No	Existing Chainage	Design Chainage	Type of Existing Structure	No of Span / Pipe x Length Span / dia	Existing Width (m)	Type of Structure Proposed	Arrangement No of Span / Pipe x Length Span / dia	Proposal & Proposed width
I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*X*
35	20+380	20+364	HPC	1 ROW 900	7.60	HPC	1 ROW 1200	Reconstruction
36	20+455	20+439	HPC	1 ROW 900	7.60	HPC	1 ROW 1200	Reconstruction
37	20+500	20+484	HPC	6 ROW 1000	7.50	HPC	6 ROW 1000	Widening
38	20+620	20+604	HPC	2 ROW 900	7.55	HPC	2 ROW 1200	Reconstruction
39	22+015	22+000	HPC	3 ROW 900	7.55	HPC	1 X 4.00	Reconstruction
40	22+455	22+438	HPC	1 ROW 900	7.50	HPC	1 ROW 1200	Reconstruction
41	22+760	22+743	HPC	1 ROW 900	10.30	HPC	1 ROW 1200	Reconstruction
42	24+880	24+860	HPC	2 ROW 900	7.55	SLAB	1 X 2.00	Reconstruction
43	25+790	25+770	HPC	2 ROW 900	7.50	SLAB	1 X 2.00	Reconstruction
44	25+950	25+930	HPC	2 ROW 600	7.60	HPC	2 ROW 1200	Reconstruction
45	26+235	26+215	HPC	1 ROW 600	7.55	HPC	1 ROW 1200	Reconstruction
46	26+625	26+605	HPC	2 ROW 900	7.55	HPC	2 ROW 1200	Reconstruction
47	26+790	26+770	HPC	1 ROW 600	7.65	HPC	1 ROW 1200	Reconstruction
48	27+650	27+630	HPC - Canal	1 ROW 600	6.75	HPC	1 X 2.00	Reconstruction
49	27+915	27+895	HPC	3 ROW 900	7.10	SLAB	1X4.00	Reconstruction
50	28+040	28+020	HPC	1 ROW 600	7.65	HPC	1 ROW 1200	Reconstruction
51	30+490	30+469	HPC	1 ROW 1000	10.10	HPC	1 ROW 1200	Reconstruction
52	30+655	30+634	HPC	2 ROW 900	10.10	HPC	2 ROW 1200	Reconstruction
53	31+120	31+100	HPC	2 ROW 600	10.00	HPC	2 ROW 1200	Reconstruction
54	31+360	31+339	HPC	1 ROW 600	10.00	HPC	1 ROW 1200	Reconstruction
55	32+905	32+883	HPC	1 ROW 900	10.10	HPC	1 ROW 1200	Reconstruction
56	33+190	33+168	HPC	2 ROW 900	10.10	HPC	2 ROW 1200	Reconstruction
57	33+385	33+363	HPC	2 ROW 600	10.15	HPC	2 ROW 1200	Reconstruction
58	33+655	33+632	HPC	1 ROW 900	10.10	HPC	1 ROW 1200	Reconstruction
59	33+730	33+707	HPC	2 ROW 1200	10.30	HPC	2 ROW 1200	Reconstruction
60	34+785	34+762	HPC	1 ROW 900	10.10	HPC	1 ROW 1200	Reconstruction
61	34+920	34+897	HPC	2 ROW 900	10.10	HPC	2 ROW 1200	Reconstruction
62	36+300	36+277	HPC	2 ROW 1200	10.15	HPC	2 ROW 1200	Rehabilitation
63	39+240	39+216	HPC	3 ROW 900	10.25	SLAB	1 X 4.00	Reconstruction
64	39+605	39+581	HPC	1 ROW 600	10.10	HPC	1 ROW 1200	Reconstruction
65	39+715	39+691	HPC	1 ROW 600	7.60	HPC	1 ROW 1200	Reconstruction
66	41+185	41+160	HPC - Canal	1 ROW 900	12.30	SLAB	1 X 2.00	Reconstruction
67	41+585	41+560	HPC - Canal	1 ROW 900	12.40	HPC	1 X 2.00	Reconstruction
68	41+940	41+914	HPC	1 ROW 600	10.25	HPC	1 ROW 1200	Reconstruction

(d) ***Table 1-30 DETAILS OF VCW***

Details of Existing Culvert						Details of Proposed Culvert		
Sr. No	Existing Chainage	Design Chainage	Type of Existing Structure	No of Span / Pipe x Length Span / dia	Existing Width (m)	Type of Structure Proposed	Arrangement No of Span / Pipe x Length Span / dia	Proposal & Proposed width
I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*X*
1	1+280	1+280	VCW	6 ROW 900	7.60	SLAB(MNB)	2X10.0	Reconstruction
2	4+850	4+848	VCW	6 ROW 900	7.60	SLAB	1 X 6.0	Reconstruction
3	11+875	11+868	VCW	6 ROW 900	7.50	SLAB	1 X 6.0	Reconstruction
4	17+425	17+411	VCW	6 ROW 900	5.10	SLAB(MNB)	2X10.0	Reconstruction
5	24+540	24+521	VCW	7 ROW 1000	7.55	SLAB(MNB)	2X10.0	Reconstruction
6	30+380	30+359	VCW	6 ROW 1200	10.20	SLAB(MNB)	2X10.0	Reconstruction
7	38+210	38+187	VCW	4 ROW 1200	5.00	SLAB(MNB)	2X10.0	Reconstruction

(e) ***Table 1-31 DETAILS OF SLAB CULVERTS***

Details of Existing Culvert						Details of Proposed Culvert		
Sr. No	Existing Chainage	Design Chainage	Type of Existing Structure	No of Span / Pipe x Length Span / dia	Existing Width (m) Over all	Type of Structure Proposed	Arrangement No of Span / Pipe x Length Span / dia	Proposal & Proposed width
I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*X*
1	16+100	16+084	SLAB	1 X 1.00	7.35	SLAB	1X2.00	Reconstruction
2	16+850	16+836	SLAB	1 X 1.00	7.40	SLAB	1X2.00	Reconstruction
3	32+520	32+498	BOX	2 X 3.0 X 2.5	8.45	BOX	2 X 3.0 X 2.5	Rehabilitation

1.10 Cost Estimate

Cost estimate for the project Road is finalised based on the improvement proposals.

Table 1-32: Cost of Civil Works

Section	Proposed Length (km)	Base Cost (Crores)	Base Cost Per K.M. (Crores)
I	*II*	*III*	*IV*
LoharaRengadabriJunapaniChouki Road	41.983	119.25	2.84

Reference: - Details have been given in ***chapter -6***

1.11 Conclusions and Recommendations

The following are general recommendations:

- Based on the lane Capacity analysis for project road has been carried out in order to define the Level of Service (LOS)-B (IRC: 64 – 1990: 'Capacity of Roads in Rural Areas') offered by road sections under the prevailing roadway and traffic conditions, We suggests going with two lanes with hard shoulder for **LoharaRengadabriJunapaniChouki Road.**
- The existing pavement is reconstructed on base layer of WBM, which is almost present in the entire project stretch Road.
- The quantity of existing crust i.e. WBM, GSB are consider as part of thickness for subgrade of proposed crust for project road.

  Note: The appropriate grade and profile correction is assumed in the reconstruction of existing pavement.
- We are going to improve two major junction at the CH 0+000 (starting point of project road) and at CH 41+980(End point of Project road).
- In villages, covered drains are proposed along the project road
- The project road is to be designed for 65 km/hr to 80 km/hr speed in entire project road length.
- The project can be constructed within 18 months period with strategic planning and through one construction package. The estimated basic civil cost is **Rs. 119.25 Crores**.