SITUATION ANALYSIS OF RURAL ROAD MAINTENANCE MANAGEMENT SYSTEM IN MADHYA PRADESH- A CASE STUDY IN JABALPUR DISTRICT BASED ON ROAD CONDITIONS

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ABSTRACT

Construction of rural roads brings multifaceted benefits to the rural areas by way of increase in agricultural production and the size of markets, better prices for agriculture produce, reduction in transport costs and the creation of off-farm employment opportunities. They also provide access to medical and educational facilities. Provision of rural roads is an effective element of a poverty reduction strategy. Rural roads form a large share of the total road network. If these roads are not maintained, the benefits disappear. Keeping these roads in a serviceable condition is crucial to the agricultural growth and affordable means of access to millions of rural people to social facilities such as health and education. Subsequent to a series of regional level workshops organized by the Ministry of Rural Development, and a series of overview studies supported by the World Bank on rural road maintenance in a few states, several areas for improvements in the delivery of maintenance have been identified. These include resource mobilization, maintenance planning, technology, implementation, monitoring and capacity building of local workers. Accordingly, to undertake a detailed situation analysis of rural road maintenance in Madhya Pradesh fieldwork was carried out in 28 Roads, four roads in each seven blocks of Jabalpur districts based on Road Conditions in the state of Madhya Pradesh. The finding of this study will be highly useful to preserve the benefits of huge rural road assets created recently in India.

KEYWORDS:-CVPD-Commercial Vehicles Passing per Day, DPR-Detailed Project Report, BC-Black Cotton, N-New, U-Upgradation.

I. INTRODUCTION

To understand the problems of road maintenance a study was conducted on Four Roads in each Block of Jabalpur district of Madhya Pradesh. The district comprises of seven blocks namely –

1.Jabalpur 2. Kundam 3.Majholi 4.Panagar 5.Patan 6.Shahpura 7.Sihora.

Road map route plan of Jabalpur District has been prepared and Road Code/Symbol has been given to portion of four roads in each block so as to ease the work, such as, JJR1 where J for Jabalpur District., J for Jabalpur Block, R1-R2-R3-R4 for road numbers 1,2,3,4; similarly for other Blocks as K for Kundam Block, M for Majholi Block, P for Panagar Block, PA for Patan Block, S for Sahapura Block and SI for Sihora Block.

So the whole study area has been identified and defined by these road codes. The portions of 28 number of roads selected for study are listed below with code -

Jabalpur Block

(1) JJR1 Pindrai to Hinotia (3.50 Km) (2) JJR2 NH 12 to Balhara (4.10 Km)
(3) JJR3 Bargi Dam Road to Rewa (4.45 Km) (4) JJR4 Bargi to Rangajhori (5.20 Km)

Kundam Block

(5) JKR1 SH 22 to Kalyanpur (15.65 Km) (6) JKR2 Kundam to Salaiya Road (0.90 Km)
(7) JKR3 SH 22 (Km 62/10) to Sahadra (3.70 Km) (8) JKR4 Jhiriya to Jaitpuri (3.40 Km)

Majholi Block

(9) JMR1Majholi to Suhajani (6.65 Km) (10) JMR2 AbhanaRoad to Umardha (3.26 Km)
(11) JMR3 T04 to Umaria (3.175 Km) (12) JMR4 Darshani to Gurji (3.50 Km)

Panagar Block

(13) JPR1 DumnaRoad to Gadheri (3.60 Km) (14) JPR2 SH 37 to Mangela (2.80 Km)
(15) JPR3 NH 7 to Imlai (2.10 Km) (16) JPR4 ODR to Urduakala (3.92 Km)

Patan Block

(17) JPAR1 SH37 to Kankarkheda (2.15 Km) (18) JPAR2 MDR to Luhari (1.50 Km)
(19) JPAR3 ODR to Rimjha (2.30 Km) (20) JPAR4 ODR to Thana (1.45 Km)

Shahpura Block

(21) JSR1TilwaraChargawa Road to Bagari(3.20 Km) (22) JSR2 Jabalpur Chargawa Road to Sunwara (2.40 Km)
(23) JSR3 NH- 12 to Sunacher (4.30 Km) (24) JSR4 NH12 to Basedi (2.00 Km)

Sihora Block

(25) JSIR1 NH 7 to Hyrdenagar (4.91 Km) (26) JSIR2 NH7 to Katra Khamariya (6.83 Km)
(27) JSIR3Pipariya to Marha (p) (3.00 Km) (28) JSIR4SihoraSilondi Road to Bhandra (4.40 Km)

II. CASE STUDY

As per the prescribed plan of Preliminary Survey, the following data has been collected, analysed and findings has been found -

(1) Data has been collected from the concern departments, and tabulated road wise as given in the format - Table 1.
(2) Data of the position of water table and water logging status in each road has been collected during the Site Survey by local enquiry along with traffic volume study in terms of number of commercial vehicle passing per day (CVPD); and are tabulated in Table 1.
(3) The Rainfall, Weather Condition and Variation of Temperature datafor the study area has been collected and is tabulated in Table 1.
(4) During the Transit visit in each road of study area the condition of Road and Road formation position, thickness of crust and year of construction arealso recorded.
(5) Soil samplesare collected from road sides and have been tested in lab for various parameters for the analysis and are tabulated in Table 2
(6) Some of the photographs,during Sample collection and lab testing,are taken and are arranged in Plate 1.

TABLE 1 : SITE SURVEY DATA for each select ROAD

S No	Road Code	Name of Road	Type of Road	Length of Road (KM)	Width of Road (m)	Thickness of Crust (mm)	Year of Construction	No. of Inter. Structure	Cost of Road workdone Lakh	Length of Rigid Pavement (CC) in km	Water Table Position (ft)	Water Logging Status	Rainfall (mm) Yearly	Weather Condition	Variation of Temperature Max-Min	Traffic Volume CVPD
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	JJR1	Pindrai to Hinotia	U	3.19	3.75/ 7.5	220	2009	6	74.33	0.40	360	No	700	Normal	40-10	6
2	JJR2	NH 12 to Balhara	U	4.10	3.75/ 7.5	220	2010	3	92.33	0.39	60	No	750	Normal	35-15	10
3	JJR3	Bargi Dam Road to Rewa	N	4.45	3.75/ 7.5	220	2007	6	68.92	0.05	150	No	600	Normal	35-15	12
4	JJR4	Bargi to Rangajhori	N	3.40	3.75/ 7.5	220	2006	7	57.81	0.40	120	No	800	Normal	35-10	12
5	JKR1	SH 22 to Kalyanpur	U	15.5 7	3.75/ 7.5	220	2009	25	333.45	1.41	450	No	850	Normal	40-15	36
6	JKR2	Kundam to Salaiya Road	U	0.90	3.75/ 7.5	220	2008	0	30.05	0.86	300	No	650	Normal	40-15	2
7	JKR3	SH 22 (Km 62/10)to Sahadra	N	3.70	3.75/ 7.5	220	2003	11	63.64	0.00	400	No	700	Normal	40-20	16
8	JKR4	Jhiriya to Jaitpuri	N	3.40	3.75/ 7.5	220	2006	10	88.92	0.16	200	No	650	Normal	40-20	20
9	JMR1	Majholi to Suhajani	N	6.65	3.75/ 7.5	220	2005	11	91.21	0.65	350	No	800	Normal	35-15	10
10	JMR2	Abhana Road to Umardha	N	1.62	3.75/ 7.5	220	2008	2	44.64	0.44	100	No	500	Normal	35-15	12
11	JMR3	T04 to Umaria	N	3.17	3.75/ 7.5	220	2006	8	60.75	0.34	200	No	600	Normal	40-20	16
12	JMR4	Darshani to Gurji	N	3.39 0	3.75/ 7.5	220	2008	6	99.42	1.19	400	No	800	Normal	40-20	20
13	JPR1	Dumna Road to Gadheri	N	3.56	3.75/ 7.5	220	2008	7	116.69	0.18	100	No	500	Normal	35-15	10
14	JPR2	SH 37 to Mangela	N	2.80	3.75/ 7.5	220	2003	4	42.05	0.07	100	No	700	Normal	35-15	8
15	JPR3	NH 7 to Imlai	N	2.10	3.75/ 7.5	220	2003	3	35.40	0.70	50	No	700	Normal	35-15	12

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S No	Road Code	Name of Road	Type of Road	Length of Road (KM)	Width of Road (m)	Thickness of Crust (mm)	Year of Construction	No. of Inter. Structure	Cost of Road work done (Lakh)	Length of Rigid Pavement (CC) in km	Water Table Position (ft)	Water Logging Status	Rainfall (mm) Yearly	Weather Condition	Variation of Temperature Max-Min	Traffic Volume CVPD
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
16	JPR4	ODR to Urduakala	N	3.39	3.75 /7.5	220	2006	7	62.17	0.24	150	Yes	900	Normal	35-15	10
17	JPAR 1	SH37 to Kankarkheda	U	2.10	3.75 /7.5	220	2010	2	49.28	0.37	300	Yes	900	Normal	35-15	6
18	JPAR 2	MDR to Luhari	N	1.50	3.75 /7.5	220	2006	3	36.16	1.50	80	Yes	800	Normal	35-15	2
19	JPAR 3	ODR to Rimjha	U	2.30	3.75 /7.5	220	2012	5	70.94	0.25	100	No	900	Normal	35-15	20
20	JPAR 4	ODR to Thana	U	1.45	3.75 /7.5	220	2012	4	37.41	0.35	100	No	1000	Normal	35-15	40
21	JSR1	Tilwara Chargawa Road to Bagari	N	2.93	3.75 /7.5	220	2008	6	61.08	0.60	50	No	900	Normal	40-20	38
22	JSR2	Jabalpur Chargawa Road to Sunwara	U	2.40	3.75 /7.5	220	2003	5	32.65	0.00	100	Yes	800	Normal	40-20	10
23	JSR3	NH- 12 to Sunacher	U	4.30	3.75 /7.5	220	2003	3	41.25	0.00	80	No	900	Normal	40-20	12
24	JSR4	NH12 to Basedi	N	2.00	3.75 /7.5	220	2006	5	32.14	0.00	100	No	800	Normal	35-15	38
25	JSIR1	NH 7 To Hyrde-nagar	N	3.42	3.75 /7.5	220	2006	10	67.42	0.47	200	No	800	Normal	40-20	6
26	JSIR2	NH7 to Katra Khamariya	N	6.83	3.75 /7.5	220	2005	17	129.37	0.96	150	No	700	Normal	35-15	8
27	JSIR3	Pipariya to Marha (p)	N	3.00	3.75 /7.5	220	2004	7	53.67	0.20	55	No	800	Normal	35-15	6
28	JSIR4	SihoraSilondi Road to Bhandra	N	4.23	3.75 /7.5	220	2007	10	80.98	1.46	150	No	900	Normal	35-10	20

Table 2 : Geotechnical Testing Report of Soil Samples Collected from Road Sites

S No.	Road Code	Name of Road with Length	Chainage	Proctor		CBR %	Atterberg Limits			FSI %	Grain Size Analysis (GSA)			Colour
				MDDg/cc	OMC %		LL %	PL %	PI %		Gravel %	Sand %	Silt & Clay %	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	JJR1	Pindrai to Hinotia (3.50 Km)	950 LHS	1.60	15	2.80	40	18	22	30.13	0	39	61	BC
2	JJR1	(L051) RDS to Hinotia (3.50 Km)	1750 LHS	1.64	11	2.90	34	15	19	29.23	0	28	72	Brown
3	JJR1	(L051) RDS to Hinotia (3.50 Km)	2500 RHS	1.68	14	2.70	35	15	20	31.71	1	27	72	Brown
4	JJR2	NH 12 to Balhara (4.10 Km)	880 LHS	1.62	16	2.52	41	22	19	34.90	0	28	72	BC
5	JJR3	Bargi Dam Road to Rewa (4.45 Km)	1400 LHS	1.62	9	3.10	35	18	17	23.85	1	30	70	Brown
6	JJR3	Bargi Dam Road to Rewa (4.45 Km)	3100 RHS	1.61	13	2.40	34	16	18	31.72	0	33	67	Yellow
7	JJR3	Bargi Dam Road to Rewa (4.45 Km)	4050 RHS	1.69	13	2.65	43	20	23	35.38	0	29	71	BC
8	JJR4	Bargi to Rangajhori (5.20 Km)	2200 RHS	1.85	10	5.50	30	19	11	9.54	24	31	45	Brown
9	JJR4	Bargi to Rangajhori (5.20 Km)	3200 RHS	1.89	15	6.15	27	15	11	9.54	55	33	12	Brown
10	JJR4	Bargi to Rangajhori (5.20 Km)	4200 RHS	1.89	11	5.25	31	19	12	10.55	48	37	15	Brown
11	JKR1	SH 22 to Kalyanpur (15.65 Km)	980 LHS	1.83	12	4.48	28.	17	11	30.13	3	20	77	Brown
12	JKR1	SH 22 to Kalyanpur (15.65 Km)	1800 RHS	1.87	12	4.31	36	23	13	31.72	0	18	82	BC
13	JKR1	SH 22 to Kalyanpur (15.65 Km)	2750 LHS	1.86	13	4.18	35	25	10	28.61	3	18	79	Brown
14	JKR1	SH 22 to Kalyanpur (15.65 Km)	3500 LHS	1.86	13	4.18	36	25	11	14.31	3	18	79	Red
15	JKR1	SH 22 to Kalyanpur (15.65 Km)	4700 LHS	1.84	12	4.47	39	25	14	14.31	4	17	79	Red
16	JKR1	SH 22 to Kalyanpur (15.65 Km)	5900 LHS	1.96	10	4.50	36	24	12	14.31	4	18	78	Red
17	JKR1	SH 22 to Kalyanpur (15.65 Km)	6800 RHS	1.71	14	2.49	41	23	18	14.31	1	17	82	Red

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				MDD g/cc	OMC %		LL %	PL %	PI %		Gravel %	Sand %	Silt & Clay %	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18	JKR1	SH 22 to Kalyanpur (15.65 Km)	7880 LHS	1.87	13	4.50	40	24	16	14.31	1	20	79	Red
19	JKR1	SH 22 to Kalyanpur (15.65 Km)	8500 RHS	1.86	13	4.36	39	25	14	19.08	3	18	79	Brown
20	JKR1	SH 22 to Kalyanpur (15.65 Km)	9700 LHS	1.96	10	4.44	33	19	14	19.08	3	18	79	Brown
21	JKR2	Kundam to Salaiya Road (0.90 Km)	400 RHS	1.98	10	6.83	28	14	14	15.56	54	26	20	Yellow
22	JKR3	SH 22 (Km 62/10)to Sahadra (3.70 Km)	800 LHS	1.70	13	3.50	35	14	21	24.60	20	48	32	Yellow
23	JKR3	SH 22 (Km 62/10) to Sahadra (3.70 Km)	1600 LHS	1.70	12	3.24	34	22	12	22.18	25	46	29	Yellow
24	JKR3	SH 22 (Km 62/10) to Sahadra (3.70 Km)	3100 RHS	1.72	14	3.10	33	14	19	23.85	8	70	22	Brown
25	JKR4	Jhiriya to Jaitpuri (3.40 Km)	700 LHS	1.88	13	6.12	31	20	11	15.34	30	60	10	Yellow
26	JKR4	Jhiriya to Jaitpuri (3.40 Km)	1800 LHS	1.85	11	8.10	31	19	12	20.59	11	64	25	Yellow
27	JKR4	Jhiriya to Jaitpuri (3.40 Km)	2800 RHS	1.72	10	5.83	32	21	11	15.82	3	88	9	Red
28	JMR1	Majholi to Suhajani (6.65 Km)	400 RHS	1.75	11	3.50	32	20	12	14.31	13	77	10	Red
29	JMR1	Majholi to Suhajani (6.65 Km)	1600 LHS	1.78	12	3.12	31	19	12	14.31	17	71	12	Red
30	JMR1	Majholi to Suhajani (6.65 Km)	2800 LHS	1.60	14	3.20	34	11	23	26.12	2	83	15	Yellow
31	JMR1	Majholi to Suhajani (6.65 Km)	3500 RHS	1.77	14	3.92	31	18	13	14,31	7	84	9	Red
32	JMR1	Majholi to Suhajani (6.65 Km)	4600 LHS	1.79	12	4.12	31	16	15	12.23	1	87	12	Red
33	JMR1	Majholi to Suhajani (6.65 Km)	5560 RHS	1.62	11	3.25	31	14	17	17.41	0	82	18	Brown
34	JMR2	Abhana Road to Umardha (3.26 Km)	850 LHS	1.76	14	3.72	34	18	16	19.08	0	55	45	Red

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				MDDg/cc	OMC %		LL %	PL %	PI %		Gravel %	Sand %	Silt & Clay %	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
35	JMR3	T04 to Umaria (3.175 Km)	720 LHS	1.59	10	2.23	41	20	21	34.90	0	68	32	Red
36	JMR3	T04 to Umaria (3.175 Km)	1700 RHS	1.69	14	2.93	35	20	15	35.38	0	71	29	Red
37	JMR3	T04 to Umaria (3.175 Km)	2600 LHS	1.65	11	2.24	39	22	17	34.90	0	79	21	Red
38	JMR4	Darshani to Gurji (3.50 Km)	90 LHS	1.75	13	3.56	35	18	17	24.60	0	68	32	Yellow
39	JMR4	Darshani to Gurji (3.50 Km)	1100 LHS	1.65	13	3.58	36	19	17	28.61	0	82	18	Brown
40	JMR4	Darshani to Gurji (3.50 Km)	2200 RHS	1.70	14	3.12	32	20	12	32.42	0	79	21	Yellow
41	JPR1	Dumna Road to Gadheri (3.60 Km)	750 LHS	1.70	11	5.24	32	17	15	19.97	11	57	32	Red
42	JPR1	Dumna Road to Gadheri (3.60 Km)	1800 RHS	1.72	14	4.92	32	20	12	19.97	13	42	45	Red
43	JPR1	Dumna Road to Gadheri (3.60 Km)	3100 LHS	1.62	13	3.88	35	18	17	31.72	2	64	34	Brown
44	JPR2	SH 37 To Mangela (2.80 Km)	700 LHS	1.60	13	2.11	38	17	21	31.72	0	77	23	BC
45	JPR2	SH 37 To Mangela (2.80 Km)	2100 RHS	1.64	13	2.60	35	19	16	30.75	0	68	32	BC
46	JPR3	NH 7 To Imlai (2.10 Km)	900 LHS	1.65	12	3.15	32	15	17	30.75	0	68	32	Yellow
47	JPR3	NH 7 To Imlai (2.10 Km)	1800 RHS	1.66	10	3.20	34	14	20	32.42	0	77	23	Yellow
48	JPR4	ODR to Urduakala (3.92 Km)	850 LHS	1.59	15	2.20	44	18	26	40.01	0	55	45	BC
49	JPR4	ODR to Urduakala (3.92 Km)	1960 RHS	1.60	11	2.21	42	15	27	31.72	0	66	34	BC
50	JPR4	ODR to Urduakala (3.92 Km)	2860 LHS	1.59	13	2.16	44	17	27	34.90	0	66	34	BC
51	JPAR1	SH37 to Kankarkheda (2.15 Km)	900 RHS	1.58	13	2.08	44	20	24	39.67	0	35	65	BC

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
52	JPAR2	MDR to Luhari (1.50 Km)	1000 RHS	1.54	10	2.16	43	18	25	41.46	0	35	65	BC
53	JPAR3	ODR to Rimjha (2.30 Km)	600 LHS	1.50	9	2.18	46	18	28	40.01	0	55	45	Yellow
54	JPAR3	ODR to Rimjha (2.30 Km)	1200 LHS	1.59	9	2.29	43	17	26	30.75	0	55	45	BC
55	JPAR4	ODR to Thana (1.45 Km)	910 RHS	1.50	11	2.21	46	20	26	42.92	0	52	48	Yellow
56	JSR1	TilwaraChargawa Road To Bagari (3.20 Km)	1700 LHS	1.60	13	2.58	42	15	27	30.75	0	81	19	Brown
57	JSR1	TilwaraChargawa Road To Bagari (3.20 Km)	2600 RHS	1.65	12	3.12	38	17	21	27.79	0	80	20	Brown
58	JSR2	Jabalpur Chargawa Road to Sunwara (2.40 Km)	800 RHS	1.60	12	2.17	45	19	26	38.15	0	75	25	BC
59	JSR2	Jabalpur Chargawa Road to Sunwara (2.40 Km)	2100 LHS	1.64	11	2.72	43	18	25	32.22	0	77	23	BC
60	JSR3	NH- 12 to Sunacher (4.30 Km)	800 LHS	1.61	12	2.68	42	17	25	31.13	0	78	22	Brown
61	JSR3	NH- 12 to Sunacher (4.30 Km)	1200 LHS	1.60	11	3.12	43	22	21	34.90	0	76	24	Brown
62	JSR3	NH- 12 to Sunacher (4.30 Km)	2150 RHS	1.65	11	2.80	41	19	22	30.75	0	81	19	Brown
63	JSR4	NH12 to Basedi (2.00 Km)	900 RHS	1.58	13	2.10	44	18	26	36.90	0	65	35	BC
64	JSR4	NH12 to Basedi (2.00 Km)	1900 LHS	1.55	12	2.52	42	15	27	25.36	0	83	17	BC
65	JSIR1	NH 7 To Hyrdenagar (4.91 Km)	600 LHS	1.68	10	3.50	34	20	14	25.36	11	72	17	Yellow
66	JSIR1	NH 7 To Hyrdenagar (4.91 Km)	1900 RHS	1.78	12	5.68	25	15	10	12.64	11	72	17	Red
67	JSIR1	NH 7 To Hyrdenagar (4.91 Km)	2800 RHS	1.75	13	5.50	28	12	16	10.55	2	72	26	Red

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				MDD g/cc	OMC %		LL %	PL %	PI %		Gravel %	Sand %	Silt & Clay %	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
68	JSIR1	NH 7 To Hyrdenagar (4.91 Km)	3600 RHS	1.69	10	3.58	30	15	15	31.72	5	73	22	Yellow
69	JSIR2	NH7 to KatraKhamariya (6.83 Km)	1600 RHS	1.90	13	5.23	30	11	19	12.23	10	74	16	Red
70	JSIR2	NH7 to KatraKhamariya (6.83 Km)	3500 LHS	1.68	14	3.24	30	20	10	22.76	3	89	8	Brown
71	JSIR2	NH7 to KatraKhamariya (6.83 Km)	6000 RHS	1.57	13	1.98	39	15	24	38.96	0	80	20	BC
72	JSIR3	Pipariya to Marha (p) (3.00 Km)	1200 RHS	1.60	11	2.23	43	19	24	35.38	0	77	23	BC
73	JSIR3	Pipariya to Marha (p) (3.00 Km)	2800 LHS	1.62	14	2.10	43	19	24	33.38	0	78	22	BC
74	JSIR4	SihoraSilondi Road to Bhandra (4.40 Km)	800 RHS	1.68	13	4.20	33	14	19	20.26	0	79	21	Red

PLATE 1 : Road – JJR1 Pindrai to Hinotia (3.50 Km)

Activity : Interview & Questionnaires for JJR1

Activity : Sample Collection of JJR1 at Ch-950 LHS

Activity : Sample of JJR1 at Ch-950 LHS



PLATE 1 : Road – JJR1 Pindrai to Hinotia (3.50 Km) cond..

Activity : MDD of JJR1 at Ch-950 LHS	**Activity : CBR mould Casting of JJR1 at Ch - 950 LHS**	**Activity : CBR mould from tank of JJR1 at Ch - 950 LHS**
		
Activity : CBR Testing of JJR1 at Ch- 950 LHS	**Activity :Atterberg Limits of JJR1 at Ch-750 LHS**	**Activity :FSI of JJR1 at Ch-750 LHS**
		
Activity : Sample of all Roads	**Activity : Inspection by Co-Supervisor Dr Rajiv Khatri**	**Activity : Inspection by Co-Supervisor Dr Rajiv Khatri**

III. DATA ANALYSIS AND DISCUSSION

The following findings have been made from the data collected from road sites -

(1) The data has been collected for four roads in seven Blocks of Jabalpur District which when analysed shows that different type of soil, including BC, yellow clayey and brown clayey silty types, over which these roads were constructed.

(2) As per DPR, the design and construction of these roads has been made taking all the aspects except Drainage layer to construct the roads and it has been constructed in good quality considering all related data from the field which the researcher has collected and analyzed.

(3) Minimum required Sub grade thickness has been provided in the Roads.

(4) Intermediate Structures have been provided in each road, as and where, required.

(5) The maintenance works are executed by the construction agency up to 5 years and after 5 years retendering is made and contractor(s) is finalized for next five years and so on.

(6) The laboratory test indicates that the subsoil has plasticity index ranging from 10 to 28. Thus the sub soil has plastic properties.

(7)There have been shrubs growth near the shoulder parts resulting in visibility problems and thus becomes more prone to accidents.
(8)These roads show pot holes at many place which if not maintained in time results into large size and thus becomes more prone to accidents.
(9) The road structures are not maintained properly thus the u/s and d/s parts become chocked due to growth of jungle and vegetation as also the silting, thus during rainy seasons the water overflows these roads resulting into more maintenance problems.

IV. CONCLUSIONS

(1) No Provision of Drainage Layer has been adopted in design as such there are issues of road maintenance.
(2) There is large variation of temperature in different roads during the year. This also results into damages of roads at various parts and thus results into issues of road maintenance.

V. RECOMMENDATIONS

1. In future during construction of new roads drainage layer needs to be provided for water to drain out.
2. Due to large temperature variation during summer, Water needs to be sprinkled on roads by boring the Tube wellson each road side. This will reduce the temperature during summer whereby the maintenance problems will reduce and durability of the roads will increase.

VI. FUTURE SCOPE OF WORK

1. The above work can be further verified experimentally for different states and strategies be planned accordingly .
2. The behaviour of Soil may be studied in different district along with States and maintenance strategies be planned accordingly.

REFERENCES

[1]. Agarwal, P.K., "*Road Condition Evaluation, Prioritization and Optimal Resource Allocation for Rural road Maintenance at Network Level*," Ph.D.thesis, Department of CivilEngineering, IIT Kanpur, Kanpur,2006
[2]. Agarwal, P. K , Singh, A. P. *"Some Strategies For Sustainable Maintenance of Rural Roads in India "* IJAET/Vol.I/Issue III/Oct.-Dec.,2010/304-311
[3]. Aggarwal, S., Jain S.S., and Parida, M.*"A Critical Appraisal of Pavement Management Systems",* Indian Roads Congress Journal, Vol. 63 No.2, IRC, New Delhi. (2002)
[4]. Aggarwal, S., Jain, S.S. and Parida, M.*"Maintenance Management of Highway Infrastructure in India",* Transport Track, Vol.2 No.1.(2002)
[5]. Chandrasekhar, B P., and others (2006). Asset management for rural roads – need for a policy framework in India. Indian Roads Congress Technical Paper No. 528. New Delhi: IRC. Available from http://irc.org.in/ENU/knowledge/archive/Technical Papers for Irc Journals/Asset Management of Rural Roads-Need for A Policy Framework in India.
[6]. Gupta Ankit, Kumar Praveen and RastogiRajat**,** Pavement Deterioration and Maintenance Model for Low Volume Roads, International Journal of Pavement Research and Technology, Vol 4, No. 4, July 2011, pp195-202.
[7]. Gupta, D P (2003a) Maintenance of rural roads: developing policy and implementation plan for Himachal Pradesh, The World Bank and Ministry of Rural Development (Government of India), Delhi
[8]. Haas, R., Hudson, W. R. and Zaniewski, J, "*Modern Pavement Management*,'' Krieger Publishingcompany, Malabar, Florida USA 1994.
[9]. International Labour Organization*"ILO-PMGSY Rural Road Project Mobilizing Funds for Maintenance of Rural RoadsA Concept Note"* July 2017

[10]. Jain, S.S. and Gupta, A.K, Khanna, S.K. &Dayanand, *" Development of Maintenance and Rehabilitation Investment Strategy for Flexible Pavements",* IRC Journal Volume 57-2, in june-1996

[11]. Jain, S.S., Parida, M. and Thube, D.T., *"Performance Based Maintenance Contracts for Roads"*, Civil Engineering and Construction Review (CE and CR), Vol.18, No.11, November, New Delhi, pp. 42-48. 2005

[12]. KhabiryMehdi and GourbianNader "*An experience on street pavement maintenance Program in small region- (Bafq city)"*. ARPN (Asian Research Publishing Network) Journal of Engineering and Applied Sciences, Vol. 4, NO. 3, May 2009. Pp. 1-5.

[13]. Lee, H.N., Jitprasithsiri, S., Lee, H., andSorcic, R.G., "*Development of Geographic Information System – Based Pavement Management Systemfor Salt Lake City*", Transportationresearch record 1524, TRB, NationalResearch Council, Washington, D.C.,1996, pp. 16-24.

[14]. NHAI,http://www.nhai.org/roadnetwok.htm,website of NationalHighway Authority of India, 2010.

[15]. Qiu, Y., Dennis, N.D. and Elliott,R.P.,(2000) "*Design Criteria for Pavement Deformation of Sub grade Soils in Flexible Pavements for Low Volume Roads*," Journal of the JapaneseGeotechnical Society of Soils andFoundations, Vol.40, No.1, pp.1-10

[16]. Sood, V.K. "*Rural Road Maintenance Strategy- An Overview*," proceedingICORT 1995, Department of CivilEngineering, University of Roorkee,1995

[17]. Sahoo, U.C., Reddy, M.A. and Reddy,K.S.,(2010), "*Rational Design Criteria for Sustainable Rural Roads*," GrameenSampark, News Letter, National RuralRoad Development Agency (NRRDA),Ministry of Rural Development, GOI,New Delhi, 2010. pp 34-39.

[18]. UfukKirbas and Mustafa Gursoy. *"Developing the basics of pavement management system in Besiktas district and evaluation of the selected sections"* (2010). Scientific Research and Essays Vol. 5(8), pp. 806-812.

[19]. www.gisdevelopment.net, site accessedin March, 2010

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