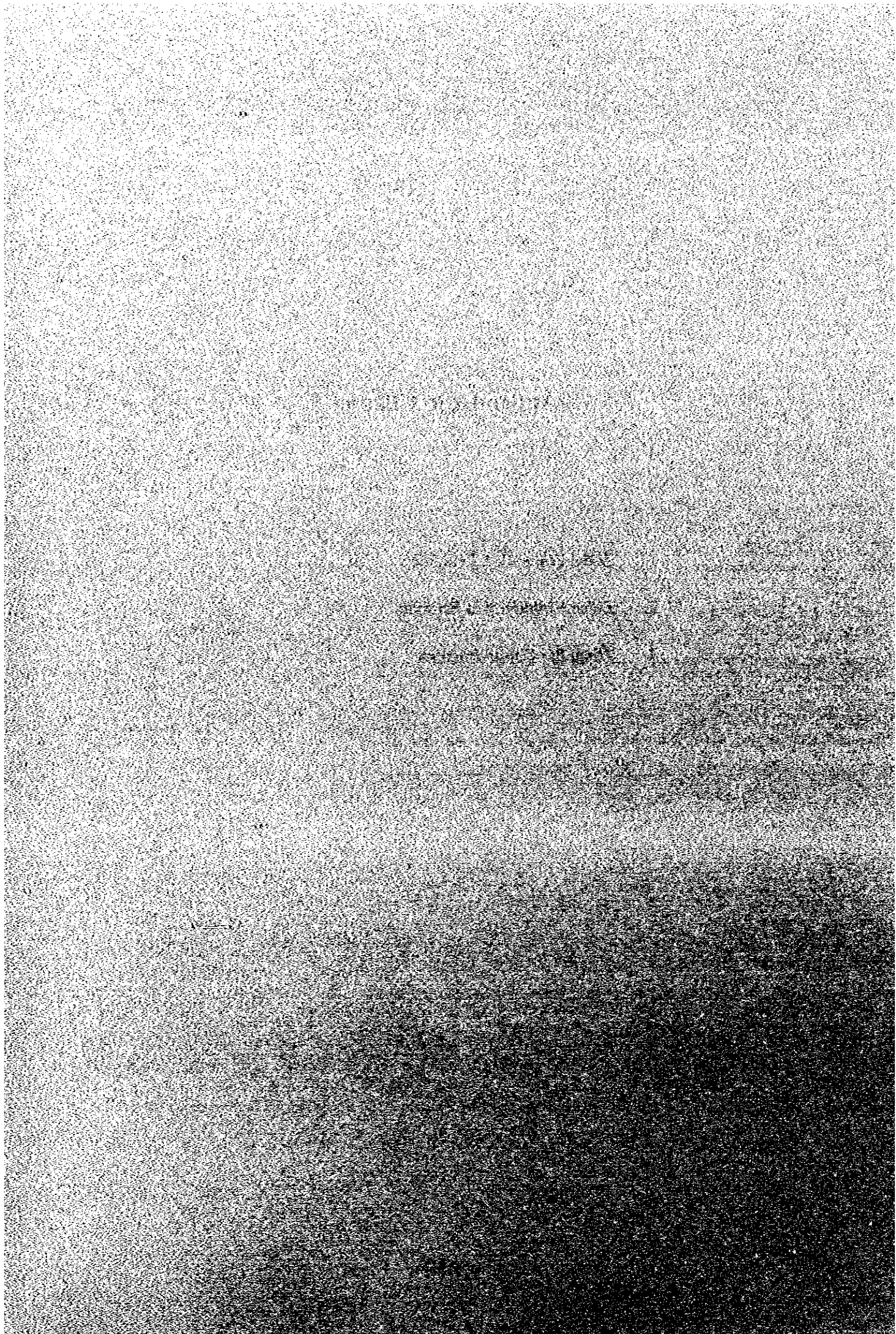


Appendix to Chapter 5

1. Zonal Population Estimate
2. Zonal Employment Estimate
3. Zonal Per Capita Income



ZONAL POPULATION ESTIMATES

Zone No	Name	POPULATION 1999	POPULATION 2001	POPULATION 2011	POPULATION 2021
1	New Delhi Railway St.	272,046	275,328	259,328	255,436
2	Jama Masjid	278,022	275,421	233,100	229,601
3	Kamla Nagar	290,914	306,438	352,520	357,804
4	Timarpur	216,768	238,203	338,577	386,303
5	Vijay Nagar	131,263	137,711	155,257	157,764
6	Wazirpur	450,241	476,406	560,521	568,923
7	Karol Bagh	280,259	291,550	315,091	315,091
8	Anand Parbat	296,764	310,159	343,090	348,233
9	Pusa Institute	245,094	259,293	304,815	316,281
10	New Rajinder Nagar	118,784	124,064	136,790	137,459
11	Central Sectt.	110,911	115,379	124,695	124,695
12	Purana Qila	60,463	65,754	88,725	98,632
13	Lodhi Colony	102,346	110,815	146,278	160,836
14	Nizamuddin	197,062	222,075	358,046	435,084
15	Panchsheel Park	353,513	385,838	530,100	538,046
16	Chanakya Puri	176,987	184,855	203,816	204,813
17	Delhi Cantt.	115,043	124,064	160,525	174,745
18	Janak Puri	447,812	467,720	515,696	523,426
19	Paschim Vihar	773,278	807,656	890,501	890,501
20	Pitampura	447,372	486,330	654,935	654,935
21	Salempur	185,293	202,236	277,850	311,675
22	Madanpur Khadar	75,962	85,604	138,017	167,713
23	Govindpuri	494,632	528,512	652,939	662,727
24	R.K. Puram	301,742	323,807	408,782	414,910
25	Jawahar Lal University	69,402	73,656	87,975	96,731
26	Kailashpuri	749,888	811,935	1,071,771	1,087,837
27	Najafgarh	553,670	649,412	1,278,847	1,717,444
28	Sultanpuri	748,743	810,696	1,070,135	1,070,135
29	Daulatpur	601,060	691,036	1,231,317	1,231,317
30	Bakauli	308,864	341,175	497,723	575,318
31	Tikri Khurd	400,924	450,910	719,758	870,262
32	Bawana	207,258	238,760	429,709	711,935
33	Nizampur	40,385	46,523	83,730	138,723
34	Gangatoli	202,545	233,798	425,007	548,388
35	Rasulpur	238,841	273,498	477,681	604,149
36	Qutabpur	150,135	176,096	346,775	628,638
37	Mehrauli	125,097	130,659	144,061	146,220
38	Chhatarpur	342,377	372,192	501,226	621,375
39	Mayur Vihar	248,214	274,182	399,989	462,347
40	Shakar Pur	339,313	365,922	473,461	480,558
41	Jagat Puri	168,886	182,130	235,655	239,187
42	Anand Vihar	120,784	130,256	168,536	183,465
43	Jheel	197,010	212,459	274,897	279,018
44	Seelampur	278,564	296,513	359,408	364,795
45	Seemapuri	321,209	341,583	412,088	433,164
46	Gokulpuri	414,070	457,388	667,260	771,285
47	LONI (WEST OF RAILWAY TO BARAUT, INCLUDES TARONICA TOWN)	84,871	91,145	179,798	292,389
48	SHAKARPURA NORTH OF GHAZIABAD RAILWAY LINE	123,449	132,574	261,524	425,294
49	BAGHPAT	319,607	325,430	364,738	401,985

50	BARAUT	610,678	621,803	696,911	768,079
51	SARDHANA	678,850	688,602	755,632	825,340
	MERRUT (R)				
52	EAST OF RAILWAY LINE	271,001	274,703	299,506	327,500
53	MERRUT (U)	1,155,340	1,230,932	1,741,668	2,091,619
	MERRUT (R)				
54	WEST OF RAILWAY LINE	327,824	332,301	362,305	396,170
55	MAWANA	658,721	669,971	745,791	817,818
56	GARHMUKTESHWAR	307,336	312,170	344,448	378,120
	HAPUR (R)				
57	WEST TO RAILWAY LINE	192,962	195,838	215,096	235,403
58	HAPUR (U)	182,455	190,255	241,725	275,081
	HAPUR (R)				
59	EAST TO RAILWAY LINE	347,331	352,508	387,173	423,725
60	BULANDSHAHR (R)	1,158,855	1,177,165	1,299,572	1,424,369
61	BULANDSHAHR (U)	141,046	142,792	156,336	165,076
62	ANUPSHAHR	639,951	650,208	719,994	789,672
63	KIURJA (R)	651,229	661,170	727,896	797,845
64	KHURJA (U)	87,144	87,751	93,559	97,502
65	SIKANDRABAD	464,479	472,808	528,652	581,648
66	DADRI	493,797	530,296	1,046,096	1,701,175
	MODINAGAR (R)				
67	WEST TO RAILWAY LINE	239,183	256,862	506,703	824,006
	MODINAGAR (R)				
68	EAST TO RAILWAY LINE	362,632	389,436	768,227	1,249,300
69	GHAZIABAD (U)	762,570	831,100	1,312,973	1,663,304
70	NOIDA	401,487	507,601	700,664	831,178
	FARIDABAD (R)				
71	EAST OF THE RAILWAY LINE	187,583	195,678	254,557	312,141
72	FARIDABAD (U)	998,700	1,114,345	1,975,417	2,793,543
	FARIDABAD (R)				
73	WEST OF THE RAILWAY LINE	105,355	109,901	142,970	175,312
74	PALWAL (R)	496,928	518,877	678,019	833,177
75	PALWAL (U)	70,651	73,195	91,325	109,445
76	FEROZPUR	382,390	400,336	533,355	664,382
77	NUH	285,765	299,440	400,567	499,767
	SOHNA				
78	RURAL GURGAON EAST TO THE RAILWAY LINE	269,525	281,268	366,509	449,781
79	GURGAON (U)	172,269	181,166	243,648	303,164
	GURGAON (R)				
80	WEST OF THE RAILWAY LINE	196,018	204,558	266,552	327,113
81	PATAUDI	102,749	107,329	140,301	172,369
82	REWARI	771,607	809,125	1,085,287	1,355,435
83	RAJ NCR	1,805,900	1,921,000	2,769,280	3,584,382
	JHAJJAR				
84	SOUTH OF ROAD TO BAHADURGARH	412,805	429,544	552,236	673,496
	JHAJJAR				
85	NORTH OF ROAD TO BAHADURGARH	125,636	130,731	168,072	204,977
86	BAHADURGARH	324,370	341,152	463,318	581,290
87	ROHTAK (R)+MAHAM	696,730	726,382	942,030	1,153,324
88	ROHTAK (U)	265,247	276,675	356,791	434,501
	SONIPAT (R)				
89	WEST TO THE RAILWAY LINE	351,544	366,924	478,681	587,809

	SONIPAT (R)				
90	EAST TO THE RAILWAY LINE	205,555	214,965	280,439	344,373
91	GANAUR	184,293	192,155	249,152	304,945
92	PANIPAT (R)	759,272	792,279	1,032,088	1,266,378
93	PANIPAT (U)	248,093	262,426	363,375	458,803
94	GOHANA	374,465	390,291	505,270	618,000
95	MODINAGAR (U)	152,394	158,548	199,163	225,358
96	HATHIN	182,023	189,736	245,878	300,926
97	SONIPAT (U)	179,017	187,363	245,944	302,290
98	MAHARASHTRA EXCEPT MU	79,534,257	81,544,116	95,711,043	110,066,774
99	MUMBAI	15,122,743	15,537,495	18,623,899	21,871,822
100	REST OF HAR (N)	6,057,585	6,148,083	6,995,939	7,799,685
101	REST OF HAR (W)	5,272,415	5,351,182	6,089,141	6,788,708
102	RAJ (N)	8,348,860	8,558,904	10,228,334	11,976,127
103	REST OF RAJ	42,786,140	43,862,571	52,418,043	61,375,111
104	PUNJAB (N)	16,468,249	16,612,908	18,734,552	20,699,779
105	PUNJAB (S)	7,602,751	7,669,535	8,649,015	9,556,285
106	JAMMU AND KASHMIR	9,313,000	9,559,195	11,503,979	13,564,370
107	HIMACHAL PRADESH	5,923,000	6,000,842	6,767,213	7,477,084
108	UP I	10,733,635	11,166,903	13,087,320	15,027,733
109	UP II	5,107,152	5,307,993	6,158,932	7,001,728
110	UP III	13,807,294	14,433,025	17,737,987	21,358,762
111	UP IV	32,424,818	33,812,464	40,562,838	47,676,528
112	REST OF UP	91,379,101	95,232,531	113,560,835	132,677,293
113	EAST INDIA EXCEPT CALCUT	242,478,911	246,605,267	285,424,759	323,672,432
114	CALCUTTA	12,621,089	12,803,817	14,453,446	15,985,569
115	SOUTH INDIA	224,535,000	226,787,940	252,953,303	276,430,224
116	MADHYA PRADESH	78,822,000	80,660,864	95,530,256	110,852,063
117	GUJRAT	47,735,000	48,363,553	54,703,955	60,623,921
	INDIA	990,292,891	1,012,386,001	1,178,888,999	1,341,000,000
	NCR	34,219,890	36,366,811	48,994,210	58,518,002
	DELHI	13,249,807	14,366,000	19,507,000	21,697,924
	HARYANA NCR	8,348,991	8,795,841	12,061,781	15,226,740
	RAJASTHAN NCR	1,805,900	1,921,000	2,769,280	3,584,382
	UP NCR	10,815,193	11,283,970	14,656,149	18,008,956
	REST OF INDIA	956,073,001	976,019,190	1,129,894,789	1,282,481,998

ZONAL EMPLOYMENT ESTIMATES

Zone No.	Name of the Zone	Employment 1999	Employment 2001	Employment 2011	Employment 2021
1	New Delhi Railway St.	136,935	137,000	137,000	137,000
2	Jama Masjid	245,474	245,474	273,429	305,766
3	Kamla Nagar	155,947	155,947	174,995	195,690
4	Timarpur	37,964	40,000	40,000	40,000
5	Vijay Nagar	35,331	38,000	38,000	38,000
6	Wazirpur	179,270	197,000	218,743	244,613
7	Karol Bagh	129,944	129,944	142,183	158,998
8	Anand Parbat	89,627	95,000	95,000	95,000
9	Pusa Institute	108,576	89,000	89,000	89,000
10	New Rajinder Nagar	60,495	66,000	109,372	122,306
11	Central Sectt.	253,000	253,000	328,115	366,919
12	Purana Qila	49,000	49,000	109,372	122,306
13	Lodhi Colony	59,000	59,000	109,372	122,306
14	Nizamuddin	52,000	52,000	109,372	122,306
15	Panchsheel Park	81,000	81,000	109,372	122,306
16	ChanakyaPuri	81,304	91,000	109,372	122,306
17	Delhi Cantt.	43,306	50,000	109,372	122,306
18	Janak Puri	104,276	107,000	109,372	122,306
19	Paschim Vihar	104,000	104,000	164,058	183,460
20	Pitampura	119,838	131,000	164,058	183,460
21	Salempur	94,908	97,000	109,372	122,306
22	Madanpur Khadar	153,397	159,000	218,743	244,613
23	Govindpuri	109,000	109,000	164,058	183,460
24	R.K.Puram	87,000	87,000	164,058	183,460
25	Jawahar Lal University	35,015	44,000	109,372	122,306
26	Kailashpuri	228,327	287,000	546,858	611,532
27	Najafgarh	223,700	282,000	546,858	611,532
28	Sultanpuri	210,928	269,000	328,115	366,919
29	Daulatpur	123,223	148,000	218,743	244,613
30	Bakauli	80,665	104,000	164,058	183,460
31	Tikri Khurd	173,930	224,000	328,115	366,919
32	Bawana	134,191	175,000	328,115	366,919
33	Nizampur	52,322	68,000	164,058	183,460
34	Gangatoli	126,730	165,000	218,743	244,613
35	Rasulpur	78,980	103,000	164,058	183,460
36	Qutabpur	23,113	30,000	109,372	122,306
37	Mehrauli	44,849	51,000	109,372	122,306
38	Chhatarpur	26,605	30,000	109,372	122,306
39	Mayur Vihar	58,033	66,000	109,372	122,306
40	Shakar Pur	48,192	61,000	218,743	244,613
41	Jagat Puri	50,708	52,000	109,372	122,306
42	Anand Vihar	21,984	25,000	109,372	122,306
43	Jheel	117,700	119,000	218,743	244,613
44	Seelampur	45,207	47,000	109,372	122,306
45	Seemapuri	97,550	113,000	218,743	244,613
46	Gokulpuri	65,788	84,000	109,372	122,306

47	LONI (WEST OF RAILWAY TO BARAUT, INCLUDES TARNICA TOWN)	12,188	13,310	29,875	55,368
48	SHAKARPURA NORTH OF GHAZIABAD RAILWAY LINE	16,300	17,442	34,044	54,867
49	BAGHIPAT	33,855	35,054	44,702	56,147
50	BARAUT	65,344	67,627	85,968	107,669
51	SARDHANA	60,718	61,343	66,393	71,662
52	MERRUT (R) EAST OF RAILWAY LINE	24,097	24,328	26,161	28,269
53	MERRUT (U)	311,971	340,085	567,891	806,423
54	MERRUT (R) WEST OF RAILWAY LINE	29,149	29,429	31,646	34,196
55	MAWANA	54,655	55,365	60,787	65,872
56	GARHIMUKTESHWAR	20,722	20,963	22,814	24,749
57	HAPUR (R) WEST TO RAILWAY LINE	16,866	17,049	18,469	19,974
58	HAPUR (U)	44,803	47,801	71,674	96,446
59	HAPUR (R) EAST TO RAILWAY LINE	30,359	30,688	33,244	35,954
60	BULANDSHAHR (R)	58,202	58,884	64,117	69,445
61	BULANDSHAHR (U)	36,265	37,565	48,538	60,602
62	ANUPSHAHR	45,113	45,652	49,860	54,040
63	KHURJA (R)	23,834	24,101	26,170	28,346
64	KHURJA (U)	21,952	22,617	28,459	35,070
65	SIKANDRABAD	46,747	47,394	52,266	56,827
66	DADRI	70,914	77,442	173,817	322,141
67	MODINAGAR (R) WEST TO RAILWAY LINE	34,349	37,511	84,193	156,037
68	MODINAGAR (R) EAST TO RAILWAY LINE	52,077	56,871	127,647	236,572
69	GHAZIABAD (U)	227,487	254,117	472,069	704,367
70	NOIDA	129,106	167,302	271,554	379,419
71	FARIDABAD (R) EAST OF THE RAILWAY LINE	19,690	20,466	26,343	32,014
72	FARIDABAD (U)	320,735	366,807	764,618	1,273,559
73	FARIDABAD (R) WEST OF THE RAILWAY LINE	11,059	11,495	14,796	17,980
74	PALWAL (R)	39,495	41,074	52,937	64,283
75	PALWAL (U)	18,127	19,215	28,294	40,095
76	FEROZPUR	28,099	29,300	38,501	47,393
77	NUH	29,002	30,268	39,935	49,237
78	SOHNA RURAL GURGAON EAST TO THE RAILWAY LINE	38,000	40,325	59,787	83,617
79	GURGAON (U)	53,004	57,132	90,352	132,413
80	GURGAON (R) WEST OF THE RAILWAY LINE	27,636	29,327	43,481	60,812
81	PATAUDI	12,836	13,628	20,205	28,209

82	REWARI	89,625	95,526	145,326	206,254
83	RAJ NCR	165,449	180,072	306,360	468,879
84	JHAJJAR SOUTH OF ROAD TO BAHADURGARH	35,026	36,300	46,029	55,474
85	JHAJJAR NORTH OF ROAD TO BAHADURGARH	10,660	11,048	14,009	16,883
86	BAHADURGARH	56,699	60,640	93,703	133,981
87	ROHTAK (R)+MAHAM	62,923	65,338	83,575	101,114
88	ROHTAK (U)	75,180	80,236	122,112	175,839
89	SONIPAT (R) WEST TO THE RAILWAY LINE	46,731	49,599	73,622	103,032
90	SONIPAT (R) EAST TO THE RAILWAY LINE	27,377	29,058	43,132	60,362
91	GANAUR	21,574	22,864	33,625	46,767
92	PANIPAT (R)	63,647	66,146	84,988	103,051
93	PANIPAT (U)	78,498	84,957	138,833	207,274
94	GOHANA	34,776	36,100	46,095	55,714
95	MODINAGAR (U)	43,907	47,266	76,365	111,318
96	HATHIN	9,950	10,330	13,203	15,968
97	SONIPAT (U)	51,960	56,271	95,002	150,428
98	MAHARASHTRA EXCEPT MUMBAI	10,763,018	11,241,248	14,404,603	17,957,075
99	MUMBAI	5,225,455	5,391,305	6,597,323	7,906,500
100	REST OF HAR (N)	715,513	733,298	874,798	1,020,313
101	REST OF HAR (W)	452,232	465,328	565,571	670,765
102	RAJ (N)	741,585	763,160	929,451	1,108,688
103	REST OF RAJ	4,538,544	4,730,792	6,120,004	7,711,946
104	PUNJAB (N)	2,717,256	2,778,020	3,340,838	3,921,145
105	PUNJAB (S)	765,142	781,807	937,722	1,098,039
106	JAMMU AND KASHMIR	1,154,653	1,198,875	1,525,207	1,895,562
107	HIMACHAL PRADESH	653,296	670,393	803,998	941,358
108	UP I	1,277,498	1,343,904	1,661,975	2,008,237
109	UP II	519,695	546,519	671,190	805,163
110	UP III	1,862,341	1,985,420	2,677,734	3,510,526
111	UP IV	3,160,631	3,298,582	3,973,249	4,689,017
112	REST OF UP	5,919,830	6,226,982	7,768,337	9,476,678
113	EAST INDIA EXCEPT CALCUTTA	22,167,095	22,866,420	28,329,959	34,240,041
114	CALCUTTA	3,827,360	3,899,246	4,494,599	5,073,881
115	SOUTH INDIA	47,007,135	50,732,931	74,734,063	101,502,443
116	MADHYA PRADESH	7,826,888	8,138,507	10,402,835	12,957,894
117	GUJRAT	7,903,147	8,207,344	10,415,160	12,796,599
	INDIA	136,775,382	144,350,172	194,360,279	247,642,509
	NCR	7,577,066	8,350,090	13,131,665	16,350,641
	DELHI UT	4,638,329	5,169,365	8,044,080	8,948,224
	HARYANA NCR	1,262,308	1,363,448	2,212,502	3,261,756
	RAJASTHAN NCR	165,449	180,072	306,360	468,879
	UP NCR	1,510,980	1,637,205	2,568,723	3,671,782
	REST OF INDIA	129,198,316	136,000,082	181,228,614	231,291,868

Estimates of Per Capita Income

ZONE NO	ZONE NAME	PER CAPITA INCOME (MONTHLY)				PER CAPITA INCOME (MONTHLY) ('94 PRICES)			
		1999	2001	2011	2021	1999	2001	2011	2021
1	New Delhi Railway St.	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
2	Jama Masjid	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
3	Kamla Nagar	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
4	Timarpur	2,484	2,627	3,219	4,849	1,492	1,578	1,934	2,913
5	Vijay Nagar	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
6	Wazirpur	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
7	Karol Bagh	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
8	Anand Parbat	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
9	Pusa Institute	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
10	New Rajinder Nagar	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
11	Central Sectt.	2,836	2,999	3,676	5,537	1,704	1,802	2,209	3,327
12	Purana Qila	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
13	Lodhi Colony	2,836	2,999	3,676	5,537	1,704	1,802	2,209	3,327
14	Nizamnudin	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
15	Panchsheel Park	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
16	Chanakya Puri	2,836	2,999	3,676	5,537	1,704	1,802	2,209	3,327
17	Delhi Cantt.	3,179	3,362	4,120	6,206	1,910	2,020	2,476	3,729
18	Janak Puri	2,265	2,396	2,936	4,423	1,361	1,440	1,764	2,658
19	Paschim Vihar	2,265	2,396	2,936	4,423	1,361	1,440	1,764	2,658
20	Pitampura	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
21	Salempur	2,484	2,627	3,219	4,849	1,492	1,578	1,934	2,913
22	Madanpur Khadar	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
23	Govindpuri	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
24	R.K.Puram	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
25	Jawahar Lal University	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
26	Kailashpuri	2,265	2,396	2,936	4,423	1,361	1,440	1,764	2,658
27	Najafgarh	2,265	2,396	2,936	4,423	1,361	1,440	1,764	2,658
28	Sultanpuri	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
29	Daulatpur	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
30	Bakauli	2,484	2,627	3,219	4,849	1,492	1,578	1,934	2,913
31	Tikri Khurd	2,484	2,627	3,219	4,849	1,492	1,578	1,934	2,913
32	Bawana	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
33	Nizampur	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
34	Gangatoli	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
35	Rasulpur	2,272	2,403	2,945	4,436	1,365	1,444	1,770	2,665
36	Qutabpur	2,265	2,396	2,936	4,423	1,361	1,440	1,764	2,658
37	Mehrauli	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
38	Chhatarpur	2,403	2,541	3,114	4,691	1,444	1,527	1,871	2,819
39	Mayur Vihar	2,265	2,403	3,219	4,868	1,361	1,444	1,934	2,925
40	Shakar Pur	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
41	Jagat Puri	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
42	Anand Vihar	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
43	Jheel	2,493	2,637	3,232	4,868	1,498	1,585	1,942	2,925
44	Seelampur	2,265	2,403	3,219	4,868	1,361	1,444	1,934	2,925
45	Seemapuri	2,265	2,403	3,219	4,868	1,361	1,444	1,934	2,925
46	Gokulpuri	2,265	2,403	3,219	4,868	1,361	1,444	1,934	2,925
47	LONI (WEST OF RAILWAY TO BARAUT, INCLUDES TARONICA TOWN)	626	632	655	723	422	380	393	434

48	SHAKARPURA NORTH OF GHAZIABAD RAILWAY LINE	587	582	530	510	395	350	318	306
49	BAGHPAT	587	594	652	720	395	357	392	432
50	BARAUT	587	594	652	720	395	357	392	432
51	SARDHANA	534	534	536	538	360	321	322	324
52	MERRUT (R) EAST OF RAILWAY LINE	530	530	532	534	357	319	320	321
53	MERRUT (U)	933	957	1,144	1,373	628	575	687	825
54	MERRUT (R) WEST OF RAILWAY LINE	530	530	532	534	357	319	320	321
55	MAWANA	527	527	529	531	355	317	318	319
56	GARHMUKTESHWAR	470	470	472	473	316	283	284	284
57	HAPUR (R) WEST TO RAILWAY LINE	508	509	511	513	342	306	307	308
58	HAPUR (U)	857	880	1,051	1,260	577	529	631	757
59	HAPUR (R) EAST TO RAILWAY LINE	508	509	511	513	342	306	307	308
60	BULANDSHAHR (R)	401	401	402	404	270	241	242	243
61	BULANDSHAHR (U)	889	912	1,094	1,314	598	548	658	789
62	ANUPSHAHR	469	469	471	473	316	282	283	284
63	KHURJA (R)	372	372	373	373	250	223	224	224
64	KHURJA (U)	881	905	1,083	1,298	593	544	651	780
65	SIKANDRABAD	534	534	536	539	359	321	322	324
66	DADRI	626	632	655	723	422	380	393	434
67	MODINAGAR (R) WEST TO RAILWAY LINE	626	632	655	723	422	380	393	434
68	MODINAGAR (R) EAST TO RAILWAY LINE	626	632	655	723	422	380	393	434
69	GHAZIABAD (U)	1,021	1,050	1,253	1,498	687	631	753	900
70	NOIDA	1,111	1,139	1,358	1,622	748	685	816	975
71	FARIDABAD (R) EAST OF THE RAILWAY LINE	1,197	1,205	1,148	1,164	771	724	690	700
72	FARIDABAD (U)	1,988	2,081	2,484	3,155	1,280	1,251	1,493	1,896
73	FARIDABAD (R) WEST OF THE RAILWAY LINE	1,197	1,205	1,148	1,164	771	724	690	700
74	PALWAL (R)	1,206	1,209	1,128	1,122	777	726	678	674
75	PALWAL (U)	1,667	1,740	2,070	2,618	1,073	1,046	1,244	1,573
76	FEROZPUR	1,186	1,186	1,090	1,074	764	713	655	645
77	NUH	1,280	1,283	1,197	1,198	824	771	719	720
78	SOHNA RURAL GURGAON EAST TO THE RAILWAY LINE	1,371	1,401	1,486	1,700	883	842	893	1,021
79	GURGAON (U)	1,901	1,992	2,383	3,028	1,224	1,197	1,432	1,819
80	GURGAON (R) WEST OF THE RAILWAY LINE	1,371	1,401	1,486	1,700	883	842	893	1,021
81	PATAUDI	1,257	1,283	1,350	1,534	810	771	811	922
82	REWARI	1,177	1,199	1,250	1,415	758	721	751	850
83	RAJ NCR	769	783	860	1,046	518	470	517	629
84	JHAJJAR SOUTH OF ROAD TO BAHADURGARH	1,193	1,199	1,133	1,136	768	720	681	683
85	JHAJJAR NORTH OF ROAD TO BAHADURGARH	1,193	1,199	1,133	1,136	768	720	681	683
86	BAHADURGARH	1,600	1,634	1,733	1,995	1,030	982	1,041	1,199
87	ROHTAK (R)+MAHAM	1,300	1,304	1,225	1,225	837	784	736	736

88	ROHTAK (U)	1,772	1,853	2,221	2,829	1,141	1,113	1,334	1,700
89	SONIPAT (R) WEST TO THE RAILWAY LINE	1,437	1,464	1,527	1,720	925	880	918	1,033
90	SONIPAT (R) EAST TO THE RAILWAY LINE	1,437	1,464	1,527	1,720	925	880	918	1,033
91	GANAUR	1,402	1,426	1,466	1,628	903	857	881	978
92	PANIPAT (R)	1,258	1,262	1,180	1,176	810	758	709	706
93	PANIPAT (U)	1,964	2,053	2,463	3,141	1,265	1,234	1,480	1,887
94	GOHANA	1,385	1,390	1,304	1,302	892	835	784	782
95	MODINAGAR (U)	990	1,028	1,341	1,752	666	617	806	1,053
96	HATHIN	1,217	1,217	1,121	1,098	784	731	674	660
97	SONIPAT (U)	1,844	1,947	2,526	3,488	1,188	1,170	1,518	2,096
98	MAHARASHTRA EXCEPT MUMBAI	2,053	2,364	3,657	5,666	1,382	1,421	2,197	3,405
99	MUMBAI	1,901	2,174	3,109	4,455	1,280	1,306	1,868	2,677
100	REST OF HAR (N)	1,429	1,487	1,614	1,755	962	894	970	1,055
101	REST OF HAR (W)	1,430	1,488	1,617	1,760	963	894	971	1,057
102	RAJ (N)	735	759	759	762	495	456	456	458
103	REST OF RAJ	776	805	855	909	522	484	514	546
104	PUNJAB (N)	1,753	1,884	2,380	3,013	1,180	1,132	1,430	1,810
105	PUNJAB (S)	1,745	1,874	2,356	2,968	1,175	1,126	1,416	1,783
106	JAMMU AND KASHMIR	796	853	1,014	1,208	536	512	609	726
107	HIMACHAL PRADESH	1,172	1,296	1,819	2,558	788	779	1,093	1,537
108	UP I	663	685	731	783	446	411	440	470
109	UP II	669	692	746	807	450	416	448	485
110	UP III	635	653	665	679	427	392	400	408
111	UP IV	649	669	698	730	437	402	419	439
112	REST OF UP	652	673	707	743	439	404	425	447
113	EAST INDIA EXCEPT CALCUTTA	611	635	659	685	411	382	396	412
114	CALCUTTA	1,222	1,383	2,110	3,226	823	831	1,268	1,938
115	SOUTH INDIA	1,053	1,168	1,669	2,391	709	702	1,003	1,437
116	MADHYA PRADESH	705	738	817	905	474	444	491	544
117	GUJRAT	1,525	1,735	2,655	4,069	1,026	1,043	1,595	2,445
	INDIA	1,080	1,176	1,514	1,997				
	NCR	1,549	1,633	1,939	2,598				
	DELHI	2,473	2,616	3,205	4,828				
	HARYANA NCR	1,435	1,471	1,592	1,862				
	RAJASTHAN NCR	769	776	981	1,351				
	UP NCR	635	652	743	841				

Appendix to Chapter 6

1. Land Value
2. Brick Kilns
3. Land Acquisition, Resettlement and Rehabilitation
4. The National Commission for Women

Appendix 6.1: Land Value

In U.P., particularly in Ghaziabad and Meerut districts, there are some categories to describe land divided in following:

- Bara/Kachiyana: A land, which is located in, and around 100-meter radius of village habitation.
- Sevta: Loamy soils.
- Dakar/Bhur: Black color soils that are generally sandy type.
- Khader: Soils that are located around the river belt.

On the other hand, in Haryana State the land has been classified in to following four categories:

- Nehri or Wahi: A land that is close to the canal or has irrigation potential.
- Warani/Rosli: A land mostly cultivated under rain water conditions as it lacks irrigation facilities.
- Banjar/Khudan: A land that is sodic/saline/waste or degraded, and not fit for cultivation unless reclaimed.
- Abadi: A land fit for residential purpose due to its proximity to habitation.

The cost of land based on land types is given in Box-1 below for the villages falling in Haryana State. These rates are fixed by the Revenue Department of respective districts. The rates are proposed for the year 1999-2001.

Box-1: Cost of land in villages of Sonapat District (Rs. /hectare)

Village Name	Broad land categories			
	Nehri/Wahi	Warani	Banjar	Abadi
1. Kundli	200,000	1,200,000	900,000	300/Sq.meter
2. Patla	600,000	400,000	300,000	175/Sq.meter
3. Atrena	540,000	400,000	300,000	175/Sq.meter
4. Manoli	640,000	440,000	300,000	175/Sq.meter
5. Badhkhalsa	1,300,000	720,000	500,000	200/Sq.meter

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

In U.P., the land has been classified according to its location as well as its type.

The location wise classification is in four categories i.e., falling in Municipal area, Town area, partially urbanized area, and rural area.

The value of land fixed in Modi Nagar is indicated in Box-2 below. The cost is determined and fixed the Revenue Department of the district.

Box-2: Value of land in Modi Nagar		(Rs./hectre)
Type of Land	Partially Urban Area	Rural Area
Bara / Kachiyana	420,000	380,000
Sevta	300,000	300,000
Dakar / Bhur	300,000	280,000
Khadar	--	200,000

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

In Modi Nagar, Yaqutpur Mavi falls under the category of partially urbanized area. The rest of sample villages fall under rural area. Apart from this, in U.P. there are other condition prescribed by the Revenue Department for land acquisition. These are as follows:

- The minimum stipulated cost of the agricultural land on Delhi–Meerut Road is Rs.1.6 million per hectare.
- If the land is sold for other than agricultural purpose, the rate applicable will be thrice that of the minimum stipulated rate.
- The cost of agricultural land on Hapur–Modi Nagar Road will be 25% more than that of minimum stipulated rate.
- Agricultural land closer to the town will be 50% higher rate than that of minimum stipulated rate.
- Agricultural land on National Highways, link roads and district roads would cost 50%, 25% and 15% more than that of minimum stipulated rate.
- The agricultural rate of the land will only be applicable if the necessary documents are produced in case of joint holder / co-holder of the 0.125 hectare of agricultural land, otherwise one has to pay Stamp Duty¹ on per square meter of the area.

¹ This is one of registration fees.

The costs of land in Bagpat district are shown in Box-3 below:

Box-3: Cost of land in Bagpat District		(Rs./hectre)
Partially Urbanised Villages		
Type of Land	Agricultural Land	Non Agricultural Land
Bara / Kachiyana	420,000	450,000
Sevta	370,000	450,000
Dakar / Bhur	285,000	450,000
Khadar	185,000	450,000

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

Village called Khekra (Bagpat district) falls under the special category of partially urbanized village, and, in fact, it is a Tehsil². Most of our sample villages of Bagpat district fall under the Khekra Tehsil and the rate mentioned above are applicable to them.

The cost of partially urbanized village i.e., Idrisipur only agricultural purpose is Rs.310,000 per hectare.

The cost of land in villages in Meerut district is given in Box-4 below:

Box-4: Cost of land in Meerut District		(Rs./hectre)
Type of Land	Agricultural Land	Non Agricultural Land
Bara / Kachiyana	350,000	400,000
Sevta	300,000	400,000
Dakar / Bhur	250,000	400,000
Khadar	120,000	400,000

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

The cost of land in villages falling in Ghaziabad district is given in Box-5 below:

² This is to be positioned between District and Block.

Box-5: Cost of land in Ghaziabad District (Rs./ha.)

Name of Village	Agricultural Land
1. Bhikanpur	520,000
2. Bhowapur	520,000
3. Morti	600,000

Source: Social Survey Report in the Expressways Project Area,
MDP Consultants Limited.

In Table 6.4.9, it shows the 17 sample villages of land use pattern, sources-wise irrigated area and market value of the land.

Appendix

Table 6.4.9: Land use pattern, sources wise irrigated area and market value of land

Name of The Villages	Total Area	Land on which water is present	Land other than agri. use like houses, roads, railway line etc.	Land not fit for agri.	Land for Agri. use	Irrigated land	Canal	State Tubewell	Private Tubewell	Open Well	Others	Cost of land (ha) as informed by villagers in Rs.
1 Katha	1016	156	55	216	767	767	N	N	767	N	N	720,000
2 Badh Khalsa	Data not available from Tehsil											
3 Sonda	556	27	66	95	448	448	160	N	288	N	N	400,000
4 Panchali Khurd	709	20	55	88	600	600	179	N	421	N	N	420,000
5 Sherpur	156	6	7	14	142	142	N	N	142	N	N	800,000
6 Khurrampur	416	12	43	59	355	355	N	N	355	N	N	400,000
7 Rawan (Badagawan)	943	42	55	100	722	722	N	N	350	N	N	600,000
8 Bhidoli	548	21	17	40	398	398	N	N	398	N	N	400,000
9 Jalalpur Raghunathpur	148	5	11	16	112	112	N	N	112	N	N	600,000
10 Mawi Kalan	632	5	48	88	523	523	N	N	523	N	N	800,000
11 Sharfabad	142	2	11	14	115	115	N	N	115	N	N	500,000
12 Sikbera	142	3	2	12	127	127	N	N	127	N	N	800,000
13 Alamgirpur	75	1	3	5	70	70	N	N	70	N	N	600,000
14 Soharka	101	2	6	9	88	88	16	N	72	N	N	400,000
15 Reora	505	6	32	51	427	427	N	293	134	N	N	500,000
16 Chajjupur	325	10	23	43	270	270	136	N	134	N	N	200,000 ~ 300,000
17 Manauli	1666	-	-	90	1539	1536	N	N	1304	N	232	3,000,000

Source: Data collected from Tehsil records of the concerned districts.

Appendix 6.2: Brick Kilns

Price of land leasing:

Lease period: not less than 5 years, not more than 15 years.

Lease fee: Rs.25,000/ha/year.

Size of leasing-in area: 0.2 ~ 20ha.

Depth of soil: 0.3 m/year.

Platform and chimney: Rs.35,000/ha.

Total area (soil part and platform & chimney): 0.2 ~ 100ha.

Height of chimney:

Large size of factory: about 35m or above.

Medium size of factory: about 32 ~34 m.

Small size of factory: about 12 m.

Production and cost:

During peak period (dried summer season): 70,000 bricks/day.

Labor productivity: 2,000/person.

Labor cost: Rs.240/day.

Value of a chimney: Rs.5 million (in large size).

(Factories in Khekra have been operating for 3 years.)

Cost of bricks: Rs.1.2 ~ 1.5/one brick.

Man power:

Example: A medium size brick kilns case:

(1) 200 workers for molding (In case of large size: 290 ~ 300 workers).

(2) 56 workers for carrying bricks.

(3) 8 workers for fueling (mainly coal and charcoal).

(4) 20 ~ 28 workers for taking out bricks

Total: more than 290 workers for a medium size brick factory.

(2) ~ (4) kinds of worker income: Rs.2,000/month (12 hours/day).

Appendix 6.3: Land Acquisition, Resettlement and Rehabilitation

Summary of Key Trends in Indian Law and Policies

Legislation and policies to address social issues associated with infrastructure projects are evolving rapidly. Most of these laws and policies are oriented towards improved understanding of two key issues namely – definition of project affected persons (PAPs), and nature and extent of entitlements. Some key changes taking place are:

- (a) Regarding the inclusion of persons within the definition of 'PAPs', unlike the Land Acquisition Act which at only once deals with people who lose land and have valid legal titles, the Draft National Rehabilitation Policy (Ministry of Rural Development) is now moving to a holistic understanding of what Rehabilitation & Resettlement (R&R) mean and who PAPs are. There are many instances where the people are encroaching upon land, which already belongs to the Government. It is comparatively easy, given political will, to clear the encroachments, since the encroaches have no legal standing. Difficulty often arises because of proper land records. Also, to make the persons encroaching amenable as well as to obtain political acceptability, certain policies of compensation and rehabilitation of persons encroaching are made by a number of States. In these State cases, the removal of encroachments becomes smooth and fast.
- (b) Regarding the extent and nature of entitlements, while 'adequate compensation' was initially the objective of laws/policies, replacement value and even development benefits are now favored in order to mitigate the potentially disruptive nature of project-induced displacement and other adverse effects. Correspondingly, compensation has now been re-defined, and includes grants/allowances/civic amenities leading to establishment of a resource base similar to pre-project condition. Seven basic categories of issues and impacts are increasingly being recognized under the entitlement framework. These are (1) loss of land, (2) loss of structure, (3) loss of source of livelihood, (4) loss of access to common resources and facilities, (5) loss of standing crops and trees, (6) losses during transition of displaced persons/establishments, and (7) loss to host communities.
- (c) Laws and policies now provide for resettlement on a community-wide basis and not on an individual basis. Integration into host communities is also an important consideration.
- (d) Most policies now view R&R as a time bound activity.
- (e) Cut off dates for identification of PAPs, and the formulation of eligibility criteria are now specified in some of the laws.
- (f) National Acts and policies have little provision for public disclosure,

consultation and participation, whereas the Orissa R&R policy and NGO policy do.

- (g) Grievance and redress mechanisms are addressed in the National Draft Policy through the provision for setting up of a Grievance and Redress Cell including organizations of displaced persons.

The requirement of social assessment is not mandatory under national law. Preparations of R&R plans are required under specific State laws and some policies, but there is no parallel with the environmental clearance required under the Environmental Impact Assessment (EIA) Notification, 1994.

Resettlement and Rehabilitation Problems

The Indian experience of displacement induced by development projects shows that the government made too weak efforts to minimize the extent and the trauma of displacement, and to comprehensively resettle the displaced people. A number of factors have contributed to make rehabilitation and development of the displaced people difficult and unmanageable. The pace of change has exceeded the limits of resilience of the prevalent social and economic system and has thus led to its disruption. The people have been left to fend for themselves in, so called, 'new world' about which they know nothing. Adverse forces, therefore, overwhelm them. Sudden changes in technology, and the rapid penetration of the market economy are all well-known examples resulting in extensive dislocation of traditional economies. One important cause of displacement is the lack of recognition of people's rights. Farmer's rights, even though partial, are on record as agriculture is their dominant activity. However, pastoralists and illegal dwellers³ have no rights whatsoever. The rights of tenants on land belonging to farmers have largely been ignored. State or any agency on its behalf can claim the resources for alternative use, at best after paying some compensation. People whose rights are not recognized at all cannot claim even nominal compensation.

Displacement has consistently been treated as a non-issue because planners and leaders fail to appreciate the empirical reality. The planners viewed people living in and around the site of a development project as impediments to progress, as those who must make sacrifices in the interests of the nation. Most planners assumed that displacement is inevitable, and often attempted to deal with the fallout only when the affected people resisted eviction. The rehabilitation policies, which emerged, were mere mitigating strategies. The system established to compensate for the loss of property and livelihoods is limited by its own definitions, the second problems arises from the mindset of the administrators of the system. They are primarily concerned about the physical location. To them, the question of livelihood is not an issue. It is expected that the people will take care of themselves, particularly after their

³ They are mainly migrants from Rajasthan, U.P. and Bihar, and their main occupations are agricultural workers and laborers in informal service sector.

legal claims have been settled. Basic needs remain unsatisfied, while superficial pay off are made to justify the process of rehabilitation. In fact, rehabilitation is a lengthy process, which may take several generations: normalization is rarely achieved. Further displacement has not been recognized as a serious issue because most of the people affected belong to the weakest sections of the community. More often than not, when land is acquired for development projects in the so-called advanced area, the landowners are not dependent on the land for their subsistence. Those who do depend on the land for their livelihood tenants or sharecroppers -- have no rights and therefore can be pushed aside without much fuss.

Appendix 6.4: The National Commission for Women

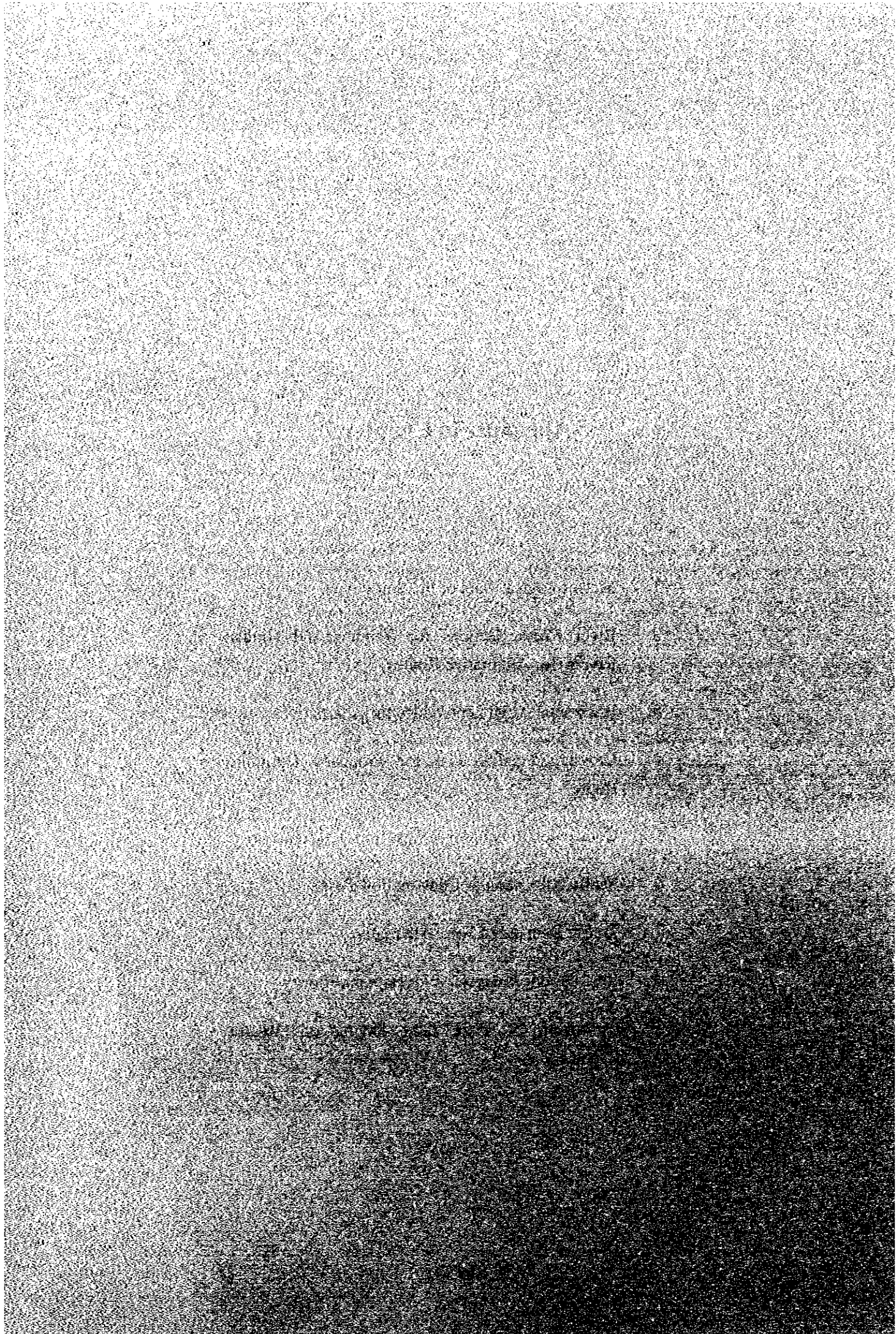
The National Commission for Women identified the following major issues which hinder the development of women:

- (a) fewer and poorer opportunities to work;
- (b) greater impact if unemployment levels are high;
- (c) under employment or employed only in 'casual' work;
- (d) greater vulnerability due to lower average skills and education;
- (e) lesser mobility;
- (f) dual home and employment responsibilities;
- (g) a current systematic social practice of underrating women's work; and
- (h) lack of access to the more sophisticated technologies.

In 1991, out of the total female population, only 4.6% were recorded as participating in the workforce. And in proportion to the total population, in the urban area of the NCR the work force participation ratio (WFPR) was only 1.1%. According to the Ministry of Labour, State of Haryana and Uttar Pradesh and the National Capital Territory of Delhi fall within the lowest category range of female WFPR.

Appendix to Chapter 7

1. Meteorological Data of the Study Area
2. River Cross Sections for Yamuna and Hindan Rivers (for Alternative Routes)
3. Horizontal Alignment Tables for Alternatives
4. Crossing Facility List for Proposed Optimum Route
5. Conversion to Economic Cost from Financial Cost
6. Yearly Allocation of Construction Cost
7. Traffic Demand of Nine Alternatives
8. Cost Benefit Analysis of Investment Priority
9. Estimation of Time Cost Saving on Meerut Extension



Appendix 7.1: Meteorological Data of the Study Area

Mean daily temperature

Unit: °C

Station		Jan.	Feb.	Mar.	Apl.	May	June	June
Delhi Safdarjang	max.	21.3	23.6	30.2	36.2	40.5	39.9	35.3
	min.	7.3	10.1	15.1	21.0	26.6	28.7	27.2
Meerut	max.	20.6	24.5	30.1	36.1	40.0	39.5	34.3
	min.	7.9	9.8	15.0	20.2	24.8	27.4	28.4
Gurgaon	max.	21.4	23.5	29.8	37.1	40.0	39.5	35.0
	min.	5.1	7.5	12.4	19.1	23.7	26.7	26.1

Station		Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Delhi Safdarjang	max.	33.7	34.1	33.1	28.7	23.4	31.7
	min.	26.1	24.6	18.7	11.8	8.0	18.8
Meerut	max.	32.7	33.4	31.9	27.9	23.2	31.2
	min.	25.7	24.3	18.5	11.3	8.1	18.3
Gurgaon	max.	33.3	34.3	33.8	28.9	23.4	31.7
	min.	25.1	22.8	17.6	10.7	6.1	16.9

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Maximum and minimum daily temperature

Unit: °C

Station		Jan.	Feb.	Mar.	Apl.	May	June
Delhi Safdarjang	max.	29.4	33.3	40.6	45.6	47.2	46.7
	min.	-0.6	1.7	4.4	10.7	17.0	18.9
Meerut	max.	29.3	32.0	37.8	43.1	45.7	46.1
	min.	0.2	0.0	6.2	12.2	15.8	19.4
Gurgaon	max.	27.4	33.0	38.3	44.6	49.0	46.3
	min.	0.0	0.7	3.8	9.4	17.0	19.1

Station		June	Aug.	Sep.	Oct.	Nov.	Dec.
Delhi Safdarjang	max.	45.0	40.0	40.6	39.6	35.0	28.9
	min.	21.4	21.2	17.6	9.4	3.9	1.1
Meerut	max.	46.1	38.3	38.2	37.8	34.0	30.0
	min.	20.3	19.9	18.5	10.9	5.6	0.2
Gurgaon	max.	44.0	38.6	41.0	38.0	38.4	29.6
	min.	21.0	15.5	15.8	9.8	3.2	-4.7

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Mean maximum and mean minimum temperature

Unit: °C

Sub-region		Jan.	Feb.	Mar.	Apl.	May	June	June
Haryana (including NCT)	max.	20.9	23.9	29.7	35.8	40.1	40.1	35.4
	min.	6.5	9.0	14.2	19.7	24.8	27.4	26.2
Uttar Pradesh (west)	max.	22.1	25.4	31.5	37.4	41.3	39.9	34.2
	min.	7.9	10.3	15.4	21.0	26.2	28.1	26.2
Rajasthan (east)	max.	23.3	26.9	32.2	37.1	40.5	38.6	33.1
	min.	8.2	10.5	15.9	21.4	26.5	27.5	25.4
NCR	max.	22.1	25.4	31.1	36.8	40.6	39.5	34.2
	min.	7.5	9.9	15.2	20.7	25.8	27.7	25.9

Station		Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Haryana (including NCT)	max.	33.8	34.3	32.9	28.2	23.1	31.5
	min.	25.4	23.7	17.5	11.0	7.4	17.7
Uttar Pradesh (west)	max.	32.5	33.1	32.7	28.7	24.0	31.9
	min.	25.4	24.3	18.9	11.9	8.4	18.7
Rajasthan (east)	max.	31.3	32.5	33.2	29.5	25.5	32.0
	min.	24.3	23.3	18.6	11.9	8.8	18.5
NCR	max.	32.5	33.3	32.9	28.8	24.2	31.8
	min.	25.0	23.8	18.3	11.6	8.2	18.3

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Seasonal and annual rainfall

Period: 1941-1990
Unit: mm

Station	Winter			Summer			
	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Delhi University	6.69	22.60	17.42	19.19	14.67	19.02	62.26
Delhi Safdarjang	7.00	21.39	16.23	14.93	11.44	17.27	54.55
Sonipat	4.72	17.20	12.32	13.41	7.58	12.43	42.06
Bagpat	4.37	18.60	15.68	11.31	4.91	11.10	38.25
Meerut	9.55	20.38	17.03	16.49	11.28	14.04	51.20
Gaziabad	5.62	19.54	13.53	14.54	5.68	10.38	37.12

Station	Monsoon			Post monsoon		Annual total
	July	Aug.	Sep.	Oct.	Nov.	
Delhi University	259.69	254.54	127.16	33.38	3.81	840.43
Delhi Safdarjang	226.71	223.78	136.65	26.14	3.79	759.88
Sonipat	219.50	194.04	101.95	20.05	3.70	648.96
Bagpat	176.06	194.25	93.01	17.44	3.35	588.33
Meerut	252.12	279.60	130.41	29.46	3.68	835.24
Gaziabad	190.28	199.92	106.55	27.37	3.22	633.75

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Normal rainfall comparison of 50 years

Unit: mm

Station	1901 - 1950			
	Jan.	May	July	Annual
Delhi	20.80	9.70	186.20	660.10
Sonipat	20.30	12.70	157.20	535.50
Meerut	13.20	15.20	229.90	810.90
Gaziabad	22.10	12.70	172.70	596.40

Station	1941 - 1990				Difference	%
	Jan.	May	July	Annual		
Delhi	21.39	17.27	226.71	759.88	99.78	15%
Sonipat	17.10	12.43	219.50	648.96	113.46	21%
Meerut	20.38	14.04	252.12	835.12	24.22	3%
Gaziabad	19.54	10.38	190.28	633.74	37.34	6%

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Related humidity

Unit: %

Station		Jan.	Feb.	Mar.	Apl.	May	June	June
Delhi Safdarjang	08:30	72	59	47	32	31	48	73
	17:30	41	28	21	16	18	32	60
Meerut	08:30	78	65	56	39	38	54	79
	17:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gurgaon	08:30	75	69	60	45	43	56	77
	17:30	48	42	35	25	28	39	66

Station		Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Delhi Safdarjang	08:30	77	70	54	48	63	56
	17:30	65	54	35	31	38	37
Meerut	08:30	83	76	69	63	73	64
	17:30	N/A	N/A	N/A	N/A	N/A	N/A
Gurgaon	08:30	82	72	59	64	71	64
	17:30	71	58	40	43	46	45

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Mean maximum and minimum relative humidity

Unit: %

Sub-region		Jan.	Feb.	Mar.	Apl.	May	June	June
Haryana (including NCT)	morning	76	68	56	40	37	51	75
	evening	46	38	30	22	21	33	61
Uttar Pradesh (west)	morning	76	66	51	36	35	52	79
	evening	49	37	27	21	22	38	69
Rajasthan (east)	morning	66	55	41	33	37	56	77
	evening	39	30	24	21	23	39	64
NCR	morning	72.7	63.0	49.3	36.3	36.3	53.0	77.0
	evening	44.7	35.0	27.0	21.3	22.0	36.7	64.7

Station		Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Haryana (including NCT)	morning	80	75	63	60	72	63
	evening	67	57	40	38	44	41
Uttar Pradesh (west)	morning	84	78	66	61	71	63
	evening	76	65	46	40	47	45
Rajasthan (east)	morning	82	75	57	56	63	58
	evening	70	60	37	35	39	40
NCR	morning	82.0	76.0	62.0	59.0	68.7	61.3
	evening	71.0	60.7	41.0	37.7	43.3	42.0

Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Mean wind speed

Unit: km/h

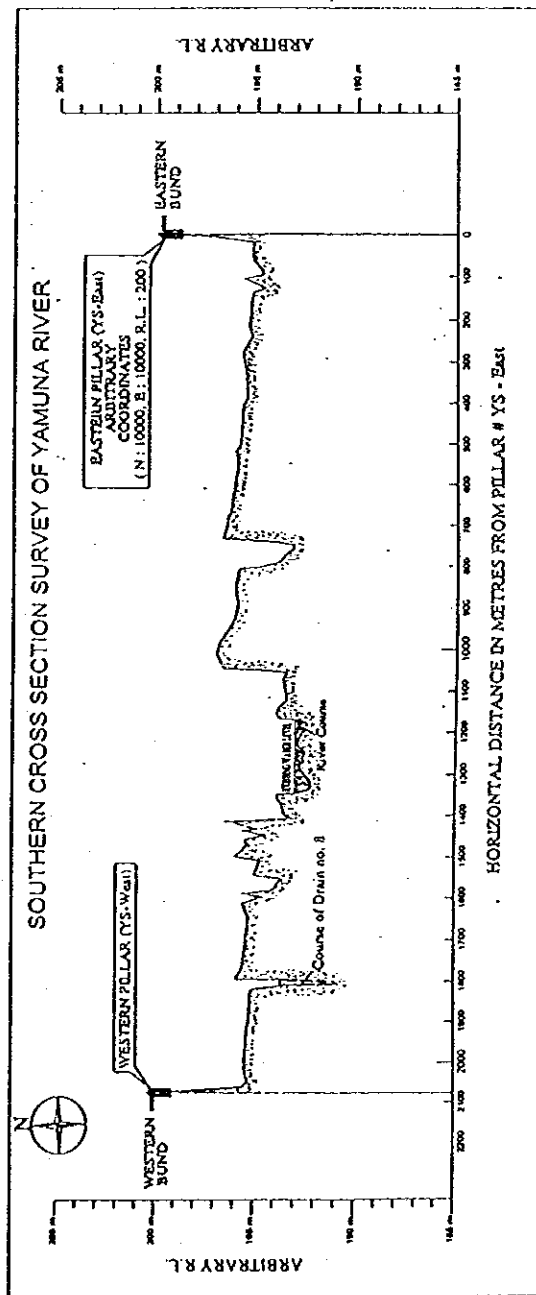
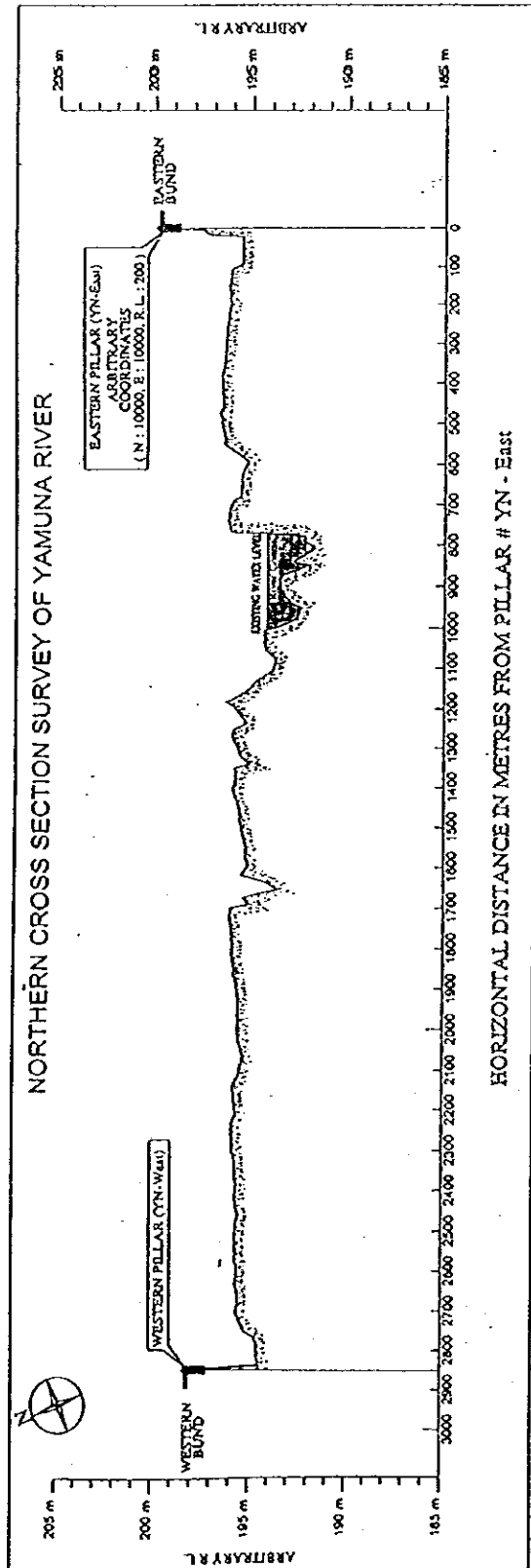
Unit: (m/s)

Sub-region		Jan.	Feb.	Mar.	Apl.	May	June	June
Haryana	km/h	6.5	7.7	8.5	8.5	9.8	11.1	9.0
(including NCT)	(m/s)	(1.8)	(2.1)	(2.4)	(2.4)	(2.7)	(3.1)	(2.5)
Uttar Pradesh	km/h	4.9	7.2	7.1	7.7	8.6	8.9	7.1
(west)	(m/s)	(1.4)	(2.0)	(2.0)	(2.1)	(2.4)	(2.5)	(2.0)
Rajasthan	km/h	11.0	11.5	12.0	13.1	16.5	17.8	16.2
(east)	(m/s)	(3.1)	(3.2)	(3.3)	(3.6)	(4.6)	(4.9)	(4.5)
NCR	km/h	7.5	8.8	9.2	9.8	11.6	12.6	10.8
	(m/s)	(2.1)	(2.4)	(2.6)	(2.7)	(3.2)	(3.5)	(3.0)

Station		Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Haryana	km/h	7.5	7.1	5.3	5.3	5.8	7.7
(including NCT)	(m/s)	(2.1)	(2.0)	(1.5)	(1.5)	(1.6)	(2.1)
Uttar Pradesh	km/h	5.9	6.0	4.4	4.4	3.7	6.3
(west)	(m/s)	(1.6)	(1.7)	(1.2)	(1.2)	(1.0)	(1.8)
Rajasthan	km/h	12.4	12.3	10.0	7.6	8.1	12.4
(east)	(m/s)	(3.4)	(3.4)	(2.8)	(2.1)	(2.3)	(3.4)
NCR	km/h	8.6	8.5	6.6	5.8	5.9	8.8
	(m/s)	(2.4)	(2.4)	(1.8)	(1.6)	(1.6)	(2.4)

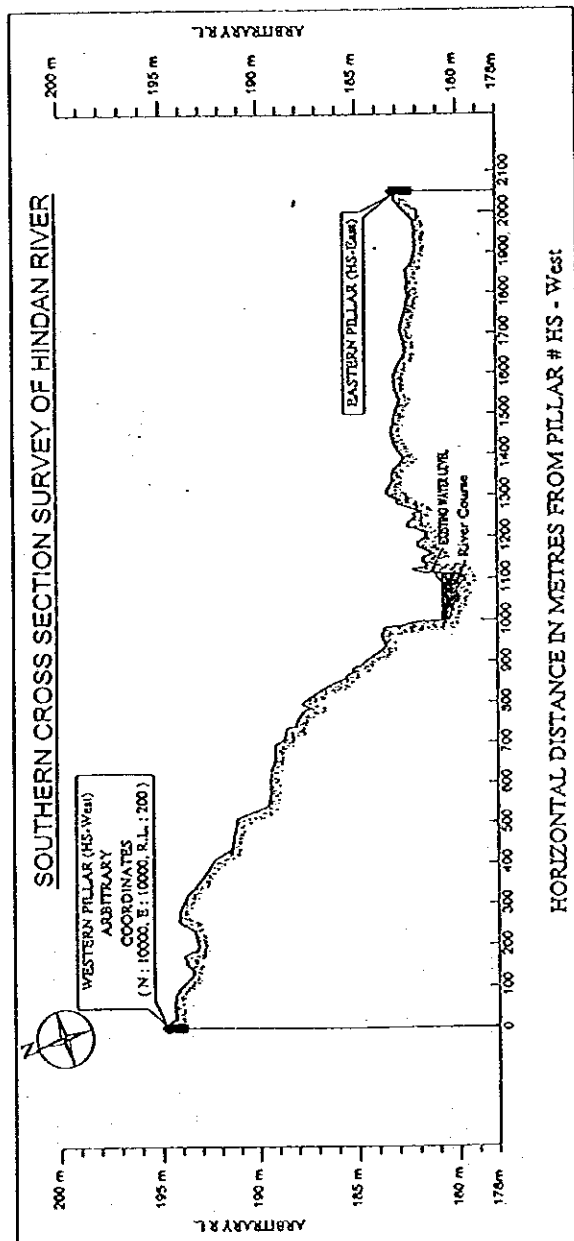
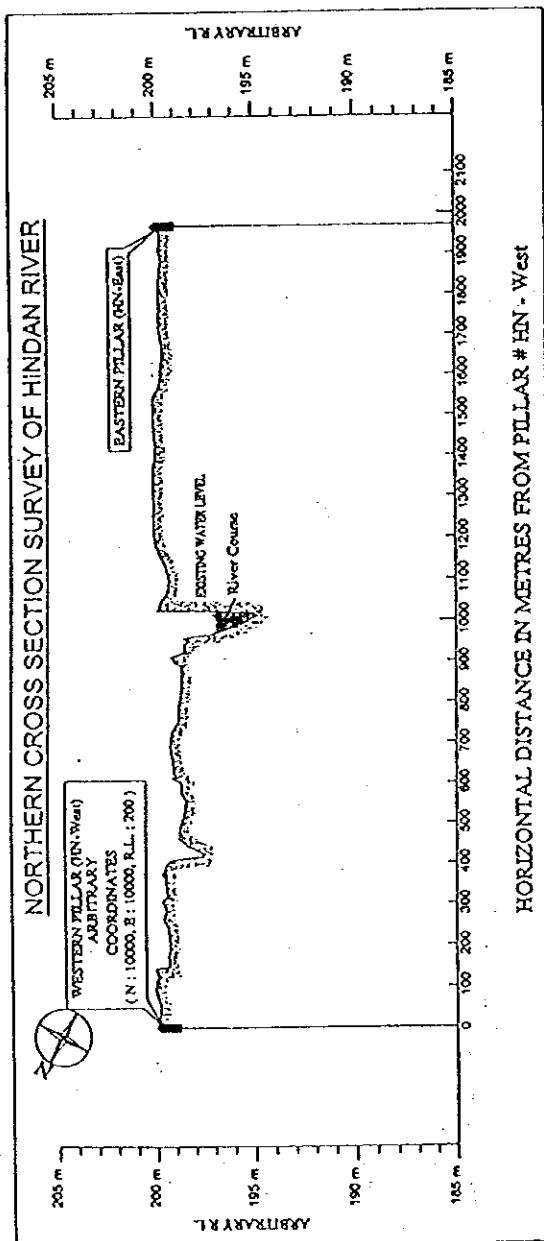
Source: NCRPB, "Study on Drainage System and Flood Control Including Water Resources in National Capital Region," October 1994

Appendix 7.2: River Cross Sections for Yamuna and Hindan Rivers (for Alternative Routes)



LOCATION MAP OF CROSS-SECTION SURVEY (YAMUNA RIVER)

River Cross Sections for Yamuna River



LOCATION MAP OF CROSS-SECTION SURVEY (HINDAN RIVER)

River Cross Sections for Hindan River

Appendix 7.3(1): Kundli - Ghaziabad Expressway Horizontal Alignment Alternatives

Horizontal Alignment

Kundli - Ghaziabad : Alternative Route 1			Kundli - Ghaziabad : Alternative Route 2			Kundli - Ghaziabad : Alternative Route 3		
Station	Design Element	Length(m)	Station	Design Element	Length(m)	Station	Design Element	Length(m)
0+000	BP	1,300	0+000	BP	1,300	0+000	BP	1,300
1+300	PRC2	3,630	1+300	PRC2	3,709	1+300	PRC2	3,630
4+930	PT2	1,250	5+009	PT2	2,740	4+930	PT2	1,250
6+180	PC3	4,276	7+749	PC3	5,760	6+180	PC3	4,276
10+456	PT3	3,000	13+509	PT3	2,640	10+456	PT3	3,000
13+456	PC4	2,617	16+149	PC4	4,887	13+456	PC4	2,617
16+073	PT4	2,580	21+036	PRC5	2,094	16+073	PT4	1,320
18+653	PC5	5,969	23+130	PT5	980	17+393	PC5	5,061
24+622	PRC6	3,421	24+110	PC6	1,920	22+454	PT5	2,820
28+043	PRC7	2,793	26+030	PRC7	2,513	25+274	PC6	3,142
30+836	PT7	2,450	28+543	PRC8	2,513	28+416	PRC7	2,513
33+286	PC8	2,138	31+056	PT8	2,300	30+929	PT7	2,300
35+424	PRC9	2,225	33+356	PC9	2,129	33+229	PC8	2,129
37+649	PT9	1,660	34+485	PT9	1,000	35+358	PT8	1,000
39+309	PC10	1,937	36+485	PC10	2,138	36+358	PC9	2,138
41+246	EP		38+623	PT10	2,700	38+496	PT9	2,700
			41+323	PC11	2059	41+196	PC10	2,059
			43+382	EP(PT11)		43+255	EP(PT10)	

Appendix 7.3(2): Ghaziabad - Meerut Expressway : Horizontal Alignment for Alternatives

Horizontal Alignment

Ghaziabad - Meerut : Alternative Route 1-1				Ghaziabad - Meerut : Alternative Route 1-2				Ghaziabad - Meerut : Alternative Route 2-1			
Station	Design Element	Length(m)		Station	Design Element	Length(m)		Station	Design Element	Length(m)	
0+000	BP	Tangent	100	0+000	BP	Tangent	100	0+000	BP	Tangent	100
0+100	PC1	R=-2,000	1,396	0+100	PC1	R=-2,000	1,396	0+100	PC1	R=-2,000	1,396
1+496	PRC2	R= 1,500	1,571	1+496	PRC2	R= 1,500	1,571	1+496	PRC2	R= 1,500	1,571
3+067	PT2	Tangent	960	3+067	PT2	Tangent	960	3+067	PT2	Tangent	960
4+027	PC3	R=-7,500	1,963	4+027	PC3	R=-7,500	1,963	4+027	PC3	R=-7,500	1,963
5+990	PT3	Tangent	2,340	5+990	PT3	Tangent	2,340	5+990	PT3	Tangent	2,340
8+330	PC4	R= 3,500	1,955	8+330	PC4	R= 3,500	1,955	8+330	PC4	R= 3,500	1,955
10+285	PRC5	R=-7,000	3,910	10+285	PRC5	R=-7,000	3,910	10+285	PT4	Tangent	2,920
14+195	PT5	Tangent	2,580	14+195	PT5	Tangent	2,580	13+205	PC5	R=-4,500	2,985
16+755	PC6	R= 4,000	3,351	16+755	PC6	R= 4,000	3,351	16+190	PRC6	R= 2,500	2,793
20+126	PT6	Tangent	1,400	20+126	PT6	Tangent	1,400	18+983	PRC7	R=-5,000	3,054
21+526	PC7	R=-4,000	3,211	21+526	PC7	R=-4,000	3,211	22+037	PT7	Tangent	1,860
24+737	PT7	Tangent	2,000	24+737	PT7	Tangent	2,000	23+897	PC8	R=-2,000	1,640
26+737	PC8	R=20,000	6,283	26+737	PC8	R=20,000	6,283	25+537	PRC9	R= 2,000	2,374
33+020	PT8	Tangent	1,300	33+020	PT8	Tangent	2,720	27+911	PRC10	R=-2,000	2,025
34+320	PC9	R=-2,000	1,955	35+740	PC9	R=-5,000	3,927	29+936	PRC11	R= 4,000	2,234
36+275	PRC10	R=10,000	3,770	39+667	PT9	Tangent	1,140	31+170	PT11	Tangent	1,830
40+045	EP			40+807	EP			34+000	PC12	R=-2,000	1,885
								35+885	PT12	Tangent	1,400
								37+285	PRC13	R=10,000	3,770
								41+055	EP		

Horizontal Alingment

Ghaziabad - Meerut : Alternative Route 2-2			Ghaziabad - Meerut : Alternative Route 3-1			Ghaziabad - Meerut : Alternative Route 3-2		
Station	Design Element	Length(m)	Station	Design Element	Length(m)	Station	Design Element	Length(m)
0+000	BP	100	0+000	BP	100	0+000	BP	100
0+100	PC1	1,396	0+100	PC1	1,396	0+100	PC1	1,396
1+496	PRC2	1,571	1+496	PRC2	1,571	1+496	PRC2	1,571
3+067	PT2	960	3+067	PT2	960	3+067	PT2	960
4+027	PC3	1,963	4+027	PC3	1,963	4+027	PC3	1,963
5+990	PT3	2,340	5+990	PT3	2,340	5+990	PT3	2,340
8+330	PC4	1,955	8+330	PC4	1,955	8+330	PC4	1,955
10+285	PT4	2,920	10+285	PT4	2,920	10+285	PT4	2,920
13+205	PC5	2,985	13+205	PC5	2,985	13+205	PC5	2,985
16+190	PRC6	2,793	16+190	PRC6	2,793	16+190	PRC6	2,793
18+983	PRC7	3,054	18+983	PRC7	3,054	18+983	PRC7	3,054
22+037	PT7	1,860	22+037	PT7	1,860	22+037	PT7	1,860
23+897	PC8	1,640	23+897	PC8	1,640	23+897	PC8	1,640
25+537	PRC9	2,374	25+537	PRC9	5,563	25+537	PRC9	5,563
27+911	PRC10	2,025	31+100	PRC10	2,500	31+100	PRC10	2,500
29+936	PRC11	2,234	33+600	PT10	1,300	33+600	PT10	2,720
31+170	PT11	3,000	34+900	PC11	1,955	36+320	PC11	3,927
35+170	PC12	3,752	36+855	PRC11	3,770	40+247	PT11	1,140
38+922	PT12	2,700	40+625	EP		41+387	EP	
41+622	EP							

Appendix 7.4(1): Crossing Facility List for Proposed Optimum Route (K-G Expressway)

Kundli - Ghaziabad : Alternative Route 1

Station	Fill Height	Crossing Facility	Requirement		Remarks
0+00	4m	National Highway No.1	Bridge	L=100m	
0+700	4m	Village Road	Bridge	L=10m	
2+100	4m	1L Minor (Distributary)	Bridge	L=10m	Including Farm Road
3+400	4m	Village Road	Bridge	L=10m	
4+100	4m	Farm Road	Box Culvert		Relocation L=400m
4+900	4m	Farm Road	Box Culvert		
5+400	4m	Drain (Small)	Pipe Culvert	D1m*2Nos	
6+100	4m	Farm Road	Box Culvert		
7+100	4m	Village Road	Bridge	L=10m	
8+000	4m/5m	Farm Road	Box Culvert		
9+500	5m	Drain (Small)	Pipe Culvert	D1m*2Nos	
10+400	5m(2m)/7m	Left Bank Road	Box Culvert		Relocated to outside of river
12+400	7m	Yamuna River	Bridge	L=600m	
13+400	7m/2m	Right Bank Road	Box Culvert		Relocated to outside of river
14+000	2m	State Highway No.57	Bridge	L=40m	
16+300	2m	Farm Road	Box Culvert		
17+500	2m	Farm Road	Box Culvert		
18+500	2m	Northern Railway	Bridge	L=11m	Shahadra Saharampur Branch
19+400	2m	Khakra Distributary	Bridge	L=10m	Including Farm Road
19+500	2m	Basi Drain	Pipe Culvert	D1m*2Nos	
19+700	2m	Mitli Distributary	Bridge	L=10m	
22+000	2m	Eastern Yamuna Canal	Bridge	L=27.7m	Including roads of both sides
22+200	2m	Village Road	Bridge	L=10m	Relocation L=500m
22+700	2m	Duala Drain	Bridge	L=10m	
25+300	2m	Farm Road	Box Culvert		
25+500	2m	Duala Drain	Bridge	L=10m	Relocation L=1,000m
26+500	2m	Village Road	Bridge	L=10m	
29+200	2m	Village Road	Bridge	L=10m	
30+600	2m	Village Road	Bridge	L=10m	
31+200	2m	Village Road	Bridge	L=10m	
32+000	2m/5m		-	-	
33+150	5m/2m	Hindan River	Bridge	L=200m	
34+500	2m/5m	Village Road	Bridge	L=10m	
36+500	5m	Sonda Drain	Pipe Culvert	D1m*2Nos	
36+700	5m	Branch of Sonda Drain	Pipe Culvert	D1m*1No	
37+800	5m/2m	Village Road	Bridge	L=10m	
39+500	2m	Bhikampur Drain	Pipe Culvert	D1m*3Nos	
39+600	2m	District Road	Bridge	L=10m	
40+000	2m	Sultampur Minor Distributary	Bridge	L=10m	Including Farm Road
41+246	2m	End Point			

Appendix 7.4(2): Crossing Facility List for Proposed Optimum Route (G-M Expressway)

Ghaziabad - Meerut : Alternative Route 1-1

Station	Fill Height	Crossing Facility	Requirement		Remarks
0+00	2m				Rip-rap at river side
0+500	2m/5m				
1+750	5m		Pipe Culvert	D1m*2Nos	
1+800	5m				New Town Area
1+900	5m	Village Road	Bridge	L=10m	
2+700	5m	Farm Road	Box Culvert		
3+800	5m/2m	Village Road	Bridge	L=10m	
5+600	2m	Village Road	Bridge	L=10m	
6+200	2m	Sultanpur Minor	Bridge	L=10m	
6+600	2m	Branch of Sutanpur Minor	Pipe Culvert	D1m*1No	
6+900	2m	Branch of Sutanpur Minor	Pipe Culvert	D1m*1No	
7+300	2m	Farm Road	Box Culvert		
7+400	2m	Branch of Sutanpur Minor	Pipe Culvert	D1m*1No	
8+100	2m	Branch of Sutanpur Minor	Pipe Culvert	D1m*1No	
9+000	2m	Branch of Sutanpur Minor	Pipe Culvert	D1m*1No	
10+000	2m	Farm Road	Box Culvert		
10+800	2m	Village Road	Bridge	L=10m	
11+000	2m	Bhikampur Drain	Pipe Culvert	D1m*3Nos	
11+500	2m	District Road	Bridge	L=10m	Relocation L=500m
13+100	2m	Tikri Distributary	Bridge	L=10m	
15+100	2m	Village Road	Bridge	L=10m	
16+300	2m	Major District Road	Bridge	L=10m	
17+300	2m	Farm Road	Box Culvert		
19+000	2m	Farm Road	Box Culvert		
20+000	2m/3m	Farm Road	Box Culvert		
20+900	3m	Upper Ganga Canal	Bridge	L=100m	
21+500	3m	Farm Road	Box Culvert		
22+800	3m/2m	Jalalabad Distributary	Bridge	L=10m	
24+000	2m	Village Road	Bridge	L=10m	
25+000	2m	Sherpur Minor (Distributary)	Bridge	L=10m	
26+250	2m	Mawi Minor	Bridge	L=10m	
26+500	2m	District Road	Bridge	L=10m	
27+500	2m	Niwari Drain	Pipe Culvert	D1m*3Nos	
28+000	2m	Aghera Minor	Bridge	L=10m	
29+700	2m	Qadirabad Drain	Pipe Culvert	D1m*3Nos	
32+000	2m	Kalaniri Minor	Pipe Culvert	D1m*2Nos	
32+100	2m	Village Road	Bridge	L=10m	
32+400	2m	Dhidala Drain	Pipe Culvert	D1m*2Nos	
34+800	2m	Left Bhola Distributary	Bridge	L=10m	
35+900	2m	Farm Road	Box Culvert		
35+900	2m	Sheikhpuri Drain	Pipe Culvert	D1m*2Nos	
36+300	2m	Sheikhpuri Drain	Pipe Culvert	D1m*2Nos	
36+900	2m	Branch of Sheikhpuri Drain	Pipe Culvert	D1m*1No	Relocation L=200m
38+700	2m	Village Road	Bridge	L=10m	
38+800	2m	Sheikhpuri Drain	Pipe Culvert	D1m*2Nos	
39+500	2m	Puth Distributary	Bridge	L=10m	
40+045	2m	End Point			