Table K.5 Economic Cash Flow (1/5) - Sarojini Nagar Area -

Area: 14,862 ha
IRR: 19.2%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	17,985			17,985		-17,985
2	1994	38,003			38,003		-38,003
3	1995	91,472			91,472	1,106	-90,366
4	1996	134,567			134,567	7,739	-126,828
5	1997	107,257			107,257	22,112	-85,145
6	1998	75,244			75,244	44,224	-31,020
7	1999		6,410		6,410	71,864	65,454
8	2000		6,410		6,410	98,398	91,988
9	2001		6,410		6,410	119,405	112,995
10	2002		6,410		6,410	132,672	126,262
11	2003		6,410	1,744	8,154	138,200	130,046
12	2004		6,410		6,410	138,200	131,790
13	2005		6,410		6,410	138,200	131,790
14	2006		6,410	16	6,426	138,200	131,774
15	2007		6,410		6,410	138,200	131,790
16	2008		6,410		6,410	138,200	131,790
17	2009		6,410		6,410	138,200	131,790
18	2010		6,410		6,410	138,200	131,790
19	2011		6,410		6,410	138,200	131,790
20	2012		6,410		6,410	138,200	131,790
21	2013		6,410	1,744	8,154	138,200	130,046
22	2014		6,410		6,410	138,200	131,790
23	2015		6,410		6,410	138,200	131,790
24	2016		6,410	16	6,426	138,200	131,774
25	2017		6,410		6,410	138,200	131,790
26	2018		6,410	10,348	16,758	138,200	121,442
27	2019		6,410		6,410	138,200	131,790
28	2020		6,410		6,410	138,200	131,790
29	2021		6,410		6,410	138,200	131,790
30	2022		6,410		6,410	138,200	131,790
31	2023		6,410	1,744	8,154	138,200	130,046
32	2024		6,410		6,410	138,200	131,790
33	2025		6,410		6,410	138,200	131,790
34	2026		6,410	16	6,426	138,200	131,774
35	2027		6,410		6,410	138,200	131,790
36	2028		6,410		6,410	138,200	131,790
37	2029		6,410		6,410	138,200	131,790
38	2030		6,410		6,410	138,200	131,790
39	2031		6,410		6,410	138,200	131,790
40	2032		6,410		6,410	138,200	131,790
41	2033		6,410	1,744	8,154	138,200	130,046
42	2034		6,410		6,410	138,200	131,790
43	2035		6,410		6,410	138,200	131,790
44	2036		6,410	16	6,426	138,200	131,774
45	2037		6,410		6,410	138,200	131,790
46	2038		6,410		6,410	138,200	131,790
47	2039		6,410		6,410	138,200	131,790
48	2040		6,410		6,410	138,200	131,790
49	2041		6,410		6,410	138,200	131,790
50	2042		6,410		6,410	138,200	131,790

Table K.5 Economic Cash Flow (2/5) - Sataon Area -

Area: 12,874 ha
IRR: 13.7%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	15,579			15,579		-15,579
2	1994	41,306			41,306		-41,306
3	1995	116,997			116,997	926	-116,071
4	1996	169,064			169,064	6,485	-162,579
5	1997	144,534			144,534	18,528	-126,006
6	1998	100,806			100,806	37,056	-63,750
7	1999		9,020		9,020	60,216	51,196
8	2000		9,020		9,020	82,450	73,430
9	2001		9,020		9,020	100,051	91,031
10	2002		9,020		9,020	111,168	102,148
11	2003		9,020	1,512	10,532	115,800	105,268
12	2004		9,020		9,020	115,800	106,780
13	2005		9,020		9,020	115,800	106,780
14	2006		9,020	200	9,220	115,800	106,580
15	2007		9,020		9,020	115,800	106,780
16	2008		9,020		9,020	115,800	106,780
17	2009		9,020		9,020	115,800	106,780
18	2010		9,020		9,020	115,800	106,780
19	2011		9,020		9,020	115,800	106,780
20	2012		9,020		9,020	115,800	106,780
21	2013		9,020	1,512	10,532	115,800	105,268
22	2014		9,020		9,020	115,800	106,780
23	2015		9,020		9,020	115,800	106,780
24	2016		9,020	200	9,220	115,800	106,580
25	2017		9,020		9,020	115,800	106,780
26	2018		9,020	13,230	22,250	115,800	93,550
27	2019		9,020		9,020	115,800	106,780
28	2020		9,020		9,020	115,800	106,780
29	2021		9,020		9,020	115,800	106,780
30	2022		9,020		9,020	115,800	106,780
31	2023		9,020	1,512	10,532	115,800	105,268
32	2024		9,020		9,020	115,800	106,780
33	2025		9,020		9,020	115,800	106,780
34	2026		9,020	200	9,220	115,800	106,580
35	2027		9,020		9,020	115,800	106,780
36	2028		9,020		9,020	115,800	106,780
37	2029		9,020		9,020	115,800	106,780
38	2030		9,020		9,020	115,800	106,780
39	2031		9,020		9,020	115,800	106,780
40	2032		9,020		9,020	115,800	106,780
41	2033		9,020	1,512	10,532	115,800	105,268
42	2034		9,020		9,020	115,800	106,780
43	2035		9,020		9,020	115,800	106,780
44	2036		9,020	200	9,220	115,800	106,580
45	2037		9,020		9,020	115,800	106,780
46	2038		9,020		9,020	115,800	106,780
47	2039		9,020		9,020	115,800	106,780
48	2040		9,020		9,020	115,800	106,780
49	2041		9,020		9,020	115,800	106,780
50	2042		9,020		9,020	115,800	106,780

Table K.5 Economic Cash Flow (3/5) - Sursa Area -

Area: 17,313 ha
IRR: 12.0%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	20,951			20,951		-20,951
2	1994	46,836			46,836		-46,836
3	1995	125,357			125,357	906	-124,451
4	1996	198,026			198,026	6,339	-191,687
5	1997	155,925			155,925	18,112	-137,813
6	1998	95,086			95,086	36,224	-58,862
7	1999		11,440		11,440	58,864	47,424
8	2000		11,440		11,440	80,598	69,158
9	2001		11,440		11,440	97,805	86,365
10	2002		11,440		11,440	108,672	97,232
11	2003		11,440	2,032	13,472	113,200	99,728
12	2004		11,440		11,440	113,200	101,760
13	2005		11,440	7,234	18,674	113,200	94,526
14	2006		11,440	7,250	18,690	113,200	94,510
15	2007		11,440	7,234	18,674	113,200	94,526
16	2008		11,440	7,234	18,674	113,200	94,526
17	2009		11,440		11,440	113,200	101,760
18	2010		11,440		11,440	113,200	101,760
19	2011		11,440		11,440	113,200	101,760
20	2012		11,440		11,440	113,200	101,760
21	2013		11,440	2,032	13,472	113,200	99,728
22	2014		11,440		11,440	113,200	101,760
23	2015		11,440	7,234	18,674	113,200	94,526
24	2016		11,440	7,250	18,690	113,200	94,510
25	2017		11,440	7,234	18,674	113,200	94,526
26	2018		11,440	7,234	18,674	113,200	94,526
27	2019		11,440		11,440	113,200	101,760
28	2020		11,440		11,440	113,200	101,760
29	2021		11,440		11,440	113,200	101,760
30	2022		11,440		11,440	113,200	101,760
31	2023		11,440	2,032	13,472	113,200	99,728
32	2024		11,440		11,440	113,200	101,760
33	2025		11,440	7,234	18,674	113,200	94,526
34	2026		11,440	7,250	18,690	113,200	94,510
35	2027		11,440	7,234	18,674	113,200	94,526
36	2028		11,440	7,234	18,674	113,200	94,526
37	2029		11,440		11,440	113,200	101,760
38	2030		11,440		11,440	113,200	101,760
39	2031		11,440		11,440	113,200	101,760
40	2032		11,440		11,440	113,200	101,760
41	2033		11,440	2,032	13,472	113,200	99,728
42	2034		11,440		11,440	113,200	101,760
43	2035		11,440	7,234	18,674	113,200	94,526
44	2036		11,440	7,250	18,690	113,200	94,510
45	2037		11,440	7,234	18,674	113,200	94,526
46	2038		11,440	7,234	18,674	113,200	94,526
47	2039		11,440		11,440	113,200	101,760
48	2040		11,440		11,440	113,200	101,760
49	2041		11,440		11,440	113,200	101,760
50	2042		11,440		11,440	113,200	101,760

Table K.5 Economic Cash Flow (4/5) - Purwa Area -

Area: 12,252 ha
IRR: 18.4%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	14,827			14,827		-14,827
2	1994	32,215			32,215		-32,215
3	1995	83,993			83,993	970	-83,023
4	1996	126,580			126,580	6,793	-119,787
5	1997	102,329			102,329	19,408	-82,921
6	1998	69,483			69,483	38,816	-30,667
7	1999		6,500		6,500	63,076	56,576
8	2000		6,500		6,500	86,366	79,866
9	2001		6,500		6,500	104,803	98,303
10	2002		6,500		6,500	116,448	109,948
11	2003		6,500	1,440	7,940	121,300	113,360
12	2004		6,500		6,500	121,300	114,800
13	2005		6,500	1,996	8,496	121,300	112,804
14	2006		6,500	2,020	8,520	121,300	112,780
15	2007		6,500	1,996	8,496	121,300	112,804
16	2008		6,500	1,996	8,496	121,300	112,804
17	2009		6,500		6,500	121,300	114,800
18	2010		6,500		6,500	121,300	114,800
19	2011		6,500		6,500	121,300	114,800
20	2012		6,500		6,500	121,300	114,800
21	2013		6,500	1,440	7,940	121,300	113,360
22	2014		6,500		6,500	121,300	114,800
23	2015		6,500	1,996	8,496	121,300	112,804
24	2016		6,500	2,020	8,520	121,300	112,780
25	2017		6,500	1,996	8,496	121,300	112,804
26	2018		6,500	1,996	8,496	121,300	112,804
27	2019		6,500		6,500	121,300	114,800
28	2020		6,500		6,500	121,300	114,800
29	2021		6,500		6,500	121,300	114,800
30	2022		6,500		6,500	121,300	114,800
31	2023		6,500	1,440	7,940	121,300	113,360
32	2024		6,500		6,500	121,300	114,800
33	2025		6,500	1,996	8,496	121,300	112,804
34	2026		6,500	2,020	8,520	121,300	112,780
35	2027		6,500	1,996	8,496	121,300	112,804
36	2028		6,500	1,996	8,496	121,300	112,804
37	2029		6,500		6,500	121,300	114,800
38	2030		6,500		6,500	121,300	114,800
39	2031		6,500		6,500	121,300	114,800
40	2032		6,500		6,500	121,300	114,800
41	2033		6,500	1,440	7,940	121,300	113,360
42	2034		6,500		6,500	121,300	114,800
43	2035		6,500	1,996	8,496	121,300	112,804
44	2036		6,500	2,020	8,520	121,300	112,780
45	2037		6,500	1,996	8,496	121,300	112,804
46	2038		6,500	1,996	8,496	121,300	112,804
47	2039		6,500		6,500	121,300	114,800
48	2040		6,500		6,500	121,300	114,800
49	2041		6,500		6,500	121,300	114,800
50	2042		6,500		6,500	121,300	114,800

Table K.5 Economic Cash Flow (5/5) - Overall Area -

Area: 57,301 ha
IRR: 15.5%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	69,342			69,342		-69,342
2	1994	158,360			158,360		-158,360
3	1995	417,819			417,819	3,908	-413,911
4	1996	628,237			628,237	27,356	-600,881
5	1997	510,045			510,045	78,160	-431,885
6	1998	340,619			340,619	156,320	-184,299
7	1999		33,370		33,370	254,020	220,650
8	2000		33,370		33,370	347,812	314,442
9	2001		33,370		33,370	422,064	388,694
10	2002		33,370		33,370	468,960	435,590
11	2003		33,370	6,728	40,098	488,500	448,402
12	2004		33,370		33,370	488,500	455,130
13	2005		33,370	9,230	42,600	488,500	445,900
14	2006		33,370	9,486	42,856	488,500	445,644
15	2007		33,370	9,230	42,600	488,500	445,900
16	2008		33,370	9,230	42,600	488,500	445,900
17	2009		33,370		33,370	488,500	455,130
18	2010		33,370		33,370	488,500	455,130
19	2011		33,370		33,370	488,500	455,130
20	2012		33,370		33,370	488,500	455,130
21	2013		33,370	6,728	40,098	488,500	448,402
22	2014		33,370		33,370	488,500	455,130
23	2015		33,370	9,230	42,600	488,500	445,900
24	2016		33,370	9,486	42,856	488,500	445,644
25	2017		33,370	9,230	42,600	488,500	445,900
26	2018		33,370	32,808	66,178	488,500	422,322
27	2019		33,370		33,370	488,500	455,130
28	2020		33,370		33,370	488,500	455,130
29	2021		33,370		33,370	488,500	455,130
30	2022		33,370		33,370	488,500	455,130
31	2023		33,370	6,728	40,098	488,500	448,402
32	2024		33,370		33,370	488,500	455,130
33	2025		33,370	9,230	42,600	488,500	445,900
34	2026		33,370	9,486	42,856	488,500	445,644
35	2027		33,370	9,230	42,600	488,500	445,900
36	2028		33,370	9,230	42,600	488,500	445,900
37	2029		33,370		33,370	488,500	455,130
38	2030		33,370		33,370	488,500	455,130
39	2031		33,370		33,370	488,500	455,130
40	2032		33,370		33,370	488,500	455,130
41	2033		33,370	6,728	40,098	488,500	448,402
42	2034		33,370		33,370	488,500	455,130
43	2035		33,370	9,230	42,600	488,500	445,900
44	2036		33,370	9,486	42,856	488,500	445,644
45	2037		33,370	9,230	42,600	488,500	445,900
46	2038		33,370	9,230	42,600	488,500	445,900
47	2039		33,370		33,370	488,500	455,130
48	2040		33,370		33,370	488,500	455,130
49	2041		33,370		33,370	488,500	455,130
50	2042		33,370		33,370	488,500	455,130

Table K.6 Farm Budget Analysis of Marginal Farmers

Project	Sarojini Nagar			Sataon			Sursa			Purwa		
Condition	Irrigated	Non-irrig.	Total	Irrigated	Non-irrig.	Total	Irrigated	Non-irrig.	Total	Irrigated	Non-irrig.	Total
With project												
Kharif	949	2,246	3,195	949	2,169	3,118	713	2,047	2,760	935	2,184	3,119
Rabi	938	2,161	3,099	938	2,063	3,001	699	1,902	2,601	906	1,912	2,818
Perennial	-	-	-	-	-	-	159	-	159	-	-	-
Sub-total	1,887	4,407	6,294	1,887	4,232	6,119	1,571	3,949	5,520	1,841	4,096	5,937
Without project												
Kharif	-	-	2,082	-	-	910	-	-	1,464	-	-	2,090
Rabi	-	-	2,065	-	-	1,868	-	-	1,825	-	-	1,785
Perennial	-	-	-	-	-	-	-	-	373	-	-	-
Sub-total	-	-	4,147	-	-	2,778	-	-	3,662	-	-	3,875
Incremental Benefit			2,147			3,341			1,858			2,062

Table K.7 Financial Cash Flow Statement of the Project

Unit: Rs.Million

Year	Year in Order	Cash Outflow						Cash Inflow						
		Project Cost	O&M Cost	Replacement Cost	Loan Interest	Loan Repayment	Total Outflow (A)	Foreign Loan	Government Budget	Governement Subsidy	Water Charge	Total Inflow (B)	Balance (B)-(A)	Accumulated Loan
1993	1	80.0	0.0	0.0	1.6	0.0	81.6	64.0	16.0	1.6	0.0	81.6	0.0	64.0
1994	2	208.9	0.0	0.0	5.8	0.0	214.7	167.1	41.8	5.8	0.0	214.7	0.0	231.1
1995	3	615.3	1.6	0.0	18.1	0.0	635.0	492.3	123.1	18.1	1.6	635.0	0.0	723.3
1996	4	967.2	9.4	0.0	37.4	0.0	1,014.0	773.7	193.4	37.4	9.4	1,014.0	0.0	1,497.1
1997	5	865.5	20.3	0.0	54.7	0.0	940.5	692.4	173.1	54.7	20.3	940.5	0.0	2,189.4
1998	6	614.3	31.3	0.0	67.0	0.0	712.6	491.4	122.9	67.0	31.3	712.6	0.0	2,680.8
1999	7	0.0	39.1	0.0	67.0	0.0	106.1	0.0	0.0	67.0	39.1	106.1	0.0	2,680.8
2000	8	0.0	39.1	0.0	67.0	0.0	106.1	0.0	0.0	67.0	39.1	106.1	0.0	2,680.8
2001	9	0.0	39.1	0.0	67.0	0.0	106.1	0.0	0.0	67.0	39.1	106.1	0.0	2,680.8
2002	10	0.0	39.1	0.0	67.0	0.0	106.1	0.0	0.0	67.0	39.1	106.1	0.0	2,680.8
2003	11	0.0	39.1	6.7	63.7	134.0	243.5	0.0	0.0	204.4	39.1	243.5	0.0	2,546.8
2004	12	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	2,412.8
2005	13	0.0	39.1	9.2	63.7	134.0	246.0	0.0	0.0	206.9	39.1	246.0	0.0	2,278.7
2006	14	0.0	39.1	9.5	63.7	134.0	246.3	0.0	0.0	207.2	39.1	246.3	0.0	2,144.7
2007	15	0.0	39.1	9.2	63.7	134.0	246.0	0.0	0.0	206.9	39.1	246.0	0.0	2,010.6
2008	16	0.0	39.1	9.2	63.7	134.0	246.0	0.0	0.0	206.9	39.1	246.0	0.0	1,876.6
2009	17	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	1,742.6
2010	18	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	1,608.5
2011	19	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	1,474.5
2012	20	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	1,340.4
2013	21	0.0	39.1	6.7	63.7	134.0	243.5	0.0	0.0	204.4	39.1	243.5	0.0	1,206.4
2014	22	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	1,072.3
2015	23	0.0	39.1	9.2	63.7	134.0	246.0	0.0	0.0	206.9	39.1	246.0	0.0	938.3
2016	24	0.0	39.1	9.5	63.7	134.0	246.3	0.0	0.0	207.2	39.1	246.3	0.0	804.3
2017	25	0.0	39.1	9.2	63.7	134.0	246.0	0.0	0.0	206.9	39.1	246.0	0.0	670.2
2018	26	0.0	39.1	32.8	63.7	134.0	269.6	0.0	0.0	230.5	39.1	269.6	0.0	536.2
2019	27	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	402.1
2020	28	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	268.1
2021	29	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	134.0
2022	30	0.0	39.1	0.0	63.7	134.0	236.8	0.0	0.0	197.7	39.1	236.8	0.0	0.0
Total		3,351.1	1,001.0	111.4	1,726.1	2,680.8	8,870.4	2,680.8	670.2	4,518.4	1,001.0	8,870.4	0.0	

ANNEX-L

MODIFIED PLAN ON THE BASIS OF COMMENTS BY THE GOVERNMENT OF INDIA

FEASIBILITY STUDY ON
IRRIGATION AND DRAINAGE DEVELOPMENT OF
SHARDA CANAL CAD PROJECT

ANNEX - L
MODIFIED PLAN ON THE BASIS OF COMMENTS
BY THE GOVERNMENT OF INDIA

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ANNEX L MODIFIED PLAN ON THE BASIS OF COMMENTS BY THE GOVERNMENT OF INDIA

1 Comments and Reply

1.1 General

The Draft Final Report was submitted to the Government of India in August 1991, describing the result of the study, and the report was discussed in the meeting of the Steering Committee held on September 5, 1991 in Delhi. According to the result of the meeting, the comments on the Draft Final Report was raised by the Government of India on October 31, 1991. This Annex presents the reply to the comments and the modified plan according to the result of the further study based thereon.

1.2 Reply to the Comments

The reply to the comments raised by the Government of India is described hereunder.

Comment 1: The cost to the project is exorbitant which diminishes its scope for replication. The unit cost per ha can be slashed down by resorting to:

(1) Substitution of metalled canal inspection road by brick soling and deletion of Chak roads
(2) Reconsideration of feasibility of construction 243.6 km of parallel canals owing to insurmountable difficulties in acquiring the land and the social resistance from the traditional users
(3) Restricting canal lining strictly to the zone of highly permeable soil or otherwise vulnerable patches
(4) Reconsideration on feasibility of pipe drainage scheme due to its practical problems of choking etc.

The reply to the comment 1 is as shown below.

(1-1) Metalled canal inspection road and chak roads:

As mentioned in the design drawing of the Draft Final Report , canal inspection roads was proposed to be improved with provision of brick pavement (100 mm). The cost estimate

was carried out on the basis of such plan. Therefore, the word "metalling" is changed into "brick soling" in the Final Report.

With the project, agricultural input and output will be increased through introduction of more intensive farming. The access to the every farm is required to be maintained to take the inputs to the field and to take away the agricultural production. Therefore, farm roads are indispensable for attaining the proposed production of crops. The proposed farm roads are contemplated with improvement of the existing Chak roads by means of earthfill to be accessible at least in fair weather. The cost required for improvement of the existing farm roads is not so large.

(1-2) Parallel canal :

The removal of uncertainty in irrigation water supply is the key element in executing the CAD works. To ensure reliable supply of irrigation water over the command area up to the tailend, direct intake from branch and distributary canals through outlets, so-called Kulaba, is required to be restricted. As mentioned in Section 3.5.2 of ANNEX-F, the existing chak size varies widely according to topographical, administrative and social conditions. The command areas of most Kulaba are small, which is under the control of water users. To attain the even distribution of irrigation water in the distributary command, unification of the existing Kulaba commanding small areas and provision of additional parallel minors were proposed in the Draft Final Report on the basis of the development concept mentioned in the Progress Report (II).

According to the comment of the Government of India that the insurmountable difficulties are foreseen in land acquisition and the social resistance from the traditional users, the modified plan is prepared by cancelling the parallel canals as the cost reduction approach. The result is presented hereunder. However, such plan obliges that the certainty in irrigation water supply is largely decreased. Upon implementation of the modified plan, special efforts to solve the social problems should be taken, such as use of the existing field channel routes for the additional minors, actual participation of water users in the beginning of the design stage,etc.

(1-3) Restricting canal lining :

As mentioned in Section 3.6.1 of ANNEX-F, canal lining was proposed in distributaries and minors for the purpose of:

(a) reduction of seepage loss,
(b) reduction of water logging in the area adjacent to the canal where seepage fro the canal occurs,
(c) improvement of operation efficiency,
(d) reduction of maintenance cost

Canal reaches requiring lining was selected for high permeable soils and topographically low depressed areas on the basis of topographic survey results, soil survey results, canal profile drawings, etc. The proposed lining was, therefore, restricted only on the required canal reaches to effectively utilize the limited surface water,and to ensure the project irrigation efficiency.

With regard to the cost reduction approach as commented by the Government of India, the modified plan is prepared and presented hereunder. The lining portions are restricted for the most critical reaches of distributaries. This plan results in the decrease in irrigation efficiency and increase in O&M cost of canals.

(1-4) Reconsideration on feasibility of pipe drainage scheme :

The following pipe drain schemes were proposed in the Project:

(a) Pipe catch drain scheme along Hardoi Branch in Sursa area
(b) Sub-surface drainage pilot farm scheme in Purwa area

Much seepage loss occurs from Hardoi Branch around Sursa area, resulting in water logging areas along Hardoi Branch and the loss of irrigation water. Such water logged areas are topographically depressed, and lie far from the main drainage stream. Those situations make it difficult to effectively evacuate drain water through an open channel system. To improve water logging conditions, as well as to utilize seepage water from Hardoi Branch, a pipe catch drain system with suction pump is proposed. Pumped water is discharged to the adjacent minor canal for augmentation of irrigation water. This scheme will function as a model scheme of improvement of water logging areas extending along Hardoi Branch

With respect of geo-hydrological condition, Purwa area is characterized by thin shallow aquifer underlain by thick clay layer of about 20 m below the ground surface. The efficiency of drawdown of ground water table by means of shallow tube well for improvement of water logging and salt affected conditions is inherently low. In consideration of the above, pipe drainage pilot farm of about 50 ha was proposed to work out the low cost

sub-surface drainage measures by use of locally available materials, such as smashed bricks, chaff,as well as the drain pipe.

It is intended to set up pilot schemes for improvement of water logging and salt affected areas under the different drainage and geo-hydrological conditions. The pipe drain system is provided with manhole and pumping equipment to avoid technical problems of pipe flows. The proposed sub-surface drainage schemes are indispensable as one of the most important components for improvement of irrigation, drainage and salt problems in the project area.

Comment 2: The IRR projected in the reports in 15.8 % which is based on yield estimations as given in the report. However, these yield levels are not likely to be attained under the given situation because the water is not the only determinant of crop yield. Irrigation at proper stage of plants is more valuable than its level or frequency. Moreover, the effect of watering on crop yield is more pronounced when inputs like seeds, fertilizer and other agronomic practices are followed as per recommendations. Use of monetary inputs depends on the economic conditions of the farmers. As a consequence of aforesaid facts the yield estimations as projected in the report are not achievable. These estimations need to be made in consultation with the Directorate of Agriculture statistic, U.P. which is an authorized agency for crop yield estimation in the State.

The reply to the comment 2 is as shown below.

(2-1) Irrigation at the proper stage of plants :

In order to ensure irrigation at the proper stage of plants, the actualization of the Osrabandi mentioned in Chapter VII 7.3 of the Main Report is proposed.

(2-2) Effect of watering on crop yield:

The comment on the effect of watering on crop yield is fully agreed, but the public services are requested to make their utmost efforts to attain the target of the project as well as to promote the sustainable agricultural development by utilizing the available resources.

The time requirement to attain this target is set up. The build-up period of five years to reach the target is taken into consideration for respective representative areas as described in Chapter IX 9.2.3.of the Main Report. The proposed build-up period in this project is

conservatively estimated, compared with those in similar projects in Indonesia or Malaysia as shown below.

Project	Country	Type of work	% of Build-up period
SHARDA	India	OFD	20-40-60-80-100
NIAS	Indonesia	Irrigation	75-88-94-97-100
LOWER ASAHAN	Indonesia	Irrigation	60-80-100
KULIM	Malaysia	Irrigation	70-80-90-95-100

The several studies have been carried out to find any degree of factors contributing to growth of rice output. Some results seen in Table L.1 show about 30% of contribution through improvement of irrigation condition without any effect of other inputs such as fertilizer. The degree of such contribution can be seen in Table L.2. Besides, Table L.3 and Table L.4 show that the best OFD works can result two times higher yield than that without OFD. This means that the proposed target is not over-estimated in either irrigated condition or un-irrigated condition shown in Chapter VII 7.2.4.of the Main Report.

(2-4) Yield estimations in consultation with the Directorate of Agriculture Statistic, U.P. :

The study team has consulted with the aforesaid Directorate. However the in-situ examination in any place is the indispensable approach to decide the target level of yield. The proposed target is not considered to be unattainable one (ref. to Table L.5, L.6, and L.7), but to be one with some safety factors, compared with other studies by JICA as shown below.

Project	Country	Type of work	Yield of paddy(t/ha)	
			Present	Target
SHARDA	India	OFD	2.0-2.5	4.0,3.0
NIAS	Indonesia	Irrigation	1.1-5.0	5.0
LOWER ASAHAN	Indonesia	Irrigation	1.5-4.0	5.0,5.5

DIRECTION FOR COMMENTS

As mentioned above, the study team maintains the opinion that the proposed target level is as reasonable, but calculate the benefit from the modified one based upon the comments where parallel canals are not planned. It results in the increase of uncertainty as to timely distribution of irrigation water. The decreased coefficient without parallel canal is assumed to be 20%, although this approach to avoid social difficulties as insurmountable should be overcome by utmost efforts during the detailed design period as mentioned above.

Comment 3: A plan for energization of tube wells and lifts canals needs to be worked out in consultation with U.P.S.E.B. Operation and management of shallow tube wells as proposed in the report may rest with the CADA agency on long term basis.

The reply to the comment 3 is as shown below.

The power supply plan for the proposed tube wells and lift canals is described in the respective concerned sections of the Final Report. The required cost was estimated as mentioned in the Draft Final Report. It is described in the Final Report that the CADA is responsible for operation and management of shallow tube wells to be constructed under the Project.

Comment 4: Some of link drains are proposed across the canals needs to be technically reexamined in order to ensure their delivery of water along the slope.

The reply to the comment 4 is as shown below.

The proposed drainage canal system was contemplated to improve water logging and salt affected areas as well as to smoothly remove the excess rain water by means of improvement of the existing drainage canals and new provision of drainage canals. The water logging areas are extending in the depressed areas surrounded with irrigation canals, roads and/or railway judging from the remote sensing imaginary data interpretation which were prepared for the Kharif and Rabi conditions. The drainage canal layout was selected so as to ensure the delivery of drain water by connecting water logging areas. It is unavoidable for some of drainage canals to intersect irrigation canals to effectively improve the water logging areas.

Comment 5: Provision of land levelling has not been kept in spite of steep slopes available at some of the places in the command area. Levelling is the first prerequisite to ensure equitable distribution of irrigation water for crop production. Higher area under paddy is indicated under non-canal/rainfed area as compared to that under irrigated areas while paddy is generally grown under irrigated canal areas.

The reply to the comment 5 is as shown below.

Paddy is presently cultivated in mid-upland, midland, mid-low land and low land. The canal irrigated area is estimated to be about 25 % of CCA according to the water availability.

Paddy area is set to be 65 % of the canal irrigation area in the proposed cropping patten. In the non-canal irrigation area,i.e.,75 % of CCA, which will be irrigated by the private tubewells or under rainfed condition, paddy area is planned for 50 % of the non-canal irrigation area. Therefore, about 54 % of CCA is planned for paddy cultivation in Kharif. Major part of the mid-upland, mid-land, mid-lowland and lowland is flat. Paddy cultivation is not planned in steep slopes areas. Besides, the reshaping of field boundaries is not executed due to procedural difficulty in land ownership,etc. The land levelling is not proposed under those conditions.

Comment 6: The items mentioned under foreign currency requirement need to be reconsidered as those items e.g. reinforcement bars,structural steels, fuel and lubricants, pump equipment and high frequency radios and telephones etc. are locally available.

The reply to the comment 6 is as shown below.

In the original estimate, some locally available items were counted for in foreign currency portion in consideration of difficulty in timely supply, sufficiency in the market etc. However, the modification of classification is made in consideration of the following:

With reference to the statistical data on the production and import of steel goods and petroleum goods (Economic survey 1989-90, Ministry of Finance), the proportions of local currency and foreign currency are determined, most of the cost is counted for in the local currency portion as shown below. Manufactured goods such as pumping equipment, prefabricated concrete units is,therefore, counted for local currency portion. However, the proposed wireless communication system consists of not only wireless radio but also data processing facilities, then all cost requirement is counted for foreign currency. On the basis of the following classification, the construction cost is modified in the Final Report.

Items	Foreign currency	Local currency
-Reinforcement bars	10 %	90 %
-Structural steel	10 %	90 %
-Reinforced concrete pipe	0 %	100 %
-Fuel and lubricants	0 %	60 %
-Pumping equipment	0 %	100 %
-High frequency radio and telephones	100 %	0 %

The modification of classification of the foreign and local currency requirements calls for the change in the economic cost estimate. The economic evaluation is re-calculated accordingly in the Final Report.

Comment 7: The organizational structure needs to be slightly amended in the light of discussions held 4th and 5th September,1991. Wherein a modified chart was given.

The reply to the comment 7 is as shown below.

Based on the result of the discussions and the organization chart supplied by the Sharda CADA in the meeting on 4th September,1991,the organizational structure of the Project is modified in the Final Report.

Comment 8: OFD works in Sharda CADA is likely to be completed by 1995-96 which may be taken into consideration in scheduling the timing of the Project.

The reply to the comment 8 is as shown below.

The extended schedule of the present OFD of Sharda CAD program does not affect the implementation schedule of the proposed works, since the construction works are proposed to be executed on the contract basis. Whereas, more staff is needed to be strengthened with introduction from the concerned government agencies. The description of schedule of the present OFD of Sharda CAD works is modified in the Final Report according to the revised schedule.

2 Modified Project Plan

2.1 Irrigation and Drainage Plan

The following modernization plan of the existing irrigation canals and related structures will be proposed:

(i) Improvement of existing irrigation system

(a) Canal lining of distributaries where distributaries run in high permeable soils and across low-depressed areas
(b) Unification of outlets on distributary canals commanding at least approximately 40 ha
(c) Improvement of existing control structures
-provision of steel gates to head regulators
-provision of measuring devices downstream of head regulators

-replacement of existing off-taking structures for minor canals with the proportional diversion structures according to the required capacities
-replacement of existing outlets on minor canals with the proportional diversion outlet structures according to the required capacities

(d) Improvement of distributary canal inspection roads by means of brick soling

(ii) Sai river pump lift scheme as supplemental water source development

(iii) Groundwater development

(iv) Establishment of wireless communication system

The proposed drainage plan will consist of the following:

(i) Main and secondary drainage canal network

-improvement/construction of main drainage canals
-improvement/construction of secondary drainage canals to connect tertiary drains with the main drains
-capacity increase of related natural drainage streams
-improvement/construction of outdated drainage structures

(ii) Sub-surface drainage system

-establishment of sub-surface pipe drainage pilot scheme
-pipe drainage system along Hardoi Branch
-groundwater development for conjunctive use

The on-farm development works include the following:

(i) Field irrigation channel : The field irrigation channel is lined by bricks so as to minimize the conveyance losses to the economical extent of 50 to 60 % of the whole reaches of the field channels

(ii) Field drainage canal : The field drainage canal to collect drain water from the sub-chak are provided with the capacity that 5-year, 3 days rainfall storm is drained within 3 days.

(iii) Chak road : The existing village roads in the chaks are improved with earthfilling having the width of 4 meters, to ensure the efficient transportation within the chak

(iv) Related structures : The related structures to the field irrigation and drainage canals consist of turnouts, culverts aqueduct , drainage culverts . Those structures are of brick construction.

2. 2 Agricultural Development Plan

The agricultural development plan of the revised plan is same as mentioned in Chapter 7 of the Main Report. The unit yields of crops under future with and without project conditions of the revised plan are estimated as shown below.

Those yields are estimated based on the expected irrigation conditions of the modified plan and present farming technology level. For achieving the target yields, optimum application of farm input is essential along with proper water management. Agriculture extension services is another need to attain the target yields. The target yields of crops will be realized in 5 years after the completion of irrigation and drainage facilities.

Unit: ton/ha

Crops	Present Condition	Future Condition	
		Irrigated Condition	Un-irrigated Condition
Kharif			
Paddy	2.08-2.57	3.2	2.4
Sorghum	1.1-1.5	-	1.6
Maize	0.7-1.3	-	1.6
Pulses	0.7-1.2	1.6	1.0
Oilseeds	0.5-0.9	1.0	0.6
Rabi			
Wheat	1.73-2.35	3.2	2.3
Pulses	0.4-0.9	1.8	1.1
Oilseeds	0.6-0.7	0.9	0.7
Potatoes	9.0-17.0	16.2	15.3

Irrigation and drainage development is expected to increase net cultivated area. The incremental production of crops in the project area is estimated as follows:

Crops	Without Project Condition		With Project Condition		
	Cultivated Area (ha)	Production (ton)	Cultivated Area (ha)	Production (ton)	Incremental Production (ton)
Kharif					
Paddy	18,700	42,000	30,710	79,600	37,600
Sorghum	5,500	7,300	5,120	8,200	900
Maize	2,900	3,700	2,540	4,100	400
Pulses	3,600	2,200	11,700	13,400	11,200
Oilseeds	600	400	6,800	5,250	4,850
Rabi					
Wheat	30,000	64,500	37,200	93,900	29,430
Pulses	3,150	2,200	8,600	11,000	8,800
Oilseeds	350	230	5,000	3,750	3,520
Potatoes	800	11,600	3,000	46,600	35,000

3. Implementation Plan and Modified Cost Estimate

3.1 Implementation Plan

The principal approach to the project implementation, implementation schedule and organization of the project implementation proposed in ANNEX J are applied to the modified plan without any change.

3.2 Construction Cost

The construction cost of the modified plan is estimated on the basis of the revised plan . It is estimated to be Rs.2,914 million, consisting of the foreign currency portion of Rs.549 million and the local currency portion of Rs.2,365 million as summarized below.

Project Cost

Unit: Rs. million

	Description	Foreign Currency	Local Currency	Total
A.	Wireless Communication System	58.9	6.5	65.4
B.	Representative Areas			
	B-1 Sarojini Nagar Area			
	1. Main system	27.9	108.2	136.1
	2. On-farm development works	33.3	149.0	182.3
	3. Land acquisition	0.0	4.6	4.6
	Sub-total (B-1)	61.2	261.8	323.0
	B-2 Sataon Area			
	1. Main system	23.5	201.6	225.1
	2. On-farm development works	28.9	131.1	160.0
	3. Land acquisition	0.0	4.6	4.6
	Sub-total (B-2)	52.4	337.3	389.7
	B-3 Sursa Area			
	1. Main system	48.2	193.2	241.4
	2. On-farm development works	38.9	180.5	219.4
	3. Land acquisition	0.0	8.0	8.0
	Sub-total (B-3)	87.1	381.7	468.8
	B-4 Purwa Area			
	1. Main system	38.2	124.3	162.5
	2. On-farm development works	27.5	124.8	152.3
	3. Land acquisition	0.0	2.8	2.8
	Sub-total (B-4)	65.7	251.9	317.6
	Sub-Total (B)	266.4	1,232.7	1,499.1
C.	Procurement of Supporting Equipment	0.0	8.4	8.4
D.	Administration Cost	0.0	148.7	148.7
E.	Engineering Service	103.8	118.6	222.4
F.	Contingencies			
	1. Physical	42.9	151.5	194.4
	2. Price	77.0	698.7	970.1
	Total	549.0	2,365.1	2,914.1

The breakdowns of project cost are shown in Tables L.8 to L.12 and the breakdown of the land acquisition cost is also shown in Table L. 13.

The annual disbursement schedule is estimated according to the implementation schedule as summarized below. The annual disbursement schedule and the breakdown for each representative area are shown in Tables L.14 and 15 respectively. The annual opertation and maintenence cost is given in Table L.16.

Annual Disbursement Schedule

Unit: Million Rs.

Year	Foreign Currency	Local Currency	Total
1993	13.8	66.2	80.0
1994	36.7	156.8	193.4
1995	96.4	439.6	536.0
1996	200.5	649.5	850.0
1997	118.1	622.2	740.3
1998	83.6	435.2	518.8

4 Project Evaluation

4.1 Economic Evaluation

(1) Economic Benefit

Economic benefit is estimated based on the revised unit yield of crops under with-project condition. The economic benefit of the modified plan is presented below (refer to Table L.17) :

Annual Incremental Benefit

Unit: Rs.million

Condition	Sarojini Nagar	Sataon	Sursa	Purwa	Total
With Project					
Kharif	75.7	63.9	83.8	68.6	292.0
Rabi	110.7	93.7	130.8	92.3	427.5
Perennial	-	-	2.9	-	2.9
Total (A)	186.4	157.6	217.5	160.9	722.4
Without Project					
Kharif	39.4	25.5	45.5	35.0	145.4
Rabi	54.9	56.1	94.9	36.3	242.2
Perennial	-	-	5.2	-	5.2
Total (B)	94.3	81.7	145.6	71.3	392.8
Incremental (A) - (B)	92.1	75.9	71.9	89.6	329.5

(2) Economic Cost

The economic cost of the Project is estimated on the basis of the revised cost, for the initial investment cost, and annual operation and maintenance cost. The economic cost of the modified plan is as summarized below (refer to Table L.18).

Economic Cost for Initial Investment

Unit: Rs.10^6

Description	Sarojini Nagar	Sataon	Sursa	Purwa	Total
1. Direct Construction Cost	284.4	336.1	408.2	280.5	1,309.1
2. Procurement of Supporting Equipment	1.5	1.3	1.7	1.2	5.8
3. Land Acquisition	3.6	3.6	6.4	2.2	15.9
4. Administration Cost	38.6	33.4	44.9	31.8	148.7
5. Engineering Services	57.7	50.0	67.2	47.5	222.4
Sub-total	385.8	424.4	528.4	363.3	1,701.9
6. Contingency	38.6	42.4	52.8	36.3	170.2
Total	424.3	466.8	581.2	399.7	1,872.1

Annual Economic O&M Cost

Unit:Rs.1,000

Description	Sarojini Nagar	Sataon	Sursa	Purwa	Total
1. Main system					
a. Irrigation Facility					
- Canal	410	1,800	490	490	3,190
- Augmentation Facilities	670	760	3,930	1,150	6,510
b. Drainage Facilities	1,050	610	1,760	1,490	4,910
c. Service Roads	680	1,100	510	420	2,710
2. On-farm system	2,950	2,620	3,600	2,460	11,630
Total	5,760	6,890	10,290	6,010	28,950

Replacement cost for equipment of irrigation and drainage system will not be changed from original plan.

(3) Economic Evaluation

The economic internal rate of return of the modified plan is calculated on the basis of the economic benefit and cost and the Project implementation schedule. The result is as shown below (refer to Table L.19).

Sarojini Nagar	14.8%
Sataon	11.5%
Sursa	8.2%
Purwa	15.2%
Overall	12.2%

The result shows that the Project is economically feasible with an internal rate of return of 12.2% for the overall area, ranging from 15.2% for Purwa area to 8.2% for Sursa area.

A sensitivity analysis is carried out for the cases of: (i) reduction of project benefit by 10 % , (ii) project cost overrun by 10 % and (iii) combination of case (i) and (ii). he result is shown below.

Unit: %

Description	Sarojini Nagar	Sataon	Sursa	Purwa	Overall
1. Case (i)	13.5	10.4	7.2	13.8	11.0
2. Case (ii)	13.7	10.6	7.5	14.0	11.2
3. Case (iii)	12.5	9.5	6.5	12.8	10.9

The result of sensitivity analysis indicates that the economic viability of the modified plan is rather insensitive to the project adverse changes.

4.2 Financial Analysis

A financial analysis of the Project is made by the analysis of the typical farm budget and assessment of repayment of the project construction cost.

(1) Farm Budget Analysis

In order to evaluate the project feasibility from farmer's household economy, typical farm budgets of marginal farmers are prepared for the future with and without conditions as shown below (refer to Table L.20):

Unit: Rupees

Area	With Project			Without Project			Incremental Benefit
	Kharif	Rabi	Total	Kharif	Rabi	Total	
Sarojini Nagar (0.58ha)	2,444	2,723	5,167	2,082	2,065	4,147	1,020
Sataon (0.58ha)	2,365	2,625	4,990	910	1,868	2,778	2,212
Sursa (0.53ha)	2,179	2,512	4,691	1,627	2,028	3,655	1,036
Purwa (0.56ha)	2,552	2,323	4,875	2,090	1,785	3,875	1,000

As seen from the above table, the income of marginal farmers is expected to increase by 25% to 80%. Their economic situations will rather be improved.

(2) Capacity to Pay

After the implementation of the project, operation and maintenance cost of the irrigation and drainage systems as well as of on-farm facilities is shouldered to beneficial farmers. Those costs are estimated as shown below:

Annual Financial O&M Costs

Description	Sarojini Nagar		Sataon		Sursa		Purwa	
	Total ($Rs.10^3$)	Per ha (Rs.)	Total ($Rs.10^3$)	Per ha (Rs.)	Total ($Rs.10^3$)	Per ha (Rs.)	Total ($Rs.10^3$)	Per ha (Rs.)
1. Main System	3,200	215	5,000	388	7,300	422	4,000	326
2. On-farm facilities	3,600	242	3,200	249	4,400	254	3,000	245
Total	6,800	457	8,200	637	11,700	676	7,000	571

O&M costs for the main system will have to be paid as water charge while those for on-farm facilities are recovered as labor force.

(3) Repayment

Fund requirement for construction of the project is estimated at Rs.2,914 million. Based on the estimated fund requirement, a cash flow statement is prepared under an assumption of the following conditions:

(a) 80% of fund requirement is financed by the international organization with loan service fee of 2.5% per annum and a repayment period of 30 years including a grace period of 10 years.

(b) Remaining local currency is financed by the budget allocation of the Government with no interest and no repayment.

The cash flow statement is shown in Table L.21.

The project brings about a great improvement in farm budget and gives an incentive to the farmers in the project area. The government should subsidize about Rs.1.6 million to Rs.204.7 million including loan repayment, loan service fee and a part of O&M cost annually for the project during the repayment of 30 years.

4.3 Socio-economic Impact

The following socio-economic impacts are expected through the implementation of the project.

(1) Improvement of nutritious status
(2) Increased employment opportunity
(3) Women's development
(4) Enhancement of regional industries
(5) Environmental conservation

4.4 Project Justification

Internal rate of return (IRR) of the project in respective Representative Areas shows different value ranging from 8.2% for Sursa to 15.2% for Purwa. The IRR of overall project shows 12.2%.

The project in the Sarojini Nagar area shows the IRR of 14.8%, following Purwa. Augmentation of irrigation water supply will increase irrigation area and reduce further deterioration of groudwater level. The project will also contribute to equitable distribution of

water through on-farm development and thereby to equitable development which is one of the objectives of State Development Plan.

The project in the Sataon area shows IRR of 11.5%. The project include canal improvement of Asiwan branch canal, whose benefit will be expected to be born from other areas commanded by the branch when on-farm development works will be carried out. If this cost is allocated proportionally to beneficial command areas, the IRR would further be increased. The same effect as Sarojini Nagar area will be expected with regards to even distribution of canal water and preventing the deterioration of ground water level.

The project in the Sursa area shows the lowest IRR of 8.2%, reflecting relatively better yield level of crops under the present condition. Irrigation water supply by canal will be reduced from present over supply condition to the proposed volume determined by the Roster, which may reduce benefit to the area but contribute to the augmentation of irrigation water volume to downstream area. Drainage improvement will increase Kharif cropping area drastically. Even distribution of water and improvement of nutritious status of farmers are expected from the project.

The project in the Purwa area shows the highest IRR of 15.2%, among the Representative areas. Drainage improvement will bring about the increase of cropped area as well as yield increase through the improvement of soil condition. Traffic condition will also be improved, and occurrence of water born diseases will be reduced through the reduction of inundation area and duration.

The IRR of the overall project shows 12.2%. The results of financial analysis reveals the improvement of farm income with repayability of water charge. Considering this IRR and positive socio-economic impacts as mentioned above, in light with the objectives of the State Five-Year Development Plan, all projects can be justified.

TABLES

Table L.1 Contribution of Specified Factors to Rice Production Increases

(1) Average Contribution to Growth of Rice Output of Four Productive Factors (1950-70)

Group of countries	Output Increases attributed to				Remarks
	Irrigation	Fertilizer & variety	Labor	Capital	
High irrigation	26	44	12	16	South Korea, Pakistan, Indonesia
Medium irrigation	30	30	25	15	Malaysia,Sri Lanka, Philippines, China, India

(2) Contribution of Specified Factors to Rice Production Increases (1965 to 1980)

Unit : 1,000 ton

Country	Variety		Fertilizer		Irrigation		Others		Total	
	Output	Rate	Output	Rate	Output	Rate	Output	Rate	Output	Rate
Burma	647	35%	353	19%	685	37%	167	9%	1,852	100%
Bangladesh	420	8%	1,284	23%	1,091	20%	2,759	50%	5,554	100%
China	13,231	26%	11,507	23%	16,153	32%	9,609	19%	50,550	100%
India	7,998	23%	10,867	31%	11,209	32%	5,078	14%	35,152	100%
Indonesia	3,162	23%	2,680	20%	2,773	20%	4,998	37%	13,613	100%
Philippines	849	26%	1,009	31%	801	24%	615	19%	3,274	100%
Sri Lanka	241	23%	215	21%	262	25%	316	31%	1,034	100%
Thailand	822	13%	682	11%	865	14%	4,031	63%	6,400	100%
Total of above	27,370	23%	28,597	24%	33,839	29%	27,573	23%	117,429	100%

Data source: The Rice Economy of Asia by R.Baker, R.W.Herdt with B.Rose
Note : Philippines ; Three-year average used for 1965 because 1965 unusually low

Table L.2 Fertilizer Response to Rice Yields in India

(1) Fertilizer Response Functions in Wet Season

Location	Variety	Year	Yield(ton/ha)		Use of N (kg/ha)
			Without Fertilizer	With Fertilizer	
Visayas, Visayas	IR8	Av.1968-75	3.3	4.4	115
	IR20	Av.1968-75	3.6	5.6	87
	Pets	Av.1968-75	2.7	3.8	49
Maruteru A.P.	Pankaj	Av.1971,74-75	4.4	4.7	48
	Mahsuri	Av.1971-75	3.9	3.9	0
	IR8	Av.1967-68	3.3	5.3	151
	Local	Av.1967-69	2.5	3.2	99
Tamil Nadu,Coimbatore	IR8	Av.1967-69	3.1	6.3	259
	CO32	Av.1967-69	3.2	5.2	126
19 Locations	IR8	Av.1967-69	3.0	4.7	194
	Mixed	Av.1967-69	2.6	3.5	116
8 Locations	Pankaj	1971	3.4	4.3	218
	Mahsuri	1971	3.3	4.0	131

(2) Fertilizer Response Functions in Wet and Dry Season

Location	Variety	Year	Yield(ton/ha)		Use of N (kg/ha)
			Without Fertilizer	With Fertilizer	
Wet Season					
TNPBS,Tamil Nadu	IR8	Av.1967-69	3.1	6.3	259
	CO32	Av.1967-69	3.2	5.2	126
CRRI, Orissa	IR8	Av.1967-69	3.3	3.4	151
	Local	Av.1967-69	2.5	3.1	99
Mars, A.P.	Pankaj	1971,74-75	4.4	4.7	48
	Mahsuri	1971-75	3.9	3.9	0
Dry Season					
TNPBS,Tamil Nadu	IR8	Av.1967-69	3.1	6.3	302
	ADT27	Av.1967-69	2.8	4.1	151
CRRI, Orissa	IR8	Av.1967-69	3.1	8.9	274
	Local	1968-69	1.6	2.9	121

Source: David C.C. and R. Barker : Modern Rice Varieties and Fertilizer Consumption, Economic Consequences of the New Rice Technology, IRRI

Table L.3 Optimum Rates of N Use and Grain Yield at Four Levels of Irrigation Performance

Irrigation Performance	Minimum S&P		Moderate S&P		Maximum S&P	
	N (kg/ha)	Yield (ton/ha)	N (kg/ha)	Yield (ton/ha)	N (kg/ha)	Yield (ton/ha)
Dry Season						
Ideal	118	4.1	118	4.1	118	4.1
Good	106	3.7	91	3.2	73	2.52
Average	89	3.2	70	2.5	54	1.7
Poor	66	2.5	49	1.7	48	1.3
Wet Season						
Ideal	81	3.1	81	3.1	81	3.1
Irrigated	73	2.9	71	2.9	44	2.3
Rainfed	54	2.6	43	2.3	14	1.5

Source: David C.C. and R. Barker : Modern Rice Varieties and Fertilizer Consumption, Economic Consequences of the New Rice Technology, IRRI

Note : S ; seepage
P ; percolation
Using Modern Varieties and 24 Years of Rainfall Data from Cabanatuan City, Philippines,1978

Table L.4 Estimated Paddy Yields at Differing Level of Modern Inputs

Irrigation Condition	Fertilizer Condition	Variety				Increase in Yield	
		Traditional		Modern			
		N (kg/ha)	Yield (ton/ha)	N (kg/ha)	Yield (ton/ha)	ton/ha	Percentage
Wet Season							
Rainfed	no N	0	1.9	0	1.9	0	0
Rainfed	Optimum N	0	1.9	50	2.4	0.5	28
Average	Optimum N	0	2.2	50	2.7	0.5	24
Average	Optimum N	8	2.3	72	2.9	0.6	27
Ideal	Optimum N	8	N.A.	72	3.1	-	-
Ideal	Optimum N	N.A.	N.A.	81	3.1	-	-
Dry Season							
Average	no N	0	1.9	0	1.9	0	0
Average	Optimum N	8	2	80	2.9	0.9	46
Ideal	Optimum N	8	N.A.	80	3.8	-	-
Ideal	Optimum N	N.A.	N.A.	118	4.1	-	-

Source : David C.C. and R. Barker : Modern Rice Varieties and Fertilizer Consumption, Economic Consequences of the New Rice Technology, IRRI

Note : N.A. ; Not Available

Table L.5 Rice yields in India for Different Levels of Fertilizer and Insecticide Use

Location	Date Seeded	Yield(G.M) (ton/ha)	Yield (Range) (ton/ha)	Fertilizer	Insecticide
Very early					
Titabar	4.5.1984	3.6	4.6-2.1	Applied	Applied
Patna,Bihar	6.22.1984	3.8	5.0-2.3	Applied	Not stated
Ranch,Bihar	6.29.1984	1.8	2.7-0.8	Applied	Not protection
Nawagam,Gujarat	7.11.1984	4.6	5.5-3.9	Applied	Not stated
Mandya,Karnataka	7.21.1984	5.5	7.3-3.6	Applied	Applied
Ambasamudram,T.N.	6.7.1984	5.1	6.3-2.9	Applied	Applied
Faizabad,U.P.	6.21.1984	2.8	4.5-2.0	Applied	Not stated
Rewa,M.P.	6.29.1984	1.7	2.4-1.2	Applied	Applied
Raipur,M.P.	7.6.1984	3.4	4.4-1.8	Applied	Not stated
Aduthurai	6.1.1984	3.9	5.1-1.3	Applied	Applied
Early					
Patna,Bihar	6.22.1984	3.8	5.7-1.9	Applied	Not stated
Ranch,Bihar	6.22.1984	6.2	8.4-4.0	Applied	Not stated
Nawagam,Gujarat	7.11.1984	4.8	5.8-3.9	Applied	Not stated
Mandya,Karnataka	7.21.1984	5.6	8.0-4.0	Applied	Applied
Ambasamudram	5.20.1984	4.6	6.1-2.3	Applied	Not stated
Faizbad,U.P.	6.22.1984	2.3	3.2-1.4	Applied	Not stated
Kaul,Harynaya	6.5.1984	5.6	6.6-3.5	Applied	Not protection
Aduthurai	6.4.1984	4.1	5.8-1.3	Applied	Applied
Raipur,M.P.	6.11.1984	3.3	4.5-2.4	Applied	Not protection
Pattambi,Kerala	7.24.1984	3.0	4.1-1.4	Applied	Not stated

Source : International Rice Testing Program, Preliminary Report April 1985, IRRI

Table L.6 Paddy Yields Reported by Farmers in Various Size Groupings

Location	No. of groups	Yield(mt/ha) Size of Grouping			Source
		Second Smallest	Second Largest	Largest	
West Bengal, India	6	3.4	3.5	3.6	Mandal and Ghosh, 1976
Orissa, India	8	3.5	3.3	4.1	Mandal and Ghosh, 1976
Tamil Nadu,India	7	5.0	4.3	4.1	Shanmugasundram, 1976
Assam, India	4	2.7	2.6	3.2	Mukhopadhyyay, 1980
Andhra Pradesh, India	4	2.6	2.5	2.4	Mukhopadhyyay, 1980
Bihar, India	4	1.7	1.8	1.9	Mukhopadhyyay, 1980
Karanataka, India	4	2.4	2.9	2.3	Mukhopadhyyay, 1980
Tamil Nadu,India	4	2.5	3.1	2.1	Mukhopadhyyay, 1980
Assam, India	7	4.8	5.2	4.8	AERC, Jorhat, 1970
Haryana, India	6	2.4	3.1	3.0	AERC, Delhi, 1970
Orissa, India	5	4.5	3.7	4.9	AERC, Visva Bharti, 1969
Punjab, India	3			1.5	Khalon and Singh, 1973
C. Java, Indonesia	7	2.8	3.2	3.1	Palmer, 1977
Punjab, Pakistan	4	2.7	2.8	3.1	Khan,1975
Sind, Pakistan	4	2.6	2.5	2.5	Khan,1975
C. Java, Indonesia	5	2.9	2.8	3.3	Soejono, 1976
C. Java, Indonesia	5	3.6	4.3	5.0	Soejono, 1976
Laguna, philippines	3			3.3	Kikuchi et al., 1982
Average		3.1	3.2	3.1	

Source : The Rice Economy of Asia by R. Barker, R. W. Herdt with B. Rose

Table L.7 Economic Optimum Yield and Nitrogen Input in Selected Areas in Asia

Location	Season	Nearest Experiment Station		Village Average	
		Yield (ton/ha)	N (kg/ha)	Yield (ton/ha)	N (kg/ha)
India					
Nainital,U.P.	Wet	5.7	38	4.5	69
Varanasi,U.P.	Wet	3.9	58	3.6	110
Cuttack,Orissa	Wet	8.3	99	3.0	53
	Dry	8.4	182	3.9	95
West Godavari,A.P.	Wet	3.8	0	4.1	70
	Dry	5.7	133	5.4	127
Shimoga,Mysore	Wet	5.6	158	5.3	145
N.Arcot,Tamil Nadu	Wet	5.1	132	4.8	132
	Dry	4.0	102	5.0	106
Indonesia					
West Java	Wet	5.8	88	3.2	96
Malaysia					
Kelaten	Wet	3.2	55	2.3	50
	Dry	3.7	52	2.3	53
Thailand					
Suphan Buri	Wet	3.7	56	2.8	13
	Dry	5.3	82	2.8	12
Philippine					
Nueva Ecija	Wet	3.8	41	2.8	71
	Dry	5.5	131	2.6	82
Leyte	Wet	4.3	89	2.7	31
	Dry	4.6	41	2.5	28

Source : Barker R. : Yield and Fertilizer Input in Changes in Rice Farming in Selected Areas of Asia, 1978

Table L.8 Project Cost

Unit: 1,000 Rs

Description	Amount		
	Foreign	Local	Total
A. Wireless Communication System			
A-1 HF Radio System	10,350	1,150	11,500
A-2 VHF Radio System	27,450	3,050	30,500
A-3 Data Processing Unit	21,060	2,340	23,400
Sub-Total (A)	58,860	6,540	65,400
B. Representative Areas			
B-1 Sarojini Nagar Study Area			
1) Irrigation System	648	23,368	24,015
2) Drainage System	20,035	38,045	58,079
3) Augumentation Facility	1,185	12,741	13,926
4) On-farm Facility	33,345	148,997	182,342
5) Improvement of Service Road	6,032	34,067	40,099
Sub-Total (B-1)	61,244	257,216	318,460
B-2 Sataon Study Area			
1) Irrigation System	2,062	106,202	108,264
2) Drainage System	13,484	21,949	35,433
3) Augumentation Facility	1,480	15,449	16,929
4) On-farm Facility	28,897	131,136	160,034
5) Improvement of Service Road	6,464	58,038	64,502
Sub-Total (B-2)	52,387	332,774	385,161
B-3 Sursa Study Area			
1) Irrigation System	666	31,131	31,797
2) Drainage System	35,078	62,641	97,720
3) Augumentation Facility	7,164	75,519	82,683
4) On-farm Facility	38,858	180,471	219,329
5) Improvement of Service Road	5,331	23,951	29,282
Sub-Total (B-3)	87,097	373,714	460,811
B-4 Purwa Study Area			
1) Irrigation System	452	27,764	28,217
2) Drainage System	32,865	50,733	83,598
3) Augumentation Facility	465	23,131	23,596
4) On-farm Facility	27,481	124,811	152,292
5) Improvement of Service Road	4,422	22,681	27,103
Sub-Total (B-4)	65,685	249,120	314,806
Sub-Total (B)	266,414	1,212,823	1,479,237
C. Procurement of Supporting Equipment	0	8,410	8,410
D. Land Acquisition	0	19,831	19,831
E. Administration Cost	0	148,700	148,700
F. Engineering Service	103,800	118,600	222,400
G. Contingency	119,917	850,176	970,093
Physical	42,907	151,490	194,397
Price	77,010	698,686	775,696
Total	548,991	2,365,080	2,914,071

Table L.9 Breakdown of Direct Construction Cost of Sarojini Nagar Area

Description		Unit	Unit Rate F/C	Unit Rate L/C	Quantity	Amount(1000Rs.) F/C	Amount(1000Rs.) L/C	Amount(1000Rs.) Total	Remarks
A. Irrigation System									
A-1 Improvement of Canal									
1) Excavation		m3	0	28	21,640	0	606	606	E-06
2) Embankment		m3	7	47	73,650	516	3,462	3,977	E-08
3) Brick Tile Lining		m2	0	206	79,800	0	16,439	16,439	C-22
4) Related Structures									
- Head Regulator	Type-C	no.	2,500	40,590	1	3	41	43	MST-05-2
- Offtaking Structure of Minor Canals		nos.	1,630	55,900	19	31	1,062	1,093	MST-03
- Outlet		nos.	250	4,150	292	73	1,212	1,285	MST-04
- Drainage Crossing	Type-A (14m)	no.	1,110	58,950	1	1	59	60	MST-06-1
	Type-B (7m)	nos.	430	31,510	2	1	63	64	MST-06
- Rehabilitation Work of Existing Facilities		L.S.			5%	5	122	127	
A-2 Construction of Parallel Canal along Amausi Disty.									
- Outlet		nos.	250	4,150	73	18	303	321	MST-04
Sub-total (A)						648	23,368	24,015	
B. Drainage System									
B-1 Main Drainage System									
1) Striping		m2	11	3	224,020	2,464	672	3,136	E-02
2) Excavation		m3	21	4	564,660	11,858	2,259	14,117	E-04
3) Embankment		m3	7	19	508,200	3,557	9,656	13,213	E-07
4) Related Structure									
- Bridge	Type-A (30m)	no.	24,500	880,540	0	0	0	0	MST-09
	Type-B (15m)	nos.	11,300	380,400	13	147	4,945	5,092	MST-10
	Type-C (7.5 m)	nos.	5,080	197,800	15	76	2,967	3,043	MST-11
	Type-D (5m)	nos.	3,400	145,880	28	95	4,085	4,180	MST-12
B-2 Tertiary Drainage System									
1) Excavation		m3	0	28	289,810	0	8,115	8,115	E-06
2) Embankment		m3	7	19	260,830	1,826	4,956	6,782	E-07
3) Related Structure									
- Foot Path		nos.	50	1,760	222	11	391	402	MST-13
Sub-total (B)						20,035	38,045	58,079	
C. Augumentation Facility									
Pump Station at the Sai River									
1) Pump House		1 lot				1	53	54	MST-15
2) Intake & Outlet Strucure						430	2,886	3,316	MST-17
3) Pump Equipment and Power Supply System		1 lot				754	9,802	10,556	MST-16
Sub-total (C)						1,185	12,741	13,926	
D. On-farm Facility									
D-1 Watercourse									
1) Lining		km	30,310	420,570	294	8,911	123,648	132,559	OF-01
2) Earth Canal		km	10,000	60,000	159	1,590	9,540	11,130	OF-02
D-2 Field Drain		km	0	21,000	368	0	7,728	7,728	OF-04
D-3 Related Structure									
1) Turnout		nos.	0	280	2,082	0	583	583	OF-03
2) Road Crossing	Type-A	nos.	70	2,820	66	5	186	191	OF-06
	Type-B	nos.	20	300	694	14	208	222	OF-07
3) Transition		nos.	0	110	496	0	55	55	OF-09
4) Aqueduct	Type-A	nos.	20	4,320	79	2	341	343	OF-10
	Type-B	nos.	20	4,090	119	2	487	489	OF-10-1
5) Drop		nos.	10	1,480	231	2	342	344	OF-11
6) Drainage Culvert	Type-A	nos.	40	2,380	0	0	0	0	OF-05
	Type-B	nos.	20	1,380	956	19	1,319	1,338	OF-05-1
D-4 Farm Road		km	50,000	10,000	456	22,800	4,560	27,360	MST-08
Sub-total (D)						33,345	148,997	182,342	
E. Improvement of Service Road									
E-1 Distributary Canal		km	60,000	610,000	55	3,297	33,520	36,817	MST-07
E-2 Minor Canal		km	50,000	10,000	55	2,735	547	3,282	MST-08
Sub-total (E)						6,032	34,067	40,099	
Total						61,244	257,216	318,460	

Table L.10 Breakdown of Direct Construction Cost of Sataon Area (1/2)

Description		Unit	Unit Rate F/C	Unit Rate L/C	Quantity	Amount(1000Rs.) F/C	Amount(1000Rs.) L/C	Amount(1000Rs.) Total	Remarks
A. Irrigation System									
A-1 Improvement of Canal									
A-1-1 Aslwan Branch Canal									
- Head Regulator	Type-A	nos.	780	14,970	15	12	225	236	MST-05
	Type-B	nos.	1,450	26,270	2	3	53	55	MST-05-1
	Type-C	nos.	2,500	41,230	0	0	0	0	MST-05-2
A-1-2 Maurawan Disty. Canal from Head to M28-0-600									
1) Excavation		m3	0	28	19,730	0	552	552	E-06
2) Embankment		m3	7	47	98,660	691	4,637	5,328	E-08
3) Brick Tile Lining		m2	0	211	299,800	0	63,258	63,258	C-22
4) Related Structures									
- Head Regulator	Type-A	nos.	780	14,970	21	16	314	331	MST-05
	Type-B	nos.	1,450	26,270	0	0	0	0	MST-05-1
	Type-C	nos.	2,500	41,230	0	0	0	0	MST-05-2
- Outlet		nos.	420	4,220	1	0	4	5	MST-04
A-1-3 Maurawan Disty. Canal from M28-0-0 to Tail End									
1) Excavation		m3	0	28	44,620	0	1,249	1,249	E-06
2) Embankment		m3	7	47	146,450	1,025	6,883	7,908	E-08
3) Brick Tile Lining		m2	0	211	121,920	0	25,725	25,725	C-22
4) Related Structures									
- Head Regulator	Type-A	nos.	780	14,970	9	7	135	142	MST-05
	Type-B	nos.	1,450	26,270	0	0	0	0	MST-05-1
	Type-C	nos.	2,500	41,230	0	0	0	0	MST-05-2
- Offtaking Structure of Minor Canals		nos.	1,630	58,170	1	2	58	60	MST-03
- Outlet		nos.	420	4,220	183	77	772	849	MST-04
- Drainage Crossing	Type-A (14m)	no.	1,110	61,320	0	0	0	0	MST-06-1
	Type-B (7m)	no.	430	32,810	1	0	33	33	MST-06
- Rehabilitation Work of Existing Facilities		L.S.			5%	4	50	54	
Sub-total (A-1)						1,837	103,948	105,786	
A-2 Construction of Parallel Canal									
A-2-1 Asiwan Branch									
- Outlet		nos.	420	4,220	329	138	1,388	1,527	MST-04
A-2-2 Maurawan Disty. from Head to M28-0-0									
- Outlet		nos.	420	4,220	159	67	671	738	MST-04
A-2-3 Maurawan Disty. from M28-0-0 to Tail End									
- Outlet		nos.	420	4,220	46	19	194	213	MST-04
Sub-total (A-2)						224	2,253	2,478	
Sub-total (A)						2,062	106,202	108,264	
B. Drainage System									
B-1 Main Drainage System									
1) Striping		m2	11	3	102,130	1,123	306	1,430	E-02
2) Excavation		m3	21	4	426,400	8,954	1,706	10,660	E-04
3) Embankment		m3	7	19	383,760	2,686	7,291	9,978	E-07
4) Related Structure									
- Bridge	Type-A (30m)	no.	24,500	912,510	0	0	0	0	MST-09
	Type-B (15m)	nos.	11,300	393,710	10	113	3,937	4,050	MST-10
	Type-C (7.5 m)	nos.	5,080	204,560	10	51	2,046	2,096	MST-11
	Type-D (5m)	nos.	3,400	150,580	19	65	2,861	2,926	MST-12
B-2 Tertiary Drainage System									
1) Excavation		m3	0	28	76,460	0	2,141	2,141	E-06
2) Embankment		m3	7	19	68,820	482	1,308	1,789	E-07
3) Related Structure									
- Foot Path		nos.	50	1,830	193	10	353	363	MST-13
Sub-total (B)						13,484	21,949	35,433	
C. Augumentation Facility									
1) Pump House		lot			1	1	55	56	MST-15
2) Intake & Outlet Strucure		lot			1	430	2,954	3,384	MST-17
3) Pump Equipment and Power Supply System		lot			1	1,049	12,440	13,489	MST-16
Sub-total (C)						1,480	15,449	16,929	
D. On-farm Facility									
D-1 Watercourse									
1) Lining		km	30,310	429,010	255	7,729	109,398	117,127	OF-01
2) Earth Canal		km	10,000	60,000	138	1,380	8,280	9,660	OF-02
D-2 Field Drain		km	0	21,000	318	0	6,678	6,678	OF-04
D-3 Related Structure									
1) Turnout		nos.	0	290	658	0	191	191	OF-03
2) Road Crossing	Type-A	nos.	70	2,910	57	4	166	170	OF-06
	Type-B	nos.	20	300	601	12	180	192	OF-07
3) Transition		nos.	0	120	429	0	51	51	OF-09
4) Aqueduct	Type-A	nos.	20	4,490	69	1	310	311	OF-10
	Type-B	nos.	20	4,250	103	2	438	440	OF-10-1
5) Drop		nos.	10	1,540	200	2	308	310	OF-11
6) Drainage Culvert	Type-A	nos.	40	2,460	0	0	0	0	OF-05
	Type-B	nos.	20	1,430	830	17	1,187	1,204	OF-05-1

Table L.10 Breakdown of Direct Construction Cost of Sataon Area (2/2)

Description		Unit	Unit Rate F/C	Unit Rate L/C	Quantity	Amount(1000Rs.) F/C	Amount(1000Rs.) L/C	Amount(1000Rs.) Total	Remarks
D-4 Farm Road	Type-A	km	50,000	10,000	395	19,750	3,950	23,700	MST-08
Sub-total (D)						28,897	131,136	160,034	
E. Improvement of Service Road									
E-1 Distributary Canal		km	60,000	630,000	91.82	5,509	57,847	63,356	MST-07
E-2 Minor Canal		km	50,000	10,000	19.10	955	191	1,146	MST-08
Sub-total (E)						6,464	58,038	64,502	
Total						52,387	332,774	385,161	

Table L.11 Breakdown of Direct Construction Cost of Sursa Area

Description		Unit	Unit Rate F/C	Unit Rate L/C	Quantity	Amount(1000Rs.) F/C	Amount(1000Rs.) L/C	Amount(1000Rs.) Total	Remarks
A. Irrigation System									
A-1 Improvement of Canal									
1) Excavation		m3	0	28	15,320	0	429	429	E-06
2) Embankment		m3	7	47	62,300	436	2,928	3,364	E-08
3) Brick Tile Lining		m2	0	218	112,750	0	24,580	24,580	C-22
4) Related Structures									
- Head Regulator	Type-A	no.	780	12,690	1	1	13	13	MST-05
	Type-B	no.	1,450	26,840	0	0	0	0	MST-05-1
	Type-C	no.	2,500	42,040	1	3	42	45	MST-05-2
- Offtaking Structure of Minor Canals		nos.	1,630	61,200	11	18	673	691	MST-03
- Outlet		nos.	420	4,370	269	113	1,176	1,289	MST-04
- Drainage Crossing	Type-A (14m)	no.	1,110	64,530	3	3	194	197	MST-06-1
	Type-B (7m)	nos.	430	34,580	3	1	104	105	MST-06
- Siphon		no.	33,790	354,510	1	34	355	388	MST-20
- Rehabilitation Work of Existing Facilities		L.S.			5%	9	128	136	
A-2 Construction of Parallel Canal									
- Outlet		nos.	420	4,370	117	49	511	560	MST-04
Sub-total (A)						666	31,131	31,797	
B. Drainage System									
B-1 Main Drainage System									
1) Striping		m2	11	3	259,450	2,854	778	3,632	E-02
2) Excavation		m3	21	4	873,760	18,349	3,495	21,844	E-04
3) Embankment		m3	7	19	816,380	5,715	15,511	21,226	E-07
4) Related Structure									
- Bridge	Type-A (30m)	no.	24,500	954,700	2	49	1,909	1,958	MST-09
	Type-B (15m)	nos.	11,300	411,220	20	226	8,224	8,450	MST-10
	Type-C (7.5 m)	nos.	5,080	213,410	29	147	6,189	6,336	MST-11
	Type-D (5m)	nos.	3,400	156,720	13	44	2,037	2,082	MST-12
B-2 Tertiary Drainage System									
1) Excavation		m3	0	28	337,600	0	9,453	9,453	E-06
2) Embankment		m3	7	19	303,850	2,127	5,773	7,900	E-07
3) Related Structure									
- Foot Path		nos.	50	1,920	262	13	503	516	MST-13
B-3 Sub-surface Drainage System along Hardoi Branch Canal									
1) Sub-surface Pipe		1 lot				5,523	8,386	13,909	MST-14
2) Pump House		1 lot				1	63	64	MST-15
3) Suction Pond		1 lot				1	59	61	MST-17
4) Equipment & Power Supply		1 lot				29	259	288	MST-16
Sub-total (B)						35,078	62,641	97,720	
C. Augumentation Facility									
Cruster Shallow Well									
1) Pump House		nos.	460	50,790	900	414	45,711	46,125	MST-18
2) Equipment and Boring with Casing		nos.	6,300	22,300	900	5,670	20,070	25,740	MST-21
3) Power Supply		set	1,200	10,820	900	1,080	9,738	10,818	MST-19
Sub-total (C)						7,164	75,519	82,683	
D. On-farm Facility									
D-1 Watercourse									
1) Lining		km	30,310	438,950	343	10,396	150,560	160,956	OF-01
2) Earth Canal		km	10,000	60,000	186	1,860	11,160	13,020	OF-02
D-2 Field Drain		km	0	21,000	428	0	8,988	8,988	OF-04
D-3 Related Structure									
1) Turnout		nos.	0	300	2,425	0	728	728	OF-03
2) Road Crossing	Type-A	nos.	70	3,030	77	5	233	239	OF-06
	Type-B	nos.	20	310	808	16	250	267	OF-07
3) Transition		nos.	0	120	577	0	69	69	OF-09
4) Aqueduct	Type-A	nos.	20	4,740	92	2	436	438	OF-10
	Type-B	nos.	20	4,490	139	3	624	627	OF-10-1
5) Drop		nos.	10	1,630	269	3	438	441	OF-11
6) Drainage Culvert	Type-A	nos.	40	2,590	0	0	0	0	OF-05
	Type-B	nos.	20	1,500	1,116	22	1,674	1,696	OF-05-1
D-4 Farm Road		km	50,000	10,000	531	26,550	5,310	31,860	MST-08
Sub-total (D)						38,858	180,471	219,329	
E. Improvement of Service Road									
E-1 Distributary Canal		km	60,000	670,000	35	2,087	23,303	25,389	MST-07
E-2 Minor Canal		km	50,000	10,000	65	3,244	649	3,893	MST-08
Sub-total (E)						5,331	23,951	29,282	
Total						87,097	373,714	460,811	

Table L.12 Breakdown of Direct Construction Cost of Purwa Area

Description		Unit	Unit Rate F/C	Unit Rate L/C	Quantity	Amount(1000Rs.) F/C	Amount(1000Rs.) L/C	Amount(1000Rs.) Total	Remarks
A. Irrigation System									
A-1 Improvement of Canal									
1) Excavation		m3	0	28	9,750	0	273	273	E-06
2) Embankment		m3	7	47	43,390	304	2,039	2,343	E-08
3) Brick Tile Lining		m2	0	211	111,160	0	23,455	23,455	C-22
4) Related Structures									
- Head Regulator	Type-A	nos.	780	14,970	3	2	45	47	MST-05
	Type-B	nos.	1,450	26,270	1	1	26	28	MST-05-1
	Type-C	nos.	2,500	41,230	0	0	0	0	MST-05-2
- Offtaking Structure of Minor Canals		nos.	1,630	58,170	10	16	582	598	MST-03
- Outlet		nos.	420	4,220	234	98	987	1,086	MST-04
- Drainage Crossing	Type-A (14m)	no.	1,110	61,320	0	0	0	0	MST-06-1
-	Type-B (7m)	nos.	430	32,810	1	0	33	33	MST-06
- Rehabilitation Work of Existing Facilities		L.S.			5%	6	84	90	
A-2 Construction of Parallel Canal along Disty. Canals									
- Outlet		nos.	420	4,220	57	24	241	264	MST-04
Sub-total (A)						452	27,764	28,217	
B. Drainage System									
B-1 Main Drainage System									
1) Striping		m2	11	3	75,270	828	226	1,054	E-02
2) Excavation		m3	21	4	1,072,680	22,526	4,291	26,817	E-04
3) Embankment		m3	7	19	965,420	6,758	18,343	25,101	E-07
4) Related Structure									
- Bridge	Type-A (30m)	no.	24,500	912,510	2	49	1,825	1,874	MST-09
	Type-B (15m)	nos.	11,300	393,710	13	147	5,118	5,265	MST-10
	Type-C (7.5 m)	nos.	5,080	204,560	16	81	3,273	3,354	MST-11
	Type-D (5m)	nos.	3,400	150,580	36	122	5,421	5,543	MST-12
B-2 Tertiary Drainage System									
1) Excavation		m3	0	28	238,910	0	6,689	6,689	E-06
2) Embankment		m3	7	19	215,020	1,505	4,085	5,591	E-07
3) Related Structure									
- Foot Path		nos.	50	1,830	184	9	337	346	MST-13
B-3 Sub-surface Drainage System									
1) Sub-surface Pipe		ha	20980	28,110	40	839	1,124	1,964	MST-14
Sub-total (B)						32,865	50,733	83,598	
C. Augumentation Facility									
Shallow Well with Strainer									
1) Pump House		nos.	460	48,190	280	129	13,493	13,622	MST-18
2) Boring & Equipment		set	0	23,600	280	0	6,608	6,608	MST-20
3) Power Supply		set	1,200	10,820	280	336	3,030	3,366	MST-19
Sub-total (C)						465	23,131	23,596	
D. On-farm Facility									
D-1 Watercourse									
1) Lining		km	30,310	429,010	242	7,335	103,820	111,155	OF-01
2) Earth Canal		km	10,000	60,000	131	1,310	7,860	9,170	OF-02
D-2 Field Drain		km	0	21,000	303	0	6,363	6,363	OF-04
D-3 Related Structure									
1) Turnout		nos.	0	290	1,716	0	498	498	OF-03
2) Road Crossing	Type-A	nos.	70	2,910	54	4	157	161	OF-06
	Type-B	nos.	20	300	572	11	172	183	OF-07
3) Transition		nos.	0	120	409	0	49	49	OF-09
4) Aqueduct	Type-A	nos.	20	4,490	65	1	292	293	OF-10
	Type-B	nos.	20	4,250	98	2	417	418	OF-10-1
5) Drop		nos.	10	1,540	191	2	294	296	OF-11
6) Drainage Culvert	Type-A	nos.	40	2,460	0	0	0	0	OF-05
	Type-B	nos.	20	1,430	790	16	1,130	1,146	OF-05-1
D-4 Farm Road	Type-A	km	50,000	10,000	376	18,800	3,760	22,560	MST-08
Sub-total (D)						27,481	124,811	152,292	
E. Improvement of Service Road									
E-1 Distributary Canal		km	60,000	630,000	35.27	2,116	22,220	24,336	MST-07
E-2 Minor Canal		km	50,000	10,000	46.11	2,306	461	2,767	MST-08
Sub-total (E)						4,422	22,681	27,103	
Total						65,685	249,120	314,806	

Table L.13 Land Acquisition Cost

Area	Work Item	Unit Rate of Land /1 (Rs./m2)	Quantity (1,000m2)	Amount (1,000Rs.)
1. Sarojini Nagar	Irrigation Facility	4.50	0	0
	Drainage Facility	3.00	1,518	4,554
2. Sataon	Irrigation Facility	5.76	0	0
	Drainage Facility	4.08	1,117	4,557
3. Sursa	Irrigation Facility	5.60	0	0
	Drainage Facility	4.40	1,808	7,955
4. Purwa	Irrigation Facility	4.00	0	0
	Drainage Facility	2.00	1,382	2,764
Total			5,825	19,831

Remarks /1 : Unit rate of land is collected from the Tehsil concerned.

Table L.14 Annual Disbursement Schedule

Unit: Million Rs.

Description		Amount			1993			1994			1995		
		Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. Direct Construction Cost													
1) Irrigation System		3.8	188.5	192.3	0.0	0.0	0.0	0.2	7.5	7.7	0.8	37.7	38.5
2) Drainage System		101.5	173.4	274.8	0.0	0.0	0.0	4.1	6.9	11.0	20.3	34.7	55.0
3) Augumentation Facility		10.3	126.8	137.1	0.0	0.0	0.0	0.0	0.0	0.0	1.7	21.1	22.9
4) On-farm Facility		128.6	585.4	714.0	0.0	0.0	0.0	5.1	23.4	28.6	25.7	117.1	142.8
5) Improvement of Service Road		22.2	138.7	161.0	0.0	0.0	0.0	0.9	5.5	6.4	4.4	27.7	32.2
6) Wireless Communication System		58.9	6.5	65.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub-total (A)		325.3	1,219.4	1,544.6	0.0	0.0	0.0	10.2	43.4	53.7	52.9	238.3	291.3
B. Procurement of Supporting Equipment		0.0	8.4	8.4	0.0	4.2	4.2	0.0	4.2	4.2	0.0	0.0	0.0
C. Land Acquisition		0.0	24.2	24.2	0.0	0.0	0.0	0.0	12.1	12.1	0.0	12.1	12.1
D. Administration Cost		0.0	148.7	148.7	0.0	19.7	19.7	0.0	25.8	25.8	0.0	25.8	25.8
E. Engineering Service		103.8	118.6	222.4	11.8	28.6	40.5	20.3	31.4	51.6	24.9	29.3	54.2
Sub-total (A - E)		429.1	1,519.3	1,948.4	11.8	52.5	64.4	30.5	116.9	147.4	77.8	305.6	383.4
F. Contingency													
Physical Contingency	10%	42.9	151.5	194.4	1.2	5.3	6.4	3.0	11.5	14.5	7.8	30.3	38.1
Price Contingency													
F/C	3%	77.0	698.7	775.7	0.8	8.4	9.2	3.1	28.4	31.5	10.7	103.7	114.5
L/C	7%												
TOTAL		549.0	2,369.5	2,918.5	13.8	66.2	80.0	36.7	156.8	193.4	96.4	439.6	536.0

Description		1996			1997			1998		
		Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
A. Direct Construction Cost										
1) Irrigation System		1.1	52.8	53.8	1.1	52.8	53.8	0.8	37.7	38.5
2) Drainage System		28.4	48.5	77.0	28.4	48.5	77.0	20.3	34.7	55.0
3) Augumentation Facility		5.1	63.4	68.6	3.4	42.3	45.7	0.0	0.0	0.0
4) On-farm Facility		36.0	163.9	199.9	36.0	163.9	199.9	25.7	117.1	142.8
5) Improvement of Service Road		6.2	38.8	45.1	6.2	38.8	45.1	4.4	27.7	32.2
6) Wireless Communication System		58.9	6.5	65.4	0.0	0.0	0.0	0.0	0.0	0.0
Sub-total (A)		135.7	374.0	509.8	75.1	346.4	421.5	51.2	217.2	268.4
B. Procurement of Supporting Equipment		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C. Land Acquisition		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D. Administration Cost		0.0	25.8	25.8	0.0	25.8	25.8	0.0	25.8	25.8
E. Engineering Service		21.5	21.1	42.6	14.8	4.8	19.5	10.6	3.4	14.0
Sub-total (A - E)		157.2	421.0	578.2	89.9	376.9	466.8	61.8	246.4	308.2
F. Contingency										
Physical Contingency	10%	15.7	42.1	57.8	9.0	37.7	46.7	6.2	24.6	30.8
Price Contingency										
F/C	3%	27.5	186.4	214.0	19.2	207.6	226.8	15.6	164.2	179.8
L/C	7%									
TOTAL		200.5	649.5	850.0	118.1	622.2	740.3	83.6	435.2	518.8

Table L.15 Breakdown of Annual Disbursement Schedule (1/2)

Unit: Rs million

Description	Amount			1993			1994			1995			1996			1997			1998		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
I. Sarojini Nagar Area																					
I-A Direct Construction Cost																					
1) Irrigation System	0.6	23.4	24.0	0.0	0.0	0.0	0.0	0.9	1.0	0.1	4.7	4.8	0.2	6.5	6.7	0.2	6.5	6.7	0.1	4.7	4.8
2) Drainage System	20.0	38.0	58.1	0.0	0.0	0.0	0.8	1.5	2.3	4.0	7.6	11.6	5.6	10.7	16.3	5.6	10.7	16.3	4.0	7.6	11.6
3) Augumentaion Facility	1.2	12.7	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.1	2.3	0.6	6.4	7.0	0.4	4.2	4.6	0.0	0.0	0.0
4) On-farm Facility	33.3	149.0	182.3	0.0	0.0	0.0	1.3	6.0	7.3	6.7	29.8	36.5	9.3	41.7	51.1	9.3	41.7	51.1	6.7	29.8	36.5
5) Improvement of Serveice Road	6.0	34.1	40.1	0.0	0.0	0.0	0.2	1.4	1.6	1.2	6.8	8.0	1.7	9.5	11.2	1.7	9.5	11.2	1.2	6.8	8.0
6) Wireless Communication System	15.3	1.7	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3	1.7	17.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub-Total (I-1)	76.5	258.9	335.4	0.0	0.0	0.0	2.4	9.8	12.2	12.2	51.0	63.2	32.7	76.5	109.2	17.2	72.7	89.9	12.0	48.9	60.9
I-B Procurement of Supporting Equipment	0.0	2.2	2.2	0.0	1.1	1.1	0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I-C Land Acquisition	0.0	4.6	4.6	0.0	0.0	0.0	0.0	2.3	2.3	0.0	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I-D Administration Cost	0.0	38.6	38.6	0.0	5.1	5.1	0.0	6.7	6.7	0.0	6.7	6.7	0.0	6.7	6.7	0.0	6.7	6.7	0.0	6.7	6.7
I-E Engineering Service	26.9	30.8	57.7	3.1	7.4	10.5	5.3	8.1	13.4	6.5	7.6	14.1	5.6	5.5	11.1	3.8	1.2	5.1	2.7	0.9	3.6
Sub-Total	103.4	335.0	438.4	3.1	13.6	16.7	7.7	28.0	35.6	18.7	67.6	86.3	38.3	88.7	126.9	21.0	80.6	101.7	14.7	56.5	71.2
I-F Contingency																					
Physical Contingency	10.3	33.5	43.8	0.3	1.4	1.7	0.8	2.8	3.6	1.9	6.8	8.6	3.8	8.9	12.7	2.1	8.1	10.2	1.5	5.6	7.1
Price Contingency	18.5	153.5	172.0	0.2	2.2	2.4	0.8	6.9	7.7	2.6	23.1	25.7	6.7	39.3	46.0	4.5	44.4	48.9	3.7	37.6	41.4
Total	132.3	522.0	654.3	3.6	17.2	20.7	9.2	37.7	46.9	23.1	97.5	120.6	48.8	136.8	185.6	27.6	133.1	160.7	20.0	99.7	119.7
II. Sataon Area																					
II-A Direct Construction Cost																					
1) Irrigation System	2.1	106.2	108.3	0.0	0.0	0.0	0.1	4.2	4.3	0.4	21.2	21.7	0.6	29.7	30.3	0.6	29.7	30.3	0.4	21.2	21.7
2) Drainage System	13.5	21.9	35.4	0.0	0.0	0.0	0.5	0.9	1.4	2.7	4.4	7.1	3.8	6.1	9.9	3.8	6.1	9.9	2.7	4.4	7.1
3) Augumentaion Facility	1.5	15.4	16.9	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.6	2.8	0.7	7.7	8.5	0.5	5.1	5.6	0.0	0.0	0.0
4) On-farm Facility	28.9	131.1	160.0	0.0	0.0	0.0	1.2	5.2	6.4	5.8	26.2	32.0	8.1	36.7	44.8	8.1	36.7	44.8	5.8	26.2	32.0
5) Improvement of Serveice Road	6.5	58.0	64.5	0.0	0.0	0.0	0.3	2.3	2.6	1.3	11.6	12.9	1.8	16.3	18.1	1.8	16.3	18.1	1.3	11.6	12.9
6) Wireless Communication System	13.2	1.5	14.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	1.5	14.7	0.0	0.0	0.0	0.0	0.0	0.0
Sub-Total (I-A)	65.6	334.2	399.9	0.0	0.0	0.0	2.0	12.7	14.7	10.4	66.0	76.5	28.2	98.0	126.3	14.7	94.0	108.7	10.2	63.5	73.6
II-B Procurement of Supporting Equipment	0.0	1.9	1.9	0.0	0.9	0.9	0.0	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II-C Land Acquisition	0.0	4.6	4.6	0.0	0.0	0.0	0.0	2.3	2.3	0.0	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II-D Administration Cost	0.0	33.4	33.4	0.0	4.4	4.4	0.0	5.8	5.8	0.0	5.8	5.8	0.0	5.8	5.8	0.0	5.8	5.8	0.0	5.8	5.8
II-E Engineering Service	23.3	26.6	50.0	2.7	6.4	9.1	4.6	7.0	11.6	5.6	6.6	12.2	4.8	4.7	9.6	3.3	1.1	4.4	2.4	0.8	3.1
Sub-Total	88.9	400.7	489.7	2.7	11.8	14.5	6.6	28.8	35.3	16.0	80.7	96.7	33.1	108.6	141.6	18.1	100.9	118.9	12.6	70.0	82.6
II-F Contingency																					
Physical Contingency	8.9	40.1	49.0	0.3	1.2	1.4	0.7	2.9	3.5	1.6	8.1	9.7	3.3	10.9	14.2	1.8	10.1	11.9	1.3	7.0	8.3
Price Contingency	15.9	186.9	202.8	0.2	1.9	2.1	0.7	7.1	7.8	2.2	27.6	29.8	5.8	48.1	53.9	3.9	55.6	59.4	3.2	46.7	49.8
Total	113.7	627.7	741.4	3.1	14.9	18.0	7.9	38.8	46.7	19.8	116.4	136.2	42.1	167.5	209.7	23.7	166.5	190.2	17.0	123.7	140.7

Table L.15 Breakdown of Annual Disbursement Schedule (2/2)

Unit: Rs million

Description	Amount			1993			1994			1995			1996			1997			1998		
	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total	Foreign	Local	Total
III. Sursa Area																					
III-A Direct Construction Cost																					
1) Irrigation System	0.7	31.1	31.8	0.0	0.0	0.0	0.0	1.2	1.3	0.1	6.2	6.4	0.2	8.7	8.9	0.2	8.7	8.9	0.1	6.2	6.4
2) Drainage System	35.1	62.6	97.7	0.0	0.0	0.0	1.4	2.5	3.9	7.0	12.5	19.5	9.8	17.5	27.4	9.8	17.5	27.4	7.0	12.5	19.5
3) Augumentaion Facility	7.2	75.5	82.7	0.0	0.0	0.0	0.0	0.0	0.0	1.2	12.6	13.8	3.6	37.8	41.3	2.4	25.2	27.6	0.0	0.0	0.0
4) On-farm Facility	38.9	180.5	219.3	0.0	0.0	0.0	1.6	7.2	8.8	7.8	36.1	43.9	10.9	50.5	61.4	10.9	50.5	61.4	7.8	36.1	43.9
5) Improvement of Serveice Road	5.3	24.0	29.3	0.0	0.0	0.0	0.2	1.0	1.2	1.1	4.8	5.9	1.5	6.7	8.2	1.5	6.7	8.2	1.1	4.8	5.9
6) Wireless Communication System	17.8	2.0	19.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	2.0	19.8	0.0	0.0	0.0	0.0	0.0	0.0
Sub-Total (I-A)	104.9	375.7	480.6	0.0	0.0	0.0	3.2	11.9	15.1	17.2	72.2	89.4	43.7	123.2	167.0	24.8	108.7	133.4	16.0	59.6	75.6
III-B Procurement of Supporting Equipment	0.0	2.5	2.5	0.0	1.3	1.3	0.0	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III-C Land Acquisition	0.0	8.0	8.0	0.0	0.0	0.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III-D Administration Cost	0.0	44.9	44.9	0.0	6.0	6.0	0.0	7.8	7.8	0.0	7.8	7.8	0.0	7.8	7.8	0.0	7.8	7.8	0.0	7.8	7.8
III-E Engineering Service	31.4	35.8	67.2	3.6	8.7	12.2	6.1	9.5	15.6	7.5	8.9	16.4	6.5	6.4	12.9	4.5	1.4	5.9	3.2	1.0	4.2
Sub-Total	136.2	466.9	603.2	3.6	15.9	19.4	9.3	34.4	43.8	24.7	92.9	117.6	50.2	137.4	187.7	29.2	117.9	147.1	19.2	68.5	87.6
III-F Contingency																					
Physical Contingency	13.6	46.7	60.3	0.4	1.6	1.9	0.9	3.4	4.4	2.5	9.3	11.8	5.0	13.7	18.8	2.9	11.8	14.7	1.9	6.8	8.8
Price Contingency	24.5	214.2	238.7	0.2	2.5	2.8	1.0	8.5	9.5	3.4	31.7	35.2	8.8	60.8	69.6	6.2	64.9	71.2	4.8	45.6	50.5
Total	174.4	727.9	902.2	4.2	20.0	24.2	11.2	46.4	57.6	30.6	133.9	164.5	64.1	212.0	276.1	38.4	194.6	233.0	25.9	120.9	146.9
IV. Purwa Area																					
VI-A Direct Construction Cost																					
1) Irrigation System	0.5	27.8	28.2	0.0	0.0	0.0	0.0	1.1	1.1	0.1	5.6	5.6	0.1	7.8	7.9	0.1	7.8	7.9	0.1	5.6	5.6
2) Drainage System	32.9	50.7	83.6	0.0	0.0	0.0	1.3	2.0	3.3	6.6	10.1	16.7	9.2	14.2	23.4	9.2	14.2	23.4	6.6	10.1	16.7
3) Augumentaion Facility	0.5	23.1	23.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.9	3.9	0.2	11.6	11.8	0.2	7.7	7.9	0.0	0.0	0.0
4) On-farm Facility	27.5	124.8	152.3	0.0	0.0	0.0	1.1	5.0	6.1	5.5	25.0	30.5	7.7	34.9	42.6	7.7	34.9	42.6	5.5	25.0	30.5
5) Improvement of Serveice Road	4.4	22.7	27.1	0.0	0.0	0.0	0.2	0.9	1.1	0.9	4.5	5.4	1.2	6.4	7.6	1.2	6.4	7.6	0.9	4.5	5.4
6) Wireless Communication System	12.6	1.4	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6	1.4	14.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub-Total (I-A)	78.3	250.5	328.8	0.0	0.0	0.0	2.6	9.0	11.6	13.1	49.1	62.2	31.1	76.2	107.3	18.4	71.0	89.4	13.0	45.2	58.2
VI-B Procurement of Supporting Equipment	0.0	1.8	1.8	0.0	0.9	0.9	0.0	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI-C Land Acquisition	0.0	2.8	2.8	0.0	0.0	0.0	0.0	1.4	1.4	0.0	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI-D Administration Cost	0.0	31.8	31.8	0.0	4.2	4.2	0.0	5.5	5.5	0.0	5.5	5.5	0.0	5.5	5.5	0.0	5.5	5.5	0.0	5.5	5.5
VI-E Engineering Service	22.2	25.4	47.6	2.5	6.1	8.6	4.3	6.7	11.0	5.3	6.3	11.6	4.6	4.5	9.1	3.2	1.0	4.2	2.3	0.7	3.0
Sub-Total	100.5	312.2	412.7	2.5	11.2	13.8	6.9	23.5	30.5	18.4	62.2	80.7	35.7	86.3	122.0	21.6	77.5	99.1	15.3	51.4	66.7
VI-F Contingency																					
Physical Contingency	10.0	31.2	41.3	0.3	1.1	1.4	0.7	2.4	3.0	1.8	6.2	8.1	3.6	8.6	12.2	2.2	7.8	9.9	1.5	5.1	6.7
Price Contingency	18.1	144.1	162.2	0.2	1.8	2.0	0.7	5.8	6.5	2.5	21.3	23.8	6.3	38.2	44.5	4.6	42.7	47.3	3.9	34.3	38.1
Total	128.7	487.5	616.2	2.9	14.1	17.1	8.3	31.7	40.1	22.8	89.7	112.5	45.5	133.1	178.6	28.3	128.0	156.3	20.7	90.9	111.6

Table L.16 Annual Operation and Maintenance Cost

Unit : 1,000 Rs

Description	O & M Cost
I. Sarojini Nagar Area	
A. Main system	
1 Irrigation Facility	
- Canal	500
- Augumentation Facility	700
2 Drainage Facility	1,200
3 Service Road	800
B. On-farm system	3,600
Total	6,800
II. Sataon Area	
A. Main system	
1 Irrigation Facility	
- Canal	2,200
- Augumentation Facility	800
2 Drainage Facility	700
3 Service Road	1,300
B. On-farm system	3,200
Total	8,200
III. Sursa Area	
A. Main system	
1 Irrigation Facility	
- Canal	600
- Augumentation Facility	4,100
2 Drainage Facility	2,000
3 Service Road	600
B. On-farm system	4,400
Total	11,700
IV. Purwa Area	
A. Main system	
1 Irrigation Facility	
- Canal	600
- Augumentation Facility	1,200
2 Drainage Facility	1,700
3 Service Road	500
B. On-farm system	3,000
Total	7,000
Total	33,700

Table L.17 Breakdown of the Expected Project Benefit

Area	Cropping Season	Project Area (ha)	With Project Condition				Without Project Condition				Incremental Benefit (Rs.million)
			Cultivated Area (ha)	Gross Income (Rs.million)	Production Cost (Rs.million)	Primary Profit (Rs.million)	Cultivated Area (ha)	Gross Income (Rs.million)	Production Cost (Rs.million)	Primary Profit (Rs.million)	
1 Sarojini Nagar	Kharif	14,862	14,862	118.4	42.7	75.7	9,237	62.6	23.2	39.4	36.4
	Rabi		14,862	147.8	37.1	110.7	9,275	76.3	21.4	54.9	55.7
	Annual			266.2	79.8	186.4		138.9	44.6	94.3	92.1
2 Sataon	Kharif	12,874	12,874	102.6	38.7	63.9	7,274	51.7	26.2	25.5	38.4
	Rabi		12,874	128.0	34.3	93.7	9,006	78.7	22.6	56.1	37.5
	Annual			230.6	73.0	157.6		130.4	48.7	81.7	75.9
3 Sursa	Kharif	17,313	16,880	129.4	45.6	83.8	9,834	68.5	23.0	45.5	38.3
	Rabi		16,880	171.1	40.3	130.8	13,280	125.7	30.9	94.9	35.9
	Perennial		433	5.4	2.5	2.9	960	10.3	5.1	5.2	-2.3
	Annual			305.8	88.3	217.5		204.6	59.0	145.6	71.9
4 Purwa	Kharif	12,252	12,252	103.2	34.6	68.6	6,638	51.9	16.9	35.0	33.6
	Rabi		12,252	121.8	29.5	92.3	6,735	48.9	12.7	36.3	56.0
	Annual			225.0	64.1	160.9		100.9	29.6	71.3	89.6
Total		57,301	57,301	1027.6	305.3	722.3	32,983	574.7	181.9	392.8	329.5

Table L.18 Annual Economic Disbursement Schedule

Unit: Rs.1,000

	Description	Amount	1993	1994	1995	1996	1997	1998
I	Sarojini Nagar Study Area							
	I-1 Direct Construction Cost	284,378	0	10,180	53,109	94,511	75,678	50,900
	I-2 Procurement of Supporting Equipment	1,496	748	748	0	0	0	0
	I-3 Land Acquisition	3,644	0	1,822	1,822	0	0	0
	I-4 Administration Cost	38,568	5,110	6,692	6,692	6,692	6,692	6,692
	I-5 Engineering Service	57,683	10,492	13,387	14,059	11,061	5,065	3,618
	Sub-Total	385,768	16,350	32,828	75,682	112,264	87,435	61,210
	I-6 Physical Contingency	38,577	1,635	3,283	7,568	11,226	8,744	6,121
	Total	424,345	17,985	36,111	83,250	123,490	96,179	67,331
II	Sataon Study Area							
	II-1 Direct Construction Cost	336,050	0	12,216	63,789	108,035	90,928	61,082
	II-2 Procurement of Supporting Equipment	1,296	648	648	0	0	0	0
	II-3 Land Acquisition	3,646	0	1,823	1,823	0	0	0
	II-4 Administration Cost	33,409	4,426	5,797	5,797	5,797	5,797	5,797
	II-5 Engineering Service	49,967	9,089	11,596	12,178	9,582	4,388	3,134
	Sub-Total	424,368	14,163	32,080	83,587	123,413	101,112	70,013
	II-6 Physical Contingency	42,437	1,416	3,208	8,359	12,341	10,111	7,001
	Total	466,804	15,579	35,288	91,946	135,754	111,224	77,014
III	Sursa Study Area							
	III-1 Direct Construction Cost	408,160	0	12,690	75,374	143,968	112,678	63,450
	III-2 Procurement of Supporting Equipment	1,743	871	871	0	0	0	0
	III-3 Land Acquisition	6,364	0	3,182	3,182	0	0	0
	III-4 Administration Cost	44,928	5,952	7,795	7,795	7,795	7,795	7,795
	III-5 Engineering Service	67,196	12,223	15,595	16,378	12,885	5,901	4,215
	Sub-Total	528,391	19,046	40,133	102,729	164,649	126,374	75,460
	I-6 Physical Contingency	52,839	1,905	4,013	10,273	16,465	12,637	7,546
	Total	581,230	20,951	44,147	113,002	181,113	139,012	83,006
IV	Purwa Study Area							
	VI-1 Direct Construction Cost	280,547	0	9,858	52,689	92,908	75,804	49,289
	VI-2 Procurement of Supporting Equipment	1,233	617	617	0	0	0	0
	VI-3 Land Acquisition	2,211	0	1,106	1,106	0	0	0
	VI-4 Administration Cost	31,795	4,212	5,517	5,517	5,517	5,517	5,517
	VI-5 Engineering Service	47,553	8,650	11,036	11,590	9,119	4,176	2,983
	Sub-Total	363,339	13,479	28,133	70,902	107,543	85,496	57,788
	I-6 Physical Contingency	36,334	1,348	2,813	7,090	10,754	8,550	5,779
	Total	399,673	14,827	30,946	77,991	118,297	94,046	63,567
TOTAL PROJECT COST								
A.	Direct Construction Cost	1,309,134	0	44,944	244,960	439,421	355,089	224,720
B.	Procurement of Supporting Equipment	5,768	2,884	2,884	0	0	0	0
C.	Land Acquisition	15,864	0	7,932	7,932	0	0	0
D.	Administration Cost	148,700	19,700	25,800	25,800	25,800	25,800	25,800
E.	Engineering Service	222,400	40,454	51,614	54,205	42,647	19,530	13,950
	Sub-total	1,701,866	63,038	133,174	332,897	507,868	400,419	264,470
F.	Contingency	170,187	6,304	13,317	33,290	50,787	40,042	26,447
	TOTAL	1,872,053	69,342	146,492	366,187	558,655	440,461	290,917

Table L.19 Economic Cash Flow (1/5) - Sarojini Nagar Area -

Area: 14,862 ha
IRR: 14.8%

Unit: Rs.1,000

Year in		Costs				Incremental	
Order	Year	Construction	O&M	Replacement	Total	Benefit	Balance
1	1993	17,985			17,985		-17,985
2	1994	36,111			36,111		-36,111
3	1995	83,250			83,250	737	-82,513
4	1996	123,490			123,490	5,158	-118,332
5	1997	96,179			96,179	14,736	-81,443
6	1998	67,311			67,311	29,472	-37,839
7	1999		5,760		5,760	47,892	42,132
8	2000		5,760		5,760	65,575	59,815
9	2001		5,760		5,760	79,574	73,814
10	2002		5,760		5,760	88,416	82,656
11	2003		5,760	1,744	7,504	92,100	84,596
12	2004		5,760		5,760	92,100	86,340
13	2005		5,760		5,760	92,100	86,340
14	2006		5,760	16	5,776	92,100	86,324
15	2007		5,760		5,760	92,100	86,340
16	2008		5,760		5,760	92,100	86,340
17	2009		5,760		5,760	92,100	86,340
18	2010		5,760		5,760	92,100	86,340
19	2011		5,760		5,760	92,100	86,340
20	2012		5,760		5,760	92,100	86,340
21	2013		5,760	1,744	7,504	92,100	84,596
22	2014		5,760		5,760	92,100	86,340
23	2015		5,760		5,760	92,100	86,340
24	2016		5,760	16	5,776	92,100	86,324
25	2017		5,760		5,760	92,100	86,340
26	2018		5,760	10,348	16,108	92,100	75,992
27	2019		5,760		5,760	92,100	86,340
28	2020		5,760		5,760	92,100	86,340
29	2021		5,760		5,760	92,100	86,340
30	2022		5,760		5,760	92,100	86,340
31	2023		5,760	1,744	7,504	92,100	84,596
32	2024		5,760		5,760	92,100	86,340
33	2025		5,760		5,760	92,100	86,340
34	2026		5,760	16	5,776	92,100	86,324
35	2027		5,760		5,760	92,100	86,340
36	2028		5,760		5,760	92,100	86,340
37	2029		5,760		5,760	92,100	86,340
38	2030		5,760		5,760	92,100	86,340
39	2031		5,760		5,760	92,100	86,340
40	2032		5,760		5,760	92,100	86,340
41	2033		5,760	1,744	7,504	92,100	84,596
42	2034		5,760		5,760	92,100	86,340
43	2035		5,760		5,760	92,100	86,340
44	2036		5,760	16	5,776	92,100	86,324
45	2037		5,760		5,760	92,100	86,340
46	2038		5,760		5,760	92,100	86,340
47	2039		5,760		5,760	92,100	86,340
48	2040		5,760		5,760	92,100	86,340
49	2041		5,760		5,760	92,100	86,340
50	2042		5,760		5,760	92,100	86,340

Table L.19 Economic Cash Flow (2/5) - Sataon Area -

Area: 12,874 ha
IRR: 11.5%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	15,579			15,579		-15,579
2	1994	35,288			35,288		-35,288
3	1995	91,945			91,945	607	-91,338
4	1996	135,755			135,755	4,250	-131,505
5	1997	111,224			111,224	12,144	-99,080
6	1998	77,014			77,014	24,288	-52,726
7	1999		6,890		6,890	39,468	32,578
8	2000		6,890		6,890	54,041	47,151
9	2001		6,890		6,890	65,578	58,688
10	2002		6,890		6,890	72,864	65,974
11	2003		6,890	1,512	8,402	75,900	67,498
12	2004		6,890		6,890	75,900	69,010
13	2005		6,890		6,890	75,900	69,010
14	2006		6,890	200	7,090	75,900	68,810
15	2007		6,890		6,890	75,900	69,010
16	2008		6,890		6,890	75,900	69,010
17	2009		6,890		6,890	75,900	69,010
18	2010		6,890		6,890	75,900	69,010
19	2011		6,890		6,890	75,900	69,010
20	2012		6,890		6,890	75,900	69,010
21	2013		6,890	1,512	8,402	75,900	67,498
22	2014		6,890		6,890	75,900	69,010
23	2015		6,890		6,890	75,900	69,010
24	2016		6,890	200	7,090	75,900	68,810
25	2017		6,890		6,890	75,900	69,010
26	2018		6,890	13,230	20,120	75,900	55,780
27	2019		6,890		6,890	75,900	69,010
28	2020		6,890		6,890	75,900	69,010
29	2021		6,890		6,890	75,900	69,010
30	2022		6,890		6,890	75,900	69,010
31	2023		6,890	1,512	8,402	75,900	67,498
32	2024		6,890		6,890	75,900	69,010
33	2025		6,890		6,890	75,900	69,010
34	2026		6,890	200	7,090	75,900	68,810
35	2027		6,890		6,890	75,900	69,010
36	2028		6,890		6,890	75,900	69,010
37	2029		6,890		6,890	75,900	69,010
38	2030		6,890		6,890	75,900	69,010
39	2031		6,890		6,890	75,900	69,010
40	2032		6,890		6,890	75,900	69,010
41	2033		6,890	1,512	8,402	75,900	67,498
42	2034		6,890		6,890	75,900	69,010
43	2035		6,890		6,890	75,900	69,010
44	2036		6,890	200	7,090	75,900	68,810
45	2037		6,890		6,890	75,900	69,010
46	2038		6,890		6,890	75,900	69,010
47	2039		6,890		6,890	75,900	69,010
48	2040		6,890		6,890	75,900	69,010
49	2041		6,890		6,890	75,900	69,010
50	2042		6,890		6,890	75,900	69,010

Table L.19 Economic Cash Flow (3/5) - Sursa Area -

Area: 17,313 ha
IRR: 8.2%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	20,951			20,951		-20,951
2	1994	44,147			44,147		-44,147
3	1995	113,002			113,002	575	-112,427
4	1996	181,113			181,113	4,026	-177,087
5	1997	139,012			139,012	11,504	-127,508
6	1998	83,006			83,006	23,008	-59,998
7	1999		10,290		10,290	37,388	27,098
8	2000		10,290		10,290	51,193	40,903
9	2001		10,290		10,290	62,122	51,832
10	2002		10,290		10,290	69,024	58,734
11	2003		10,290	2,032	12,322	71,900	59,578
12	2004		10,290		10,290	71,900	61,610
13	2005		10,290	7,234	17,524	71,900	54,376
14	2006		10,290	7,250	17,540	71,900	54,360
15	2007		10,290	7,234	17,524	71,900	54,376
16	2008		10,290	7,234	17,524	71,900	54,376
17	2009		10,290		10,290	71,900	61,610
18	2010		10,290		10,290	71,900	61,610
19	2011		10,290		10,290	71,900	61,610
20	2012		10,290		10,290	71,900	61,610
21	2013		10,290	2,032	12,322	71,900	59,578
22	2014		10,290		10,290	71,900	61,610
23	2015		10,290	7,234	17,524	71,900	54,376
24	2016		10,290	7,250	17,540	71,900	54,360
25	2017		10,290	7,234	17,524	71,900	54,376
26	2018		10,290	7,234	17,524	71,900	54,376
27	2019		10,290		10,290	71,900	61,610
28	2020		10,290		10,290	71,900	61,610
29	2021		10,290		10,290	71,900	61,610
30	2022		10,290		10,290	71,900	61,610
31	2023		10,290	2,032	12,322	71,900	59,578
32	2024		10,290		10,290	71,900	61,610
33	2025		10,290	7,234	17,524	71,900	54,376
34	2026		10,290	7,250	17,540	71,900	54,360
35	2027		10,290	7,234	17,524	71,900	54,376
36	2028		10,290	7,234	17,524	71,900	54,376
37	2029		10,290		10,290	71,900	61,610
38	2030		10,290		10,290	71,900	61,610
39	2031		10,290		10,290	71,900	61,610
40	2032		10,290		10,290	71,900	61,610
41	2033		10,290	2,032	12,322	71,900	59,578
42	2034		10,290		10,290	71,900	61,610
43	2035		10,290	7,234	17,524	71,900	54,376
44	2036		10,290	7,250	17,540	71,900	54,360
45	2037		10,290	7,234	17,524	71,900	54,376
46	2038		10,290	7,234	17,524	71,900	54,376
47	2039		10,290		10,290	71,900	61,610
48	2040		10,290		10,290	71,900	61,610
49	2041		10,290		10,290	71,900	61,610
50	2042		10,290		10,290	71,900	61,610

Table L.19 Economic Cash Flow (4/5) - Purwa Area -

Area: 12,252 ha
IRR: 15.2%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	14,827			14,827		-14,827
2	1994	30,946			30,946		-30,946
3	1995	77,991			77,991	717	-77,274
4	1996	118,297			118,297	5,018	-113,279
5	1997	94,046			94,046	14,336	-79,710
6	1998	63,567			63,567	28,672	-34,895
7	1999		6,010		6,010	46,592	40,582
8	2000		6,010		6,010	63,795	57,785
9	2001		6,010		6,010	77,414	71,404
10	2002		6,010		6,010	86,016	80,006
11	2003		6,010	1,440	7,450	89,600	82,150
12	2004		6,010		6,010	89,600	83,590
13	2005		6,010	1,996	8,006	89,600	81,594
14	2006		6,010	2,020	8,030	89,600	81,570
15	2007		6,010	1,996	8,006	89,600	81,594
16	2008		6,010	1,996	8,006	89,600	81,594
17	2009		6,010		6,010	89,600	83,590
18	2010		6,010		6,010	89,600	83,590
19	2011		6,010		6,010	89,600	83,590
20	2012		6,010		6,010	89,600	83,590
21	2013		6,010	1,440	7,450	89,600	82,150
22	2014		6,010		6,010	89,600	83,590
23	2015		6,010	1,996	8,006	89,600	81,594
24	2016		6,010	2,020	8,030	89,600	81,570
25	2017		6,010	1,996	8,006	89,600	81,594
26	2018		6,010	1,996	8,006	89,600	81,594
27	2019		6,010		6,010	89,600	83,590
28	2020		6,010		6,010	89,600	83,590
29	2021		6,010		6,010	89,600	83,590
30	2022		6,010		6,010	89,600	83,590
31	2023		6,010	1,440	7,450	89,600	82,150
32	2024		6,010		6,010	89,600	83,590
33	2025		6,010	1,996	8,006	89,600	81,594
34	2026		6,010	2,020	8,030	89,600	81,570
35	2027		6,010	1,996	8,006	89,600	81,594
36	2028		6,010	1,996	8,006	89,600	81,594
37	2029		6,010		6,010	89,600	83,590
38	2030		6,010		6,010	89,600	83,590
39	2031		6,010		6,010	89,600	83,590
40	2032		6,010		6,010	89,600	83,590
41	2033		6,010	1,440	7,450	89,600	82,150
42	2034		6,010		6,010	89,600	83,590
43	2035		6,010	1,996	8,006	89,600	81,594
44	2036		6,010	2,020	8,030	89,600	81,570
45	2037		6,010	1,996	8,006	89,600	81,594
46	2038		6,010	1,996	8,006	89,600	81,594
47	2039		6,010		6,010	89,600	83,590
48	2040		6,010		6,010	89,600	83,590
49	2041		6,010		6,010	89,600	83,590
50	2042		6,010		6,010	89,600	83,590

Table L.19 Economic Cash Flow (5/5) - Overall Area -

Area: 57,301 ha
IRR: 12.2%

Unit: Rs.1,000

Year in Order	Year	Costs				Incremental Benefit	Balance
		Construction	O&M	Replacement	Total		
1	1993	69,342			69,342		-69,342
2	1994	146,492			146,492		-146,492
3	1995	366,187			366,187	2,636	-363,551
4	1996	558,655			558,655	18,452	-540,203
5	1997	440,461			440,461	52,720	-387,741
6	1998	290,917			290,917	105,440	-185,477
7	1999		28,950		28,950	171,340	142,390
8	2000		28,950		28,950	234,604	205,654
9	2001		28,950		28,950	284,688	255,738
10	2002		28,950		28,950	316,320	287,370
11	2003		28,950	6,728	35,678	329,500	293,822
12	2004		28,950		28,950	329,500	300,550
13	2005		28,950	9,230	38,180	329,500	291,320
14	2006		28,950	9,486	38,436	329,500	291,064
15	2007		28,950	9,230	38,180	329,500	291,320
16	2008		28,950	9,230	38,180	329,500	291,320
17	2009		28,950		28,950	329,500	300,550
18	2010		28,950		28,950	329,500	300,550
19	2011		28,950		28,950	329,500	300,550
20	2012		28,950		28,950	329,500	300,550
21	2013		28,950	6,728	35,678	329,500	293,822
22	2014		28,950		28,950	329,500	300,550
23	2015		28,950	9,230	38,180	329,500	291,320
24	2016		28,950	9,486	38,436	329,500	291,064
25	2017		28,950	9,230	38,180	329,500	291,320
26	2018		28,950	32,808	61,758	329,500	267,742
27	2019		28,950		28,950	329,500	300,550
28	2020		28,950		28,950	329,500	300,550
29	2021		28,950		28,950	329,500	300,550
30	2022		28,950		28,950	329,500	300,550
31	2023		28,950	6,728	35,678	329,500	293,822
32	2024		28,950		28,950	329,500	300,550
33	2025		28,950	9,230	38,180	329,500	291,320
34	2026		28,950	9,486	38,436	329,500	291,064
35	2027		28,950	9,230	38,180	329,500	291,320
36	2028		28,950	9,230	38,180	329,500	291,320
37	2029		28,950		28,950	329,500	300,550
38	2030		28,950		28,950	329,500	300,550
39	2031		28,950		28,950	329,500	300,550
40	2032		28,950		28,950	329,500	300,550
41	2033		28,950	6,728	35,678	329,500	293,822
42	2034		28,950		28,950	329,500	300,550
43	2035		28,950	9,230	38,180	329,500	291,320
44	2036		28,950	9,486	38,436	329,500	291,064
45	2037		28,950	9,230	38,180	329,500	291,320
46	2038		28,950	9,230	38,180	329,500	291,320
47	2039		28,950		28,950	329,500	300,550
48	2040		28,950		28,950	329,500	300,550
49	2041		28,950		28,950	329,500	300,550
50	2042		28,950		28,950	329,500	300,550

Table L.20 Farm Budget Analysis of Marginal Farmers

Project Condition	Sarojini Nagar			Sataon			Sursa			Purwa		
	Irrigated	Non-irrig.	Total	Irrigated	Non-irrig.	Total	Irrigated	Non-irrig.	Total	Irrigated	Non-irrig.	Total
With project												
Kharif	686	1,758	2,444	686	1,679	2,365	574	1,605	2,179	717	1,835	2,552
Rabi	818	1,905	2,723	818	1,807	2,625	727	1,785	2,512	789	1,665	2,454
Perennial	-	-	-	-	-	-	159	-	159	-	-	-
Sub-total	1,504	3,663	5,167	1,504	3,486	4,990	1,460	3,390	4,850	1,506	3,500	5,006
Without project												
Kharif	-	-	2,082	-	-	910	-	-	1,464	-	-	2,090
Rabi	-	-	2,065	-	-	1,868	-	-	1,825	-	-	1,785
Perennial	-	-	-	-	-	-	-	-	373	-	-	-
Sub-total	-	-	4,147	-	-	2,778	-	-	3,662	-	-	3,875
Incremental Benefit			1,020			2,212			1,188			1,131

Table L.21 Financial Cash Flow Statement of the Project

Unit: Rs.Million

Year	Year in Order	Cash Outflow						Cash Inflow						
		Project Cost	O&M Cost	Replacement Cost	Loan Interest	Loan Repayment	Total Outflow (A)	Foreign Loan	Government Budget	Governement Subsidy	Water Charge	Total Inflow (B)	Balance (B)-(A)	Accumulated Loan
1993	1	80.0	0.0	0.0	1.6	0.0	81.6	64.0	16.0	1.6	0.0	81.6	0.0	64.0
1994	2	191.3	0.0	0.0	5.4	0.0	196.7	153.0	38.3	5.4	0.0	196.7	0.0	217.0
1995	3	533.8	1.3	0.0	16.1	0.0	551.2	427.0	106.8	16.1	1.3	551.2	0.0	644.0
1996	4	850.0	8.1	0.0	33.1	0.0	891.2	680.0	170.0	33.1	8.1	891.2	0.0	1,324.0
1997	5	740.3	17.5	0.0	47.9	0.0	805.7	592.3	148.1	47.9	17.5	805.7	0.0	1,916.2
1998	6	518.8	27.0	0.0	58.3	0.0	604.0	415.0	103.8	58.3	27.0	604.0	0.0	2,331.3
1999	7	0.0	33.7	0.0	58.3	0.0	92.0	0.0	0.0	58.3	33.7	92.0	0.0	2,331.3
2000	8	0.0	33.7	0.0	58.3	0.0	92.0	0.0	0.0	58.3	33.7	92.0	0.0	2,331.3
2001	9	0.0	33.7	0.0	58.3	0.0	92.0	0.0	0.0	58.3	33.7	92.0	0.0	2,331.3
2002	10	0.0	33.7	0.0	58.3	0.0	92.0	0.0	0.0	58.3	33.7	92.0	0.0	2,331.3
2003	11	0.0	33.7	6.7	55.4	116.6	212.4	0.0	0.0	178.7	33.7	212.4	0.0	2,214.7
2004	12	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	2,098.1
2005	13	0.0	33.7	9.2	55.4	116.6	214.9	0.0	0.0	181.2	33.7	214.9	0.0	1,981.6
2006	14	0.0	33.7	9.5	55.4	116.6	215.1	0.0	0.0	181.4	33.7	215.1	0.0	1,865.0
2007	15	0.0	33.7	9.2	55.4	116.6	214.9	0.0	0.0	181.2	33.7	214.9	0.0	1,748.4
2008	16	0.0	33.7	9.2	55.4	116.6	214.9	0.0	0.0	181.2	33.7	214.9	0.0	1,631.9
2009	17	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	1,515.3
2010	18	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	1,398.8
2011	19	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	1,282.2
2012	20	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	1,165.6
2013	21	0.0	33.7	6.7	55.4	116.6	212.4	0.0	0.0	178.7	33.7	212.4	0.0	1,049.1
2014	22	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	932.5
2015	23	0.0	33.7	9.2	55.4	116.6	214.9	0.0	0.0	181.2	33.7	214.9	0.0	815.9
2016	24	0.0	33.7	9.5	55.4	116.6	215.1	0.0	0.0	181.4	33.7	215.1	0.0	699.4
2017	25	0.0	33.7	9.2	55.4	116.6	214.9	0.0	0.0	181.2	33.7	214.9	0.0	582.8
2018	26	0.0	33.7	32.8	55.4	116.6	238.4	0.0	0.0	204.7	33.7	238.4	0.0	466.3
2019	27	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	349.7
2020	28	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	233.1
2021	29	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	116.6
2022	30	0.0	33.7	0.0	55.4	116.6	205.6	0.0	0.0	171.9	33.7	205.6	0.0	0.0
Total		2,914.1	862.7	111.4	1,502.9	2,331.3	7,722.3	2,331.3	582.8	3,945.5	862.7	7,722.3	0.0