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GOVERNMENT OF MAHARASHTRA

IRRIGATION DEPARTMENT

URMODI IRRIGATION PROJECT

TALUKA:- SATARA,

DISTRICT: SATARA,

VOL. I.

REPORT ESTIMATES & APPENDICES

Irrigation Projects & Water Resources Investigation Circle,

PUNE-1.

Irrigation Projects Investigation Division, KARAD

APRIL-1981

C E R T I F I C A T E

CERTIFIED THAT THIS (UMODI) PROJECT
REPORT HAS BEEN GOT FULLY CHECKED
ARITHMETICALLY WHEREVER NECESSARY AND
THAT ALL NECESSARY CORRECTIONS HAVE
BEEN CARRIED OUT BEFORE SUBMISSION.

ASSISTANT ENGINEER

RIVER GAUGING SUB-DIVISION

S.I.I.R.I

UMCDI IRRIGATION PROJECT

TUMKUR & SIFDE DISTRICT & SIFDE

VOLUME-I

R.R.C.R.I

INDEX

Sr. No.	Particulars	Pages	
		From	To
1	2	3	4
I.	Salient Features	I	VII
II.	Reports :		
	Chapter -I General Description and History	1	7
	Chapter- II Hydrology	8	12
	Chapter-III Water Planning	13	22
	Chapter- IV Head Works	23	33
	Chapter- V Canal and Command	34	39
	Chapter- VI Construction Material	40	45
	Chapter-VII Colony, Access and Communications	46	52
	Chapter-VIII Submergence	53	59
	Chapter- IX Estimates	60	73
	Chapter- X Construction Programme	75	82
	Chapter- XI Financial Forecast	83	90

EMCDI IRRIGATION PROJECT
TAHSA : S.P.A.R. DISTRICT : S.P.A.R.

VOLUME-I
4.S.I.M.I.T.E.S

INDEX

Sr. no.	Particulars	Pages From	To
	Estimates	91	-
1.	Total Cost of Project	92	93
2.	Recapitulation Sheet	94	-
	I-Head Works		
3.	Recapitulation sheet of I-Head Works	95	-
4.	'A' Preliminary	96	106
5.	'B' Lands	107	110
6.	'C' Works	111	123
7.	'D' Regulator	124	129
8.	'K' Buildings	130	139
9.	'M' Flotation	140	-
10.	'O' Miscellaneous	141	143
11.	'P' Maintenance	144	145
12.	'Q' Special pools and Flents	146	150
13.	'R' Communication	151	-
	II-Main Canal and Branches		
14.	Recapitulation Sheet of II-Main Canal and Branches.	153	-
15.	'A' Preliminary	154	154
16.	'B' Lands	165	165

Sr. No.	Particulars	Pages	
		From	To
16.	'D' Regulators	167	176
17.	'F' R.H.L. Jorks	177	205
18.	'G' Bridges	206	212
19.	'H' Escapes	213	214
20.	'K' Buildings	215	222
21.	'L' Earth work for Canal	223	235
22.	'M' Plantation	235	-
23.	'C' Miscellaneous	237	241
24.	'P' Maintenance	242	243
25.	'Q' Special Tools and Plants	244	247
26.	'R' Communications	248	
27.	III-Distributors	249	-

URMODI IRRIGATION PROJECT

TALEK : S.P.A. DISTRICT : S.P.A.

A.P.P.E.N.D.I.C.E.S

Sr. No.	Appen- dix No.	Particulars	Pages	
			From	To
1	2	3	4	5
1.	I/1 a,b,c	Statement showing the list of the Bench marks.	251	256
2.	I/2	Statement showing comparative merits of alternative sites.	257	257
3.	II/1	Statement showing the discharge data of <u>U</u> rmodi River at Farali.	258	259
4.	II/2	Statement showing the average annual yield by Isohyetal method.	259	260
5.	III/1	Talukwise existing crop-pattern	261	262
6.	III/2	Letter from the Agricultural Department regarding approval to the Crop-pattern	263	265
7.	III/3	Area capacity table.	266	267
8.	III/4	Water requirement for 10000 Ac.	269	271
9.	III/5	Storage Calculations	272	275
10.	III/6	Statement showing canal capacities of the L.B. and R.B. canals.	276	279

1	2	3	4	5
11.	III/7	Land Use in each zone.	279	280
12.	III/8	Area on seasonal basis.	281	282
13.	IV/1	Notes and Geological mapping of the boras of Farali U/S site.	283	307
14.	IV/2	Comparative cost details of the Dam with ungated and gated waste weir for different layouts.	308	310
15.	IV/3	Free Board Calculations.	311	311
16.	IV/4 (a)	Design of the Spillway	312	313
17.	IV/4 (b)	Design of the Bucket.	314	315
18.	IV/5	Design of the Tail Channel	316	316
19.	IV/6	Stability calculations for non-overflow section.	318	325
20.	IV/7	Stability calculations for overflow section.	327	328
21.	IV/3 (d)	Stability of Sarthan Dam	329	332
22.	IV/8	Stability analysis of Sarthan Dam	333	333
23.	IV/9	Soil Testing Results	334	335
24.	IV/10	Design of outlet	336	337
25.	IV/1	Statement showing village-wise G.C.A., C.C.A., Population benefitted under Left Bank Canal.	338	338

1	2	3	4	5
26. V/2	Statement showing village-wise G.C.A., C.C.A., population benefitted under Right Bank Canal.		339	-
27. V/3	Statement showing section-wise G.C.A., C.C.A., I.C.A., etc.		340	340
28. V/4	Statement showing details of Canal Sections.		341	341
29. VI/1	Statement showing the available materials from excavated stuff.		342	343
30. VI/2	Statement showing the materials from borrow area.		344	344
31. VI/3	Requirement of Machinery for I-Head Works		345	347
32. VI/4	-do- II Main Canal.		348	349
33. VI/5	Requirement of additional machinery for I-Head Works.		350	351
34. VI/6	Requirement of additional machinery for II Main Canal.		352	352
35. VI/7	Statement showing the requirement of construction material.		353	354
36. VI/8	Statement showing the requirement of Labour Units for I-Head Works		355	357
37. VI/9	-do- for II Main Canal.		358	359

1	2	3	4	5
38. VII/1	Statement showing permanent Staff structures for I-Head works.		360	360
39. VII/2	Statement showing temporary staff structures for I-Head works.		361	363
40. VII/3	Requirement of Permanent Buildings.		364	364
41. VII/4	Requirement of Temporary Buildings.		365	367
42. VII/5	Statement showing the permanent staff structures for II-Main Canal.		368	369
43. VII/6	Requirement of Temporary Staff structures for II-Main Canal.		370	370
44. VII/7	Statement showing the list of Permanent Buildings for Canals.		371	371
45. VI/F	Statement showing List of Temporary Buildings proposed during the construction.		372	372
46. VII/8 (a)	Temporary Buildings for II-Main Canal.		373	373
47. VII/9	Statement showing the over-lapping of Temporary and Permanent Buildings.		374	375

1	2	3	4	5
48.	VIII/1	Letter from the Archaeological Department.	376	376
48.	VIII/2	Villagewise submergence area.	377	378
50.	VIII/3	Letter from the Peshildar, Satara regarding land rates.	379	383
51.	VIII/4	Requirement of area for Canal.	384	385
52.	VIII/5	Capitalisation of abatement of land revenue.	386	-
53.	IX/1	Details of Important rates adopted for Estimate.	387	393
54.	X/1,2	Statement showing Yearwise Allocation of the expenditure against each sub-head.	394	396
55.	X/3	Statement showing Yearwise Abstract of Direct and Indirect Charges.	397	398
56.	X/4	Physical construction schedule.	399	399
57.	XI/1	Realisation of Water Rates, Revenue and Betterment Levy.	400	401
58.	XI/2	Yearwise Development of Irrigation, Yearwise gross and net revenue.	402	404

1	2	3	4	5
---	---	---	---	---

59. AI/3	percentage return on sum at Charges.		405	406
60. AI/4	Benefit Cost Ratio		407	407
61. AI/5 a,b	Benefits of existing produce for 1000 acres.		408	410
62. AI/6	Benefits for Irrigated Produce.		411	412
63. AI/6 (a)	Statement showing value of Net Benefits for proposed crop pattern for 1 Hectare.		413	419
64. AI/7	Increase in food grains after Irrigation.		420	421

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1	2	3	4	5
---	---	---	---	---

59.	41/3	percentage return on sum of Charges.	405	406
60.	41/4	Benefit Cost Ratio	407	407
61.	41/5 a,b	Benefits of existing produce for 1000 Acres.	408	410
62.	41/6	Benefits for Irrigated Produce.	411	412
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URMODI IRRIGATION PROJECT

TALUKA : SAFARA

DISTRICT : SAFARA

VOLUME-I

R E P O R T

=====

SALIENT FEATURES

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URMODI IRRIGATION PROJECTTaluka : Satara Dist. : Satara

Name of work : Survey Investigation and Preparation
of Plans and Estimates on River Urmodi,
near Village : Parali, Taluka and
District : Satara.

S A L I S N I P A R A M E T E R S

Sr. No.	Items	Particulars	Ref. to Para No.
1.	Scope of the Scheme.	In Irrigation Project on River Urmodi near Village : Parali, Taluka and District: Satara, with canals on both the banks irrigating ⁶⁰³⁰ 6000 ha. ^{14,900} (12600 Ac.) in Satara Taluka, Dist. Satara.	
2.	(A) source	Urmodi River.	
	(B) Location	: : : : : : :	
	i) state	Maharashtra	
	ii) region	Western Maharashtra	
	iii) District	Satara	
	iv) Taluka	Satara	

Sr. No.	Items	Particulars	Ref. to Para No.
	v) Topo-Sheet No.	47-G/11 & 47-K/2	
	vi) Latitude	17°-40'-0" (N)	
	vii) Longitude	73°-54'-40" (E)	
viii)	Population affected	3636 souls.	
3.	Upstream Utilisation (Mcum/Mcft)	3.40 Mcum (120 Mcft)	
4.	Yield and Utilisation on the Project.		
	i) Catchment area (Sq.km./Sq.miles)	116.86 Sq.Km. (42.12 Sq.miles)	
	ii) Rainfall (mm/inches)	650 mm to 1270 mm (25" to 50")	
iii)	75% dep. yield (Mcum/Mcft)	201.05 Mcum (7.1 TMC)	
iv)	Proposed utilisation	107.664 Mcum (3.8 TMC)	
v)	Gross annual utilisation (Mcum/Mcft)	107.718 Mcum (3.80 TMC)	
vi)	Percentage of 75% dep. yield to gross annual utilisation.	53.52%	
5.	Dam and Reservoir		
	i) Gross capacity of the Reservoir (at F.R.L.) (Mcum/Mcft)	82.94 Mcum (2929 Mcft)	
ii)	Capacity of dead storage (Mcum/Mcft)	6.212 Mcum (219.4 Mcft)	
iii)	Capacity of live storage (Mcum/Mcft)	76.728 Mcum (2709.6 Mcft)	

III

Sr. No.	Items	Particulars	Ref. to Para No.
iv)	Maximum water level (F.N.L. m/ft)	680.00 m (2231.00 ft)	
v)	Evaporation losses (annual Mcum/Mcft)	11.378 Mcum (401.81 Mcft)	
vi)	Type of the dam	earth dam with gated spillway on the left flank.	
vii)	Maximum height of the dam (m/ft) in the gorge.	32.00 m (105.00 ft)	
viii)	a) Length of Dam (m/ft)	1527 m (5010.00 ft)	
	b) Masonry portion (m/ft)	101 m (331.40 ft) between Ch.409 to Cd. 510 m	
	c) Earthwork portion (m/ft)	1426 m (4678.60 ft)	
ix)	Total quantity of -		
	a) Earthwork (Cum/Mcft)	1.283 Mcum (45.31 Mcft)	
	b) Masonry (Cum/Mcft)	0.023 Mcum (0.81 Mcft)	
	c) Concrete (Cum/Mcft)	0.001 Mcum (0.036 Mcft)	
	d) Excavation (Cum/Mcft)	0.329 Mcum (11.60 Mcft)	
x)	Submergence		
	a) Land under Submergence	870 ha (2150.0 Ac)	
	b) No. of villages affected	8 Nos. (including wadies)	
xi)	Freeboard (m/ft)	2.50 m (8.20 ft)	

VI

Sr. no.	Items	Particulars	Ref. to para no.																																							
8.	Intensity of irrigated to gross command area.	68%																																								
9.	Normal rainfall in the command (mm/inches)	1270 mm(50") to 712 mm(30")																																								
10.	Soils in the command area.	Reddish black																																								
11.	Existing crop pattern	<table border="1"> <thead> <tr> <th data-bbox="917 1072 984 1109">Sr. no.</th> <th data-bbox="1021 1109 1288 1145">Name of Crop</th> <th data-bbox="1463 1109 1530 1145">%age</th> </tr> </thead> <tbody> <tr> <td data-bbox="935 1218 966 1255">1.</td> <td data-bbox="997 1218 1112 1255">Paddy</td> <td data-bbox="1481 1218 1512 1255">3</td> </tr> <tr> <td data-bbox="935 1296 966 1333">2.</td> <td data-bbox="997 1296 1112 1333">Jowar</td> <td data-bbox="1463 1296 1512 1333">37</td> </tr> <tr> <td data-bbox="935 1374 966 1411">3.</td> <td data-bbox="997 1374 1130 1411">Bajari</td> <td data-bbox="1481 1374 1512 1411">8</td> </tr> <tr> <td data-bbox="935 1453 966 1489">4.</td> <td data-bbox="997 1453 1148 1489">Gr. Nut</td> <td data-bbox="1463 1453 1512 1489">20</td> </tr> <tr> <td data-bbox="935 1531 966 1567">5.</td> <td data-bbox="997 1531 1166 1567">Chillies</td> <td data-bbox="1481 1531 1512 1567">3</td> </tr> <tr> <td data-bbox="935 1609 966 1645">6.</td> <td data-bbox="997 1609 1130 1645">Pulses</td> <td data-bbox="1481 1609 1512 1645">8</td> </tr> <tr> <td data-bbox="935 1687 966 1723">7.</td> <td data-bbox="997 1687 1112 1723">Grass</td> <td data-bbox="1463 1687 1512 1723">17</td> </tr> <tr> <td data-bbox="935 1765 966 1801">8.</td> <td data-bbox="997 1765 1221 1801">Kh. Fallow</td> <td data-bbox="1481 1765 1512 1801">4</td> </tr> <tr> <td colspan="3" data-bbox="917 1828 1239 1864">Follow up crops</td> </tr> <tr> <td data-bbox="935 1906 966 1942">9.</td> <td data-bbox="997 1906 1221 1942">Rabi Jowar</td> <td data-bbox="1481 1906 1512 1942">8</td> </tr> <tr> <td data-bbox="917 1984 966 2020">10.</td> <td data-bbox="997 1984 1093 2020">Gram</td> <td data-bbox="1481 1984 1512 2020">1</td> </tr> <tr> <td data-bbox="917 2062 966 2098">11.</td> <td data-bbox="997 2062 1112 2098">Wheat</td> <td data-bbox="1481 2062 1512 2098">1</td> </tr> </tbody> </table>	Sr. no.	Name of Crop	%age	1.	Paddy	3	2.	Jowar	37	3.	Bajari	8	4.	Gr. Nut	20	5.	Chillies	3	6.	Pulses	8	7.	Grass	17	8.	Kh. Fallow	4	Follow up crops			9.	Rabi Jowar	8	10.	Gram	1	11.	Wheat	1	
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9.	Rabi Jowar	8																																								
10.	Gram	1																																								
11.	Wheat	1																																								
12.	Cost of the scheme (in Rs. lakhs)	1084.93 lakhs																																								
13.	Cost per Mcum/Mcft of gross storage.	15.08 lakhs/Mcum 37033/Mcft																																								

Sr. No.	Items	Particulars	Ref. to Para No.
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7. Irrigated crop-pattern

Sr. No.	Name of Crop	Age
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1.	Sugar Cane O.I., 30%, 40%, 10%	15
2.	Other perennials	5
3.	Chillies	5
4.	Ginger & Turmeric	5
5.	Green Manure	2
6.	Paddy late variety (1/10th seedling)	10
7.	Am. Hy. Jawar	15
8.	Am. Hy. Maize	10
9.	Am. Pulses (b.l.)	10
10.	Am. Gr. Nut	15
11.	Am. Vegetables	3
<u>Follow on crops</u>		
12.	Gram on paddy	10
13.	Am. Hy. Maize on G.M. & Am. Hy. Maize	7
14.	Am. Hy. Jawar on Pulses	10
15.	Am. Hy. Maize on G. Nut	15
16.	Am. Hy. Vegetables	3
17.	Am. Hy. Gr. Nut on Am. Hy. Jawar	15
18.	Am. Hy. Sodder on Maize	5

IV

Sr. no.	Items	Particulars	Ref. to Para No.
xii)	Spillway		
	a) type	masonry with radial gates.	
	b) Maximum flood discharge (cumecs/cusecs)	1570 cum/sec. (55400 cusec)	
	c) Inglis flood	1274 cum/sec (45000 cusec)	
	d) Depth over crest (m/ft)	8 m. (26.25 ft.)	
	e) Length (m/ft)	48 m. (157.50 ft.)	
xiii)	Canal	L.B.C.	R.D.C.
	i) Length	29.5 Km 18.00 miles	27.5 Km 16.78 miles
	ii) Discharge at Head	2.74/ Cumsecs	2.71 Cumsecs
		56.6 cusecs	95.61 cusecs
6.	Commanded Area		
	i) Gross commanded area (Area ha./Ac.)	8822 ha.	21800 Ac.
	ii) Culturable Command area (ha./Ac.)	6704 ha.	16560 Ac.
	iii) Irrigable command area (ha./Ac.)	6030 ha.	14900 Ac.
	iv) Groped area (ha./Ac.)	9632 ha.	23840 Ac.
	v) No. of taluka benefited	One (Satara)	

VII

Sr. no.	Issues	Particulars	Ref. to Para No.
14.	a) Cost per ha./Acr. of irrigable area in Rs.	= 18,000/ha. = Rs. 7,287/Ac.	
	b) Cost per Mcum/Mcft of water utilised in Rs.	10.41 lakhs/Mcum 29475/Mcft	
15.	Benefit cost ratio	1.65 excluding storage required for SAADA water Supply Scheme.	
16.	Percentage return on the scheme.		
	a) On total capital outlay	1.29	
17.	Percentage of submergence to irrigable area.	17.1%	

C H A P T E R S

URMODI IRRIGATION PROJECT
Taluka : Satara. Dist. : Satara

Part No. I

General Description and History of the Project

1.1.00 General Description

1.1.01 The Urmodi Irrigation Project envisages construction of an earthen dam across Urmodi River near Village-Parali in Satara taluka of Satara District to impound a gross storage of 107.77 Mcum (3800 Mcft) by harnessing the water potential of Urmodi River. The river Urmodi is a right bank tributary of river Krishna, in the main Krishna Basin. It rises in the Sahyadri ranges on upstream of village Kas at an altitude of about 1263 m (4144 ft.). It runs through Satara and Aarad talukas of Satara district and confluences with the Krishna river near village Mashil in Satara taluka.

1.1.02 There is a small tank known as Kas tank, constructed on up-stream of the presently selected site on the same river in the upper reaches. The tank caters for the need of water supply of Satara city. The catchment area upto this tank is 6.99 sq. Km. (2.70 sq. miles) and has got an impounding capacity of 3.40 Mcum (120 Mcft). The unintercepted catchment area at the Parali site which is presently proposed works out to 109.87 sq. Km. (42.42 sq. miles) and

the total catchment area of the Urmodi river upto this proposed dam site is 116.85 sq.Km.(45.12 sq. miles).

1.2.00 HISTORY OF THE PROJECT

1.2.01 The project was included in the Master Plan of Krishna basin prepared by the committee of Chief engineer. The allocation according to the Master Plan was 192.56 Mcum (6800 Mcft). The investigation for preparing feasibility report was first taken up in 1965 and was completed in 1976. Previously draft project report was prepared for utilisation of 201.05 Mcum (71.00 Mcft) and submitted to Government in 1973. On account of the Krishna water dispute tribunal Award the review team has placed some restrictions on the utilisation of water in the different projects in the Krishna basin and for the above project the allocation proposed is 107.66 Mcum (3800 Mcft) at 75% dependability.

1.2.02 In the Second five-year plan a bandhara namely Valsa Bandhara was constructed on this river for Kharif irrigation. but major portion of the water potential remained un-harnessed. Hence, Government in the Irrigation and Power Department directed to investigate this project as a part of the main Krشنا Irrigation Project, consisting of Farali, Wang and Urmodi Schemes.

1.2.03 On detailed investigation it has been found that the project can be planned as an independent one and prove to be feasible even with use of the reduced water potential.

1.3.00 Necessity of the Project

1.3.01 There is not a single major or medium irrigation project existing in the Urmodi valley. The irrigation from the existing minor tanks such as Valsa Bandhara, Kas Tank and Padali Bandhara is meagre compared to the availability of the water potential of the valley.

The command area of this project lies in the rainfall shadow zone ranging from 712 mm to 1270 mm (30" to 50") and the soil characteristics is capable of producing valuable food and cash crops if irrigation water supply is assured.

1.3.02 From the experience of the existing bandharas, it can be said that people are irrigation minded and are clamoring for such storage. Hence, Project as now contemplated is a must for prosperity of the region.

1.4.00 Present Scheme

1.4.01 The project as planned envisages a storage across river Urmodi just upstream of Parali village with a gross storage capacity of 83.99 Mcum (2929 Mcft).

Consequent to the restriction placed on the use of Arsha water utilisation under this project is restricted to 3.8 f.m.c. against the available 75% dependable yield of 201.05 Mcum (7.1 f.m.c.). The main dam would be about 1027 m (5010 ft.) long and its maximum height in the river gorge portion would be about 32.00 m (105 ft.) above the river bed. A gated spillway on the left flank near a local nalla is provided to cater for a maximum designed flood of 1274 cum/sec (45000 cusecs).

1.4.02 A fairly long tail channel is required to divert the floods in the main river channel vide Place no. 17. Suitable enveloping arrangements have been proposed on either sides of the masonry spillway for junction with the earthen dam. The command on either banks would be served by left and Right Bank Canals with two head regulators to be constructed at C.H.420 and 1230 m. respectively.

1.4.03 The total irrigable area that can be served by using the approved crop-pattern is 6030 ha. (14900 Ac.) with canal lengths of 27.5 km. (16.78 miles) and 29.5 km (18 miles) for Right Bank and Left Bank Canal respectively.

G.C.A. covered is 8892 ha. (21800 Ac.) with G.C.A. of 6704 ha. (16560 Ac.) giving an intensity of irrigation of 60% to G.C.A. and 68% to G.C.A.

1.5.00 Location :

1.5.01 The proposed dam site is located about a kilometre upstream of Parali village, a holy place, in Taluka and District Satara. The co-ordinates of the dam site are as below vide topo-sheet no. 47.G/14.

- i) Latitude $17^{\circ}40'6''$ (N)
- ii) Longitude $73^{\circ}54'40''$ (E)

1.6.00 Climate and rainfall

1.6.01 In general, in the command area during monsoon months from June to October the atmosphere is highly humid but in the summer and in winter it is dry particularly in the afternoon. In the plains, the dryness is more marked than on hills. The temperature range for Satara district is about from 37° to 13° C.

1.6.02 The average rainfall of Satara and Karad talukas of Satara District is 1611 mm (40") and 745 mm (30") respectively. Major rainfall occurs from June to September. There are also occasional showers from North-east monsoon in the month of December.

1.7.00 Approach to the project site :

1.7.01 The dam site is approachable from left bank as well as from right bank side. On the right bank the dam site is approachable by Satara. Nitral road and is about 12 km. (7.5 miles) from Satara.

1.7.02 On the left bank the dam site is approachable by Satara Lunkhol road.

1.8.00 Historical Monuments

1.8.01 A holy place Parali Sa. Jengad is about 1 Km. down stream of the proposed dam site and is not going to be affected. This place attracts a continuous flow of pilgrims throughout the year particularly in the month *January*, when an annual festival is celebrated.

1.9.00 Conclusion

1.9.01 The proposed gross storage would be 22.94 mcum/ (2929 Mcft) and the cost of gross storage works out as follows :

- i) Rs. 13.08 lakh per mcum .
- ii) Rs. 37,033 per Mcft.

1.9.02 The benefit cost ratio as works out to 1.65 and is above the specified norms for a medium project.

1.9.03 The project satisfies the feasibility norms and it deserves to be given priority for execution in the Sixth five-year plan period, with the important consideration of Satara city water supply.

~~XXXXXXXXXXXXXXXXXXXX~~
Taluka : Satara District: Satara

Chapter No. 11

2.1.0.0.0.0.0.0.0

2.1.00 Description of the river

2.1.01 The river Urmodi is a major right bank tributary in Maharashtra of the river Krishna in the main Krishna basin. It rises from the upstream of village Kas at an elevation of 1263 M(4144 ft.). It flows through Satara and Karad talukas of Satara district and confluences with Krishna river near village Kashi after flowing through a distance of nearly 53 Km (33 miles). The river flows through a narrow strip in the upper reaches and then flows through spurs projecting from main hill ranges. There is no major tributary upstream of the dam site, contributing substantially to the run-off.

2.1.02 The catchment of the river Urmodi is oblong with a fan shape. The average width of the catchment is 5.6 Km. (3.5 miles). The total catchment area of the river upto the proposed dam site is 116.86 sq.Kms. (45.12 sq. miles).

2.1.03 The total meandering length of the river from its source to its confluence with Krishna river is nearly about 53 Km. (33 miles). The catchment area upto its confluence with Krishna is 408.40 sq. Km. (157.68 sq. miles).

2.1.04 River Bed Slopes

The river bed slopes in its different reaches are approximately as under :

i) From its origin to first 4 kms. (2.5 miles)	<u>35.43 m/Km.</u> <u>186 ft/mile</u>
ii) 4 km to 6.5 km	<u>21.11 m/Km.</u> <u>111 ft./mile</u>
iii) Then upto confluence with Krishna river.	<u>3.76 m/Km.</u> <u>20 ft./mile</u>

2.1.05 The river has already been harnessed by a bandhara near village Vals; during the second five year plan. There being no stabilising storage on the U/s of this bandhara, the irrigation facilities ex. this bandhara are limited and of the order of only 500 Ac.

2.2.00 Catchment Area

2.2.01 The total catchment area upto the proposed dam site is 116.86 sq. Km. (48.12 sq. miles). The catchment area is partly hilly and covered with thick forests, particularly in the upstream reaches above Kas tank. The average annual rainfall ranges from 6350 mm (250") at the hill ridges to 1270 mm (50") near the dam site.

2.3.00 Rainfall data

2.3.01 At present there are two rain gauge stations existing in the catchment area. One is at Kas i.e. in the upper reaches for which data is available for a very short period. But as this

rain gauge is located almost at the ridge point with an average annual rainfall of about 4700 mm (185") this alone cannot be taken to represent the entire catchment area. The other rain gauge station is at Parali for which data is available from 1964 onwards. Hence, due to the short period of 12 years, this data is hardly useful for working out the hydrology of this project. The rain gauge stations at Satara, Madha, Umboli and Koragaon fall outside the catchment area and in the Vanna and Koyna valleys and, therefore, are not considered suitable for calculating the hydrology of this project.

2.4.00 River Gauge Data :

2.4.01 There is one river gauge station established at Parali on this river for which gauge data is available from 1964 (vide appendix No.11/1). The period of actual observation is for only 12 years and is considered inadequate for working out a reliable rainfall runoff relationship. Incidentally, it is mentioned that on the basis of Isohytal study and yield calculations, the 75% dependable yield at the present dam site is estimated to 201.05 Mcum (7.1 T.M.C.). Against this availability, the present proposal utilises only 107.664 Mcum (3.8 T.M.C.). It is considered that computations of the gauged data or rainfall /runoff series would, therefore, be a matter of an academic interest as very accurate determination of yield is not necessary.

2.6.00 Climate and Rainfall in the Command

2.6.01 The climate in the command area, during South-west monsoon months is highly humid but in the summer and in the winter seasons, it is comparatively dry. In the plains, dryness is more marked than on hills. The temperature range for Satara district is about from 37° C to 13° C.

2.6.02 The area receives rains mainly due to south-west monsoons from June to September. There are also occasional showers from the North-east monsoon in the month of December. The monsoon precipitation commences generally from the second week of June and continues till about the end of September. A dry spell of 10 to 15 days is generally experienced sometimes in August or September and this in most years is followed by few showers in early October. The average weighted monsoon rainfall in the catchment is of the order of 650 mm to 1270 mm (25" to 50"). It is more or less assured, but its distribution over the monsoon period in the same years shows erratic trend.

2.6.00 Yield and Utilization

2.6.01 In view of non-availability of sufficient rainfall and river gauge data, the average and annual yield of this project is worked out from the Isohyets for the base period from 1906 to 1925-26 as approved by the I.M.D. by using Inglis formula suitable for

this area. For working out the average annual yield, the catchment is divided into (i) high rainfall zone from 6550 mm to 1530 mm (250" to 60") and (ii) Medium rainfall zone from 1530 mm to 1020 mm (60" to 40"). The average annual yield works out to 262 Mcum (9.252 TMC). By applying an utilisation factor of 0.85 and 0.65 for high rainfall zone and medium rainfall zone, respectively, the 75% dependable yield works out to 201.05 Mcum (7.10 TMC).

2.6.02 In the case of Ahodgi weir on Krishna river, it was found that the 75% dependable yield based on actual gauged data falls short by 0.935% than the 75% dependable yield arrived at from isohyets. Applying therefore the same principle, the 75% dependable yield at the proposed Dam site works out to $7.751 \times 0.935 = 7.24$ T.M.C. (vide Appendix No. 11/2). For Kas hydroelectric project, yield is reserved as 0.12 T.M.C. (7.24 T.M.C. - 0.12 T.M.C.) = 7.12 , say 7.10 T.M.C.

2.6.03 As explained in para 3.3.C1, although the yield computations are based on empirical formulae, the proposed utilisation is practically 50% of the estimated available yield of 7.1 T.M.C. at 75% dependability and it is considered that any study for calculation of more precise yield on the basis of gauged data or any other actual data is more or less of an academic interest.

WRODI IRRIGATION PROJECT

Taluka - Satara Dist. Satara

CHAPTER No. IIIWATER PLANNING3.1.00 WATER AVAILABILITY

3.1.01 As explained in the earlier Chapter on hydrology, the total gross yield available for utilisation at Parali site is 267.01 Mcum/9.44 f.m.c., and the 75% dependable yield available for utilisation is 201.05 Mcum (7.10 f.m.c.) from the catchment (vide Appendix No. 11/1, and 11/2).

As per the present planning, the utilisation in this valley is restricted to 107.66 Mcum (3.8 f.m.c.) only.

3.2.00 CHARACTERISTICS OF THE COMMAND AREA

3.2.01 The Command Area on both the banks has fairly good cross slope and is normally well drained. Many nullas flow through proposed command area and will help in maintaining good drainage. Lands are normally not expected to be affected by water logging and/or salt efflorescences in the early stages.

3.2.02 The entire command lies in Satara taluka of Satara district. The area is predominantly kharif bounded on the west by 50" and on the east by 30 inches isohyets. In the fair weather season, i.e. October to May, the rainfall is negligible and occurs in occasional showers. In the monsoon months, the rainfall is between 712 mm to 1270 mm (30" to 50").

3.3.00 Existing Crop Pattern

3.3.01 The existing crop-pattern in the command area in Satara taluka is given below. The details are based on the actual statistics of the area collected by this office (vide Appendix No.111/1).

Sr. No.	Name of Crop	% age
1.	Chillies	3
2.	Jowar	37
3.	Bajari	8
4.	Gr. Nut	20
5.	Raddy	3
6.	Pulses	8
7.	Grass	17
8.	Fallow	4
		100%
		====
	<u>Follow on Crops</u>	
9.	Kabi Jowar	2
10.	wheat	1
11.	Gram	1
		10%
		====

3.3.02 It is evident from the above statistics that Jowar and Ground nut are the predominant crops in Satara taluka, whereas Bajari and Pulses are fairly popular.

3.4.00 ~~Proposed Crop Pattern~~

3.4.01 Taking into consideration the type of soil, climatic conditions and existing crop-pattern in the area, the Director of Agric. Insp., PUNE, has approved the following crop pattern for this project under his letter no. 1RP/54/I/1319 dated 27.8.1966 and is appended in Appendix No.111/2.

Sr. no.	Name of Crops	% age
1.	Sugarcane Overlaps 30%, 40%, 10%	15
2.	Other perennials	5
3.	Chillies	5
4.	Ginger & Turmeric	5
5.	Green manure	2
6.	Paddy late variety	10
7.	Kh. Hy. sorgh	15
8.	Kh. ny. maize	10
9.	Kh. Gr. Nut	15
10.	Vegetables	3
11.	Pulses (b.l.)	10
		85%
		===

Sr. no.	Name of Crops	Page
FOLLOW-ON CROPS		
12.	Gram on Paddy	10
13.	wheat on Green manure and maize	7
14.	Rabi Hy. Jowar on pulses	10
15.	Rabi Hy. maize on Gr. Mut	15
16.	Rabi Vegetables	3
17.	H.s. Gr. Mut	15
18.	H.W. Fodder on maize	5

		160½
		===

3.5.00 Duties

3.5.01 Standard duties at distributory head in case of

Deccan Canals are adopted for different crops, and

these are as under :

Sr. no.	Name of Crop	Duties		
		kh.	Rabi	H.W.
1.	Sugar Cane	65	70	50
2.	Other perennials	100	105	75
3.	Chillies	300	140	-
4.	Ginger and Turmeric	300	140	-
5.	Green Manure	400	-	-
6.	Paddy	65	400	200
7.	Kh. Hy. Jowar	400	-	-
8.	Kh. Hy. Maize	400	-	-

Sr. No.	Name of Crop	Duties		
		Rs.	Rabi	Kharif
9.	Kh. Gr. Nut	200	-	-
10.	Rabi Gram	-	400	-
11.	Pulses (Unirrigated)	-	-	-
12.	Vegetables	150	-	-
13.	Rabi wheat	-	150	-
14.	Rabi Hy. Jowar	-	110	-
15.	Rabi Hy. Maize	-	110	-
16.	Rabi Vegetables	-	140	-
17.	Kharif Gr. Nut	-	-	100
18.	Kharif Pottor	-	-	100

3.6.00 Canal Capacity

3.6.01 The canal capacities for right and left bank canals are estimated to 2.74 cum/(=6.90 cusecs) and 2.71 cum/sec. (95.61 cusecs), respectively, and are comparable to the capacities of a distributory. As the duties adopted are at distributory head, it is considered that no additional transit losses in the main branch are required to be accounted for (please vide Appendix No.111/6).

3.7.00 Water Requirement

Water requirement is calculated for 10,000 Ac. for the proposed crop-pattern on the basis of duties adopted as explained in para 3.5.00.

Additional transit losses in the canal are not considered (please vide appendix no. 111/4,5). Annual and seasonal water requirement for 10,000 Ac. and for the proposed irrigation of 14,900 Ac. are as under :

Sr. no.	Season	Water Requirement in Mcum/Mcft	
		For 1000 Ac	For 14900 Ac
1.	Kharif	<u>20.98</u> 740.50	<u>31.26</u> 1105.93
2.	Rabi	<u>22.98</u> 811.70	<u>34.24</u> 1209.18
3.	n.w.	<u>17.68</u> 625.80	<u>26.31</u> 929.13
Total :		<u>61.62</u> 2175.80	<u>91.81</u> 3242.24

3.8.00 Silt load

3.8.01 The C.A. upto the proposed dam site admeasures 116.86 sq. Km. (45.12 sq. miles), out of this C.A., a small portion admeasuring 2.7 sq. miles is intercepted by the Ras Water Supply Project. The silt load has been estimated assuming life of tank as 100 years. The silt load estimated at the rate of 75 acre feet per year for 100 sq. miles for free catchment area is 3.910 Mcum/138 Mcft. The silt load contribution due to the intercepted C.A. of 6.99 sq. Km. (2.70 sq. miles) is not accounted for as the quantum

of silt load involved is very small (for details vide Appendix No. 111/5).

3.8.02 The C.D.L. is kept at A.L. 661.70 m., where capacity available is 3.10 Mcum (138 Mcft). This capacity is sufficient to accommodate silt load for a life of 100 years.

3.9.00 Evaporation Losses:

3.9.01 Provision for losses in storage has been made as per the standard practice prevalent. The details are as under:

Season	Rate
i) Aharif	6"/0.15 m on area at F.D.L.
ii) Rabi	2'-6"/0.8 m on mean area of Rabi end
iii) h.w.	3'-6"/1 m Rabi end and F.D.D.L.

With the above rates, the losses are as under:

1) Aharif	1.505 Mcum	Total : 10.145 Mcum.
2) Rabi	5.540 Mcum	
3) h.w.	3.300 Mcum	

3.9.02 For estimating annual utilisation, the evaporation losses are worked out as per the standard practice, as given above, except that in the Aharif season, the rate is considered at 0.5 m (1'-6"). The annual losses thus work out to:

1) Khirif	2.538 Mcum
2) Rabi	5.540 Mcum
3) H.w. losses	3.300 Mcum

Total :	11.378 Mcum
	=====

3.10.00 Storage Requirement

3.10.01 For 75% dependable yield at the proposed dam site works out to 201.05 Mcum (7.100 fmc). However, it is proposed to utilise 107.664 Mcum (3.80 fmc) only due to the restrictions imposed by the Krishna water disputes tribunal's award for total permissible utilisation in the 'Krishna' basin. For storage planning a r.m. flow at 5% of 75% dependable yield has been assumed.

3.10.02 It is proposed to provide storage for :

	Mcum
1) Dead storage upto M.D.D.L.	6.212
2) 20% Kh. requirement	6.252
3) Full Rabi requirement	34.240
4) Full h.w. requirement	26.310
5) 22 days carry-over	3.220

	<u>Mcum</u>
6) Satara City water Supply requirement	4.530
7) Fair weather losses	10.145 -----
Total :	90.909
Deduct p.m. flow at 5%	10.053 -----
Total :	80.586

The F.R.L. is proposed at R.L. 679.50 m. to where the capacity is 82.94 Mcum (2929 Mcft).

3.10.03 Important levels

The controlling levels of the reservoir (such as M.D.D.L., F.R.L., etc.) are fixed with the help of area capacity table prepared from actual survey carried out (vide Appendix no. 111/3).

The important levels for Urmasi project would be as follows :

I.S.L.	682.500 m.
H.F.L.	680.000 m.
F.R.L.	679.50 m.
M.D.D.L.	663.50 m.
C.S.L.	661.70 m.
River bed	650.50 m.

- 3.10.04** Statement showing the seasonwise water use for the proposed crop-pattern for the cropped areas on seasonal basis are appended in Appendix No. III/7 and III/8.
- 3.11.00** Annual Utilisation
- 3.11.01** The annual utilisation of water under this project is 107.718 Mcum (3801.76 Mcft) against the permissible water use of 107.664 mcum (3800 Mcft).

4.1.03 A study of the following alternative sites with reference to the final site has been made in considerable details and comparative merits and demerits are enclosed in Appendix No. 1/2.

4.1.04 The broad details of the three alternative sites chosen for detailed study including the one finally selected are given below :

TABLE NO. IV/1

Sl. No.	Particulars	Dam site l/s village Parali	Dam site near Kawathi	Dam site near Lumnekholi
1.	Catchment area in sq. miles	45.12	35.40	21.20
2.	Estimated 75% dependable yield in Mcum/Mcft	201.05 71000	170.75 6030	114.12 4030
3.	Gross storage required in Mcum/Mcft	107.218 3802	107.55 3798	107.16 3795
4.	Dead storage provided in Mcum/Mcft	6.212 218.40	5.290 186.80	3.172 112.00
5.	Details of dam			
a)	Maximum height in m river bed ft.	22.30 106	22.60 107	21.50 106
b)	Length	1527 m 5010 ft	1450 m 4757 ft	1300 m 4265 ft
6.	Earthwork in Mcum/Mcft	1.262 45.51	1.98 69.92	3.16 111.58
7.	Submergence of land ha./Ac.	870 2150	756 1868	511 1343

Sr. No.	Particulars	Dam site u/s village Parali	Dam site near Kamathi	Dam site near Lunnekhhol
8.	Submergence of village Gathans	8 nos.	6 nos.	4 nos.
9.	Total cost of project Rs.	1084.95 lakhs	832 lakhs	1229 lakhs

Note : Cost of the project before finalisation of the detailed estimates.

4.1.05 From the above given table No.IV/1 it will be seen that the physical characteristics of all the three alternative sites are different. The final choice of the site has been made on the basis of economical and technical considerations. On the basis of study, it was seen that site immediately on the D/s site of village 'Parali' also had good merits. This site however, could not be chosen on account of submergence of village Parali. The site upstream of village Parali is therefore, finally, selected.

4.2.00 ~~Feasibility-exploration and Suitability~~

4.2.01 The study has revealed that site u/s of Parali village is the only obvious choice and has comparative better merits. Accordingly, all necessary detailed investigations from the point of view of ascertaining the suitability of construction materials, suitable foundation

conditions, etc. have been completed in greater details for preparation of estimates.

4.2.02 In the initial stage, 11 bores were drilled on the main axis of the dam. These bores were drilled without ascertaining percolation characteristics. These bores could not therefore, decide in the absence of data on percolation conditions, the suitability of foundation conditions either for C.C.f. or for the masonry structures. Besides, the bores drilled did not reveal all the features of the site to the back. To ascertain more precisely, the requisite characteristics of this site, in all 19 bores were drilled. The boring was carried out progressively and after due discussions with the Assistant Geologist, attached to Superintending engineer, I. R. & S. D. I. Circle, Pune. The bores were also tested for percolating characteristics of the underneath strata.

The logging of these bores and their engineering suitability has been done by the Assistant Geologist. The logging of bores with Geological map has been attached (vide plate No. 13). From the report of the Assistant Geologist, it is gathered that foundation conditions are quite reasonable and are not likely to pose any special problems.

4.3.00 Type of Dam

4.3.01 The selection of the type of the dam and its appurtenant works has been made on the basis of following considerations :

- a) Economy in construction.
- b) Suitability and abundance of the construction materials.
- c) Suitability of the foundations met with.
- d) Ease and speed of construction.

Accordingly, final choice of earthen dam with surplusing arrangement on the left flank between CH 409 to 610 m. has been made. For details, please vide Appendix No. IV/2. The P.R. has been prepared on this basis.

4.4.00 Type of Dam and appurtenant works

4.4.01 G.O.I.

As explained in para 4.2.02 above, in all 19 bores have been drilled. The logging of the bores with percolation characteristics and the Geological map has been done by the Assistant Geologist attached to the S.A., I.P. & W.R.I. Circle, Pune. The Geological map of the foundation conditions, indicates existence of the volcanic breccia with amygdaloidal basalt in the gorge portion between CH. 780 m. to CH. 900 m. except this presence nowhere indication of existence of volcanic breccia is seen.

As suggested by the Assistant Geologist, Pune, C.O.I. is taken in basalt zone with 0.6 m. depth except in the gorge portion. In the portion where volcanic breccia is met with, C.O.I. is allowed to rest in the volcanic breccia to a depth of 1.20 m.

4.4.02 Drainage Arrangements

Standard type of L.C. and toe drains interconnected with each other, arrangement has been made for the earthen section. A typical drawing of these arrangements has been prepared and attached as Plate No. 8.

4.4.03 Earthen Section

The materials viz. soil for hearting, murum for casing and stone for masonry have been tested from the point of their engineering use. The soil/murum have been tested in the laboratory for the optimum moisture density, sp. gravity, direct shear, permeability, etc. The tests for compaction are on the basis of standard proctor and test for shear, on the basis of direct box shear. The test results for soil/murum samples are shown in the Appendix No. IV/9.

As an initial choice, a standard earth section had been adopted, with the help of soil/murum tests. These sections are subject to critical analysis of slip circle and the final choice of the section has been made on the basis of factor

of safety, the least. An earthquake factor of 0.07 has been considered while evaluating the structural analysis of the finally selected earthen section. For design details vide Appendix No. IV/8.

Rock toe of the height of $H/6$ has been provided. Ripping has been provided on the U/S slope to protect the earthen section from damages due to wave action.

4.4.04 Free board

Free board to the extent of 2.50 m. has been provided to accommodate wave height while estimating wave height Molitor's formula has been adopted. (vide Appendix No. IV/8.)

4.4.05 Surplus arrangements

The river bed is gauged at Parali. The gauging site is just on the down stream of the dam proper. The gauged data maintained is for 12 years and is considered inadequate for working out rainfall/run-off relationship or establishing unit Hydrograph. In the absence of reliable data which can be used for estimating length and type of the spillway. Use of the empirical formula has been made. The intensity of flood is therefore, based on the empirical formula of Inglis. The peak flood works out to 1274 cumecs (45000 cusecs) with 45.12 sq. miles/116.86 sq. Km. (45.12 sq. miles) C.A.

For details please vide Appendix No. IV/2. From the comparative cost study of the possible alternatives of the earthen section and surplusing arrangements, for the site, it has been observed that the most economical layout is possible, if the gated "Ogee" type masonry overflow section from Ch. 434 m to 482 m. is adopted. The cost comparison is attached vide Appendix No. IV/2.

Normally, for a medium project, a gated spillway is not preferred because for operation of spillway gates special staff is required to be maintained on the dam throughout the monsoon period and fear of ascertaining floods, through faulty operation of gates, etc. The non-gated spillway has the principal disadvantage of larger submergence and higher section of dam for the flanks. In the present project, the former proposals of gated spillway outweigh the merits of non-gated proposal and there is definite economy in cost. Besides the dam is easily approachable from Sitara city and no operational difficulties would therefore, be encountered. Details of hydraulic calculations can be seen in the Appendix No. IV/4.a.

Foundation levels for gated ogee section and NUF section are shown on Plate No. 16. Masonry clear overfall type spillway is proposed of 4.5 m. height above lowest foundation and 16.5 m. height above river bed. The foundation is taken down to good hard trap rock. Stability calculations have been worked out and are attached as Appendix No. IV/6 and 7.

As good hard rock is available at shallow depth pillar type bucket is proposed. The downstream conditions are also suitable and no erosion or retrogression is expected. However, more careful and in-depth studies may be made at the time of technical sanction to this part of the project. For detailed design, vide Appendix No. IV/4(b).

4.6.00 Approach and tail channels

4.6.01 Ground levels and rock levels along central line of the approach and tail channel till it meets Urmodi river are shown on the Plate No. 17. A study of the details shown on this plate indicates availability of good grade rock at 3.5 m.

The cutting involved in the tail channel is of the order of 5 m. on an average.

Suitable tail and approach channels on the D/s and on the U/s with workable bed slopes are proposed. The relevant details are given in the Appendix No. IV/5.

4.7.00 Emergency waste weir

4.7.01 The gated spillway is proposed to be located on the left flank between the Ch. 454 to 462 m. The gorge width is about 150 m. and maximum height of the dam in the river bed is 32 m. The total earth work involved in this portion is 0.42 cum (14.83 Mft.). It would, therefore, be possible

to complete this much quantity of earthwork in one working season. Temporary diversion for river is, therefore, not considered necessary.

4.8.00 Head Regulator

4.8.01 The command is proposed to be served by L.S.C. /R.S.C. The capacity of each H.R. is 3.5 cumecs (123.9 cusecs). Two head regulators will be required on the two flanks to feed the Right and Left bank canals. The location of the head regulators for the right bank canals is proposed at Ch. 1230 m.

4.8.02 The head regulator for the L.S.C. is proposed to be provided in the non-overflow section. The size of the outlet is 1.2 m x 1.2 m. as per the standard design. The both the regulators are designed for a maximum capacity of 3.5 cumec/123.9 cusecs. For details please vide Appendix no. IV/10.

4.8.03 The layout of the head regulator is proposed on the basis of standard design and section recommended by the C.D.O., Bombay. For details of layout, please see plate no. 18-A and B.

4.9.00 Control levels and other important details

4.9.01 The control levels and other important details for the Jam are as under :

1) Control Levels		

	R.Ls. in Metres	

1) River bed	650.500	
2) C.S.L.	661.700	
3) M.D.D.L.	663.500	
4) F.R.L.	679.500	
5) H.F.L.	680.000	
6) top of Dam	682.500	
7) bed level of tail channel	650.870	
8) tail water level	666.050	
9) Foundation level of overflow section	667.000	
10) Level of bucket (inverted)	652.250	

2) Important Details		

	Mcum	Mft

i) Capacity at sill level	3.910	138.08
ii) Capacity at at M.D.D.L.	6.212	219.40
iii) Capacity at at F.R.L.	82.94	2921
iv) Capacity at H.F.L.	17.45	3087.86
v) Capacity at the end of Rabi Season	36.87	1801.9
vi) Length of the Spillway	48 m	157.4 feet

~~BRIDGE~~

Taluka - Satara

Dist. - Satara

Appendix No. V

Canal Irrigation System

5.1.00 Topography

5.1.01 The topography of the command on the both the banks of the river Urmodi is more or less similar having fairly plain plateaus. Therefore, canals on both the banks have been proposed to give irrigation benefits to cultivators on both sides of the river and to avoid long length of a single canal. The general ground slope is 1 in 50 and soils are generally well drained. There are very few patches of h.p.c. in the proposed command on both the banks.

5.2.00 Command Lines

5.2.01 The canals are proposed on both the banks of the river from the Jam. The left canal is proposed to be terminated at Ameri, and right bank canal is extended upto village Abodad. Survey has been done for these canals and the alignment decided by adopting economic proposal.

5.2.02 The total gross command covered by this project is 2222 ha. (21800 Ac). The command of both the canals lies in the Satara Taluka of Satara District vide Appendix No. V/1 and 2. The maximum canal capacity required at the head of R.B.C. and L.B.C. work out to 25.61 cusecs and 96.90 cusecs, respectively. For design of Canal sections, please vide Appendix No. V/4.

5.2.03 Statistics about different uses to which land is put viz. culturable, fallow, etc. for all villages covered by the command is obtained by broad details thereof are given in Appendix No. V/2 and on an average it is found that the culturable command is 80% of G.C.A. %age of I.C.A. to C.C.A. is assumed as 90% thus the intensity of irrigation would be 72%.

5.3.00 Canal alignment

5.3.01 Both the left and right bank canals take off directly from the head works with a starting C.S.L. at R.L. 661.70 m. and at chainages 420 m. and 1230 m. respectively and is designed at falling gradient considering the discharge in the various zones.

5.3.02 After going through 'L' section of the canal it is noticed that, the canal alignment passes through heavy banking and deep cutting at certain points. This has resulted in the increase in cost. Since survey has been completed in the past, the possibility of alternative suitable alignment would have to be considered at the time of execution as fresh canal survey for reduced capacity is not carried out.

5.4.00 Canal Capacity

5.4.01 The canal capacity for 10,000 Acres is worked out in Appendix No. III/6.

5.4.02 The canal section at head with these criteria is as under ;

Sr. No.	Name of Canal	Required discharge in cusecs	Design discharge in cusecs	Bed width (m)	FSD (m)
1.	L.B. Canal	96.6	107	4.72	1.02
2.	R.B. Canal	95.61	107	4.72	1.02

The rate of maximum canal discharge required at the canal head works out to 129.20 cusecs/10000 Acres. With this rate, the canal capacity required in different reaches has been worked out and the Canal sections have been designed for the same. For details, please see appendix no. V/3 and 4. The maximum canal capacity required at the head for L.B.C. and R.B.C. works out to 96.6 cusecs. and 95.61 cusecs respectively.

5.5.00 Canal Design

5.5.01 Canal section is designed for a maximum discharge of 3.03 cum/sec. (107 cusecs) for the first reach. As the canal is unlined one and maximum discharge is below 500 cusecs, the value of N is taken as 0.025. The side slopes for design purposes are taken as 1/2 : 1 and for excavation it would vary accordingly to the strata met with being 1/2:1 in S.R. 1/4 : 1 in H.R. and 2 : 1 for banking.

For design of canal section, please see Appendix V/4.

- 5.6.02 The velocity allowed in the Canal is non-scouring and non-silting. The critical velocity is calculated by Kennedy's formula. The ratio V/V_0 is within 0.9 to 1 in all cases. Please refer Appendix V/4.
- 5.6.03 Typical section of canal i. cutting, partial cutting and full embankment are tentatively adopted as per type section attached to Government circular no. MIP-2259/I, 9668-I dated: 25.7.1959 with service road and inspection path. Please vide Plate No.19.
- 5.6.00 Reaches of Canal
- 5.6.01 The total length of Canal is divided into suitable reaches in which uniform section of canal can be maintained. These reaches or zones are determined by considering the drop in discharge according to the command covered by the various distributories.
- 5.6.02 Two reaches for L.D.C. and three reaches for H.D.C. have been formed to irrigate the respective areas and accordingly the canal section is reduced. The statement of canal zones with the areas covered and position where the canal section changes is given in Appendix No. V/3.

5.7.00 Basis for estimation

5.7.01 The canal earth work estimates have been prepared taking into consideration different reaches and for every reach estimates for a few Km. is framed. On the basis of these estimates, cusecs-Km rates are arrived at and for the remaining Km, this rate is adopted.

5.8.00 Canal Structures

5.8.01 The nalla crossing across the canal and their respective type of C.D. works are attached to estimate of sub-head F.R.H.T. works.

These are decided according to the site conditions noted during the survey and the size of nalla, etc. The provision of C.D. works has been made for every nalla met with. For details please vide statement attached to estimate of sub-head F.R.H.T. Works.

5.9.00 Bridges

5.9.01 Road bridges have been provided for the roads crossing the canal to maintain the present communication of the villages in the command. In all, 15 nos. of road bridges on L.D.C. and 15 nos. road bridges on R.D.C. have been proposed.

5.10.00 Falls

5.10.01 No falls have been provided as the alignments have been fixed with reference to falling contour.

5.11.00 Escapes

5.11.01 The escapes have been provided where necessary. 4 nos. for L.B.C. and 5 nos. for R.B.C. The capacity of the escape is provided for at 1/3rd the discharging capacity of the canal at the location.

5.12.00 Regulator, Cross Regulator, S.D.F.

5.12.01 Necessary provision has been made for cross regulator, and S.D.F. etc. at suitable places.

5.13.00 Drainage Systems.

5.13.01 The command area on both banks have fairly good slopes and are normally well drained. Many nullas flow through the command and will help in maintaining good drainage. Lands are generally not expected to be affected by water logging and or salt affluence in the early stages. No provision on this account is, therefore, proposed at this stage.

5.14.00 Arbiculture

5.14.01 Necessary provision for planting and maintaining trees along the canal alignment has been made in the estimate under sub-head 'A' Plantation.

LAMODI IRRIGATION PROJECT

Taluka : Satara Dist. : Satara

CHAPTER NO. VI

CONSTRUCTION MATERIAL, MACHINERY AND LABOUR6.1.00 Construction Material :

6.1.01 The principal material required for the construction are as under :

- i) hearting and casing material.
- ii) Stone
- iii) Sand
- iv) Cement
- v) Steel
- vi) Bricks
- vii) timber, etc.

As mainly it is an earthen dam with a total earth work of 1.283 Mcum (45.31 Mcft), greater investigation for the hearting and casing materials have been done.

6.2.00 borrow area investigation

6.2.01 borrow area investigations for the materials required for the construction of earthen dam have been carried out by selecting suitable quarries as close to the dam alignment as possible vide plate No. 14. Quite a large number of trial pits have been taken over the borrow area. Representative samples are collected and tested, (Vide Appendix no. IV/9).

The properties of these tests are described in brief in the following paragraphs :

6.2.02 Casing Material

Test results of casing material proposed to be used for casing purpose indicate material to be of good quality. From the mechanical analysis, it is seen that gravel proposed for casing is a clean gravel (except at Sample No. MS-14) which will lead to better drainage property of the casing material. The average optimum dry density is about 107.lbs./cft (excluding Sample No. MS-13 and MS-14). Thus in general good casing material is available at the site. The total quantity of casing material required is about 805 Mcum/(28.42 Mcft) whereas quantity available from the borrow area is nearly 7,69,595 cum. within an average lead of 1.5 km. about 25% of the quantity available from spillway excavation and tail channel excavation is also proposed to be used for casing.

6.2.03 Hearting Material

From the mechanical analysis of the soil samples, it is seen that most of the samples have good percentage of sand, and also have a liquid limit above 50 (i.e. high liquid level with plastic limit more than 15). From this analysis, it is quite clear that hearting soil is sufficiently plastic and has good optimum dry density.

Due to presence of adequate sand in the soil sample, soil is not likely to have high swelling and shrinkage affect which is a desirable quality for its use in the hearting zone. High liquid limit and plasticity index on the higher side (above 27) indicates the imperviousness of the soil. Thus, soil is generally suitable for the hearting purpose.

Soil samples at S.No.1, 2 and 3 having high liquid limit and optimum dry density on the higher side are, therefore, more suitable for cut-off filling. In general, there appears no problem as far as hearting material is concerned.

As per the broad estimate sufficient quantity of hearting material is available from the borrow area (for details, vide Appendix VI/1).

6.2.04 Sand

The sand required for drains, and U.C.R. Masonry, cement concrete, etc. is available near village Mahuli on Krishna river. The lead involved of the order of 20 Km.

6.3.00 Stone

6.3.01 From the visual inspection of the submergence area, it is anticipated that good stone quarry would be available in the nearby areas of the construction activities. It is also anticipated that a substantial quantum of rubble required for

the construction purposes will be available from the excavated stuff.

The detailed exploration of stone quarries is not made at this stage.

6.4.00 Cement

6.4.01 Nearest cement factory is at Bagalkot. Cement can be brought by railway upto Satara and then transported to the construction site by road. Lead upto the dam site is approximately 20 km.

6.5.00 Steel

6.5.01 Quantity of steel required is comparatively small and, therefore, can be procured locally from Satara or can be brought from nearby cities like Poona.

6.6.00 Bricks

6.6.01 Bricks for construction of colony buildings and other structures can be manufactured locally.

6.7.00 Lumber

6.7.01 This can be had from local market at Satara.

6.8.00 Hume Pipes

6.8.01 Hume pipes required for C.D. works etc. can be brought from Satara and Karad, etc.

6.9.00 Bulk of Work

6.9.01 Quantities of various materials required are as under :

Sr. No.	Item	Qty. required in cum	Qty. available from excavation in cum
1.	Soil	0.423	0.110
2.	Murum	0.825	0.052
3.	Sand	0.022	-
4.	Rubble	0.170	-
5.	Cement	0.010	-

Availability of soil, murum and rubble from excavated stuff and their use is shown in Appendix No. VI/1.

6.10.00 Water

6.10.01 Water is required for the embankment of earthen dam, for construction of masonry and concrete works and water supply to colonies, water so required can be supplied through service reservoirs which will be constructed near the project site. Necessary provisions are made in the estimate of '0' Miscellaneous.

6.11.00 Machinery

6.11.01 Some machinery and other equipments would be required for the construction of dam and canal works. This will have to be purchased or procured, from other completed projects. For details of machinery required vide Appendix No. VI/3 and 4.

6.12.00 Labour

6.12.01 Labour of various categories will be required for construction of various works on site. Few important classes are mentioned below :

- i) Operators for tractors, pumps, etc.
- ii) fitters and mechanics for various types of machines.
- iii) skilled labour such as Mason, Carpenters, Quarrymen and blacksmith.

6.13.00 Availability of Labour

6.13.01 trained operators, fitters, mechanics may be available with the machines from the other projects. otherwise they will have to be secured by transferring from other completed project. Skilled labours are not available locally and will have to be recruited from surrounding areas. Preference will be given to local labour. Approximate labour units required for various items of works are appended in Appendix No. VI/8.

6.14.00 Power

6.14.01 electrical power supply required for the machinery on construction works, street lighting, water supply, etc. is proposed to be obtained from M.S.S.D. Sub-stations. If this is not easily and timely possible, a separate generation unit can be installed within the cost.

UNMODIFIED IRRIGATION PROJECT

Taluka - Satara Dist. - Satara

CHIEF-VIIColony Access and Communication

7.1.00 Colony

7.1.01 The total estimated cost of I-Head works is Rs.536.505 lakhs. The project is scheduled to be completed in a period of five years. The average outlay per year, therefore, would be Rs.107.301 lakhs. For a project of this magnitude an organisation consisting of one Division with four sub-divisions would be hence necessary and the same has accordingly been proposed. The headquarter of a division with two sub-division is located at Satara and other two sub-divisions at dam site i.e. Parali.

7.1.02 It is proposed to give irrigation benefits to an area of 6030 ha. (14900 acres). Two permanent sections are considered necessary for irrigation management and maintenance of canal system after the completion of the project. The provision for permanent buildings for the staff of this section is made accordingly (vide App. No.VII/1 and VII/5).

7.1.03 The headquarters of the sections are proposed to be located at Satara and Parali for irrigation management and maintenance of canal and head works.

7.1.04 The statement showing requirement of staff for maintenance and management of the project is given in Appendix No. VII/1 and 5, with their proposed headquarters. Similarly, the details pertaining to permanent buildings required for this staff are given in Appendix No. VII/5 and 7 with their locations.

7.2.00 Colony Sites

7.2.01 There is practically no possibility of getting any accommodations at Satara as well as at dam site and at villages in the vicinity of the dam site or along the canal alignments. It would, therefore, be difficult to house the staff engaged on the construction work in private houses. The Project colonies are, therefore, necessary at the dam site as well as at Satara to meet the housing requirement of the staff during the construction stage. The colony of temporary buildings is proposed to be one at Satara and other near village Parali on Right Bank of River Urmodi which is at a distance of 1.50 km. on down-stream of proposed dam site (vide App. No. VII/2, 4, 8).

7.3.00 Temporary Quillings

7.3.01 The project envisages construction of an earthen dam with gated ogee type spillway on left bank requiring about 1.283 Mcum (45.31 Mcft.) of earth work and about 0.023 Mcum (0.81 Mcft.) of masonry. The right bank canal is 27.5 km. in length and the left bank canal is 28.5 km. in length.

7.3.02 The temporary staff required for the construction of Jam and canals for one Division with four sub-divisions, with their headquarters is given in Appendix No. VII/2, 4,6. Similarly temporary buildings required to accommodate the staff with their locations are detailed in the Appendix No. VII/6 and 8.

7.3.03 In both the cases, the location of permanent and temporary buildings are required at the same stations. It is, therefore, proposed to construct permanent buildings at the start of construction so as to house the temporary staff therein and avoid duplication of building structures. Details of building structures, details of overlapping of permanent and temporary buildings are given in Appendix No.VII/9.

7.3.04 The total cost of permanent and temporary buildings for head works and canals is as under :

Sl. no.	Particulars	I-Head Works	II-Main Canals	Total
1	PERMANENT BUILDINGS			
	1. Residential	-	8,81,730	8,81,730
	2. Non-Residential	2,11,100	1,00,640	3,11,740
	Total of permanent buildings.	2,11,100	9,82,370	11,93,470

Sr. no.	Particulars	I-Work	II-Canals	Total
11	Temporary buildings			
	1. Residential	14,24,529	4,44,120	18,68,649
	2. Non-Residential	11,64,180	3,94,495	14,98,675
	Total for Temporary Bldgs.	25,28,709	8,38,615	33,67,324
	Grand total :	27,59,809	18,40,985	45,80,794

7.4.00 Plinth Area Rate and scale

7.4.01 The plinth area for different types of residential and non-residential temporary and permanent buildings are as per scale laid down by the Government. The provision for service buildings is made taking into consideration the quantum of work to be handled. The provision of Stores and Sheds is proposed to be barest minimum as per requirements. For estimate purpose, rate per sq. ft. of plinth area is adopted. The same are considered to be adequate compared to the similar structures constructed recently on other projects.

Sr. No.	Type of buildings	Rate per Sq.ft. of plinth area in Rs.
I	<u>KAHULI</u>	
	a) Residential	40/-
	b) Non-residential	35/-
ii	<u>GENERAL</u>	
	a) Residential	26/-
	b) Non-residential	24/-
	c) Stores	24/-

7.5.00 Stores

7.5.01 Temporary stores sheds are proposed at dam site and at Satara and other at Mahuli. The materials and stores required for the project works could be conveniently be handled from these stations.

7.6.00 Labour Colony

7.6.01 In the case the construction of the dam is given on contract basis, the responsibility of providing accommodation to labourers and crew will be with the contractor. If the work is to be done departmentally, this responsibility will lay with Government. One room hutment are proposed for daily labour under the sub-head 'A' building for head work and II-Main Canal to meet their head needs. This is the only for the barest minimum requirements. For bulk of quarters if required to be built, the cost would be debited to the work concerned.

7.7.00 Facilities

7.7.01 Adequate provision has been made for water supply, sanitation and electric supply for colony areas under the sub-head 'C' Miscellaneous.

7.8.00 Layout Plan for Colony

7.8.01 It is proposed to locate the colony of Division office and with two sub-divisions at Satara. The other colony for two sub-divisions is proposed at dam site near village Parali in the proximity of works from point of view of effective control on the quality and progress of work. Detailed layout of these colonies is yet to be finalised. This will be got approved from the competent authority at the time of obtaining technical sanction.

7.8.02 Necessary provision for internal colony roads has been made in the estimate of 'K' buildings.

7.9.00 Access

7.9.01 The proposed dam site near village Parali is approachable from Left bank as well as from Right Bank side. The major town nearest to the dam site is Satara which is district place of Satara district itself. From the right bank side, it is approachable by Satara-Nitral road about 12 km. south-west of Satara. Existing roads are available almost right upto the flanks of the dam on either bank. The left side is approachable upto village Lumanakhol.

7.9.02 No important road goes under submergence except the following roads :

i) Parali Mitral (M.D.R.)	3.50 Km.
ii) Parali Manghar (V.D.)	2.00 Km.
iii) Chondwale Patyghar (V.D.)	5.00 Km.

Suitable diversion roads to replace these roads has been made in the estimate.

7.10.00 Railway Communication

7.10.01 The nearest railway station is at Mahuli on the broad gauge of South-Central Railway and is about 17 Km. from the dam site.

7.11.00 Telegraph and Telegraphic Service

7.11.01 Postal facilities such as telegraph, telephone, etc. are generally available at important places like Datera, Parali, etc. Provision for additional postal facilities at head works are made in the estimate under sub-head 'C' Miscellaneous.

ಕರ್ನಾಟಕ ಸರ್ಕಾರ
ಕಲ್ಹಾಸಿ-ಬೀದರ್ ಜಿಲ್ಲೆ ಡಿಸ್. : ಬೀದರ್

ಕ್ರಮ-8-VIII

ಸುಮರ್ಜನೆ-201. ಸುಮರ್ಜನೆ

8.1.00 ಸುಮರ್ಜನೆ-201

8.1.01 The gross area under submergence at F.R.L. A.L. 679.500 m. (2229.3 ft.) (as the dam is with gated spillway with no additional flow lost) is found to be 870 ha. (2150 ac.) from the area capacity curve vide plate no.4. The area capacity curve has been prepared on the basis of actual survey carried out for the submergence areas. For details, please see Appendix No.111/3. The entire area under this contour i.e. contour A.L. 679.50 m. has been proposed for acquisition.

8.1.02 Accordingly, the details of private land, Government land, etc. likely to go under submergence have been obtained on the basis of village statistics. The following are the total areas of private land and Government land coming under the submergence area.

- | | |
|---------------------|------------------|
| 1) Private land | 820 ha./2026 Ac. |
| ii) Government land | 50 ha./ 124 Ac. |

The villagewise details of private land to be acquired are shown in the estimate for sub-head Lands 'B' under 'Head Works'. Suitable provision has been made in the estimate accordingly.

8.1.03 The provision for prime crop-compensation as necessary has also been made in this estimate. It is on an adhoc basis.

8.1.04 The rates for acquisition of private land of different villages likely to go under submergence are obtained from the Revenue department. A copy of the letter showing land rates for different villages received from Tahashildar-Satara is enclosed as Appendix No.VII/3. The rates range from Rs.3500/Ac. to Rs. 5000/- for bagayat land and Rs. 2500/Ac. to Rs. 4000/Ac. for Jirayat land.

8.1.05 Submergence Ratio

The percentage of area likely to go under submergence to the area that would be irrigated would be $\frac{2150 \times 100}{12600}$
= 17%.

This is quite low and is therefore, an attractive feature of this project.

8.2.00 Submergence of the Garden land and Fruit bearing trees.....

8.2.01 Gross submergence area is 870 ha(2150 Ac) out of which there is no fruit bearing land. Fruit bearing trees, such as mango trees 435 nos. are likely to be submerged. These have been accounted for and requisite compensation and provision has been made in the estimate. The details regarding the number of wells likely to go under submergence are also collected and necessary provision has been made in the relevant 'B' Land estimate.

Compensation to be paid for the wells is assessed on rough estimation taking into account condition of the well at Rs. 5000/number.

8.3.00 Submergence of Villages

8.3.01 Total submergence area of the villages likely to go under submergence at contour R.L. 679.50 m. is 870 ha. (2150 Ac.). The villages getting affected are listed below and all these are from Satara taluka.

- 1) Ambwade Bk. 2) Asht. 3) Punwadi, 4) Duhwad,
- 5) Lunekhol, 6) Mohit, 7) Parali (Wadi only)
- 8) Dhanghar, 9) Kamathi, 10) Kalewadi Bk. 11) Devali,
- 12) Mitral, 13) Kalewadi Kh. 14) Jalgaon.

8.3.02 Details of village statistics such as population, number of houses, Gactan lands, Govt. lands, private land and wells, etc. are collected and accordingly provision has been made in the estimate of 'B' land. The details of village statistics are tabulated and enclosed as statement No. Vill/2.

8.4.00 Submergence of Forest and Govt. Land

As per the village statistics collected, Government land (Waste Land) estimated to 50 ha/124 Ac. is likely to go under submergence. This area when compared to total submergence area works out to a meagre 5.7% of the gross land that would go under submergence.

8.5.00 Submergence of the existing roads

Following roads are likely to go under submergence (vide Page No.5).

- | | |
|-------------------------------|----------|
| i) Parali-Nitral (M.D.R.) | 3.50 Km. |
| ii) Parali-Singhar (V.R.) | 2 Km |
| iii) Dandawade-Patyhar (V.R.) | 5 Km. |

Alternative diversion roads to replace these roads have been made in the estimate.

As the villages which are likely to go under submergence will have to be shifted and rehabilitated in the new locations, and since these are to be connected by new roads, a provision for another about 13 Km. length of road has been made in the estimate of 'B' Lands.

8.6.00 Submergence of 'Historical Monuments' and Railway

8.6.01 No monuments of archaeological or historical importance are likely to get affected due to the construction of Brachi Irrigation Project. For details, please see Appendix No. VIII/1.

8.7.00 Provision for Compensation

8.7.01 Following provisions for compensation of lands, houses, and providing public amenities etc. are made in the 'B' Land estimate.

- i) Compensation for acquiring private houses.
- ii) Compensation for acquiring private lands.

- iii) Compensation for acquiring private wells.
- iv) Compensation for fruit-bearing trees.
- v) Provision for acquiring land for new Gaothan and amenities to rehabilitate persons, such as providing schools, new wells, ~~chickens~~, etc. Chowkies

8.8.00 Rehabilitation

8.8.01 The displaced persons would be rehabilitated at the proper gaothans. The sites of new gaothans would be decided in consultation with the Director of Resettlement or in consultation with appropriate body which may be constituted for this purpose, when the scheme is taken up for execution. Every care would be taken to see that the displaced persons are properly rehabilitated in new gaothans. All the necessary amenities such as drinking water facilities, school for education of children, chowkies and communication facilities, etc. are provided in the newly established villages.

8.8.02 Due to submergence of land as stated previously, the total loss to Government by way of revenue will be Rs.0.16 lakhs per year; for details, please vide Appendix No. VII/5. The capitalised value of the same at the rate of interest of 6.5% works out to Rs.2.499 lakhs. This is included in the project cost under indirect charges.

	TOTAL CULT. LAND in Ac.	Land in Ac.	SAKHA Acha	SAKHA Acha	SAKHA Acha	SAKHA Acha	Acres	Remarks
	8	9	10	11	12	13	14	15
1.	37	-	-	-	-	-	-	-
2.	223	-	62	6	-	3	30	Gathan going under submergence.
3.	198	-	65	2	2	2	40	"
4.	127	-	135	5	2	1	35	"
5.	16	-	71	-	1	-	25	"
6.	173	-	-	7	1	-	40	"
7.	272	124	50	1	1	1	26	2 wadies under submergence.
8.	74	-	-	-	1	-	15	-
9.	210	-	16	-	1	-	60	Gathan going under submergence.
10.	217	-	-	-	-	-	25	-
11.	217	-	36	-	1	1	40	Gathan going under submergence.

59-A

	1	2	3	4	5	6	7
12. Nitral			503	12	6	5	2
13. Matewadi kh.			-	20	-	12	3
14. wadgaon			-	10	5	2	0
Total :			3636	1083	633	211	99

59-B

	8	9	10	11	12	13	14	15
12.	59	-	110	-	1	1	50	Garothan going under submergence. (Maharwadi)
13.	35	-	-	-	-	-	50	-
14.	17	-	-	-	-	-	50	-
=====								
	2026	124	-	-	-	-	155	
=====								

WATER SUPPLY PROJECT

Taluka - Satara Dist. - Satara

Estimated Rs. 16

Estimated

9.1.00 Estimated

9.1.01 The estimates of the project are divided into the following three major sub-heads :

Sr. No.	Major Head	Amount in Lakhs of Rs.
1.	I-head works	712.71
2.	II- main Canal and branches	342.01
3.	III-Distributaries	34.12
Total :		1088.84 =====

9.1.02 The above three major heads are further sub-divided into the following sub-heads and the estimated costs thereof are as under:

Sr. No.	Sub-Head	I-head Works	II-Main Canal & branches	Total
1.	A-Preliminary	6.16	3.47	8.63
2.	B-Land	210.98	38.37	249.35
3.	C-Works	275.16	-	275.16
4.	D-regulator	18.17	3.34	21.51
5.	E-Falls	-	-	-
6.	F-R.R.S. works	-	130.82	130.82

9.1.02

Sr. No.	Sub-Head	Local works	Main Canal & branches	All Distributaries	Total
7.	G-bridges	-	6.20	-	6.20
8.	H-escape	-	0.51	-	0.51
9.	A-sullins	32.75	22.05	-	54.80
10.	L-earth work	-	72.29	-	72.29
11.	M-Plantation	2.00	4.560	-	6.56
12.	O-miscellaneous	21.60	9.36	-	30.96
13.	P-maintenance	5.40	3.65	-	9.05
14.	Q-special I & F	128.74	36.94	-	166.68
15.	R-Communication	11.75	10.45	-	22.20
16.	Distributaries	-	-	34.12	34.12
			342.01		
	Total :	712.71		34.12	1088.84

9.2.00 General

9.2.01 The estimates have been generally framed as per the Govt. circulars under no. P/JD/MIP-2259-J of 31.3.1959, 22.4.1959 and 5.7.1959 and on the lines of similar projects which have already been cleared by the C. d. r. C. New Delhi and/or Government.

9.2.02 Rates of various items of construction adopted in this project estimate are as per the Government circular no. SRS-1074/165646-11-1.27 dated 18.12.1975 (vide Appendix N. 12/1), i.e. rates applicable in the entire State. Wherever rates for items are not

indicated in the Govt. circular, a reference has been made to the C.O.R. made applicable in the six districts of Pune, Solapur, Satara, Sangli, Solapur and Kolhapur, approved by Additional Chief Engineer, Irrigation Department, Pune.

9.2.03 Flat rates have been adopted for certain items viz. A-buildings, M-plantation, etc. These flat rates adopted in the similar projects situated surrounding the present project area enhanced further to account for increase in the rates.

9.3.00 Preliminary

9.3.01 Detailed estimate is prepared as per the G.O. No. 1. of P.D.N. S. 63/7645-IP (Call) dated 25.10.1960. It includes the expenditure already incurred for the preliminary survey and investigation done so far and the necessary provision for the expenditure required to be done on further detailed survey and investigations till the commencement of the construction of the project. The estimate includes provision for reconnaissance survey, detailed survey for the dam site and vicinity foundation exploration, material testing and printing of the project reports, etc. Provision for A.C. estt. is also made as per the actual expenditure and also for the future.

9.3.02 Estimate for In-drain Canal provides for the detailed survey of canal alignment, collection of data for C.D. works and command survey. Necessary provision for the soil survey has also been made.

9.4.00 Land

9.4.01 In this estimate, provision for acquisition of land coming under the submergence upto R.L. 679.50 m has been made. This works out to 870 hectares. In addition to this, about 50 ha. of land is proposed for acquisition for the seat of Dam, colonies, new Gathan and tail channel etc. The details of land proposed for acquisition are as under :

Table 14/1

Land proposal for Acquisition			
Sr. No.	Particulars	Hectares	Acres
1.	Submergence upto R.L. 679.50 m.	870	2148.9
2.	Seat of Dam	10	248
3.	New Gathan	20	496
4.	Tail channel and Approach Channel	4	9.92
5.	Colonies	4	9.92
6.	Borrow Area and quarries	12	29.76
Total :		920	2273

9.4.02 The statistics of the lands of the villages getting affected has been collected and the percentage of land of different categories such as Bagayat, Jirayat, waste land and Govt. land has been worked out. On the basis of this percentage, the classification of land coming under submergence is made.

The village-wise area under submergence is given in the Appendix Ia/2.

8.4.63 For working out land compensation, the Tahasildar of Malkajgiri, District-Nitara was approached. He has communicated the prevailing land rates in the area vide Appendix No. VIII/3. The average rate of these villages is adopted to work out land compensation required to be paid. The rates adopted are as under :

Table No. 16/2

Sl. no.	Type of land	Rate in Rs. proposed for Acquisition	Remarks
1.	Orchard Land	3925/Ac.	Average rate
2.	Barayad land	2885/Ac.	worked out from
3.	waste land	2154/Ac.	the rates commu-
4.	Tarf. land	3386/Ac.	nicated by Tahasildar.

8.4.64 The houses are proposed to be acquired upto H.F.L. 680 m. + 1.5 m. i.e. at H.L. 681.5 m. In all seven village gramams and two small wadies get affected. The compensation for pucca houses is proposed at the rate of Rs. 7500/- per house while that for kaccha house at Rs. 4000/- per house has been made. This provision appears to be reasonable as seen from the records maintained by the village Panchayat. The houses getting

affected generally of an inferior type as observed, during submergence survey. The provision made on the lumpsum basis, therefore, appears reasonable.

- 9.4.05 Provision for the acquisition of trees, wells, and other properties is also made separately in addition to the above provision.
- 9.4.06 The affected persons numbering 3636 are required to be rehabilitated either along the fringe of the water spread area or in the commanded area as may be suitable for them. To provide them with necessary amenities such as water supply, approach road to new Gathan, school, public buildings, a tentative provision at the rate of Rs. 200 per head of the displaced person is made in the estimate. In addition to this, provision for shifting of the kit of the families getting affected, an additional provision of Rs. 1.82 lakhs has been made.
- 9.4.07 No monuments of archeological or historical importance are likely to be affected by the submergence of this project.
- 9.4.08 Charges for compulsory land acquisition, interest charges, revenue establishment charges, crop compensation have been estimated as under :

1) Charges for compulsory acquisition of land	15%
2) Demarcation charges	3%
3) Interest charges	6.5%
on total compensation for 2 years.	
4) Revenue establishment of Rs.100/ha. (40/Ac.)	

9.4.09 The acquisition of land required for canal is worked out on ascertaining the land width required for each canal in its different reaches. The total land proposed for acquisition is 411 ha. (1015 Ac.). This has been further classified into Bagayat, Jirayat, Land and waste land on percentage basis prevailing in Satara taluka. The rates adopted are the same as communicated by the Tahasildar for Satara Taluka (vide Appendix No. VIII/3).

9.5.00 Canals

9.5.01 An earthen dam with spillway on the left flank is proposed across the river Urmodi near village Parali. Spillway provided is of clear overfall type with gated waste-weir and ogee-shaped crest. On both the sides of the spillway, masonry non-overflow sections have been provided for the required length for junction with the earthen dam.

9.5.02 Construction of the earthen dam is proposed to be completed by rolled fill method. The material required for the construction of earthen masonry section can be had either from the available excavated stuff or

from the tail and approach channels or from the borrow areas i.e. quarry material. The rates proposed for most of the items are as per the Govt. Circular No. S.S. 1074/145646-11/P.27 dated 18.12.1975.

Wherever rates are not prescribed separately by the Government, reference is made to the C.S.R. of Addl. Chief Engineer (Irrigation), Pune, applicable to the Pune Division. Necessary increase in the rates has been made taking into consideration necessary lead and lifts.

Requisite leads and lifts for the construction materials are considered while working out the rates. The rates for laying, casing and hearting materials are obtained as follows :

1) Casing with

a) Available material	Rs. 4.40/Cum.
b) From borrow area	Rs. 10.90/Cum.

2) Hearting with

a) Available material	Rs. 4.55/Cum.
b) From borrow area	Rs. 9.60/Cum.

rubble pitching of 0.60 m. thick is proposed to be provided for the protection of upstream face. Rock toe is proposed for 1/6 the height of the dam on the down-stream toe of masonry casing. The material available from excavation/or borrow areas will be utilised for the same.

- 9.5.04 Provision for other miscellaneous items such as dewatering for foundation, relief wells, grouting etc. is made adequately.
- 9.6.05 The spillway section and the non-overflow section of the masonry portion is proposed to be constructed in uncoursed rubble masonry (U.C.R.) in cement mortar 1:5 for hearting portion and in C.M. (1:3) for U/s face for a thickness of 1.5 m. The crest and the down-stream face of the overflow section and the bucket will be constructed in the reinforced cement concrete. Use of surkhi will be made if it is available in required quantity and quality. The concrete and masonry will be bonded with reinforcing mild steel bars at 30 cm. centre to centre at staggered locations. The rates for concrete/masonry/steel items are adopted as per the Govt. Circular with due increase for lead and lift. The rate for the main item of U.C.R. masonry in C.M. (1:3) is Rs. 20.80 per cum.
- 9.5.06 For consolidation of foundation grouting is proposed and suitable provision has been made in the estimate.
- 9.6.00 ~~Deregulation~~
- 9.6.01 It is proposed to provide an irrigation outlet in the earthen portion at Ch. 1250 m. on the right bank for the A.B.C.

The layout design of the head regulator is as per the standard practice. The size of the gates is 1.20 m. x 1.20 m. with discharging capacity of 3.50 cum. (123.9 cusecs). The regulator on the left bank canal is proposed to^{be} located in the non-overflow section of the masonry dam at Ch. +20 m. For proper functioning both emergency and service gates have been provided. The rates adopted are similar to those adopted for the estimate of 'C' works.

9.6.02 Under the major head II-Main Canal and branches, provision for regulators, cross regulators and S.W.F. is made under this sub-head. Regulators are proposed on the D/s of the off-take point of the distributory. Cross-regulators are also proposed. One S.W.F. is proposed on each canal. The water way for the regulator is worked out with 60% fluming. The construction cost of the cross regulators has been worked out on the cost curve basis. Increase in the cost by 3% is provided to suit the present day rates.

9.7.00 Exc. & M. Works

9.7.01 The provision for aqueduct, culverts, siphons, slab drain, etc. has been made in the estimate under this sub-head. For every structure a typical estimate is prepared and on the basis of nalla and canal discharges, the provision for all the remaining structures has been made.

9.8.00 ~~Utilities~~

9.8.01 The provision for bridges has been made on almost all roads in this sub-division. A typical estimate of the bridge is prepared and the cost of the remaining structures is accordingly laid out.

9.9.00 ~~Escapes~~

9.9.01 Escapes are provided upstream of regulators at intervals of 6 to 8 km. The capacity of each escape is taken 1/3rd the full supply discharge of the canal in that particular portion. The provision is made at the rate of Rs. 600/-Sq. ft. of the water-way provided.

9.10.00 ~~Quarters~~

9.10.01 The staff needing construction of quarters is as under

- 1) Division at Satara
- 2) Two sub-divisions at Parali
- 3) Two sub-divisions at Satara

The buildings (permanent and temporary) are proposed to be constructed as per the norms laid down by the Government. It is proposed to construct temporary buildings (residential as well as non-residential) at Satara for Divisional staff and two sub-divisions as there is an acute shortage of rented premises. These quarters will be constructed at the following rates :

Residential permanent	Rs. 45/Sq.ft.
Temporary	Rs. 35/-Sq.ft.

Non-residential :

Permanent	Rs. 40/sq.ft.
Temporary	Rs. 35/sq.ft.
Sanitary blocks (Temporary & Permanent)	Rs. 40/sq.ft.

(For details, vide App.No. VII/3,5,7,9,10)

9.10.02 Only two permanent section offices - one at Satara and the other at Parali respectively for the maintenance and management of the dam and canal and management of irrigation work are proposed to be constructed. Provision for non-residential buildings has also been made according to the requirements. Please vide Appendix N. VII/2,4,6,8.

9.10.03 The salvage value of the temporary buildings has been considered at 15% of the cost on completion of construction period. The same works out to Rs. 4.352 lakhs for Head works and Rs. 1.44 lakhs for the II-Main Canal. This has been suitably accounted for to reduce charges to be borne by the project.

9.11.00 Leakage Work

9.11.01 The length of the L.S. Canal is 33 Km and that of the H.S. Canal is 27.5 Km. as determined from actual surveys carried out. The detailed estimates Km.wise for both the canals have been prepared on the basis of data of soil stratification available from the trial pits taken along the canal alignment.

the average rate per cusec Km. based on these estimates has been worked out for different reaches, and the same is adopted to work out the total cost. According to this rate, the cost of 'L' earthen work for the L.D.C. and A.D.C. works out to Rs. 37.22 lakhs and Rs. 35.7 lakhs, respectively.

9.12.00 'N' Plantation

9.12.01 The provision for planting and maintaining roadside trees and canal side trees has been made at the rate of Rs. 50/- per no. In addition to this, a lumpsum provision for establishing the nursery, etc. has also been made.

9.13.00 'O' Miscellaneous

9.13.01 Under this sub-head provision for amenities such as water supply, sanitary arrangement, medical aid, photographs, models, telephone communication, etc. has been made. In addition, provision for transport vehicles, labour compensation, etc. has been made. Similarly, provision for Km stone, Half Km. stone, boundary stone, guard stones, etc. has also been made for canals. The rates adopted for this are as per the sanctioned schedule of rates.

9.14.00 'P' Maintenance

9.14.01 The provision for the sub-head maintenance of the following works during construction is made as under :

1. C-works at 0.25% on the progressive expenditure of the year.
2. A-Buildings at 2% on the progressive expenditure of the year.
3. A-Communications at 5% on the progressive expenditure of the year.

9.15.00 Special Tools and Plants

9.15.01 The construction of the earthen dam is proposed to be done departmentally with earth moving equipment from the central pool as far as possible. In order to have quality and speed, some earth moving machinery would be necessary. The requirement of machinery is worked out considering the construction period, the peak schedule and the average annual output of each type of the machine. The rates adopted to work out the cost are based on the recent purchases made through mechanical organisation.

9.15.02 The estimate of this sub-head is further divided into two parts (i) rated equipment; (ii) non-rated equipment. The actual expenditure of the rated equipment debitable to work is practically nil. In case of non-rated equipment, only 10% of the cost of the machinery is debitable to work. In case of rated equipment, cost of depreciation for machines will be debited to items of works concerned and balance will be made good partly by recovering hire charges from the

Contractor (whenever the machines are given on hire) and partly by adjusting cost recovered in transferring the same to the other project.

9.16.00 ~~Communication~~

9.16.01 Provision for the following roads is made under this sub-head :

- 1) Quarry roads and roads in working area;
- 2) Improving the existing approach roads including their upgradation.
- 3) Temporary crossings on the major nallas.

9.17.00 ~~Distribution~~

9.17.01 Provision for the distribution system is made at the flat rate of Rs. 250/ha. of the gross command area. This is based on detailed estimate done for similar other projects. Similarly, provision for effective drainage in the command area has been made at Rs. 200/ha. for the entire irrigated command.

Left Bank Irrigation Project
Taluka : Satara Dist. : Satara

Construction, Equipment and Organisation

10.1.00 CONSTRUCTION REFERENCE

10.1.01 The total cost of the project for works portion excluding the contingency charges is Rs. 1084.93 lakhs. The works portion consists of ...

- a) Construction of an earthen dam of 32.30 m. maximum height and 1527 m. length from Ch. 190 m. to 1717 m.
- b) Gated spillway section for a length of 48 m. between dba inage 434 to 482 m. with radial gate of 12 m x 8 m size.
- c) Non-overflow masonry sections from Ch. 409 to 434 m. and from 482 m. to 510 m. (total length 53 m.)
- d) Two head regulators at Ch. 420 m. and 1230 m.
- e) Construction of L.D. Canal for length of 33 Km.
- f) Construction of R.D. Canal for a length of 27.5 km.
- g) Distributory system for command area of 8622 ha./ 21800 Acres.

10.1.02 The above said works are proposed to be completed in five working seasons i.e. in 5 years. The planning of construction programme is arranged in such a manner that the annual expenditure on this work is as far as possible within the capacity of the staff

staff engaged on the project. The programme of expenditure of the works is as under (vide Appendix No. A/1 to A/3).

Table No. A/1

Sr. No.	Construction year	All the figures in lakhs of funds				III Distri- buto- ries	% age
		I-head works	% age	II-main Canal	% age		
1.	Ist year	114.15	16.02	68.94	20.15	-	-
2.	IInd year	185.79	26.068	92.55	27.06	--	-
3.	IIIrd year	156.15	21.90	64.10	18.74	-	-
4.	IVth Year	131.43	18.44	65.44	19.13	17.06	50
5.	Vth year	125.19	17.56	50.98	14.92	17.06	50
TOTAL :-		712.71	100%	342.01	100%	34.12	100

10.1.03 The quantities of the principal items of I-head works are as under (vide Appendix No. A/1 and A/2 ,3)

Table No. A/2

Sr. No.	Items	I-Head Works cum
1.	excavation for foundation of Masonry section of Jam, tail and approach channels, C.O.F. and L & C drains in soft strata.	0.174
2.	do-in hard rock	0.155
3.	Embankment in impervious selected soil including C.O.F. Filling	0.499
	b) embankment for pervious material	0.805

of.	Head works
ha.	msqm
4. Un-coursed rubble masonry	0.176
5. Cement concrete	0.036
6. Construction of permanent and temporary buildings (11 litch area)	0.009 msqm 0.009 msqm
7. Construction of Head regulator	2 Nos.
9. Acquisition of land	1281 ha.

10.2.00 Physical Programme of I-Head Works

10.2.01 At the commencement of the construction, concentration will be on the preliminary activities such as preparation of approach roads to the dam site, acquisition of lands for approach roads, seat of dam, colony, etc. and construction of temporary buildings for accommodating the staff side by side, the work of finalising the design of important structures, preparation of tender papers and specification will be taken up so as to start the construction of main dam at the earliest. The activities of providing amenities such as water supply, telephone lines, grid lines, sanitary arrangements etc. will be started in the first year only.

10.2.02 The excavated material from the tail and approach channels is proposed to be utilised for the construction of earthen dam. In order to have maximum use of the excavated stuff excavation of this portion will be taken up first and will be kept ahead of the

embankment work. The total excavation in soft strata is estimated to the extent of 0.174 Mcum as against the embankment quantity of 1.30 Mcum. The targetted yearwise physical programme of important items pertaining to the earthen dam and spillway is given in the Appendix No. 4/4 and is shown on L.S. in Plate No. 21.

10.8.03 The important yearwise activities proposed are given below :

1st Year

- i) Acquisition of land required for the seat of dam, approach road, colony and tail channel, etc.
- ii) Preparation of seat of dam Ch.510 to 780 m. and 930 to 1660 m. excavation for C.G.F. and filling of the same.
- iii) Preliminaries for providing amenities such as water supply, electric grid line and telephone line etc.
- iv) Construction of temporary and permanent buildings at the dam site.
- v) Preparation of new approach road to the dam site, and strengthening of Parali-Satara Road including C.D. works.
- vi) Excavation in tail and approach channels.

IIII Year

- i) Acquisition of land required for rehabilitating the displaced persons.
- ii) Excavation for waste weir, tail and approach channels. Masonry for waste weir bar.
- iii) Excavation of L. and C. drains from laying L. & C. drain.
- iv) Embankment of the dam from CH.510 to 780 m.
- v) Completing water supply arrangement, sanitary arrangements, etc.
- vi) Construction of temporary and permanent buildings.
- vii) Completing the approach road etc.

IIII Year

- i) Acquisition of land and houses under submergence.
- ii) Excavation of L. and C. drains from Ch. 930/ to 1200 m and Ch. 190 m to 409 m. including laying L. & C. drains.
- iii) Embankment (heaving and casing) between Ch.190 to 409, 510 to 780 m. and Ch.930 to 1200 m.
- iv) Providing rubble pitching and rock toe above masonry for waste weir and flank walls for the dam.

1968-69

- i) Acquisition of land and houses under submergence.
- ii) embankment (hearting and casing) from 930 m. to 1717 m.
- iii) Cement concrete (A.C.C.) for bucket portion.
- iv) road regulator for L.D.C. (partly, and A.D.C. partly)
- v) excavation and filling C.O.I. from Ch.780 m. to 930 m. including L. and C. drains laying.

1969-70

- i) Acquisition of land and houses for entire area under submergence.
- ii) embankment (hearting and casing) from Ch.780 to 930 m.
- iii) Pitching for dam.

10.3.C0 Physical Parameters for II Main Canal

10.3.C1 The activities of the canal works are spread over an extensive area and can, therefore, be started simultaneously to the full stretch of the canal length. The pattern of construction organisation is also proposed to be created accordingly. However, in the initial stages of the project, construction will be on the preliminary works such as constructing colony buildings.

Providing required amenities and acquisition of land required for excavation of various works.

10.3.02 The execution of the canal works will be undertaken mostly by the piece-work system and by contract system. All the works being independent of one another can be started after getting approval to the alignment etc. at one time. Some time will be required for collection of hydraulic data pertaining to C.D. works and their design. It is, therefore, proposed to start the construction works of all these structures in the second year of the construction programme. The distribution system will be taken up for execution in the 4th year and will be completed by the end of 5th year. Total number of C.D. works are 150. Out of these structures only 10 structures are major and will require some time for completion.

10.4.00 ~~Temporary Waste Weir~~

10.4.01 The gated spillway is proposed to be located on the left flank between Ch. 481 to 482 m. The gorge width is 150 m. The maximum height of the dam in the river bed is 32 m. The total earth work involved in this portion is approximately 0.42 Mcum. It would therefore, be possible to complete this much quantity of earth work in one working season. Temporary diversion for river is, therefore, not considered necessary.

10.5.00 Machinery and Laboratory

10.5.01 The requirement of machinery for completing the project is appended in the Appendix No. VI/3 to 6. Most of the machinery will be procured by transfer which needs some advance action. The laboratory for testing the embankment work will have to be established in the first year only.

10.6.00 Construction Organisation

10.6.01 One Division with four sub-divisions is proposed for the execution of the project. Two sub-divisions will be in charge of the head works and other two for canal works. For details of staff pattern and their headquarters vide appendix no. VII/2,5,6 in Chapter no. VII.

ಬೆಂಗಳೂರು-ಬಿಳಿಬೀದಿ-ವಿಳಿಬೀದಿ

Taluka : sagara District : sagara

ಕಾರ್ಯ :- XI

FINANCIAL PROVISION

11.1.00 Cost of the project

11.1.01 The detailed estimate has been prepared for I-head works, II-main Canal and branches, and III-Distributories. The total cost of the project based on this estimate including indirect charges works out to Rs. 1084.93 lakhs. The direct and indirect charges are as under :

Sr. No.	Items	Amount in Rs. lakhs
A) Direct Charges		
	1) head works	712.71
	ii) II-main Canal & branches	342.01
	iii) III-Distributories	31.12
		1088.84
1)	estt. charges @ 1% excluding cost of B-Land (1088.84 219.35) 869.49	117.53
ii)	Ordinary I & P charges on I-head works @ 2% excluding B-Land (839.49)	20.99
iii)	Leave and pensionary charges @ 5.5% of estt. Charges on (117.53)	6.41
	Total :	1231.47

Sr. No.	Items	Amount in Rs. lakhs
		1251.47
	Deductions	
1.	Receipts and recoveries on capital outlay on account of :	
	1) rated equipments of special r & r @ 100%	152.99
	11) Non-rated equipment of ICB due to resale.	1.37
2.	Salvage value of temporary buildings @ 15% (4.35 + 1.44)	5.79

		160.15

	Total for (A) Direct Charges	1071.32

b)	INDIRECT CHARGES	
1)	Capitalisation of abutment of land revenue of the rate of 65%	0.71
11)	Audit and Account charges at 17.00 on (Rs. 1231.47)	12.31
111)	Secretariat Charges @ 0.5% of estt. i.e. on (117.53)	0.59

	Total for 'B'	13.61

	Total cost of the project A + B = 1071.32 + 13.61	
		= 1084.93 lakhs

11.2.00 Construction Programme

It is proposed to complete the construction of the dam and its appurtenant works, canals, distribution system in a period of five years. The average annual expenditure required to be incurred works out to Rs. 195.58 lakhs. The same is proposed to be achieved by employing the staff of one division on this project. The maximum annual expenditure proposed to be incurred as per the financial schedule is Rs. 246.57 lakhs.

11.3.00 Development of Irrigation

11.3.01 The storage of water will be available after fifth year of construction. The development of irrigation will commence from the sixth year. The development of irrigation is anticipated as tabulated below.

For details please vide Appendix No. A1/2.

Sl. No.	Year from the commencement of the project	% of development	Area under irrigation Acres		Progressive Area under irrigation Acres	
1.	I	-	-	-	-	-
2.	II	-	-	-	-	-
3.	III	-	-	-	-	-
4.	IV	-	-	-	-	-
5.	V	-	-	-	-	-
6.	VI	20	2980	80	2980	-
7.	VII	20	2980	40	5960	-
8.	VIII	20	2980	60	8940	-

Sr. No.	Year from the commencement of the Project	% of development	Area under irrigation Acre	%	Progressive Area under irrigation Acre	%
8.	11	20	2980	80	11920	-
10.	12	10	1490	90	13410	-
11.	13	10	1490	100	14900	-

11.4.00 Water rates and irrigation cess

11.4.01 water rates and irrigation cess for different crops have been adopted as per the Government Circular No. GR/WR-4366/(1)(4) dated 10.1.1966. The same are given in the Appendix No. 41/1.

11.5.00 Revenue

11.5.01 In the first year after commencement of irrigation, the water charges will be levied at the concessional rate. The concessional rates as per the Government Circular No. GR/WR/1072-1 dated 8.5.1974 are as under

Table No. 41/3

Sr. No.	Year	Food & Fodder Crops	Other Crops
1.	First Year	Free	1/2 rate
2.	Second Year	Full rates	Full rates

The assessment of revenue for the area under irrigation according to the above percentage and

development of irrigation has been worked out and is given in the Appendix No. XI/1, and 2. The working expenses are taken at Rs. 10/Acre of irrigated area vide G.O. No. 1172/58179-1(5) dated 28.1.1974. The net revenue that will be realised after deducting the working expenses works out to Rs. 14,23 lakhs and is given in the Appendix No. XI/1.

11.6.00 Interest

11.6.01 Simple interest at the rate of 6.5% per year is assumed for the net expenditure incurred during the respective years. For details, please vide Appendix No. XI/3.

11.7.00 Circulated Return

11.7.01 Appendix No. XI/2 shows annual revenue and Appendix No. XI/3 shows (a) Annual expenses, (b) Simple interest, (c) sum at charges and (d) percentage return on the capital outlay of the full development of irrigation. The percentage returns on the capital outlay works out to 1.29%. The percentage return on sum at charges on full development works out to 0.66%. For details, please vide Appendix No. XI/3.

11.8.00 Cost of Project

11.8.01 The total cost of the project is Rs. 1084.93 lakhs. The irrigation proposed is 6030 ha. (14900 Ac.).

The cropped area is 2158 ha. (20160 ac.). The total area on seasonal basis 26,592 Ha. (65709 ac.). For details please vide Appendix No. 111/8 and 7. The cost of the project for the above referred area works out as under :

a) Cost per hectare of irrigated area	Rs. 18,000
ii) Cost per Acre of irrigated area	Rs. 7,286
b) Cost per hectare of cropped area	Rs. 11,264
ii) Cost per Acre of cropped area	Rs. 4,551
c) Cost per hectare on seasonal basis	Rs. 4,078
ii) Cost per Acre on seasonal basis	Rs. 1,651

11.9.00 Cost per Mcum/Mcft

11.9.01 The cost of the project per Mcum/Mcft on total capital cost works out as under :

a) Cost per Mcum of the gross storage	Rs. 13.08 lakh s
b) Cost per Mcum of the live storage	Rs. 14.14 lakhs
c) Cost per Mcum of the proposed utilisation of	Rs. 10.41 lakhs
d) Cost per Mcft of the gross storage	Rs. 37,033
e) Cost per Mcft of live storage	Rs. 40,033
f) Cost per Mcft of utilisation	Rs. 29,473

11.10.00 Benefit Cost Ratio

11.10.01 The benefit cost ratio has been worked out on the following assumptions :

- a) The yields for crops after irrigation and those of existing crops are adopted as approved by the Director of Agriculture, Maharashtra State, Poona.
- b) The farm harvest prices are taken as per levy rates proposed by the Government for the year 1975-76 for 10% yield and for balance quantity the prices are taken as per present market rates.
- c) Expenses of seeds, manure, labour and fodder, etc. are adopted as communicated by Agriculture Department.
- d) Interest charges are taken at 10% on the capital cost of the project.
- e) Depreciation cost is taken at 1% on the capital cost of the project.
- f) Administrative charges are taken at Rs.25/ha. (Rs.10/Acre) of irrigated area.

In general, the same procedure has been followed for working out the benefit cost ratio as has been adopted in similar other projects.

11.10.02 The benefit cost ratio works out to 1.65. For details, please refer Appendix No. XI/4, 5-a, 5-b and 6-a.

11.11.00 Increase in the food crops

11.11.01 On full development of irrigation increase in food grains will be to the extent of 8555 tonnes. The increase in fodder to the extent of 7530 tonnes (vide Appendix No. XI/7).

11.12.00 Conclusion

11.12.01 It will be possible to cover the age-old rainfed cultivation into irrigated cultivation to the extent of 6030 ha. (14900 Acres).

11.12.02 The cost of the Project and the B.C. ratio arrived to fulfil the norms for feasibility of the Project. The Project is, therefore, recommended for taking up for construction.

ESTIMATES

UMODI IRRIGATION PROJECT

Taluka : Satara

Dist. : Satara

COST OF PROJECT

Sr. no.	Items	Amount in Rs.lakhs
A)	<u>DIRECT CHARGES</u>	
1.	Head Works	712.71
2.	Main Canal and branches	342.01
3.	Distributories	34.12

		1088.84
I	Estt. charges @ 14% excluding cost of B-Land (108884-249.35) 839.49	117.53
II	Ordinary T & P Charges on I-Head Works @ 2.5% 2.5% excluding B-Land (839.49)	20.99
III	Leave and Pensionary charges @ 3.5% of Estt. Charges on (117.53)	4.11

	Total :	1231.47
	<u>Deductions</u>	
1)	Receipt & recoveries on capital outlay on account of :	
	i) Rated equipments of special T & P @ 100%	152.99
	ii) Non-rated equipment of 10% due to resale.	1.37
2.	Salvage value of temp. buildings @ 15% (4.35 + 1.44)	5.79

		160.15

	Total for 'A) Direct Charges	1071.32

Sr. no.	Items	Amount in Rs. lakhs
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B) INDIRECT CHARGES

I) Capitalisation of amount of land revenue of the rate of 6.3% 6.5%	0.71
II) Audit and Account charges at 17.00 on Rs. 1331.47	12.31
III) Secretariat charges at 0.5% of establishment i.e. on(117.53)	0.59

Total for 'B'	13.61
	=====

Total cost of the project A + B 1071.32 + 13.61
= 1084.93 lakhs

B.C. Ratio $\frac{B}{C} = 1.65$

Executive Engineer
Irrigation Project Investigation

DN KARAD

URMODI IRRIGATION PROJECTTaluka : Satara District : Satara

I -works I-Head Works II-Main Canal and III-Distributories.

R E C A P I T U L A T I O N - S H E E T

Sr. No.	Name of Sub Estimate	Amount in lakhs of Rs.		Total Amount in lakhs
		I-Head Works	II-Main canal	
1	2	3	4	5
1.	'A' Preliminary	5.16	3.47	8.63
2.	'B' Lands	210.98	38.37	249.35
3.	'C' Works	275.16	-	275.16
4.	'D' Regulator	18.17	3.34	21.51
5.	'F' R.M.I. Works	-	130.82	130.82
6.	'G' Bridges	-	6.20	6.20
7.	'H' Escapes	-	0.51	0.51
8.	'K' Buildings	32.75	22.05	54.80
9.	'L' Earth-work	-	72.29	72.29
10.	'M' Plantation	2.00	4.56	6.56
11.	'O' Miscellaneous	21.60	9.36	30.96
12.	'P' Maintenance	5.40	3.65	9.05
13.	'Q' Special tools & Plants	129.74	36.94	166.68
14.	'R' Communication	11.75	10.45	22.20
15.	III Distributories	-	34.12	34.12
Total :		712.71	376.13	1088.84

Say Rs. 1088.84 lakhs.

UNMODI IRRIGATION PROJECT

Taluka : Satara Dist. : Satara

I- Head WorksRECAPITULATION - Rs. Lakhs

Sr. No.	Items	Amount in lakhs Rs.	Remarks
1	2	3	4
1.	A-Preliminary	5.16	
2.	B-Land	210.98	
3.	C-Works	275.16	
4.	D-Regulator	18.17	
5.	K-Buildings	32.75	
6.	M-Plantation	2.00	
7.	O-Miscellaneous	21.60	
8.	P.Maintenance	5.40	
9.	Q-Special Tools and Plant	129.74	
10.	R-Communication	11.75	

Total I-Head works Rs. 712.71 lakhs

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URMODI IRRIGATION PROJECT

Taluka : Satara Dist. : Satara

I-Head Works'A' Preliminaries

Sr. No.	Items	Amount in Rs. lakhs
1.	Sub Estimate No. I-A Preliminary Surveys	0.43
2.	Sub Estimate No. I-B Foundation exploration	1.54
3.	Sub-Estimate No. I-D Survey for materials of construction.	0.10
4.	Sub-Estimate No. I-E Establishment	0.16
5.	Sub-Estimate No. III Transport Equipments	2.50
7.	Sub-Estimate No. IV Miscellaneous	0.43
Total Rs.		5.16 lakhs =====

UMODI IRRIGATION PROJECT

TALUKA : SAFARI

DISTRICT : SALEM

I-HEAD WORKS

" A " : PRELIMINARIES

Qty.	Unit	Item	Rate	Per	Amount
<u>SUB-ESTIMATE I-A PRELIMINARIES SURVEYS</u>					
56	KMs	1) Double levelling to connect G.F.S.P.M. and establishing the permanent B.M. at the Dam site.	25.00	KM	1400
1200	Hect	2) Submergence survey including establishing temporary B.M. to prepare submergence plan with 5(2 m.) contour interval to a scale 4" into 1 mile.	3.10	Hect.	3720
1.60	Sq.m.	3) Detail survey of Dam Site finally approved including levelling and mapping to the extent of 3 m. higher than the top of dam on either flanks and 300 m u/s and 500 m d/s showing all important features etc. all complete.	2017	Sq.M.	3707

Qty.	Unit	Items	Rate	Per	Amount
15	Sq.Km.	4) Detailed survey for dam site vicinity (about 2 to 3 miles in all directions from dam axis) to include dam site proper, proposed colony site, borrow area for suitable soil, etc. map to be produced to a scale of 8" in = 1 mile with 5 feet (say 2 mt.) contour interval.	1158	Sq.Km.	17370
15	KM	5) taking L/S of alternative dam site and river L.S. 1.5 Km U/S and 1.5 KM D/S.	36.85	K.M.	523
7	No.	6) Establishing permanent B.M. in the submergence area and at dam site including necessary double levelling, etc. complete.	50	No.	250

Qty.	Unit	Items	Rate	Per	Amount
8	No.	7) Fixing alignment pillars at alternative dam site.	40	No.	320
35	No.	8) Fixing alignment headers at alternative dam site considered.	20	No.	700
2	No.	9) Fixing permanent theodo- lite pillar at the site finally approved.	250	No.	500
Job		10) Purchase of petty material such as K.Oil black Japan nails, stationery, drawing, materials, etc. complete.		Lump	2000
3	No.	11) Establishing rain gauge station in the catch- ment area and at the dam site as required at every 20 sq.miles.	500	No.	1500
20	Sq.M.	12) Constructing for shed for storing survey articles tools and plants, boring equip- ments, etc. at dam site.	86	Sq.m.	1720

Qty.	Unit	Items	Rate	per	Amount
					100
3	KM	13) Preparation of approach road for investigation for alternative sites for dam and conveyance of boring material.	500	KM	1500
50	Copies	14) Preparation and printing of Project Report -	100	Copies	5000
		Total for sub-estimate No. I-A.			<u>43520</u>
		Deduct : Salvage value at 15% of temporary Shed			258
		Net total for Sub-estimate No. I-A			<u>43262</u>
					Say Rs. 0.43 lakhs

SUB-ESTIMATE NO. I (3)FOUNDATION EXPLORATION

Qty.	Unit	Items	Rate	Per	Amount
Job		1) reconnaissance founda- tion condition for various alternative dam sites, including some trial pits etc. complete.	Lump		500
820	R.M.	2) Taking trial bores for detail investiga- tion with calyx and/ or diamond drill.	160	R.M.	1,31,200
110	No.	3) Providing standard core boxes for preservation of cores.	90	No.	9,900
656	Mtrs.	4) Providing and carrying out water intake tests in cored strata in the above holes at the interval of 1.5 M in ascending and descending orders of pressure equivalent to 0.25, 0.75 and 1.5 h	15	R.M.	9,840

Qty.	Unit	Items	Rate	Per	Amount
Job		5) Making open trenches exploration trail pits etc. as directed by Geologist.	Lump		1000
Job		6) Mapping and surface Geology at dam site and vicinity.	Lump		500
Job		7) Geology survey at alternative sites.	Lump		500
Job		8) Investigation for reservoir basin regarding mineral resources, archaeo- logical treasures tightness of reservoir basin etc.	Lump		<u>200</u>
Total of sub Estimate No. 1(B)					1,55,640
Say Rs.					1.54 lakhs

A. P. S. E. R. A. C. I.

 Qty. Unit Items Rate Per Amount

Sub-estimate No. I(D)

Survey for materials of Construction

Job	-	<u>Item No. 1:</u>		
		Field survey and mapping of		
		quantity extent of rubble, sand,		
		gravel, etc.	Lumpsum	1,000
Job	-	<u>Item No. 2:</u>		
		Field survey for borrow areas		
		for soil and murum required		
		for Marthen dam.	Lumpsum	1,000
Job	-	<u>Item No. 3:</u>		
		Collection of materials samples		
		and sending them to the		
		laboratory for testing.	Lumpsum	1,500
Job	-	<u>Item No. 4:</u>		
		Testing of soil and		
		murum samples in the labora-		
		tory for ascertaining the		
		suitability for construction.	Lumpsum	6,000

		Total for Sub-estimate No. I(D)		9,500

 say Rs. 0.10 lakh

SUB ESTIMATE No. 1 (E)

Qty.	Unit	Item	Rate	Per	Amount
<u>Establishment</u>					
6	Months	1) Sub-overseer or Surveyer or Jr. Survey Asstt.	375	Month	2,250.00
6	Months	2) Survey Maistry or Mukadam	375	Month	2,250.00
6	Month	3) Tracer	390	Month	2,340.00
14		4) Survey Maistry for Boring	375	Month	5,250.00
6	Month	5) Chowkidar	240	Month	1,440.00
6	Month	6) Add Rs.30/- per month as attendance allowance to No.1 (i.e. 6 months)		Month	180.00
Total :					13,710.00
7) Add P.A. to W.C. Estt. at 20% for items 1,2 and 4					1,950.00
8) Add Survey Allowance to item no. 4 @ 25% of pay per month					570.00
Total for sub-estimate No.1-(E)					Rs. 16,230.00
Say					Rs.00.16 lakhs

ABSTRACTSUB-ESTIMATE No. II (Transport Equipment)

Qt.	Unit	Item	Rate	Per	Amount
1	no.	1) Station wagon Model 4.75 W.D. etc.	85000	No.	85,000
1	No.	2) Providing and supplying universal Jeep with trailer.	100000	No.	1,00,000
Job		3) Equipment for field testing Laboratory	Lump	-	25,000
Job		4) Running of inspection Vehicles at rs.10000/- per year per vehicle for two years 2 x 2 x 10,000			40,000
Total for Sub-Estimate No. II					<u>2,50,000</u> =====
Say					rs. 2.50 lakhs =====

SUB-ESTIMATE NO. III
(Miscellaneous)

Qty.	Unit	Items	Rate	Per	Amount
Job	-	1) Medical Provision for first aid boxes for survey party.	Lump		1000
Job	-	2) Technical record and library including photograph.	Lump		1000
Job	-	3) Running of field testing laboratory.	Lump		2000
Job	-	4) Purchase of S. & M. instruments, etc.	Lump		39000
Total for Sub-estimate No. III					43000

Say Rs. 43 lakhs

URMODI IRRIGATION PROJECT

Tal.: Sagara

Dist.: Sagara

1. Head Works

B-Lands

Qty.	Unit	Item	Rate	per	Amount
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1) Acquisition of land required for seat of dam, quarries, colony, tail channel, new gathan and area affected by submergence.

(10*4 + 12*4 + 20*870 = 920)

257	ha.	a) Bagayat Land	16250/-	ha.	41.76
447	ha.	b) Jirayat Land	10200/-	ha.	45.59
81	ha.	c) waste Land	4700/-	ha.	3.81
85	ha.	d) Fari Land	8000/-	ha.	6.80
50	ha.	e) Govt. land		Ha.	-----
			(1)		97.96 =====

2) Compensation for houses, trees, wells, going under submergence.

611	No.	a) Houses Pakka	7500/-	No.	45.83
15	No.	b) Houses Kacha	4000/-	No.	0.60
435	No.	c) trees	100/-	No.	00.44
30	No.	d) Wells	7500/-	No.	02.25
			(2)		49.13 =====

(1 + 2) = 147.08

Qty.	Unit	Items	Rate	Per	Amount in lakhs
					147.08
		3) Compulsory acquisition charges at 15% on the cost of item 1 and 2 above.			22.06
			(1+2+3)		169.14
		4) Interest charges at 6.5% for 2 years on 20% amount of item no.1,2,3, above (33.84)			4.40
		5) Demarcation charges at 3% on item nos.1,2 & 3			5.07
920	Ha.	6) Revenue establishment and contingencies.	100	Ha.	0.92
197	Ha.	7) Crop compensation on 25% of bagayat and Jirayat and fari land.	500	Ha.	0.99
		8) Assessment of land for 2 years.			
257	ha.	1) Bagayat land	7.40	ha.	0.02
85	ha.	2) Fari land			
528	ha.	3) Jirayat Land including land.	3.10	na.	0.02

Qty.	Unit	Items	Rate	Per	Amount in lakhs
3636	Soul	9) Payment and transport of personal kit of families disposal within one mile.	50/-	Soul	1.82
		10) <u>Villages-3:</u> Providing amenities in new gaathan such as Roads, water Supply, Electrification, public buildings, etc.			
4	Nos.	(a) For village having population 600 to 999 4 nos. at <u>2.5 lakh</u> per no.	-	-	10.00 lakhs
4	Nos.	(b) For village having population upto 500 4 nos. at <u>1.25 lakh</u> per No.	-	-	5.00 lakhs
				Total :	<u>15.00 lakhs</u> =====
Job	-	11) Transport charges for conveyance of salvagable material, etc.	Lump	-	00.10

Qty.	Unit	Items	Rate	Per	Amount in lakhs
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13.50	K.M.	12) Construction of new road of M.D.R. standard for the roads going under submergence.			
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1) Parali-Nitral

6.5 Km.		100,000	K.M.	13.50
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2) Parali-Peteghar

7.00 Km.

Total : 13.5 K.M.

Total of Sub-Estimate No. I-B

210.98 lakhs
=====

Say Rs. 210.98 lakhs.

Urmodi Irrigation ProjectTal. : Satara Dist. : Satara

- I - Works
 I - Head Works
 C - Works

Recapitulation Sheet

Sr. No.	Name of Sub-Estimate	Amount in Rs. of Lakhs
1)	Marthen Dam	154.76
2)	Waste Weir	120.40
Total Cost of 'C' Works		275.16
		=====

Say Rs. 275.16 lakhs

-: URMODI IRRIGATION PROJECT :-

Tal: Satara Dist: Satara

1-Head Works 'C' WorksBARTHEN DAM

Quantity	Unit	Items	Rate	Per	Amount in lakhs of Rs.
Job		<u>Item No.1:-</u> Cleaning the site before and after construction and every year before and after monsoon.		Lump	00.05.
39700.	Cum.	<u>Item No.2:-</u> Preparing seat of dam of by removing vegetation and un-suitable soil and murum and stacking off the same as directed with average lead of 50.m.	3.50.	Cum.	1.39
33380.	Cum.	<u>Item No.3 :-</u> Excavation in soil and soft murum for C.O.T. including removing and stacking the excavation stuff as directed for average lead of 100.m. and average lift of 2.mt.	4.30	Cum.	1.44.
9250.	Cum.	<u>Item No.4 :-</u> Excavation in hard murum with boulders for C.O.T. including stacking the materials as directed for average lead of 100.m. and average lift of 3.m.	7.20	Cum.	0.67.
					----- 3.55. -----

Qty	Unit.	Items	Rate	Per	Amount in lakhs of Rs.
27,330.	Cum.	<u>Item No.5:-</u> Excavation in soft rock for C.O.T.including stacking the materials as directed for average lead of 100.m. and average lift of 4.m.	9.60	Cum.	2.62
1110.	Cum.	<u>Item No.6 :-</u> Excavation in hard rock for C.O.T. including stacking the materials as directed for average lead of 100.m. and average lift of 5.m.	23.00.	Cum.	0.26.
15173.	Cum.	<u>Item No.7:-</u> Excavation in soil and murum for L. and C.drains and toe drains and stacking the materials as directed for average lead of 100.m.	4.30	Cum.	0.65.
71070.	Cum.	<u>Item No.8:-</u> Filling C.O.T. with selected materials in layers of specified thickness including watering compaction etc.complete for average lead of 100.m.to 500 m. and average lift of 5.m.	7.80.	Cum.	5.54.
407100.	Cum.	<u>Item No.9:-</u> Constructing embankment for hearting zone with selected materials laying in layers, levelling,watering,			

Qty	Unit	Items	Rate	Per	Amount in lakhs of Rs.
100764.	Cum.	(A) From available material for average lead of 500.m. and lift of 4.m.	4.55.	B.F. Cum.	12.62. 4.48.
306336.	Cum.	(B) From borrow area for average lead of 1000 m. to 1500. and lift of 5.m.	9.60	Cum.	29.41.
804820.	Cum.	<u>Item No.10:-</u> Constructing embankment for casing zone with selected material laying in layers,levelling and dressing watering,consolidation etc. complete.			
35225.	Cum.	(a) From available for average lead of 500.m. and average lift of 5.m.	4.40	Cum.	1.55.
769595	Cum.	(b) From borrow area for average lead of 1000m. to 1500 m. and average lift of 5.m.	10.90	Cum.	83.89.
26860.	Cum.	<u>Item No.11:-</u> Providing rock toe with 15.cm to 23.cm.on down stream of dam with hand packing with average lead of 100.m. to 500.m. required lift 3.mt.	8.70	Cum.	2.34.

Qty.	Unit	Items	Rate	Per	Amount in lakhs of Rs.
35535.	Cum.	<u>Item No.12:-</u> Providing and laying dry stone pitching 0.60 thick to side slopes of embankment including dressing etc.complete. (rubble 30 to 45 Kg) average lift 5.m. from available materials.	13.50	Cum.	4.73
8885.	Cum.	<u>Item No.13 :-</u> Providing and laying quarry spouls of 20mm to 40mm below pitching including hand packing etc.complete. average lift 5.m.	4.90	Cum.	00.44.
9073.	Cum.	<u>Item No.14:-</u> Providing and filling longitudinal and cross drains with filtered materials in layer of specified thickness with av.lead at 100.m.	28.50	Cum.	2.59.
1956.	Cum.	<u>Item No.15:-</u> Providing rubble pitching 0.23.m.thick for open cross drains and toe drain from available material.	13.30.	Cum.	00.26
110.	R.M.	<u>Item No.16:-</u> Providing Hume-pipe at 60.m.C/C.250.mm. Ø along berm.	31.00.	R.M.	00.03.
550.	R.M.	<u>Item No.17:-</u> Providing paved chute.	20.00	R.M.	00.11.

Qty.	Unit.	Items	Rate	Per	Amount in lakhs of Rs.
1600.	R.M.	<u>Item No.18</u> :- Providing open gutters on D/S of dam @ berm	8.00	R.M.	00.13.
Job.	-	<u>Item No.19</u> :- Provision for dewatering the foundation.	Lump	-	1.00.
Job.	=	<u>Item No.20</u> :- Provision for gross preserve relief.	Lump.	-	0.50.
Job	-	<u>Item No.21</u> :- Provision and or other petty items such as guard stones notice board Ch. stones and other use and are such item.	Lump	-	0.20.
Job.	-	<u>Item No.22</u> :- Providing landscape architectural features.	Lump.	-	0.50.
Job.	-	<u>Item No.23</u> :- Provision for memorials..	Lump.	-	0.20.
Job.	-	<u>Item No.24</u> :- Providing instrumentation in the dam.	Lump.	-	0.50.
Job	-	<u>Item No.25</u> :- Provision for protection of embankment during mansoon.	Lump.	-	0.50.

Qty.	Unit.	Items.	Rate	Per	Amount in lakhs of Rs.
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71720.	Sq.m.	<u>Item No.26:-</u> Providing Harali turving on D/S slope of earthern dam including trimming etc.complete.	2.00	sq.m.	1.43.
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Total:- 147.41.

Add 3% for contingencies.

except.Lumps item i.e.

Rs.143.96) :-

4.32.

151.73.

Add 2% for W.C.Establishment :-

3.03.

Total :- 154.76.

G.Total Rs. 154.76.

:- URMODI IRRIGATION PROJECT :-

Tal: Satara Dist - Satara

I-Works. I-Head Works.

C-Works. Estimate for waste weir including

N.O.F. over flow training wall, tail and approach
Channel.

Qty.	Unit.	Items.	Rate	Per	Amount in Lakhs of Rs.
18091.	Cum.	1) Excavation for tail and approach channels, overflow, Non-overflow, bucket, training walls, puddle trench etc. in soil and soft murum including removing the materials as directed with average lead of 100.m. and lift 2.m.	4.30.	Cum.	0.78.
20638.	Cum.	2) Excavation in hard murum and boulders including removing the stuff as directed with average lead 100.m. and lift 3.m.	7.20	Cum.	1.49.
3441.	Cum.	3) Excavation in soft rock including removing the stuff as directed with average lead of 100.m. and lift 4.mt.	9.60.	cum.	0.33.
106395	Cum.	4) Excavation in hard-rock including removing the materials as directed with average lead 100.m. to 500 and lift 4.m.	24.70.	Cum.	26.28.

Qty.	Unit.	Items.	Rate	Per	Amount in Lakhs of Rs.
2722.	Cum.	5) Providing un-coursed rubble masonry in c.m. (1:5) for hearting of over flow, non over flow including scaffolding, watering, curing, etc. complete.	120.80.	Cum.	3.29.
1334.	Cum.	6) Providing and laying C.R. II in c.m.(1:3) for facework of stone masonry, masonry sections of overflow and non-overflow including scaffolding, watering etc. complete.	152.00	Cum.	2.05.
5365.	Cum.	7) Providing and laying R.C.C.(1:2:4) for D/S face of ogee, bucket, piers, including form work curing etc.including necessary steel reinforcement.	235.40.	Cum.	12.65.
6231.	Cum.	8) Providing U.C.R.masonry in c.m.(1:5) for training walls including scaffolding and pointing to the exposed face etc.completc.	124.90.	Cum.	7.78.

Qty.	Unit.	Items.	Rate	Per	Amount in Lakhs of Rs.
3690.	Cum.	9) Providing and laying 450mm. thick rubble pitching on 15mm thick quarry spalls backing including hand packing etc. complete.	11.20.	Cum.	0.41.
20600.		10) Constructing embankment for hearting zone including puddle trench of guidebund with selected soil including laying in layers levelling and dressing the bank work including watering consolidation etc. complete.			
9703.	Cum.	a) Available.	4.55	Cum.	0.44.
10897.	Cum.	b) Barrow area	9.60	Cum.	1.05.
20050.	Cum.	II) Constructing embankment for casing zone with selected material from already deposited including laying in layers, levelling and dressing the bank work watering and consolidation etc. complete.			
16510	Cum.	a) Available.	4.40	Cum.	0.73.
3540.	Cum.	b) from Barrow area	10.90.	Cum.	0.39.

Qty.	Unit.	Items.	Rate	Per	Amount in Lakhs of Rs.
4770.	Cum.	12) Back filling of D/S of Non overflow section of masonry section, training wall by selected excavated materials including consolidating watering etc.complete.	4.10.	Cum.	0.19.
76.00	Cum.	a) Road way slab.	235.40.	Cum.	0.18.
52.00	Cum.	b) R.C.C. beam for bridge	235.40.	Cum.	0.12.
3.00	No.	c) Centering and staging for bridge work for (40') span clear	-	-	
5.00	No.	d) Expansion joint	100.	No.	0.005.
288.	Sq.m.	14) Providing radial gates of 12 x 8 m.size over the top of overflow section including erection of gates hoisting platform arrangement embedding etc.complete.	9,000	Sq.m.	25.92.
472.	Cum.	15) Providing and laying plain cement concrete (1:3:6) at the base of training walls, including formwork,curing etc. complete.	167.80	Cum.	00.79.
25.00	R.M.	16) Providing and fixing enamelled guage plates etc. complete.	17.00	R.M.	0.004.

Qty.	Unit.	Items.	Rate	Per	Amount in Lakhs of Rs.
Job.	-	17) Providing high pressure curtain cement grouting holes of 45mm in dia @ 6m. C/C. and 15.m.deep along the axis of masonry portion etc.	Lump.	-	3.00.
34.00	R.M.	18): Providing ladders for inspection of operation of gates.	36.00	R.M.	0.01.
439.4.	Tonnes.	19) Providing reinforcement to the all items of R.C.C. including required stirrups etc.complete.	540860.	Tonnes.	23.77.
Job.	-	20) Providing copper plates and expansion joint at junction of masonry.	-	Lump	0.25.
Job.	-	21) Providing pour pressure measuring arrangement and necessary settlement pizometer including providing suitable control room etc.complete.	-	Lump	1.00.
Job.	-	22) Providing 3 rows of pipe railing each side for bridge.	=	Lump.	0.05.
Job.	-	23) Dewatering the foundations including, provision for scoursluice etc.	-	Lump.	0.60

123

Qty.	Unit.	Items.	Rate	Per	Amount in Lakhs of Rs.
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Job

24) Other unforeseen items.

0.06

Total:-115.01.

Add for contingencies @ 3%

excluding lump items) 115.01.

- 4.96= 110.05.

3.03.

118.04.

Add 2% for W.C.Establishment :-

2.36

120.40.

Total of Sub-Estimate No.I-C

Say Rs.: 120.40 Lakhs.

:- URMODI IRRIGATION PROJECT :-DAM Site Near U/S of PARALI.

Tal:-Satara Dist:Satara

I-Head Works D-Regulator for left bank Canal
At Ch.

Quantity	Unit.	Items.	Rate	Pcr	Amount in lakhs of Rs.
17076.	Cum.	1) Excavation in soil and soft murum for approach and tail channel and foundation including stacking the materials as specified with lead upto 100m. and lift upto 3.m.	4.70.	Cum.	00.80.
3410.	Cum.	2) Excavation in soft rock for above with lead upto 100.m. and lift upto 4.m.	9.60.	Cum.	0.33.
11980.	Cum.	3) Excavation in hard rock for approach and tail channel and foundation including stacking the materials as specified with lead upto 100.m. and lift 4 to 7.m.	24.70.	Cum.	2.96.
13.20.	Cum.	4) Providing and laying C.C. (M:75)(1:4:8) for stilling basin lining of silt pocket etc.including ramming,curing, formwork etc.complete. including reinforcement.	146.90.	Cum.	0.02.

Quantity	Unit	Items.	Rate	Per	Amount in Lakh Rs.
563.00	Cum.	5) Providing U.C.R.masonry in c.m.(1:5) for H.C.F.head wall (C.P.(1:3) wing wall, including curing etc. complete.	124.90.	Cum.	0.70.
4.20.	Cu.m.	6) Providing and laying copying in C.C.M.150(1:2:4) including ramming, curing etc.complete	235.40.	Cum.	0.01.
305.40	Cum.	7) Providing R.C.C.(M.150) 1:2:4 for opening conduct sill and braces, bucket etc. complete, including centering, ramming, curing etc. complete.	235.40.	Cum.	00.72.
54.60.	Cum.	8) Providing and laying M:200(1:1,5:3) for breast wall etc.including centering, ramming, etc.complete.	275.65	Cum.	0.15.
2.88.	Sq.m.	9) Providing and fixing out-let gates of size 1.2 x 1.2 m.including hoisting and lifting arrangement etc. complete.	24210.	Sq.m.	0.70.
21.50.	R.M.	10) Providing and fixing vent pipe 200mm.	52.50	R.M.	0.01

Qty	Unit	Item	Rate	Per	Amount in Lakhs of Rs.
18.50.	R.M.	11) Providing and fixing iron ladder with all accessories etc.complete.	36.00	R.M.	0.01.
Job.	-	12) Other items such as joints plat forms, guage plates etc. and unforseen items.	Lump.		0.25.
28.80.	Tonnes.	13) Reinforcement for R.C.C.works with required stirrups etc.complete.	5408.60.		
				Tonnes.	1.56.
		Add 3% for contingencies except lump items i.e.Rs.(Rs.7.97).			8.22
					0.24.
					8.46.
		Add 2% for W.C.Establishment			0.15.
		Total left Bank -			8.61.
		Total for Rt.bank.			9.56.
		Total Rs.			18.17.

URMODI IRRIGATION PROJECT

Dam site near U/S of Parali.

Tal: Satara Dist - Satara.

I-Head work D-Regulator for Right bank canal
at Ch.1230.M.

Quantity	Unit	Items	Rate	Per	Amount in Lakhs of Rs.
20626	Cub.m.	1) Excavation for approach tail of stilling basin in soft strata such as soil murum etc.including removing the stuff and stacking the same as directed.Av.lead 100.m. lift 3.m.	4.70.	Cum.	0.97.
600.	Cum.	2) Excavation for approach tail and stilling basin in soft rock including removing the stuff and stacking the same as directed av.lead of 100.m. and lift 5.m.	10.00	Cum.	0.06.
735.	Cum.	3) Excavation for approach tail and stilling basin in Hard rock including removing the stuff and stacking the same as directed lead upto 100 m.lift.7.m.	24.70.	Cum.	0.18.

A B S T R A C T

Qty.	Unit	Items	Rate	Per	Amount in Rs. lakhs
10.8	Cum	<u>Item no.4</u> : Providing and laying R.C.C. (M.150)1:2:4 for stilling basin etc.includ- ing ramming ,curing.form work etc. complete including rain- forcement.	235.40	Cum	0.03
425	Cum	<u>Item no.5</u> : Providing R.C.C. (M.200)1:1.5:3 for conduct arch, breast wall, etc. including form work,curing, etc. complete.	275.65	Cum	1.17
2908	Cum	<u>Item no.6</u> : Providing U.C.R. masonry in C.M.(1:5) for head wall, wing walls, retaining walls, etc. including formwork, scaffold- ing, watering, pointing, to exposed faces, etc. complete.	124.90	Cum	3.63
2.88	Sq.M.	<u>Item No. 7</u> : Providing and fixing in position outlet gates(of size 1.2m x 1.2 m) including hoisting arrange- ment.	24210	Sq.M.	0.70

A B S T R A C T

Qty.	Unit	Items	Rate per	Amount in Rs. lakhs
49	Cum	<u>Item no. 8</u> : Providing and laying copping in C.C. (M.150) (1:2:4) for wing walls, retaining walls cut off collars, etc. complete.	255.40 Cum	0.12
18.5	RM	<u>Item no. 9</u> : Providing and fixing iron ladder with all accesso- ries etc. complete.	36 RM	0.01
10.20	RM	<u>Item No. 10</u> : Providing approach bridge including pipe railing etc. complete.	750 RM	0.08
19.5	Cum	<u>Item No. 11</u> : Providing and laying C.C. (m.75) 1:4:8 for silt pocket and bedding under wall, etc. including, ramming curing, form work, etc. complete.	146.90 Cum	0.03
Job		<u>Item no. 12</u> : Other items such as joints, platforms, vent pipe, gauge plates trashract etc. and other unforeseen items.	Lumpsum	0.250
34.9	ton	<u>Item no. 13</u> : Providing rein- forcement to all the items of R.C.C. including required strips etc.	5408.60 ton	1.89
		Add 3% for contingencies except lumpsum items i.e. Rs. 1.17		0.26
			Total :	9.38
		Add 2% for W.C. Estt.	Total :	9.56
			Say Rs.	9.56 lakhs.

Tal- Satara DIST:- Satara

I- Head WorksK- Buildings

		Amount in Rs.
I) Permanent Buildings.		2,11,100.00
A- Non residential		
B- Residential		
Total I-A+B=		2,11,100.00
II) Temporary Buildings		
A)-Non residential		11,04,180.00
B- Residential		14,24,529.00
Total of II-A+B		25,28,709.00
Total for I & II		27,39,809.00
III) Add 2% contingent work for I & II:-		54,796.00
Total of I, II & III		27,94,605.00.
IV) Services.		
1) Add land development @ Rs. 2%		55,892.00
2) Add colony road @ 2%		55,892.00
3) Fencing at 1%		27,946.00
4) Lands and gardens @ 1%		27,946.00
5) (A) Water supply charges @ 5% on residential i.e. Rs. 14,24,529.00)		71,226.00
B (B) Water supply charges at 2.5% on non-residential buildings i.e. on (13,15,280.00).		32,882.00

Amount in Rs.

6) (A) Internal sanitation at 5% on Residential at on Rs. 14,24,529.00	71,226.00
(B) External sanitation at 2.5% on non- re residential building.	32,882.00
7) (A) Installation of internal electrification at 5% on residential	71,226.00
(B) Installation of internal electrification at 2.5% on non-residential	32,882.00
Total for IV :-	<u>4,80,000.00</u>
Total for I+ II+ III + IV IV:-	<u>32,74,605.00</u>

Say Rs. 32.75. Lakhs.

URMODI IRRIGATION PROJECT
TALE: SARANA DIST.: SARANA
(Storage of U/S of Parali)

I-Head works

I-PERMANENT BUILDINGS

"A" NON-RESIDENTIAL BUILDINGS

Qty.	Unit	Items	Rate	Per	Amount
2270	Sq.ft.	1) Inspection bungalow I-Class of two suits.	50.00	Sq.ft.	1,13,500
		1 x 2270 = 2270 Sft = 211 Sq.m.			
1100	Sq.ft.	2) Garage for Inspection bungalow for 2 suits.	40.00	Sq.ft.	44,000
		2 x 550 = 1100 Sq.ft.			
1230	Sq.ft.	3) Staff quarters for class-Ia-A.	40.00	Sq.ft.	49,200
		3 x 410 = 1230 Sft.			
110	Sq.ft.	4) Sanitary block	40.00	Sq.ft.	4,400
		2 x 55 = 110 Sft.			
					2,11,100.00
					Total for I-(A)

ERMUDI IRRIGATION PROJECTP.A. : SAHARADist. SAHARAI-Head worksTEMPORARY BUILDINGS

Qty.	Unit	Items	Rate	Per	Amount
<u>II-A- Non-residential</u>					
3960	Sq.ft.	1) Executive Engineer's office 1 x 3960 = 3960 sq. ft.	35.00	Sq.ft.	1,38,600.00
268	Sq.ft.	2) Garrage and Chowkidar -1 x 268 =268 Sq.ft.	35.00	Sq.ft.	9,480.00
188	Sq.ft.	3) Sanitary Block for Divisional Office(2 units) 94 x2 =188 Sq.ft.	35.00	Sq.ft.	6,580.00
1039	Sq.ft.	4) Sub-Divisional Office, 1x1039 = 1039 Sq.ft.	35.00	Sq.ft.	36,365.00
268	Sq.ft.	5) Garrage and Chowkidar for Sub- Divisional Office 1x268 = 268 Sq.ft.	35.00	Sq.ft.	9,380.00

Qty.	Unit	Items	Rate	Per	Amount
1315	Sq.ft.	6) Laboratory			
		1x1315 = 1315 Sq.ft.	35.00	Sft.	46,025.00
2000	Sq.ft.	7) Divisional Store			
		1x2000 = 2000 Sq.ft.	35.00	Sft.	70,000.00
1200	Sq.ft.	8) Stores for Sub-Divisional Office			
		2 x600 = 1200 Sq.ft.	35.00	Sft.	42,000.00
<u>B-BUILDING FOR MACHINERY</u>					
<u>WORKSHOP AND STORE.</u>					
2400	Sq.ft.	1) Machinery work shop and Heavy repair work shop.			
			30.00	Sq.ft.	72,000.00
600	Sq.ft.	2) Structural work shop 1x600=600 Sq.ft.			
			30.00	Sft.	18,000.00
600	Sq.ft.	3) Electrical shop and store			
		1x600 = 600 Sq.ft.	35.00	Sft.	21,000.00
600	Sq.ft.	4) Hardware shop and spare part stores.			
		1x600= 600 Sq.ft.	35.00	Sft.	21,000.00
1000	Sq.ft.	5) Tyre Stores and Tools Stores			
		1x1000=1000 Sq.ft.	35.00	Sft.	35,000.00

Qty.	Unit	Items	Rate	Per	Amount
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C-BUILDING FOR EARLIER MOVING MACHINERY

900	Sq.ft.	1) Repair work shop.			
		1x900= 900 Sq.ft.	30/-	Sft	27,000.00

4500	Sq.ft.	2) Parking Shed			
		1x 4500=4500 Sq.ft.	30/-	Sft.	1,35,000.00

D-CONSTRUCTION PLANT

1500	Sq.ft.	1) Repairs work shop			
		1x1500 =1500 Sq.ft.	30/-	Sft	45,000.00

E-CIVIL STORES

2400	Sq.ft.	1) Cement Stores			
		1x2400 =2400 Sq.ft.	35.00	Sft	84,000.00

800	Sq.ft.	2) Hardware Stores and building material stores.			
		1x800 =800 Sq.ft.	35/-	sft	28,000.00

800	Sq.ft.	3) Tools and Plants Stores			
		1x800 = 800 Sq.ft.	35/-	Sft	28,000.00

250	Sq.ft.	4) Magazine Store			
		1x250 = 250 Sq.ft.	35/-	Sft.	8,750.00

1800	Sq.ft.	5) Stores Shed at Mahuli(Cement)			
		1x1800 = 1800 Sq.ft.	30/-	sft.	54,000.00

Qty.	Unit	Items	Rate	per	Amount
<u>F-SERVICE BUILDING</u>					
2000	Sq.ft.	1) Community Building			
		1x2000=2000 Sq.ft.	35/-	Sft.	70,000.00
1000	Sq.ft.	2) Power House			
		1x1000 = 1000 Sq.ft.	30/-	sft.	30,000.00
500	Sq.ft.	3) Pump House			
		1x500 =500 Sq.ft.	30/-	Sft.	15,000.00
1000	Sq.ft.	4) Reservoir			
		1x1000=1000 Sq.ft.	30/-	sft.	30,000.00
800	Sq.ft.	5) Canteen			
		1x800 = 800 Sq.ft.	30/-	Sft	24,000.00
Total :					11,04,180.00
					=====

URMODI IRRIGATION PROJECTTAL. : SAHARADIST. : SAHARAI-HEAD WORKS'K' BUILDINGS

Qty.	Unit	Items	Rate	per	Amount
<u>TEMPORARY BUILDINGS</u>					
<u>11-B : Residential</u>					
1611	Sq.ft.	1) Executive Engineer Residence			
		1x1611= 1611 Sq.ft.	45/-	Sft	72,495.00
268	Sq.ft.	2) Garage and Servants			
		1x268 = 268 Sq.ft.	45/-	Sft	12,060.00
3570	Sq.ft.	3) Sub-Divisional Officer's Residence.			
		3x1190 =3570 Sq.ft.	45/-	Sft	1,60,650.00
15893	Sq.ft.	4) Class-III A Quarters			
		23x691 =15893 Sq.ft.	45/-	Sft	7,15,185.00
7360	Sq.ft.	5) Class III - B Quarters -			
		16x460 = 7360 Sq.ft.	45/-	Sft	3,31,200.00

Qty.	Unit	Items	Rate	Per	Amount
5263	Sq.ft.	6) Class-IV A Quarters 19x277 = 5263 sq.ft.	30/-	Sft	15,789.00
275	Sq.ft.	7) Sanitary block for IV-A. 5x55 = 275 Sq.ft.	30/-	Sft	8,250.00
1662	Sq.ft.	8) Two Room hutments 6x277 = 1662 Sq.ft.	35/-	Sft	58,170.00
1308	Sq.ft.	9) One room hutments 12x109 = 1308 Sq.ft.	35/-	Sft	45,780.00
165	Sq.ft.	10) Sanitary Block for two and one room hutments. 3x55 = 165 Sq.ft.	30/-	Sft	4,950.00
Total for II-B					14,24,529.00

URMODI IRRIGATION PROJECT

Taluka : SARANA Dist. : SARANA

I-HEAD WORKS"K" BUILDINGSSALVAGES VALUE OF TEMPORARY BUILDINGS

	Amount of Rs. in lakhs
1) Cost of temporary buildings	25.257
2) Contingent work at 2%	17.803.
	0.356
	0.506
Total :	25.793
3) Fencing charges at 1%	258
4) Water Supply, sanitation and electrification charges at 15% on residential buildings - i.e. on Rs.14,245/-	2.137
5) Water Supply, Sanitation and electrification at 7.5% on the cost of non-residential buildings, i.e. on Rs. 11,042/-	0.828
	0.606
Grand Total :	29.016
Salvage Value at 15%	4.352
Salvage Value temporary buildings is Rs. 4.352/- lakhs	

URMODI IRRIGATION PROJECTTAL. : SATARADIST. : SATARAI-HEAD WORKS"M" Plantation

Quantity	Unit	Items	Rate	Per	Amount
					Rs. lakhs
Job	-	1) Establishing Nursery including manure, seed and labours, etc. at 10% of total cost.	Lump	-	0.200
Job	-	2) Establishing garden in the colony.	Lump	-	0.300
2000	No.	3) Planting and maintaining road side trees on approach road and in other areas	60.00	No.	1.200
Job		4) Other works	-	Lump	0.300
Total :rs.					2.000 lakhs
=====					

URMODI IRRIGATION PROJECT

141

Tal - Satara Dist - SataraI-HEAD WORKS10' -Miscellaneous

Quantity	Unit	Items.	Rate	Per	Amount
Job	-	1) Medical Services.			
		a) Equiping the dispensary including furnitures, instruments medical and sanitary etc.			
		(Additional and existing)	Lump		1,00,000-00
5	Year	B) Antimaleria measures	Lump		30,000-00
		2) SECURITY SERVICES.			
5	Year	A)-Police Services.			
		No.2 x 400 x 12=9600/year.	9600.	Year	48,000-00
5	Year	B)-Departmental watchman.			
		No.2 x 400 x 12 =9600/year.	9600.	"	48,000-00
		3) Equiping the school with furniture,books, charts etc.			
		(Additional to Existing)	Lump.	-	1,00,000-00
5	Year	4)(A) Rent of Telephone lines installed by P.&T. Departmental			
		1 x 13 Km. x 1000	13000 /Year.		65,000-00
5.	No.	B) Internal system for works cost of lines and phones.	5000./No.		25,000-00
5.	No.	C)-Phone lines for parali colony.	5000. / No.		25,000-00

Quantity	Unit	Items.	Rate	Per	Amount
5.	No.	D)-Working charges of internal system for work.	12000.	No.	60,000-00
JOB	-	5(a)-Water supply to colony an earthern bunds,wells, and distribution lines etc.		Lump.	1,50,000-00
5.	Year.	b)-Running charges of water supply including running of pumps, chemicals,M.&.R. to pipe line etc. complete.	20000	/Year	1,00,000-00
5.	Year.	c)-Repairs to pipe line civil works etc.	5000/	Year	25,000-00
JOB	-	6(a) -Sanitary arrangement for colony external installa- tion and drains (incinator) etc.		Lump	50,000-00
5.	Year	(b)-Running charges of sanitary services.	10000	/Year.	50,000-00
5.	-"-	C)-Staff and labour conveyance two trucks.	20000	/Year	1,00,000-00
5.	-"-	D)-Inspection Vehicles. 6 x 8000 (7)a)-Power supply and Electrification Equipment & external installation.	48000	/Year	2,40,000-00

Quantity	Unit	Items	Rate	Per	Amount
1	No	i) Generators 15 K.W.	1,40,000 /	No.	1,40,000-00
Job		ii) Switch gear	Lump		10,000-00
2	Miles	iii) Distribution lines	12000 /	Miles	24,000-00
100.	No.	iv) Street lights.	500 /	No.	50,000-00
5	Year	v) ^{Running charges.} Running of 15 K.W.set.	20000 /	Year	1,00,000-00
JOB		8) -Fire fighting equip- -ments.	Lump		2,50,000-00
JOB		9) -Recreation commenities including equiping the unity building, gardens, sports etc.	Lump		1,00,000-00
Job		10) -Workmens compensation	Lump		50,000-00
Job		11) -Testing materials inclu- -ding establishing laboratory.	Lump		1,00,000-00
Job		12) Model experiments.	Lump		50,000-00
Job		13) Technical literature	Lump		10,000-00
Job		14) Photographic record.	Lump		10,000-00
Job		15) Printing of reports.	Lump		10,000-00
Job		16) Official ceremonies	Lump		10,000-00
Job		17) Visit of high dignitories.	Lump		10,000-00
Job		18) Miscellaneous	Lump		20,000-00
			Total :		21,60,000-00

Say Rs. :- 21.60 Lakhs

URMODI IRRIGATION PROJECT

144
- 100

TAL: SATARA DIST: SATARA.

I- HEAD WORKS

P- Maintenance

ABSTRACT

5 Years (1) Maintenance of head works during the construction period of project @ $\frac{1}{4}$ % of the cost 275.16 lakhs cost of C-Works.

Year	%	Cost during year Rs.in Lakhs.	Progressive cost Rs.in Lakhs	Amount of maintenance $\frac{1}{4}$ % Rs.in Lakhs.
I-Year	10	27.52	27.52	-
II-Year	15	41.27.	68.79	0.069.
III-Year	25	68.79.	137.58	0.172.
IV-Year	30	82.55.	220.13	0.344.
V-Year	20	55.03.	275.16	0.550.
Total:-				1.135.

(2) Maintenance of temporary and permanent buildings during the construction period of project @ 2% per year on Rs. 32.75 lakhs.

I-Year	60	19.65	19.65	0.393
II-Year	40	13.10	32.75	0.655
III-Year	-	-	32.75	0.655.
IV-Year	-	-	32.75	0.655.
V-Year	-	-	32.75	0.655
				2.358

Year	%	Cost during year Rs.in Lakhs.	Progressive cost. Rs.in Lakhs.	Amount of maintenance $\frac{1}{4}$ % Rs.in Lakhs.
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(3) : Maintenance of approach road and colony roads during construction period of 5% of R-Communication.. (11.75).

I	50	5.87	5.87	-
II	25	2.94	8.81	0.294.
III	25	2.94	11.75	0.441.
IV	-	-	11.75	0.588.
V	-	5.40	11.75	0.588
				<u>3.358</u>
			Total :-	<u>5.404</u>

Say 5.40 lakhs....

URMODI IRRIGATION PROJECTTaluka : SATAJI Dist. : SATAJII-HEAD WORKS10. SPECIAL TOOLS & PLANTS

No.	Items	Amount in Rs. of lakhs
A)	Rated equipment of special tools and plants (as per sub-estimate no.I)	117.97
B)	Non-rated equipment of special tools and plants as per Sub-estimate No. II	11.77
G Total :		<u>129.74</u>
Deduct for receipts and recoveries on capital account :		
C)	Rated equipment due to depreciation transferred to concerned items and balance residual value realised by resale @ 100%	117.97
D)	Non-rated equipment due to resale value @ 10%	1.18
		<u>119.15</u>
Net expenditure debitable to works		<u>10.59 lakhs</u>

URMODI IRRIGATION PROJECT
TALUKA AND DISTRICT - SATARA
(Storage of U/S of Parali)

147

I- HEAD WORKS.

'Q' Special Tools and Plants (Rated Equipments.)

SUB: ESTIMATE NO. I.

I-EXPLANATORY

Qty	Unit	Items	Rate	Per	Amount in Rs.
1	No	1) Core drilling machine with accessories.	1,80,000	No.	1,80,000-00
					1,80,000-00

II-PNEUMETEC DRILLING AND
BLASTING EQUIPMENT.

2.	Nos.	1) Air compressor 365.capacity	1,40,000.	No.	2,80,000-00
Job.	-	ii)Blasting equipment.	Lump		12,000.00
					2,92,000.00

III-EARTHMOVING MACHINERY

2.	Nos	1) Bull-dozer (130 H.P.)and above.	9,20,000.	No.	18,40,000-00.
2.	Nos	2) Scraper motiriscd wheeled (28 x 38) cyd capacity.	1,20,000.	No.	2,40,000-00
2.	Nos	3)Scraper tractor dra ^w (14x23)Cyd.capacity.	2,40,000.	No.	4,80,000-00
2.	Nos	4) Shovel (2.5 to 3 Cuyd) capacity.	8,25,000.	No.	16,50,000.00

Qty	Unit	Items	Rate	Per	Amount in Rs.
3.	Nos	5) Dumpers (10 Cuyd) capacity.	1,90,000.	No.	5,70,000-00
5.	Nos.	6) Water tanker 2000.GAL. Capacity.	1,60,000.	No.	8,00,000.00
2	Nos.	7) Diesel Road Rollers	1,60,000.	No.	3,20,000.00.
1	No.	8) Excavation	19,00,000.	No.	19,00,000.00.
1	No.	9) Rooter	75,000.	No.	75,000.00.
1	No.	10) Motor grader	5,00,000.	No.	5,00,000.00.
1	No.	11) Ripper	25000.	No.	25,000.00.
Total for III :-					84,00,000.00

IV-CONCRETE AND MORTOR PLANTS

2	Nos	1) Crusher 10 Ton capacity.	75,000	No	1,50,000.00.
2	Nos	2) Concrete mixer 7/10 Cft. capacity.	40,000.	No.	1,20,000.00.
3	Nos	3) Morter Mixer 500 Cft. Capacity	25,000	No.	75,000.00
Total for IV :-					3,45,000.00

Qty	Unit	Items	Rate	Per	Amount
<u>V-TRANSPORT EQUIPMENT</u>					
6.	No.	1) Heavy Truck (5 to 7 Ton)			
		Capacity.	1,80,000.	No.	10,80,000.00
4.	No.	2) Jeep with trailer	1,00,000.	No.	4,00,000.00
1.	No.	3) Station Wagon	85,000.	No.	.85,000.00
1.	No.	4) Explosive Van	1,80,000.	No.	1,80,000.00
1.	No.	5) Wheel tractor with trailer	50,000.	No.	50,000.00
1.	No.	6) Oil tanker.	1,70,000.	No.	1,70,000.00
3.	Nos.	7) Light truck.	1,20,000.	No.	3,60,000.00
2.	No.	8) Pick-up-vans.	85,000.	No.	1,70,000.00
1	No.	9) Ambulance.	85,000.	No.	85,000.00
Total for V :-					25,80,000.00

Total for 1 to V. 117.97 Lakhs.

SUB-ESTIMATE NO. II

NON-RATES EQUIPMENT.

2.	Nos	1) Air Compressor	1,80,000	No	3,60,000.00
2.	Nos	2) Jack hammers	4,000.	No.	8,000.00
3.	Nos	3) Vibrators	6,000.	No.	18,000.00
2	Nos	4) Diesel generator set			
		10 to 20 K.W.	35,000/-	No.	70,000.00
2.	Nos	5) Pump 1/2 cusecs.	5,000/-	No.	10,000.00
2.	Nos	6) Pump 1 Cusecs	8,000/-	No.	16,000.00
2	Nos	7) Pump 2 Cusecs.	15,000/-	No.	30,000.00
					5,12,000.00

Qty	Unit	Items.	Rate	Per	Amount
2.	Nos.	6) Diesel Engine 10.H.P.	6,000/-	No.	12,000.00
2.	Nos	7) Sheep foot roller	40,000/-	No.	80,000.00
1.	No.	8) Compression testing machine.	9,600/-	No.	9,600.00
1.	No.	9) Welding machine	30,000/-	No.	30,000.00
1.	No.	10) Platform for weighing	12,000/-	No.	12,000.00
1.	No.	11) Boat	25,000/-	No.	25,000.00
16	Nos.	12) Flood lights.	600/-	No.	9,600.00
1	No.	13) Work shop Unit.	50,000/-	Lump	50,000.00
1.	No.	14) Laboratory testing Unit.	50,000/-	Lump	50,000.00
		15) Hoisting equipment			
1.	No.	(a) Crane on wheel 5 to 10. Tonne.	2,74,000/-	Lump	2,74,000.00
2	Nos	(b)Winches 3 tonnes.	9,000/-	No.	18,000.00
2	No	(C)Chain and pulley blocks of various capacities.	6,000/-	No.	12,000.00
5	Nos	d) Screw jacks of various Capacities.	1,500/-	No.	7,500.00
2.	Nos	e) Tripod 5 tonnes.	2,500/-	No.	5,000.00
2.	Nos	16) Grount Pump.	3,500/-	No.	70,000.00
					11,76,700.00
				Say :-	11,77. Lakhs.

URMODI IRRIGATION PROJECTTaluka SATARA Dist. SATARAI-HEAD WORKSR-COMMUNICATION

Qty.	Unit	Items	Rate	Per	Amount
					Rs. lakhs
3	K.M.	1) Constructing road to colony work shop, etc.			
		M.D.R. Std.	1,00,000	KM	3.00
5	K.M.	2) Constructing temporary approach road to quarry and work site.	25,000	KM	1.25
5	Year	3) Temporary River Crossing during working season.	20,000/-	Year	1.00
13.00	K.M.	4) Strengthening the existing C.D. works on Satara Parali road for conveyance of heavy machinery and resurfacing the existing road.			
		(30000 + 20000/-)	50,000	K.M.	6.50

				Total :	11.75 lakhs
					=====

II - MAIN CANAL & BRANCHES

III - DISTRIBUTUARIES.

UNMODI IRRIGATION PROJECTTAL. : SARANADist. : SARANAII-Main Canal and branches & III-DistributoriesRECAPITULATION SHEET

<u>Sr.No.</u>	<u>Sub-Head</u>	<u>Cost in Rs. lakhs</u>
1.	A- Preliminary Expenses	3.47
2.	B- Land	38.37
3.	D- Regulator	3.34
4.	F- R.H.F. Works	130.82
5.	G- Bridges	6.20
6.	H- Escapes	0.51
7.	K-buildings	22.05
8.	L- Earth Work	72.29
9.	M- Plantation	4.56
10.	O- Miscellaneous	9.36
11.	P- Maintenance	3.65
12.	Q- Special F. & P.	36.94
13.	R- Communication	10.45

	Total for II - Main Canal	342.01 lakhs
	III Distributories	34.12

	Total for II Main Canal and III-Distributories	376.13

		376.13 lakhs

URMODI IRRIGATION PROJECT

154

Tal. : SAJJAN

Dist. : SAJJAN

11-Main Canal and Branches 'A' Preliminary.

Sr. No.	Items	Amount in Rs.
1.	Sub-Estimate No.1.A Preliminary Survey	- 87,346.00
2.	Sub-Estimate No. I.B. Foundation exploration	- 40,030.00
3.	Sub-Estimate No.I-C Soil Survey	- 8,500.00
4.	Sub-Estimate I.D Survey for Material of Construction.	- 7,750.00
5.	Sub-Estimate No.1-E Establishment	- 16,065.00
6.	Sub-Estimate No. II S. & M. Instrument	- 31,860.00
7.	Sub-Estimate No. III Transport and Drilling Equipment	1,49,000.00
8.	Sub-Estimate No. IV Miscellaneous	- 6,000.00
	Total:	13,46,551.00
		=====
	Say Rs. 13.47 lakhs	-----

URMODI IRRIGATION PROJECT

155

Tal-Satara Dist -Satara.

II - Main Canal and Branches 'A' Preliminary.

Qty	Unit	Items	Rate	Per	Amount
<u>SUB-ESTIMATE NO. I-A</u>					
72.	K.M.	1) Double levelling to connect and G.T.S.B.M. and establishing permanent B.M. along the canal alignment.	25.00	K.M.	1,800.00
72.	K.M.	2) Survey for main canal on following contour with trial pits along with tentative alignment.	62.50	K.M.	4,500.00
9000.	Ha.	3) Contour survey for the commanded area including preparation of plans, labour work charged estt. materials etc.	3.10.	Hect.	27,900.00
72.	K.M.	4) Detail alignment survey of distribution system.	22.00	K.M.	1,584.00
37.	Nos	5) Establishing permanent B.M. in commanded area and along canal including necessary double levelling (one at every five mile Sq.m. command)	500.	No.	18,500.00

Qty	Unit	Items	Rate	Per	Amount (Rs.)
490.	Nos.	6) Providing and fixing alignment pillers at every 300.m. internal.			
		a) Approx.			
		b) Approx. pillers 300.			
		c) Alignment pillers, $\frac{196}{10 \times 24 \times 240}$	40.00	No.	19,600.00
20.	Sq.m.	7) Construction of shed for storing survey articles, T & P etc.	86.00	Sq.m.	1,720.00
20.	K.M.	8) Preparing approach road for conveyance of boring machine and equipment of survey articles.	500/-	K.M.	10,000.00
Job.		9) Purchase of petty materials such as K' Oil, Paints, ranging poles etc. complete.	Lump		2,000.00
			Total :-		87,604.00
		Deduct salvage value at 15% of temp. shed.			258.00
			Grand Total :-		87,346.00

Qty	Unit	Items	Rate	Per	Amount (Rs)
<u>SUB-ESTIMATE NO. I.B.</u>					
<u>FOUNDATION EXPLORATION.</u>					
Job.	-	1) Reconnaissance survey for foundation condition of various alternative alignment including same trial pits.	Lumpsum		200.00
		2) Trial bores for detailed investigation with clay &/or diamond drill including preservation of cores in standard core boxes with permability tests.			
200.	R.M.	a) For Major canal C.D. Works 10 c.d. works 2.bores for each app.depth.10.m.	160.00	R.M.	32,000.00.
Job	-	3) Taking trial pits for sizable minor C.D.works on canal.	Lumpsum		3,000.00
27.	Nos	4) Providing standard core boxes for preservation of cores.	90.00	Nos	2,430.00
160.	M.	5) Providing and carrying out water intake tests in cored strata in bore hole at an interval of 1.524, with a ascending and descending order of pressure.	15.00	No.	2,400.00
					----- 40,030.00

Qty	Unit	Items	Rate	Per	Amount
<u>SUB-ESTIMATE NO. I. C.</u>					
<u>SOIL SURVEY.</u>					
90.00	Sq.m.	1) Preliminary soil survey for the entire command including study of sub-soil water table economic survey etc. complete.	50.00	Sq.m.	4,500.00
350.00	Nos	2) Taking trial pits along the main canal for 56 KM.	10.00	No.	3,500.00
JOB	=	3) Miscellaneous	Lumpsum		500.00
					Total : 8,500.00

SUB-ESTIMATE NO. I-DSURVEY FOR MATERIAL OF CONSTRUCTION

Job	=	1) Field survey and mapping of quantity extent etc. for rubble, sand, gravel, and lime quarries.	Lump	K.M.	1,000.00
112.00	Nos	2) Field survey for borrow areas for soil, and murum required for canal earth work 2 Nos for each K.M.	10.00	K.M.	1,120.00
112.00	Nos	3) Collection of materials samples and sending them to laboratory for testing 2 Nos. for each K.M. including testing.	50.00	No.	5,600.00

Qty	Unit	Items	Rate	Per	Amount Rs.
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SUB-ESTIMATE NO. I-E.ESTABLISHMENT

12.	Month.	1) Jr. Survey Asst.	375.00	Month	4,500.00
6	"	2) Survey Mistry	375.00	"	2,250.00
6	"	3) Mistry or Mukadam for Boarding	375.00	"	2,250.00
6	"	4) Tracer	390.00	"	2,340.00
6	"	5) Chowkidar	240.00	"	1,440.00

12,780.00

6) Add Rs.30/- Month as
attendant allowance.

360.00

13,140.00

Add T.A. @ 20% of items No.1,2,&3

1,800.00

Add Survey allowance 25% of Basic pay
on No. 1 above.

1,125.00

Total :- 16,065.00

Say Rs. 0.161. Lakhs.

URMODI IRRIGATION PROJECTTal - Satara Dist-SataraII-Main Canal.

statement showing the S. & M. instrument Provided for II-Main Canal.

A-Preliminaries.

Sr. No.	Name of Instrument and Description.	No. of instrument required for Sub-Dn.	Total No. of Instruments.	Rate as per No. Rs.	Amount in Rs.
1	2	3	4	5	6
1)	Drawing Board (106.63 x 73.76).	12	12	76.00	936.00
2)	" (81.25 x 60.96)	9	9	45.00	405.00
3)	Colour Box 1st size.	6	6	35.00	210.00
4)	Prismatic compass	9	9	275.00	2,475.00
5)	French curve box	3	3	29.00	87.00
6)	Cross staff with stand	12	12	35.00	420.00
7)	Chain Iron 30.m. with 10 arrows.	18	18	55.00	990.00
8)	Instrument box 1st size	6	6	70.00	420.00
9)	-do- 2nd size	3	3	55.00	165.00
10)	Dumpy level with stand	12	12	950.00	11,400.00
11)	Level Spirit	6	6	7.00	42.00
12)	Magnifying glass	3	3	20.00	60.00
13)	Glass tracing 81.25x60.96	-	-	-	-
14)	Planimeter	3	3	150.00	450.00
15)	Protractor circular plastic 15.26 cm.	6	6	6.00	36.00
	22.56.cm.	6	6	15.00	90.00

1	2.	3	4	5	6
16)	Slide rule	6	6	90.00	540.00
17)	Ruller brass parallel 60 cm.long.	6	6	60.00	360.00
18)	Ruller brass parallel 45.72 cm. long.	6	6	45.00	270.00
19)	-do- diaphragm 45.p.	3	3	50.00	150.00
20)	T-Square	21	21	22.00	462.00
21)	Scale boxes with off sets	12	12	35.00	420.00
22)	Set square of 45 and 60 Plastic transferent	21	21	8.00	168.00
23)	Staves levelling 4.m. long	24	24	70.00	168.00
24)	Square optical	3	3	40.00	120.00
25)	Steel tape 30.m.long	6	6	70.00	420.00
26)	"- 15.m. long	6	6	55.00	330.00
27)	Tape metallic 30.m.long	6	6	35.00	210.00
28)	"- 15.m.long	6	6	25.00	150.00
29)	"- 10.m.long	6	6	20.00	120.00
30)	Theodolite with stand.	2	2	3,500.00	7,000.00
31)	Ranging rod 3.m. long with 0.30.m. iron shoe.	12	12	20.00	240.00
32)	Chains iron 20.m.	12	12	40	480.00
33)	Tape refills 30.m.long	3	3	25	75
34)	"- 15.00 m.long.	3	3	20	60
35)	"- 10.00 m. long.	3	3	14	42
36)	Straight edge steel and brass 121,92.cm.	3	3	75.00	225.00

1	2	3	4	5	6
37) Rotameter.		3	3	50.00	150.00
				Total	31,858.00
				Say Rs.	31,860.00

Quantity	Unit	Items	Rate	Per	Amount Rs.
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SUB-ESTIMATE NO.III

TRANSPORT EQUIPMENT.

1	No.	Jeep with Trailor	1,00,000/-	No.	1,00,000.00
1	No	Pump (1/2 cusecs)	4,000/-	No.	4,000.00

Total:- 1,04,000.00

Job	-	3) Equipment field testing Laboratory	Lump	-	25,000.00
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1	No	4) Running of transport vehicle (1.No) for four year.	10,000/-	Year	20,000-00
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Total cost: 1,49,000-00

Say Rs. 1.49. Lakhs.

.....
 qty. Unit Items Rate Per Amount

SUB-ESTIMATE NO. IV

MISCELLANEOUS

Job	-	1) Medical aids provision for first aid boxes to Survey Party.	Lumpsum	500.00
Job	-	2) Technical record and Library including photograph.	Lumpsum	500.00
Job	-	3) Preparing copies of plans and estimates.	Lumpsum	2,000.00
Job	-	4) Preparing original Plans and Estimates for canal structure.	Lumpsum	2,000.00
Job	-	5) Preparing detailed map.	Lumpsum	500.00
Job	-	6) Other Miscellaneous	Lumpsum	500.00

Total : 6,000.00
 =====

Say Rs. 6.06 lakhs

URMODI IRRIGATION PROJECT

		Tal. : SAGAR		Dist. : SARAI	
II-Main Canal and Branches 'B' Land		ABSTRACT			
Qty.	Unit	Items	Rate Per	Per	Amount
1) Land proposed to be acquired for LB & RB Canal and colony.					
82.00	Ha.	a) Waste Land	3050/-	Ha.	2,50,100
313.00	Ha.	b) Jirayat Land	8300/-	Ha.	25,97,900 25,97,900
16	Ha.	c) Bagayat Land	15100/-	Ha.	2,41,600
Total :					30,89,600
2) Compulsory acquisition					
15% of item No. 1					<u>4,63,440</u>
Total :					<u>35,53,040</u> =====
3) Demarcation charges at 3% of above items 1 and 2 on Rs. 3553040					
					1,06,591
4) Interest charges at 6.5% for two years on 10% amount of items 1 and 2 on Rs. 3553040.00					
					92,379
411	Ha.	5) Revenue establishment charges for land acquisition.	100	Ha.	41,100
82.00	Ha.	6) Crop compensation on 25% of land to be acquired except waste land.	500	Ha.	41,000

Qty.	Unit	Items	Rate	Per	Amount
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7) Assessment of land
for two years.

395	Ha.	A) Jirayat Land @ <u>Rs. 3.10</u> for two years			1,225.00
16	Ha.	B) Bagayat Land @ <u>Rs. 7.40</u> for two years.			1,204.00

Total : 38,36,509.00

or 38.37 lakhs

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara

II-Main Canal and Branches 'D' Regulators.

ABSTRACT

 Amount in Lakhs of Rs.

1) Total cost of D-Regulators

along L.B.Canals ...

1.76.

2) Total cost of D-Regulators

along R.B. Canal.

1.58.

 Total :- 3.34 Lakhs.

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara

II-Main Canal and Branches. 'D' Regulator.

LEFT BANK CANAL

Sr.No.	Items	Amount in Rs.
1)	Providing Regulator along the L.B. Canal (As per statement attached).	30,900.00
2)	Providing cross regulators along the L.B. Canal (As per statement attached.)	68,100.00
3)	Providing standing waves flume along the L.B. Canal (As per statement attached).	16,300.00
4)	Providing outlets along the L.B. canal (As per statement attached)	45,000.00
	Total	1,60,300.00
	Add 10% for unforeseen additional works.	16,030.00
	Total	1,76,330.00
	Say Rs. :-	1.76. Lakhs.

URMODI IRRIGATION PROJECTTal: Satara Dist-SataraII- Main Canal and Branches

statement showing the location and probable cost of the 'D'
Regulators L.B. Canal.

Sr.No.	Location & Ch.in Meter	Canal discharge in cusecs.	Area of water way of Regulators for 60% of base width.	Cost in Rs.at Rs.100% Sq.ft.	Remarks.
1)	3010	107	9.30 x 3.5 = 32.60	3260.	
2)	6900	107	9.3 x 3.5 = 32.60	3260.	
3)	11000	107	9.3 x 3.5 = 32.60	3260.	
4)	16000	107	9.3 x 3.5 = 32.60	3260.	
5)	22660	73	8.4 x 3.0 = 25.20	2520.	
6)	27200	73	8.4 x 3.0 = 25.20	2520.	
7)	28050	73	8.4 x 3.0 = 25.20	2520.	
8)	33000	-	-	-	

				20600.	
Add 50% increase in cost of construction material.				10300.	

				30900.	

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara'D' Cross Regulators

statement showing the location and probable cost of 'B' cross Regulators, along L.B. Canal.

Sr.No.	Location & Chainages in K.M.	Canal Discharge in Casecs.	Branch Discharge in Casecs	Products of Canal and Branches discharge.	Amount as per cost of casecs <i>M. & S. Curves</i> in Rs.
1	2	3	4	5	6
1)	1000	124.02	1.00	124.03	2000.
2)	1850	124.02	1.00	124.03	2000.
3)	3000	124.03	2.00	248.06	2000.
4)	4200	124.03	1.00	124.03	2000.
5)	6000	124.03	2.00	248.03	2000.
6)	8000	124.03	2.00	248.03	2000.
7)	9000	124.03	2.00	248.03	2000.
8)	10450	124.03	2.00	248.03	2000.
9)	12000	124.03	4.00	496.06	2100.
10)	14000	124.03	7.00	868.21	2200.
11)	15000	124.03	6.00	744.18	2200.
12)	17000	124.03	14.00	1736.42	2300.
13)	18500	124.03	1.00	124.03	2000.
14)	19200	90.03	2.00	180.06	2000.
15)	20000	90.03	4.00	360.12	2000.
16)	20800	90.03	2.00	180.06	2000.
17)	21000	90.03	2.00	180.06	2000.
18)	22000	90.03	8.00	729.24	2100.
19)	24000	90.03	8.00	729.24	2100.
20)	26500	90.02	6.00	540.18	2100.

1	2	3	4	5	6
21)	27200	90.03	8.00	720.24	2100.
22)	28300	90.03	8.00	870.27	2200.
23)	29000	28.00	8.00	224.00	
24)	30000	28.00	8.00	224.00	
25)	31000	28.00	8.00	224.00	
26)	32500	28.00	4.00	112.00	

45400.

Add 50% for increase in cost of material
and Labour.

22700.

68,100.00

URMODI IRRIGATION PROJECTTal - Satara Dist - Satara

statement showing location and probable cost of standing wave flume for left Bank Canal.

Sr. No.	Location	Canal discharge in Cusecs.	Waterway of S.W.F. in sq.ft.	cost in @ Rs.500/- Sq.ft.	Remarks.
1)	Av. Lead	124.03	(9.3 x 3.5) = 32.60.	16,300.	
				----- 16,300. -----	

Out let for L.B.C.

Qty	Unit	Items	Rate	Per	Amount in Rupees.
30.00	Nos.	Providing outlet	1500/-	No.	45,000/-
					----- Total Rs.: - 45,000.00 -----

URMODI IRRIGATION PROJECTTal - Satara, Dist-Satara

II-Main Canal and Branch 'D' Regulators

Right Bank Canal.

Sr.No.	Item	Amount in Rupees.
1)	Providing regulators along the R.B. Canal (As per statement attached)	32,340.00
2)	Providing cross regulators along the R.B. Canal (As per statement attached)	52,830.00.
3)	Providing standing wave flume along the R.B. canal (As per the statement attached)	16,300.00.
4)	Providing out lets along L.C. R.B. Canal (As per the statement attached)	42,000.00
	Total :-	1,43,470.00
	Add 10% for unforeseen additional works ..	14,347.00.
	Total Cost:-	1,57,817.00
	Say Rs. 1.58. Lakhs.	

URMODI IRRIGATION PROJECT.Tal - Satara Dist-Satara.II-Main Canal and Branches.

statement showing the location and probable cost of the

'A' Regulators R.B. CABAL

Sr.No.	Location Chainage in K.M.	Canal Discharge in Cusecs.	Area of water way of cross regulator 60% of base width Sft.	Cost in Rs.@ Rs. 100/Sq.ft.	Remarks.
1)	3780	107	9.3 x 3.5 = 32.6	3260.	
2)	6000	107	9.3 x 3.5 = 32.6	3260.	
3)	10270	107	9.3 x 3.5 = 32.6	3260.	
4)	12500	107	9.3 x 3.5 = 32.6	3260.	
5)	16075	75	8.7 x 3.0 = 26.1	2610.	
6)	20000	76	8.7 x 3.0 = 26.1	2610.	
7)	24925	42	6.6 x 2.5 = 16.5	1650.	
8)	27000	42	6.6 x 2.5 = 16.5	1650.	
				21560.	

Add 50 % increase in cost of

labours and materials.

10780.

Total:- 32340/-

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara'D' Cross - Regulators.

statement showing the location and probable cost of 'D' Cross Regulator along R.B. Canal.

Sr. No.	Location & Chainage in K.M.	Canal Discharge in Cusecs.	Branch Discharge in Cusecs.	Product of canal & Branch Discharge.	Amount as per cost carve.	Remarks.
1)	1500	107	3.00	321	2000.	
2)	3700	107	3.00	321	2000.	
3)	4000	107	3.00	321	2000.	
4)	5600	107	3.00	321	2000.	
5)	8000	107	3.00	321	2000.	
6)	10400	107	6.8	642	2200.	
7)	11200	107	2.0	214	2000.	
8)	12000	107	5.0	535	2100.	
9)	13200	107	7.0	749	2200.	
10)	16000	76	6.00	456	2100.	
11)	17100	76	3.0	228	2000.	
12)	18300	76	3.00	228.	2000.	
13)	18800	76	5.00	380.	2060.	
14)	20000	76	17.0	1292.	2300.	
15)	22000	76	5.0	380.	2060.	
16)	24200	42	6.0	252.	2000.	
17)	26000	42	15.0	630	2200.	
					35,220.	
Add 50% increase in cost of labour and material.					17,610.	
Total :-					52,830.00.	

URMODI IRRIGATION PROJECT.Tal -Satara Dist-Satara.

Statement showing the location and probable cost of standing wave flume for Right Bank Canal.

Sr.No.	Location	Canal Discharge in Cusecs	Water way of S.W.F.	Cost in Rs.10% Sq.ft. 500/-	Remarks.
1)	Av. Lead	107	9.3 x 3.5 = 32.6.	16,300/-	
				Total :-	16,300/-

Out lets for R.B. Canal

Quantity	Unit	Items	Rate	Per	Amount in Rs.
28.Nos	Nos.	Providing cut let on right bank canal.	Rs.1500/-	No.	42,000/-
					Total :- 42,000/-

URMODI IRRIGATION PROJECTTal-Satara Dist-Satara

II-Main Canal and Branches ...

F.R.H.T. Works.

Sr. No.	Name of F.R.H.T. work	Amount of Lakhs L.B.C.	In Rs. R.B.C.	Total Amount in Rs. of Lakhs.	Remarks.
1)	Providing H.P.Culverts along L.B. & R.B. Canal	8.11	7.63	15.74.	
2)	Providing slab drain L.B. & R.B. Canal.	34.40	30.10	64.50.	
3)	Providing canal syphan along L.B.C. & R.B.C.	5.45	5.20	10.65	
4)	Providing Aqueduct along L.B.C. & R.B.C.	9.40	23.36	36.76.	
5)	Providing super passage along L.B. & R.B. Canal.	0.96	-	0.96.	
6)	Providing Nalla - Diversion to L.B. and R.B. canal.	1.69.	0.52	2.21.	
Total :-		60.01.	70.81.	130.82.	

Total cost of F.R.H.T. works = 130.82. Lakhs

URMODI IRRIGATION PROJECT

Tal-Satara Dist-Satara.

Statement Showing the details and cost

Sr. No.	Location Chainage in M.	C.A. in Sq. Mile of Nalla	C.A. of Diverted Nalla if any	Total C.A. in Sq. Mile	Nalla Dis-charge in Cusecs.	Nalla bed in R.L. in metrs.
1	2	3	4	5	6	7
1)	900	0.17	-	0.17	330	656.62
2)	3220	0.08	-	0.08	160	657.60
3)	3720	0.17	-	0.17	330	656.77
4)	4390	0.25	-	0.25	490	655.89
5)	6750	0.07	-	0.07	135	654.58
6)	7085	0.04	-	0.04	75	655.220
7)	7295	0.07	-	0.07	135	656.570
8)	8785	0.09	-	0.09	110	652.19
9)	13485	0.17	-	0.17	330	653.96
10)	15285	0.15	0.04	0.19	370	652.85
11)	16655	0.16	-	0.16	300	654.08
12)	18230	0.15	0.03	0.18	350	653.90
13)	20095	0.10	-	0.10	220	655.00
14)	21305	0.05	-	0.05	100	653.33
15)	22660	0.18	-	0.18	350	652.69
16)	23125	0.10	-	0.10	200	652.81
17)	28050	0.03	0.03	0.06	120	651.62

Note: continued on further page is 178-B.

of (H.P.) Culverts along proposed URMODI L.B.C.

Canal bed R.L. in Metrs.	Different in Nalla bed & C.B.L.	No. of vents.	Cost of structure per vent based on estimate.	Total Cost in Rs.	Remarks.
8	9	10	11	12	13
661.2	4.62	5	14,990.00	74,950.00.	
660.35	2.75	2	"	29,980.00.	
660.20	3.42	5	"	74,950.00.	
660.00	4.11	7	"	1,04,930.00.	
659.365	4.765	2	"	29,980.00.	
659.245	4.025	1	"	14,990.00.	
659.160	2.590	2	"	29,980.00.	
658.635	6.455	2	"	29,980.00.	
657.26	3.30	5	"	74,950.00.	
656.00	3.75	4	"	59,960.00.	
656.36	2.28	4	"	59,960.00.	
655.95	2.05	5	"	74,950.00.	
655.40	0.4	3	10,109	30,327.00.	
655.01	1.68	2	"	20,218.00.	
654.62	2.53	5	"	50,545.00.	
654.49	1.68	3	"	30,327.00.	
652.995	1.375	2	"	20,215.00.	
				8,11,192.00.	

Total L.B.C. Rs. 8.11.Lakhs.

Total R.B.C. Rs. 7.63.Lakhs.

Grand Total 15.74.Lakhs.

URMODI IRRIGATION PROJECT

Ta:-Satara Dist-Satara

Statement Showing the details of Cost

Sr. No.	Location in M.	C.R.in Sq.Mile of Nalla	C.R.of Diverted Nalla if any.	Total C.R. in Sq.Mile	Nalla dis-charge in Cusecs.	Nalla R.L. in Mtrs.
1)	1050	0.06	-	0.06	120	651.070
2)	2090	0.03	-	0.03	60	650.810
3)	2905	0.21	-	0.21	495	654.425
4)	8990	0.15	-	0.15	290	656.275
5)	9590	0.20	-	0.20	390	657.410
6)	9810	0.08	-	0.08	160	655.700
7)	10265	0.15	-	0.15	290	654.140
8)	12635	0.18	-	0.18	345	655.73
9)	12845	0.14	-	0.14	270	656.630
10)	15360	0.22	-	0.22	435	654.285
11)	15500	0.20	-	0.20	390	653.980
12)	16250	0.12	-	0.12	230	655.690
13)	16775	0.04	-	0.04	80	654.910
14)	17215	0.10	-	0.10	200	652.635
15)	21,475	0.18	-	0.18	345	650.810
16)	26415	0.03	-	0.03	160	648.785
17)	26670	0.22	-	0.22	435	650.070

of Hume Pipe Culverts proposed along R.B. Canal.

Canal bed R.L. in Mtrs.	Different in Nalla bed and C.B.L.	No. of vents.	Cost of structure per vent based on estimate.	Total Cost in Rs.	Remarks.
660.755	9.685	2	14,990.00	29,980.00.	
660.505	9.695	1	-"-	14,990.00.	
660.210	5.785	5	-"-	74,950.00.	
658.630	2.355	4	-"-	59,960.00.	
658.380	0.970	5	-"-	74,850.00.	
658.300	2.60	2	-"-	29,980.00.	
658.140	4.00	4	-"-	59,960.00.	
657.510	1.70	4	-"-	59,960.00.	
657.460	0.830	4	-"-	59,960.00.	
656.770	2.485	6	11,192.00	67,152.00.	
656.730	2.750	5	-"-	55,960.00.	
656.480	0.790	3	-"-	33,576.00.	
656.265	1.355	1	-"-	11,192.00.	
656.105	3.470	3	-"/-	33,576.00.	
654.530	3,720	4	-"-	44,768.00.	
652.965	3.980	2	6,513.00	13,026.00.	
652.910	2.80	6	6,513.00	39,078.00.	

Total : 7,63,018.00.

Say :- 7.63.Lakhs.

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara.Hume Pipe Culverts at Ch.15,885. M/L B.Canal.

A) Nalla bed R.L.	652.850.m.
Canal bed R.L.	656.600.m.
Canal discharge	124.03 Cusecs.
Nalla Discharge	2.90 Cusecs.

B) Design Details

Dia. of pipe	1.2.m.(4.ft).
Area of pipe	12.60.Sq.ft.
Velocity assumed	6.00ft/sec.
Discharge through pipe =	12.6 x 6 cusecs.
=	78. cusecs.

$$\therefore \text{No. of (Pipes) Vents} = \frac{290}{75} = 4. \text{ Nos.}$$

Provide H.P. Drain 4 in 4 Rows.

URMODI IRRIGATION PROJECT.Tal-Satara Dist-Satara.TYPE ESTIMATE FOR HUME PIPE CULVERTS.

Abstract of estimate of construction of Hume Pipe Culverts at
Ch.15,885 m of Urmodi Left Bank Canal (4 -Rows of 1350 mm. ϕ Pipe)

Qty	Unit	Items	Rate	Per	Amount
Job -		1) Cleaning the site	Lump	-	1000.00.
		2) Excavation in soil and soft murum and sand including dressing the site and trenches and stacking the materials nearly within a lead of 15.m. and lift 3.m.etc.			
46.08	Cum.	(A) Complete	3.50	Cum.	161.00.
38.40	Cum.	(B) Complete in Hard-murum	6.40	Cum.	246.00.
5.76	Cum.	3) Providing and laying plain cement concrete 1:4:8 mix metal, 40 mm gauge from broken hard trap stone including form work, placing ramming, casing, and finishing, etc. complete for foundation.	146.90	Cum.	846.00.
1.80	Cum.	4) Providing and laying Cement concrete (1:2:4) for copying etc. complete.	235.40	Cum.	424.00.
				C.O.	2,677.00.

Qty.	Unit.	Items.	Rate	Per	Amount
191.70	Cum.	6) Providing and laying U.C.R.masonry in c.m.(1:5) proportion for foundation and super structure inclu- -ding watering etc. complete.	120.80	Cum.	12,285.00.
23.50	Sq.m.	6) Providing cement pointing in U.C.R. masonry (1:3) proportion including curing etc. complete.	2.60	Sq.m.	61.00.
63.50	Sq.m.	7) Providing rough stone revetment and approx. 30 to 45 cm. thick with large size trap stone of approved quality including watering, ramming etc.complete.	6.70	Sq.m.	425.00.
135.20	R.M.	8) Providing and laying in position and jointing the H.Pipe NO.2 class of 200 m Ø including water tight joints with c.m. (1:1) proportion fixing smooth collar etc. complete as directed.	386.70	R.M.	40,681.00.
132.22	Cum.	9) Providing and laying the murum bedding below pipes and murum cushioning above the pipe including watering tamping, etc.complete.	5.20	Cum.	688.00.

Qty	Unit	Items	Rate	Per	Amount
26.00	Nos.	10) Providing and fixing guard stones of trap stone of size 75mm fixed in standard block of C.C. of 1:4:8 proportion.	10.50	No.	273.00
Total :-					57,090.00
Add 5% for contingencies on Rs. 57090.00					1,683.00
Total					58,773.00
Add 2% for W.C. Establishment					1,175.00
Total :-					59,948.00
Say Rs.					59,948.00
Length of structure 10.m.					
Rate per meter = $\frac{59948}{10}$					10.00
Rs. = 5994.80					Total Rs. 5,994.80
Say Rs. :-					5994.80

184-A, I

URMODI IRRIGATION PROJECT

Tal: SATARA - DIST: SATARA

Statement Showing the details

Sr. Location No.	Chainage in M.	C.A. In Sq. Mile of Nalla	Chn. of Diverted Nalla if any.	Total C.A. in Sq. Mile.	Nalla discharge in Cusecs.	Nalla bed R.L. in Metrs.
1	2	3	4	5	6	7
1)	2672	0.37	-	0.37	705	657.60
2)	3010	0.26	-	0.26	500	653.59
3)	4670	0.21	-	0.21	405	654.17
4)	4920	0.29	-	0.29	560	654.22
6)	5600	0.33	-	0.33	720	654.48
6)	6350	0.19	-	0.19	370	654.07
7)	9335	0.67	-	0.67	1250	652.68
8)	7565	1.01	-	1.01	1890	656.01
9)	12,585	0.39	-	0.39	750	654.86
10)	15,450	0.29	-	0.29	560	654.20

And cost of Slab Drain along proposed URMODI L.B.C.

canal bed R.L. in Meters.	Differ- ence Nalla bed and C.B.L.	No. of Span	Cost structure Span.	Total cost in Lakhs.	Remarks.
8	9	10	11	12	13
660.54	2.94	2	2.15	4.30	
660.40	6.81	1	2.15	2.15	
659.90	5.73	1	2.15	2.15	
659.80	5.58	1	2.15	2.15	
659.75	5.20	2	2.15	4.30	
659.47	5.40	1	2.15	2.15	
658.49	5.49	2	2.15	4.30	
659.04	3.03	3	2.15	6.45	
657.76	2.90	2	2.15	4.30	
656.70	2.50	1	2.15	2.15	
Total				34.40	Lakhs.

URMODI IRRIGATION PROJECT

Tal-Satara

Dist-Satara

Statement Showing the details and Cost of Slab

Sr. No.	Location Chainage in M.	C. of Nalla in Sq.Miles.	C. of diverted Nalla.	Total C. in Sq.Mile.	Nalla discharge in Cusecs.	Nalla bed level in M.
1	2	3	4	5	6	7
1)	1155	0.40	-	0.40	767	650.6600
2)	4960	0.83	-	0.83	1515	656.1100
3)	5810	0.48	-	0.48	900	654.9600
4)	7040	0.23	-	0.23	440	653.4000
5)	7500	0.45	-	0.45	355	656.4700
6)	14655	0.31	0.20	0.51	990	652.1000
7)	18210	0.33	-	0.33	630	653.9900
8)	26125	0.32	-	0.32	615	651.7300

drain along proposed URMODI L.B.C.

Canal bed level in M.	Difference in Nalla bed and Canal bed.	No. of Span	Cost of structure Span.	Total cost in Lakhs.	Remarks.
8	9	10	11	12	13
660.750	10.09	2	2.15	4.30.	
659.545	3.435	3	-"-	6.45.	
659.300	4.34	2	-"-	4.30.	
659.175	6.775	1	-"-	2.15.	
659.03	2.56	2	-"-	4.30.	
656.98	4.88	2	-"-	4.30.	
655.77	2.78	1	-"-	2.15.	
653.06	1.325	1	-"-	2.15.	
Total :-				30.10. Lakhs.	

URMODI IRRIGATION PROJECTTal-Satara Dist-SataraSLAB DRAIN :-

Ch. 4670 m.	of left Bank Canal.
Nalla bed R.L.	654.17.m.
Canal Bed R.L.	659.90.m.
Canal Discharges	124.03 Cusecs.
Nalla Discharges	405 Cusecs
Span	4.m.
Cost as per Estimate Rs.:-	2,15,109.00.

DESIGN DETAILS :-

Nalla Discharge	405 Cusecs.
Flood depth assumed	3.m.(10ft)
velocity assumed.	

URMODI IRRIGATION PROJECT.

187

Tal-Satara Dist-Satara

Type Estimate for slab Drain L.B. Canal at Ch.4670.m. and of L.B.Canal.

Qty	Unit	Items	Rate	Per	Amount
Job -		1) Clearing the site	Lump	-	500.00
1020	Cum.	2) Excavation in different strata including dressing the sides of trenches and stacking the materials neatly as directed etc.complete.	3.50	Cum.	3,570.00
45.00	Cum.	3) Providing and laying cement concrete (1:4:8) mix metal 40mm gauge from broken hard trap stone including formwork ramming, curing and finishing etc.complete.	146.90	Cum.	6,610.00
1300	Cum	4) Providing and constructing U.C.R. Masonary in c.m.(1:5) proportion for a super structure including watering C.P.(1:3) etc.complete.	124.90	Cum.	1,62,370.00
2.00	Cum.	5) Providing and laying Plain cement concrete(1:2:4) mix for bed etc.complete.	217.40	Cum.	435.00

Qty	Unit	Items	Rate	Per	Amount
39.	Cum.	6) Providing and laying cement concrete (1:2:4) proportion ordinary grade, in position form work placing etc.complete.	235.40	Cum	9,181.00
3.5 Tonnes		7) Providing and fixing in M.S.reinforcement as per design including laying, bending, hooking etc. complete.	5402.60	Cum.	18,930.00
Job -		8) Providing expansion joints for R.C.C.slab on load bearing wall of slab with per moulded filter with copper plate etc. complete.	Lump	-	500.00
53.00	Cum.	9) Providing and fixing rough stone revetment 30cm to 45 cm thick with large size trap stone of approved quality etc.complete.	6.70	Cum.	355.00
6.00	Cum.	10) Providing and filling in revetment with available stuff etc.complete.	5.20	Cum.	31.00
60	Cum.	11) Providing earthwork in embankment with available stuff from excavation and stacked neatly as directed etc.complete.	5.20	Cum.	312.00

Qty	Unit	Item	Rate	Per	Amount
4.	No.	12) Providing and fixing guard stones including white washing etc.. complete.	10.50	Cum.	42.00
Job -		13) Dewatering the foundation.	Lump	-	500.00
Job -		14) Testing	Lump	-	500.00
Job -		15) Miscellaneous items if any.	Lump	-	1,000.00
				Total:-	2,04,836.00
		Add 3% for contingencies:-			61,450.55
				Total:-	2,10,891.00
		Add W.C. Establishment @ 2% =			4,218.00
				Total	2,15,109.00
				Say Rs.:	2.15 Lakhs.

URMODI IRRIGATION PROJECTTa-Satara Dist-SataraStatement Showing the details of Cost Syphon Along

Sr. No.	Location Ch.in.M.	C.A.of Nalla	C.A.of diverted nalla if any..	Total C.A.	Nalla Dis-charge in Cusecs.	Nalla R.L. in M.
1	2	3	4	5	6	7
1)	2370	0.08	-	0.08	160	660.19
2)	2330	0.08	-	0.08	160	662.22
3)	8340	0.08	-	0.08	160	658.84
4)	10055	1.04	-	1.04	1960	656.90
5)	10410	0.06	0.03	0.09	175	658.87
6)	11300	0.34	-	0.34	650	657.92
7)	12975	0.43	-	0.43	1160	655.72
8)	13100	0.14	-	0.14	270	658.23
9)	13230	0.09	-	0.09	180	658.67
10)	13980	0.32	-	0.32	620	657.35
11)	14160	0.19	0.03	0.22	430	657.37
12)	14165	0.37	=	0.37	705	658.31
13)	14320	0.21	-	0.21	450	657.77
14)	15290	0.18	0.05	0.23	425	655.80
15)	16465	0.16	-	0.16	300	656.87
16)	17185	0.07	-	0.07	135	655.05
17)	18660	0.30	-	0.30	570	654.97
18)	18870	0.29	-	0.29	560	654.98
19)	19335	0.57	-	0.57	1080	655.95
20)	19790	0.47	-	0.47	900	654.90

F.R.H.T. Works.proposed URMODI L.B.C.

Canal bed R.L. in M.	Differ- -ence in Nalla bed and C.B.L.	Bank length of the syphen Nalls.	Cost of structure Per Km. Length based on actual estimate	Total cost in Rs. thousand.	Remarks.
8	9	10	11	12	13
660.515	+ 325	2m	3634	7268.	
660.480	- 1.74	2 m.	"	7268.	
658.765	- 0.085	2 m.	"	7268.	
658.28	1.36	14	"	50876.	
658.15	- 0.75	2.m.	"	7268.	
657.82	- 0.10	5	"	18170.	
657.37	1.65	8	"	29072.	
657.33	- 0.90	2	"	7268.	
657.30	- 1.37	2.m.	"	7268.	
657.115	- 0.235	5	"	18170.	
657.065	- 0.305	3	"	10902.	
656.93	1.33	6	"	21804.	
656.87	- 0.90	4	"	14536.	
656.73	+ 0.93	3	"	10902.	
656.405	- 0.465	3	"	10902.	
656.225	+ 1.175	2	"	7268.	
653.815	0.845	5	"	18170.	
655.745	0.754	4	"	14536.	
655.615	0.33	9	"	32706.	
655.485	0.585	8	"	29072.	

Contd...

191-A

1	2	3	4	5	6	7
21)	20695	0.23		0.23	540	655.16
22)	21600	0.65	0.02	0.67	1253	656.22
23)	22500	0.25	0.02	0.27	530	655.78
24)	22900	0.08		0.08	160	656.25
25)	23010	0.13		0.13	250	654.21
26)	23470	0.11		0.11	210	654.92
27)	23930	0.16		0.16	310	654.00
28)	24950	0.27		0.27	525	654.19
29)	25475	0.50		0.50	945	653.87
30)	25900	0.09		0.09	180	654.61
31)	28250	0.03	0.03	0.06	120	652.55
32)	28750	0.03		0.03	60	653.60
33)	29750	0.27		0.27	525	654.19
34)	30800	0.18		0.18	425	654.19
35)	32000	0.16		0.16	310	654.00

192-A

URMODI IRRIGATION PROJECT
Sal- Satara Dist- Satara

Statement showing the details of Cost of Canal

Sr. No.	Location Ch.in.M.	C.A. of Nalla	C.A. of Diverted Nalla if any.	Total C.A.	Nalla discharge in cusecs.	Nalla bed R.L. in.M.
1)	235	0.14	-	0.14	270	660.99
2)	600	0.17	-	0.17	330	660.99
3)	5110	0.13	-	0.13	250	659.895
4)	5890	8.02	-	8.02	7980	666.505
5)	11225	0.14	0.09	0.23	450	654.760
6)	11910	0.26	0.07	0.33	740	656.62
7)	13425	0.06	-	0.06	120	658.13
8)	14070	0.32	-	0.32	615	658.83
9)	18430	0.59	-	0.56	1110	655.01
10)	18850	0.2	-	0.2	500	656.025
11)	20987	0.44	-	0.44	840	654.32
12)	22348	0.21	-	0.21	405	653.84
13)	23250	1.73	0.08	1.81	3310	652.28
14)	24170	0.21	-	0.21	405	653.3
15)	24925	0.25	-	0.25	945	652.01
16)	25425	0.80	-	0.80	1280	651.14

Syphan along proposed URMODI L.B.C.

Canal bed R.L.in.M	Difference in Nalla and G.B.L.	Barrel length of the Syphan Nalla.	Cost of structure per r.m. length based on actual estimate.	Total cost in Rs. thousand.
661.00	0.01	2.m.	3634	7268.
666.78	0.29	2.m.	"	7268.
659.545	0.35	3	"	10902.
659.20	2.695	58	"	210772.
657.905	3.145	3	"	10902.
657.7	1.08	5	"	18170.
657.315	0.815	1	"	3634.
657.14	0.71	5	"	18170.
655.705	0.695	8	"	29072.
655.5650	0.460	4	"	14536.
654.785	0.465	6	"	21804.
654.38	0.36	3	"	10902.
654.06	1.70	24	"	87216.
653.76	0.46	3	"	10902.
653.42	1.41	7	"	25438.
653.265	2.125	9	"	32706.
			Total:-	5,19,662.00

Say Rs. 5.20. Lakhs.

URMODI IRRIGATION PROJECTTal - Satara Dist - Satara.CANAL SYPHON(with two walls of 1 m ϕ and inlet H.P. of 1.22m. $\phi \frac{3}{4}$)

 Location CH. 18660/- L.B.C.

C.B.L. 655.815.m.

Nalla bed R.L. 654.970.m.

0.845.m.

Nalla C.A. 0.30 Sq.miles.

Nalla Discharge = 570 cusecs

Data Assumed

Water depth = 2.m. (6ft)

1) Strata of 1m, Soil, 2m H.M.
and 2.15 m.S.R. is

App. Velocity = 7.ft/sec.

assumed.

Canal :-

Discharge : 62.00.cusecs.

ii) Well foundation is

B.W. : 14.00.ft.

considered on the top level of

F.S.D. : 3.00.Ft.

H.R.

F.B. : 2.00.ft.

iii) Depth of well depends

V : 1.567.ft.

upon the strata met with.

Design Details.

• Length of barrel required $\frac{570}{42} = 13.6.ft.$

Barrel length provided = 5.m.

URMODI IRRIGATION PROJECTTal -Satara Dist-Satara

II Main Canal Type estimate for Syphon C.D. Works at Ch.18660 M.
of L.B. Canal.

Qty	Unit	Items	Rate	Per	Amount
Job	-	1) Clearing the site		Lumpsum	500.00.
117	Cum	2) Excavation for foundation in soil and S.M. for wells and inlet pipe for syphons including stacking the materials as directed lead 50.m. and lift upto 2.m,	3.50	Cum.	409.00.
142	Cum	3) Excavation in Hard-Murum B.for foundation and constructing well etc. including the stacking the materials, as specified with lead upto 50m. and lift 2.m.	6.40	Cum.	909.00.
56	Cum.	4) Excavation in soft rock for well, inlet pipe including stacking the materials as directed for average lead of 25.m. lift of 4.m.	8.80	Cum.	493.00.
3.30	Cum	5) Providing and laying plain cement concrete (1:3 :6) at the base of wells and coping on top of wells including formwork curing etc.completc.	167.80	Cum.	554.00.

Qty	Unit	Items	Rate	Per	Amount
43.5	Cum	6) Providing and constructing U.C.R. masonry in c.m.(1:5) for inlet and outlet wells including scaffolding and pointing to the exposed faces etc.complete.	124.90	Cum	5,433.00.
10.	Cum	7) Providing and laying H.M. bedding under inlet pipe.	5.20	Cum	52.00.
10.	R.M.	8) Providing and laying and jointing hume pipe of 1200mm. dia connecting two wells including collars etc.	386.70	R.M.	3,867.00.
8.	Nos	9) Providing and fixing M.S.Grills etc.	525.00	Nos	4,200.00
Job =		10) Refilling of H.M. for Nalla surface.		Lumpsum	400.00.
Job -		11) Miscellaneous items such as dewatering the foundation and other unforeseen items.		Lumpsum	500.00.
					Total 17,335.00.
Add 3% for contingencies excluding lump items.					478.00.
					17,813.00
Add 2% W.C.Establishment :-					356.00.
					Total 18,169.00.
Cost per R.M. Rs. 5/-					18,169.00.
					= 3,633.80.
					Say Rs.3,634/-

-: URMODI IRRIGATION PROJECT :-

Tal-Satara Dist-Satara. (F.R.H.T.works).

Statement showing the details and cost of Aqueduct along proposed Urmodi Canals.

Jr. No.	Location in M.	Catchment area in Sq.m.	Nalla bed level in.m.	Canal bed level in m.	Diff.in Nalla bed & Canal bed in m.	Max.flood discharge of Nalla in cusecs.	No.of Span.	Cost of Aqueduct. in Rs.@ 85,500. thousand per Span.	Remarks.
<u>LEFT BANK CANAL.</u>									
1)	1630	5.92	652.76	660.92	8.16	13.150	9	7,69,347.00	As per actual
2)	2231	1.33	654.18	660.70	6.52	2,500	2	1,71,000.00	estimate.
								Total :-	9,40,347.00.
<u>RIGHT BANK CANAL :-</u>									
1)	3775	8.96	649.670	659.700	10.03	17,420	10	8,55,000.00	
2)	235	1.09	651.580	658.805	7.225	2,050	1	85,500.00.	
3)	15075	14.74	641.240	656.875	14.635	23,840	13	11,11,500.00.	
4)	19145	6.16	646.800	655.470	8.670	13,530	8	6,84,000.00.	
								Total :-	27,36,000.00.
								Total :-	36.76 Lakhs. (9.40 + 27.36) L.B.C. R.B.C.

ERMUDI IRRIGATION PROJECTTal-Satara. Dist-Satara.AQUEDUCT

Details of Aqueduct on L.B. Canal at Ch.1630.m.

Nalla bed R.L.		652.760.m.
Canal bed R.L.		660.920.m.
Canal Discharge		107.Cusecs.
Nalla discharges		13,150.cusecs
Flood depth		4.5.m.(15ft).
Velocity		6.ft./sec.
Length required	=	$\frac{13150}{90}$
	=	146.ft. Say 150.ft.

• •
 Cost of Aqueduct as per estimate Rs. 7,69,347.00.

Cost of Aqueduct as per Cost curve.

		<u>Lakhs.</u>
Cost per meter	=	0.142
Cost per span of	=	0.85

URMODI IRRIGATION PROJECT.Tal-Satara Dist-Satara.

Type Estimate of Aqueduct of L.B.C. at Ch.1630.m.

ABSTRACT

Qty	Unit	Items	Rate	Per	Amount
Job	-	1) Clearing the site	Lumpsum		2,000.00.
1664.58.Cum		2) Excavation in soil and murum for foundation of embankment, wing walls and pillers and piers.	3.50	Cum	5,826.00.
1778.97.Cum		3) -do- in S.R.	8.80	Cum	15,655.00.
707.46 .Cum		4) -do- in H.R.	21.00	Cum	14,857.00.
424.46 cum		5) Providing and laying c.c. 1:3:6 for foundation of abutment wing wall piers etc. complete.	167.80	Cum	71,224.00.
4567.00 4576.09.Cum		6) Providing and laying U.C.R. masonry (1:5) for abutment wing wall pier etc. complete.	120.80	Cum	5,52,792.00.
135.74 Cum		7) Providing and laying R.C.C. work (1:2:4) for slab including sides of canal section and bed block excluding steel etc. complete.	235.40	Cum	31,953.00.
6.51 Ton		8) Steel for R.C.C. work 2% of R.C.C. by wt.	5408.60	Ton	35,210.00.

Qty	Unit	Items	Rate	Per	Amount
1090.26	Sq.m.	9) Providing and laying pointing for exposed surface of abutment, wing, walls, piers etc.complete.	2.60	Sq.m.	2,835.00.
Total :-					7,32,352.00.
Add 3% for contingencies :=					21,910.00
Total:-					7,54,262.00.
Add 2% W.C. Estt.					15,085.00.
					7,69,347.00.

Cost of Aqueduct per meter = $\frac{7,69,347.00.}{54}$
= 14,247/- Say : 14,250/-

Cost per Span = $14,250 \times 6 = 85,500/-$
Say :- 85,500.00.

-: URMODI IRRIGATION PROJECT :-

Tal: Satara Dist-Satara

F- R.H.T. work.

Statement showing the details and cost of Super Passage proposed on URMODI L.B.C.
and R.B.C.

Sr. No.	Location in M.	C.A.of Nalla in Sq.Miles.	Nalla bed in M.	Canal bed level in m.	Diff. between Nalla bed and Canal bed in m.	max.Nalla discharge in Cusecs.	Nos.of vents.	Cost in Rs.	Remarks.
<u>LEFT BANK CANAL :-</u>									
1)	60	0.12	674.29	661.40	12.89	240	-	70,870.00.	
2)	105	0.10	666.53	661.30	5.23	200	-	25,000.00	
								Total :-	95,870.00.
								Say Rs. :-	00.96.Lakhs.

URMODI IRRIGATION PROJECT

Tal : Satara Dist:Satara

H.P. Super Passage at Ch.60 M. of L.B.C.

Nalla bed R.L.	674.29.m.
Canal bed R.L.	661.40.m.
Canal discharge	107 Cusecs
Nalla discharge	240 Cusecs
flood depth	5 ft. assumed.
Velocity.	6.ft/sec.
Per foot run	= 6 x 5 = 30.
Length of barrel	$\frac{240}{30} = 8.ft.$
Length of pipe provided of 1.2.mt. dia pipe	= 5.m.
Cost of Super. passage Rs.	70,870/-
Cost per meter	Rs. $\frac{70,870}{5} = 14,174.00.$

URMODI IRRIGATION PROJECTTal-Satara Dist-Satara

Type estimate for Super passage at Ch.60.M. of L.B.C.

II main Canal and branches.

ABSTRACT

Qty	Unit	Items	Rate	Per	Amount
Job	-	1) Clearing the site	Lumpsum		500.00
		2) Excavation for head wall and wing wall in different strata, as shown below including stacking the materials as directed.			
308.	Cum	i) Soil and soft murum	3.50	Cum	1,078.00.
624.	Cum	ii) Hard murum and boulders average lift 3.m.	6.40	Cum	3,994.00.
260.00	Cum	iii) Soft rock average lift 5.m.	8.89	Cum	2,288.00.
125	Cum	iv) Hard rock with average lift of 11.m.	21.00	Cum	2,625.00.
12	Cum	3) Providing and laying c.c. 1:3:6 for foundation of head wall, wing wall and on top of wall i.e. coping etc. complete.	167.80	Cum	2,014.00.
371.	Cum	4) Providing and constructing of U.C.R. masonry in c.m.(1:5) for lead wall, wing wall, including C.P.1:3 striking joints scaffolding & curing etc.	124.90	Cum	46,338.00

Qty	Unit	Items	Rate	Pcr	Amount
16.00	R.M.	5) Providing and fixing in position 1:2 m ² and in level Hume pipe with collars and other etc. complete.	386.70	R.M.	6,187.00.
40.00	Cum	6) Providing and laying rubble 225 mm. (9") for nalla bed.	11.20	Cum.	448.00.
11.	Cum	7) Providing and laying murrum filling below hume pipe bedding.	5.20	Cum	57.00.
Job	-	8) Dewatering the foundation.	Lump	-	1,000.00
Job	-	9) Miscellaneous items such as unforeseen items	Lumpsum	-	1,000.00
			Total :-		67,529.00.
		Add 3% contingencies			1,951.00
		Add 2% W.C. Estt.			1,390.00.
		Total			70,870.00.
		Say :-			70,870/-

204-A

URMCDI IRRIGATION PROJECT

Tal: Satara - Dist: Satara -

Statement showing the details of Cost of Diversion.

Sr.No.	Location Chainage in M.	Catchment Area of Nalla.	Nalla bed level (in.m.)	Canal bed level in M.	Difference between Canal bed & nalla bed level in m.
1)	10,715	0.03	657.24	653.025	+ 0.785
2)	12,845	0.18	656.47	657.400	+ 0.930
3)	14,225	0.03	656.82	657.045	0.225
4)	16,110	0.04	654.23	656.445	+ 2.265
5)	17,780	0.03	656.12	656.075	- 0.045
6)	20,400	0.01	654.30	655.290	+ 0.990
7)	21,825	0.02	656.30	654.860	- 1.440
8)	22,275	0.02	652.83	654.730	+ 1.900
9)	26,725	0.03	651.59	653.375	+ 1.785
10)	27,105	0.04	652.110	653.265	+ 1.155
12)	27,360	0.03	650.110	653.195	+ 3.085
12)	27,880	0.03	652.210	653.045	+ 0.835
13)	28,110	0.03	653.250	652.970	- 0.280

along proposed URMODI L.B. Canal.

Max.flood discharge of Nalla in cusecs.	Proposed diversion in Nalla at location (Cft.in meter).	Cost of diversion	Cost of Diversion has been assumed as Rs.13,000/- in Manjra Project.
60	10,410	13,000/-	
340	12,975	-"-	
60	14,160	-"-	
80	15,885	-"-	
60	18,230	-"-	
20	inlet	-"-	
40	21,600	-"-	
40	22,500	-"-	
60	26,650	-"-	
65	27,250	-"-	
60	27,250	-"-	
60	28,050	-"-	
60	28,250	-"-	
Total :-		1,69,000.00.	

Say :- 1.69. Lakhs.

URMODI IRRIGATION PROJECT

Tal - Satara Dist- Satara

Statement showing the details of Cost of Diversion, along proposed URMODI R.B.CANAL.

Sr. No.	Location Ch.in.M.	Catchment area of Nalla in Sq.mile.	Nalla Bed level in m.	Canal bed level in m.	Diff.between canal bed level Nalla bed level.	Max.flood discharge of Nalla in cusecs.	Proposed diversion in Nalla @ locat- ion Ch.in Mile.	Cost of Diversion.
1	2	3	4	5	6	7	8	9
1)	11,425	0.09	654,665	657.845	+ 3.180	180	11,225.	13,000.00.
2)	11,770	0.07	659.260	657.740	+ 1.520	135	11,910	"
3)	14,800	0.20	654.580	656.935	+ 2.355	340	14,655	"
4)	23,570	0.08	655.020	653.225	- 1,795	60	23,250	"
							Total :-	52,000.00
							Say Rs.	0.52.Lakhs.

-: URMODI IRRIGATION PROJECT :-

Tal : Satara Dist- Satara

II-Main Canal and Branches.

" G " BRIDGE.

Total Cost of " G " Bridges.

1) Left Bank Canal	Rs. 3.40 Lakhs.
2) Right Bank Canal	Rs. 2.80. - " -

Total Rs:	Rs. 6.20 Lakhs.

:- URMODI IRRIGATION PROJECT :-Tal - Satara Dist- Satara.

Statement showing the details of Road Bridges on L.B.C.

" G " BRIDGES.

Sr. No.	Chainage in M.	Type of Bridge.	G.L.	C.B.L.	Differ. ence	Rate	Amt	Canal G
1)	625	V.R.B.	663.93	661.60	2.33	2415	15,213.	
2)	3465	MDRD7.50	662.85	660.26	2.59	3000	37,500.	
3)	4200	VRB	661.47	660.02	1.95	2415	15,213.	
4)	6080	-"-	661.39	659.51	1.88	-"-	-"-	
5)	7410	-"-	659.88	659.13	0.75	-"-	-"-	
6)	8850	-"-	658.75	658.60	0.15	-"-	-B-	
7)	10550	-"-	661.75	658.16	3.59	-"-	-"-	
8)	11885	CDRB .7.50	660.60	657.65	2.95	3000	30,000.	
9)	14390	NHW	663.49	656.96	6.73	3000	60,000.	
10)	15510	VRB	657.44	656.64	0.80	2415	15,213.	
11)	18715	-"-	658.04	655.77	2.27	-"-	-"-	
12)	20950	-"-	657.64	655.12	2.52	-"-	-"-	
13)	24055	ODRB	659.14	654.18	4.96	3000	30,000.	
14)	25275	VRB	656.01	653.80	2.21	2415	15,213.	
15)	28750	-"-	653.60	653.75	0.85	-"-	15,213.	
16)	30,000	VRB	653.24	652.39	0.85	-"-	15,213.	
Total							34,056.00.	
Say Rs.							3.40.Lakhs.	

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara.

Statement showing the details of Road Bridges on R.B. Canal.

" G " BRIDGES :-

Sr. No.	Ch.in.M.	Type of Bridge	G.L.	C.B.L.	Difference	Rate	Amt.	Canal 'G'.
1)	500	V.R.B.	662.130	660.40	1.730	2720	17,110.	
2)	2580	M.D.R.B.	662.675	650.30	2.375	3000	37,500.	
3)	3525	V.R.B.	661.640	660.04	1.600	2415	15,213	
4)	6975	V.R.B.	662.275	658.90	3.395	-"	17,110.	
5)	8915	-"	660.100	658.36	1.740	-"	17,110.	
6)	10,900	ODRB	660.900	667.69	3.210	3000	30,000.	
7)	13375	V.R.B.	658.230	657.03	1.200	2415	15,213.	
8)	14100	-"	658.610	656.81	1.800	-"	15,213.	
9)	16125	-"	658.885	656.10	2.785	-"	15,213	
10)	17925	-"	658.750	655.54	3.210	-"	15,213.	
11)	19070	-"	658.600	655.20	3.490	-"	15,213.	
12)	25150	-"	657.020	654.31	2.710	-"	15,213.	
13)	22825	-"	657.650	653.90	3.750	-"	15,213.	
14)	23880	ODRB	658.230	653.53	4.750	3000	30,000.	
15)	25890	VRB	656.470	652.00	3.670	2415	15,213	
Total							2,80,056.	
Say Rs.							2.80 Lakhs.	

URMODI IRRIGATION PROJECTTal - Satara Dist:Satara.Road Crossing at Ch.8850.m. of R.B. CanalDATA :-

1) Ground level R.L.		658.75.m.
2) C.B.L. R.L.		658.60.m.
3) Vertical diff. cutting		0.15 m.
4) Discharge		107. cusecs.
5) Canal details.		
	(I) B.W.	4.72.m.
	(II) T.D.	1.67.m.
6) Data assumed.		
	Soil	0.5.m.
	S.Murum	0.8.m.
	H.Murum	0.2.m.
7) Estimated cost	Rs.:-	0.15 Lakhs.
8) Cost/Cusecs.		
9) Cost/Rd.width	Rs.:-	272/-

URMODI IRRIGATION PROJECT

210

Tal - Satara. Dist-Satara

Type Estimate for V.R.B. Crossing at Ch.8850 of Left Bank Canal.

Qty	Unit	Items.	Rate	Per	Amount
Job	-	1) Clearing the site	Lumpsum		1,000.00.
32.00	Cum	2) Excavation for foundation in soil and murum upto WSR including dressing the sides of trenches and stacking the materials neatly within a lead of 15.m. and lift upto 1.5.m.etc.complete.	3.50	Cum.	112.00.
4.19	Cum.	3) Providing and laying P.C.C. 1:3:6 for foundation of head walls with graded materials including ramming, watering etc.complete.	167.80	Cum.	703.00.
55.52.	Cum	4) Providing and laying U.C.R. masonry in c.m. (1:5) for foundation and super structure including watering etc. complete.	120.80	Cum.	6,707.00.
37.17	Sq.m.	5) Providing cement pointing to U.C.R. masonry with cm. (1:3) including curing etc. complete.	2.60	Sq.m.	96.00.

Qty	Unit	Items.	Rate	Per	Amount
13.2	R.M.	6) Providing and laying NP-2 class standard pipe 4' Ø at required grade including pointing with collar etc. complete.	386.70	R.mt.	5,104.00.
42.19	Cum.	7) Providing and laying the murum bedding below and above the pipes.	5.20	Cum	219.00.
1.13.	Cum	8) Providing and laying C.C. (1:2:4) for copying on the top of head wall.	235.40.	Cum	266.00.
15.00	Nos	9) Providing and laying guard stone of trap stone of size 0.75cm with fixing in std.block of C.C.(1:4:8)	10.50	No.	157.00.
Job		10) Providing and laying marble plate on structure.	Lumpsum		150.00.
				Total.	14,514.00.
		Add 3% contingencies.:-			401.00.
					14,915.00.
		Add 2% W.C. Estt. charges...			298.00.
				Total :-	15,213.00
				Say Rs. :-	00.152.lakhs

Qty	Unit	Items	Rate	Per	Amount
					B.F. :- 15,213.00.

• Cost of Road bridge per m.lenth.

$$= \frac{15,213.00}{6.3} = 2415/-$$

• Cost of Road bridge taking into consideration

the width of the road = 3000/-

URMODI IRRIGATION PROJECTTal - Satara Dist- Satara.II- Main Canal and Branches 'H' - Escapes

Qty	Unit	Items	Rate	Per	Amount
		Providing escape along left and right bank canal as per separate statement attached ...			Rs. 46,620.00.
					Rs. 46,620.00.
		Add 10% for excavation of escape channels.			Rs. 4,662.00.
			Total Rs.		51,282.00
			Say Rs.		00.513. Lakhs.
					0.51. Lakhs.

URMODI IRRIGATION PROJECTTal- Satara Dist - SataraII - Main Canal and Branches ' H ' - Escape

Sr. No.	Location	Canal Discharges	Capacity of escape 1/3rd of Canal Q.	Water way S.F.T. Velocity 5/Sec.	Cost of Rs. 600/Sq.ft.
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L.B. CANAL :-

1)	3010	107	35.6	7.1	4260.
2)	13980	107	35.6	7.1	4260.
3)	26660	73	24.3	4.8	2880.
4)	28050	73	24.3	4.8	2880.

14,280.00.

R.B. CANALS :-

1)	3775	107	35.6	7.1	4260.
2)	10265	107	35.6	7.1	4260.
3)	15075	107	35.6	7.1	4260.
4)	19145	75.6	25.2	5.1	3000.
5)	24925	42.10	14.0	1.7	1020.

Total :- 16,800.

Total of L.B.C. + R.B.C. = 14,280 + 16,800 = 31,080.00.

Add 50% for increase cost :- =15,540.00.

Total :- 46,620.00.

URMODI IRRIGATION PROJECTTal- Satara Dist - SataraII-Main Canal & Branches'K' BUILDINGS

Sr.No.	Items	Amount
(A)	<u>Permanent Buildings :-</u>	
	a) Residential	8,81,730.00
	b) Non-Residential	1,00,640.00
	Total	<u>9,82,370.00</u>
(B)	<u>Temporary Buildings :-</u>	
	a) Residential Building	4,44,120.00
	b) Non-residential building	3,94,495.00
	Total	<u>8,38,615.00</u>
	TOTAL FOR A + B	18,20,985.00
(C)	868 contingent works 2% @ (A+B)	<u>36,420.00</u>
	(A+B+C) Total :-	18,57,405.00
(D)	<u>Services :-</u>	
	1) Land development 2% @ (A to C) =	37,148.00
	2) Colony roads 2% (A to C) =	37,148.00
	3) Lawn and garden 1% (A to C) =	18,574.00
	4) Fencing 1% (A to C) =	18,574.00
	5) Water supply (Only internal installation	
	5% of Residential (A to C) i.e. ₹	
	13,25,850. 2.5% of non residential=	66,292.00
	i.e. 49,51,135/- =	12,378.00

Sr.No.	Items	Amount
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B/F.

Services :- (Contd)

6) Sanitation (Only internal installation

5% of Residential.

66,292.00

2.5% for Non-Residential

12,378.00

7) Electrification.

5% of Residential

66,292.00

2.5% of Non-Residential

12,378.00

Total for 'D'

3,47,454.00

TOTAL FOR A TO D :

22,04,859.00

Say Rs.

22.05.Lakhs.

URMODI IRRIGATION PROJECTTal- Satara Dist-SataraII-Main Canal and Branches('K' BUILDINGS)ABSTRACT

Qty	Unit	Items	Rate	Per	Amount
<u>(A) : PERMANENT BUILDINGS :</u>					
a) <u>Residential :-</u>					
1382	Sq.ft.	1) -Overseer or Sectional Officer or S.D.C.Residen- -tial Class III-A. 2 x 691 = 1382.Sq.ft/ 320.Sq.m ²	45.00	Sq.ft.	62,190.00
8748	Sq.ft.	2) -Class-III-B-Quarter 18 x 286. = 4748.Sq.ft.	45.00	-"-	3,93,660.00
5740	-"-	3) Class IV-A-Quarters 14 x 410 = 5740.Sq.ft.	45.00	-"-	2,58,300.00
200	-"-	4) Sanitary block of item No.3 4 x 55 =220 Sq.ft.	45.00	-"-	9,900.00
2464	-"-	5) Inspection Chowki for Canal 2 x 1232 = 2464 sq.ft.	45.00	-"-	1,10,880.00
1040	-"-	6) Canal Chowki. 4 x 260 = 1040.Sq.ft.	45.00	-"-	46,800.00
Total					8,81,730.00

Qty	Unit	Items	Rate	Pcr	Amount
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(A): Permanent Building:-(B): Non-Residential Building:-

1950	Sq.ft.	(1) :Signaller's Office and Residence.			
		2 x 975 = 1950. Sq.ft.	40.00	Sq.ft.	78,000.00
110	"	2)-Sanitary Block			
		2 x 55 = 110. Sq.ft.	40.00	"	4,400.00
1460	"	3)-Sectional Office.			
		2 x 730 = 1460 Sq.ft.	40.00	"	5,840.00
110	"	4)-Sanitary Block for sectional office.			
		2 x 55 = 110.Sq.ft.	40.00	"	4,400.00
200	"	5) waiting shed.			
		2 x 100 = 200. Sq.ft.	40.00	"	8,000.00
Total for 'D'					1,00,640.00

Total for 'A' - Residential

Total for (A + B)

Total for permanent Building :

=

9,82,370.00

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Qty	Unit	Items	Rate	Pcr	Amount
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'B' - TEMPORARY BUILDING
(RESIDENTIAL)

1190	Sq.ft.	1) Class II Quarters.			
		1 x 1190 = 1190 Sq.ft.	35.00	Sq.ft.	41,640.00
3450	Sq.ft.	2) Class III - A Quarters			
		5 x 690 = 3450.Sq.ft.	35.00	-"-	1,20,750.00
4920	-"-	3) Class IV -A-Quarters.			
		12 x 410 = 4920 Sq.ft.	35.00	-"-	1,72,200.00
220	Sq.ft.	4) Sanitary Block for IV.			
		Quarters			
		4 x 55 = 220. Sq.ft.	30.00	-"-	6,600.00
1662	-"-	5) Two room hutment.			
		6 x 277 = 1662. Sq.ft.	35.00	-"-	58,170.00
1090	-"-	6) One room hutment.			
		10 x 109 = 1090 Sq.ft.	35.00	-"-	38,150.00
220	-"-	7) Sanitary block for			
		hutment.			
		4 x 55 = 220 Sq.ft.	30.00	-"-	6,600.00

Total for (a) Residential :-

4,44,120.00

Qty	Unit	Items	Rate	Per	Amount
'B' - TEMPORARY BUILDING					
<u>NON-RESIDENTIAL</u>					
(1) OFFICES :-					
1039	Sq.ft.	1) - S.D.O's Office.			
		1 x 1039 = 1039 Sq.ft.	35.00	Sq.ft.	36,365.00
268	-"-	2)- Garage and Chowkidar			
		1 x 268 = 268 Sq.ft.	35.00	-"-	9,380.00
1200	-"-	3) Sub-Divisional Store			
		2 x 600 = 1200 Sq.ft.	35.00	-"-	42,000.00
(2) CIVIL STORE :-					
2400	-"-	1) Cement Store.			
		1 x 2400 = 2400 Sq.ft.	35.00	-"-	84,000.00
800	-"-	2) Building material store			
		1 x 800 = 800 Sq.ft.	35.00	-"-	28,000.00
800	-"-	3) Hardware Store			
		1 x 800 = 800 Sq.ft.	35.00	-"-	28,000.00
800	$\frac{3}{4}$ "-	4) Tools and Plants store			
		1 x 800 = 800 Sq.ft.	35.00	-"-	28,000.00
250	-"-	5) Magazine Store.			
		1 x 250 = 250 Sq.ft.	35.00	-"-	8,750.00
Total					2,64,495.00

Qty	Unit	Items	Rate	Per	Amount
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(3) : SERVICE BUILDING :

2000 Sq.ft. 1) Community buildings.

1 x 2000 = 2000 Sq.ft. 35.00 Sq.ft 70,000.00

1000 -"- 2) Power House and Pump house.

1 x 1000 = 1000 Sq.ft. 30.00 -"- 30,000.00

1000 -"- 3) Reservoir.

1 x 1000 = 1000 Sq.ft. 30.00 -"- 30,000.00

Total for (b) Non-Residential :-	3,94,495.00
Total for (a) Residential	4,44,120.00
Total for 'B' Temp. Building	8,38,615.00
(A + B) =	

URMODI IRRIGATION PROJECTTal -Satara Dist:SataraII-MAIN CANAL & BRANCHES" K " BUILDINGSSalvage Value of Temporary Buildings ..

Sr.No.	Particulars	Amount in Lakhs.
1)	Cost of Temporary Building	8.39
2)	Contigent work @ 2%	0.18
3)	Fencing charges at 1%	0.08
4)	Water supply, Sanitary, Electri- -fication charges, at 15% on residential Buildings i.e. on 4.44	0.67
5)	Water supply, Sanitary and Elect- -rification charges at 7.5% on non-residential building i.e. on 3.95.	0.30
	Total :-	9.62.
	Salvage Value @ 15%	1.44.

URMODI IRRIGATION PROJECTTal - Satara Dist-Satara.III-Main Canal & BranchesCOST OF 'L' EARTH WORK FOR URMODI R.B. CANAL

Sr. No.	Section No.	Canal K.M.	No. of Canal K.M.	Canal discharge.	Rate Per Cusces Per K.M.	Total Amount	Remarks
1	2	3	4	5	6	7	8
1)	I	1,3,6,10,15	5	107	1290	6,88,426.	
2)	I	2,4,5,7,8,9,11,12, 13,14.2.	10.2	107	1290	14,07,906.	
3)	II	17,20,23	3	75	1586	3,56,860.	
4)	II	15,2,10,16,18,19, 21,22,23 to 23.3.	5.1	75	1586.	6,06,645.	
5)	III	25,27,5	2.5	42	2537	2,66,385.	
6)	III	23.3, to 24, 26	1.7	42	2537	1,21,142.00	
Total :-						35,07,364.00	
Say Rs.						35.07 Lakhs.	
L.B.C.						37.22. -"	
Grand Total Rs.						72.29 Lakhs	

URMODI IRRIGATION PROJECTTal-Satara-I Dist- SataraStatement showing the quantity of Earth-work and

Sr. No.	Items	K.M. No. 1		K.M. No. 3	
		Qty.	Amount	Quantity	Amount
1	2	3	4	5	6
1)	Excavation in soil and soft Murum including removing the stuff as directed lead 25.mt. and lift 2.m. at Rs.3.50/- Cu.m.			2020	7070
2)	Excavation in hard murum and boulders including removing the stuff as directed lead 25.m. and lift 3.m. at Rs. 6.40/-Cu.m.	16,100	1,03,040	9307	59,656
3)	Excavation in soft rock, lead 25m. and lift 4.m. at Rs. 8.80/cum.			195	1716
4)	Excavation in soil and soft murum including removing the stuff as directed lead 25.m. lift 2.m. for paddle trench at Rs. 3.50/-Cum.	180	630	120	420

Amount (K.M.wise) for BRMODI RIGHT BANK CANAL

K.M. No. 6		K.M.No.10		K.M.No. 15.		Remarks.
Quantity	Amount	Quantity	Amount	Quantity	Amount	
7	8	9	10	11	12	13

3996 13,936 3250 11,375 3683 12,890.

12133 77,683 13805 28,352 8085 51,744.

- - 26 317 - -

200 700 - - 300 1050.

225-A

1	2	3	4	5	6
5) - Embankment for available stuff					
lead 50.m. lift 2.m. for casing 80% of H.M. from available stuff at Rs.1.90/-					
Cum.		6730	12737	7445	14145
6) Excavation from borrow are					
lead 50.m. lift 2.m. for casing at Rs. 7.50.cum.					
				440	3212
7) Embankment from available stuff lead 15.m. lift 1.m. for veasting 60% of soil and S.M. including consolidation dressing etc. at Rs. 2.05/Cum.					
				1212	2485
8) Embankment from borrow areas, lead 30.m. lift 2.m. for hearting at Rs. 6.00/-Cum.					
		7240	43440	8683	52098
9) Filling paddle trench with selected materials in layers of specified thickness including consolidation, levelling from borrow area at Rs. 4.10/Cum.					
		180	738	120	492

7	8	9	10	11	12	13
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2760 5130 1242 2360 6468 12289

1400 4920 608 1246 2400 4920.

1038 6228 - - 5360 32160.

200 820 - = 300 1230.

226-A

1

2

3

4

5

6

10) Service Road if inspection

path at Rs.5000/-K.M. 1 K.M. 5000 1 K.M. 5000

Total	1,65,635.	1,46,203.
Add 3% for contingencies	4,969.	4,386.
Total	1,69,604.	1,50,589.
Add 2% for W.C. Estt.	3,392.	3,012.
Total :-	1,72,996.	1,53,601.

Rate per Cusecs K.M. 1290/- Cusecs K.M. Average. Average Rate

 7 8 9 10 11 12 13

1 K.M. 5000	1 K.M. 5000	1 K.M. 5000
1,14,467.	1,08,650.	1,21,233.
3,434.	3,260.	3,638.
1,17,901.	1,11,910.	1,24,921.
2,353.	2,238.	2,498.
1,20,259.	1,14,148.	1,27,419.

per K.M. 6,88,426 = 1286.78. Say :- 1290/-

URMODI IRRIGATION PROJECT

CALUKA : SAFARA

II-MAIN CANAL AND BRANCHES

Statement showing the quantity of LL Earth work and amount
(K.M. wise) for URMODI RIGHT BANK CANAL.

Sr. No.	Items	Section No. 2, 15.2 Km to 23.3 Km.	
		K.M.No. 17 Quantity	K.M.No. 20 Amount
		Quantity	Amount
1	Excavation in soil and murum including removing stuff as directed 25 m. lead and lift 2 m. at Rs. 3.50/Cub.m.	3512	12,292
2	Excavation in hard murum boulders including removing the stuff as directed lead 25 m., lift 3 m. at Rs.6.40/Cub. m.	9536	61,030
3	Excavation in soft rock lead 25 m. lift 4 m. at Rs.8.80/Cub. m.	92	810
4	Excavation in soil and soft murum including removing the stuff as directed lead 25 m. for paddle trench at Rs.3.50/Cum.		

Section No. 3, 23.3 km to 24 km						
K.M.No. 23		K.M.No. 25		K.M.No. 27		Remarks
Quantity	Amount	Quantity	Amount	Quantity	Amount	
7	8	9	10	11	12	13

6049	21,171	397	1,390	242	£,687	
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11673	74,707	14245	91,168	£696	55,654	
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1024	9,011	1111	9,777	984	£,659	
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1	2	3	4	5	6
5. Embankment from available					
stuff lead 50 m. lift					
2 m. for casing 80% of					
H.M. from available					
stuff at Rs.1.90/Cub.m.					
		4025	7,648	3460	6,574
6. Embankment from borrow					
area lead 50 m. lift					
2 m. casing at Rs.7.30/					
Cum.					
		-	-	4607	33,631
7. Embankment from available					
stuff, lead 50 m. and lift					
2 m. for hearting 60% of					
scil and s.m. at Rs.2.05/					
Cub. m.					
		2107	4,319	9860	18,734
8. Embankment from borrow areas					
lead 50 m. lift 2 m. for					
hearting at Rs.6.00/Cum.					
		588	3,498	-	-
9. Filling puddle trench with					
selected improvious materials					
in layers of specified thick-					
ness including consolidation					
levelling, etc. complete					
from borrow area at Rs. 4.10/					
Cub.m.					

7	8	9	10	11	12	13
---	---	---	----	----	----	----

435 ~~227~~ 1470 2,793 2705 5,140

290 551 240 456 1,190 2,851

- - 740 4,440 310 1,860

 7 8 9 10 11 12 13

1 Km.	5000	1Km.	5000	1 Km.	5000
	-----		-----		-----
	111267		115024		17431
	3338		3451		2635
	-----		-----		-----
	114605		118475		90466
	-----		-----		-----
	2292		2369		1809
	=====		=====		=====
	116897		120844		92275

 $213119 = 2537 / \cancel{\text{cusec}} / \text{km.} / \text{cusec}$

42x2

URMODI IRRIGATION PROJECTTal. SALARA Dist. : SALARAII-Main Canal and BranchesCost of Earth Work for Urmodi L.S. Canal

Sr. no.	Sec- tion	Canal K.M.	No. of Km.	Canal Discharge	Rate per Cusecs per K.M.	Total Amount	Remarks
1	2	3	4	5	6	7	8
1)	I	1.	1	124.03	5960	7,39,279	
2)	I	4,5,10,12, 16,	5	124.03	992	5,15,389	
3)	I	2,3,6,7,8, 9,11,13, 14,15,17, 18,18.5	12.5	124.03	992	15,37,972	
4)	II	21,26,29.5	3.5	90.03	762	2,40,110	
5)	II	18.5 to 19, 20,22, 23,24,25, 27,28	7.5	90.03	762	5,14,521	
6)	III	29.5 to 33	3.5	28	762	74,676	
Total :						37,21,947	
Say Rs.						37.22 lakhs	

URMODI IRRIG

TALUKA : SARARA

DISTRICT : SARARA

II-MAIN CANAL & BRANCHES

Statement showing the quantity of 'L' earth work and amount
(Km.wise) for URMUDI LEFT BANK CANAL.

Sr. No.	Items	K.M. No. 1		K.M. No. 4	
		Quantity	Amount	Quantity	Amount

1	2	3	4	5	6
1.	Excavation in soil and soft murum including removing the stuff as directed lead of 25 m. and lift 2 m. at Rs. 3.50/Cub.m.	12,825	44,888	1,591	5,568
2.	Excavation in H.M. and boulders includ- ing removing the stuff as directed lead 25 m and lift 3 m. at Rs. 6.40/ Cub.m.	16,902	108,173	8,328	53,299
3.	Excavation in soft rock lead 25 m. lift 4 m. at Rs. 8.80/Cub.m.	-	-	831	7,313

K.M.No. 5		K.M.No. 10		K.M.No. 12		K.M.No. 16		
Quantity	Amount	Quantity	Amount	Quantity	Amount	Qty.	Amount	R E M A R K S
7		8 889,19		10		11		
						12		
						13		
						14		
						15		

4,616 16,156 2,270 7,945

3,900 24,960 5,081 32,518 5,738 36,723 4,639 29,690

2,697 23,734

	1	2	3	4	5	6
4. Excavation in H.R. lead 25 m. lift 5.m. at Rs.21/-			21,658	517,818		
5. Excavation in soil and soft murum includ- ing removing the stuff ad directed lead 50 m. lift 2 m. for puddle trench at Rs.3.50/ Cum.			300	1,050	480	1,680
6. Embankment from available stuff lead 50 m. lift 2 m. for casing 80% of hard murum at Rs.1.90/- Cub. m.			5,141	9,768	6,511	12,371
7. Embankment from borrow area lead at 50 m. and lift 2 m. at Rs.7.30/ Cub.m.						
8. Embankment from available stuff lead 50 m. lift 2 m. for bearing 60% of soil and s.m. at Rs.2.05/ Cum.			7,681	15,746	954	1,956

 7 8 9 10 11 12 13 14 15

420 1,470 - - - - 240 840

3120 5,928 4,065 7,724 2,411 4,714 3,412 6,443

6765 49,385 2,182 15,929 - -

- - - - 1,654 3,391 1,362 2,792

1	2	3	4	5	6
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9. Embankment from borrow area lead 50 m. lift 2 m. for heaving at Rs. 6.00/Cub.m.				9,248	55,488
10. Filling puddle trench with selected imper- vious material in layers of specified thickness including consolidation from borrow area at Rs. 4.10/Cub.m.	300	1230	480	1968	
11. Service road and in- spection path at Rs. 5000/- K.M.	1 Km	5000	1 km	5000	
		Total : 705673		144645	
Add 3% for contingencies		21110		4339	
		Total :		724783	148982
Add 2% for W.C. Establishment		14496		2980	
		Total :		739279	151962
=====					
rate/Cusec/km. = Rs. 600/Cusec/km.					

 7 8 9 10 11 12 13 14 15

14217 85,302 7,645 45,870 - - - 2,808 16,848

420 1722 - - - 2+0 984

1 Km 5000 1Km 5000 1 Km 5000 1 km 5,000

173767	107041	89718	70,582
5213	3211	2692	2,117
178980	110252	92410	72,699
3579	2205	1848	1,454
182559	112457	94258	74,153

Rs. 992/Cusec/km.

URMODI IRRIGATION PROJECT

Taluka : Satara

District : Satara

11-MAIN CANAL & BRANCHES

statement showing the quantity of 'L' Earth work and Amount
(Km.wise) for URMUDI L.B. CANAL.

Sr. no.	Items	K.M. Qty.	No. 21 Amount
1.	Excavation in soil and soft murum including removing the stuff as directed lead 50 m. and lift 2 m. at Rs.3.50/Cub.m.	5947	20,815
2.	Excavation in Hard-Murum boulders, including removing, the stuff as directed, lead 50 m. lift 2 m. at Rs. 6.40 /Cub. m.	5332	34,125
3.	Excavation in soft rock -lead 50 m. lift 2 m. at Rs. 8.80/Cub.m.		
4.	Excavation in soil and soft murum including removing the stuff as directed lead 50 m. lift 2 m. for paddle trench at Rs.3.50/Cub.m.	180	630
5.	Embankment for available stuff lead 50 m. lift 2 m. for casing 80% of hard murum from available stuff at Rs.1.90/Cub.m.	1670	3,173

K.M. No. 26		K.M. No. 29		Remarks
Qty.	Amount	Qty.	Amount	
4465	15,627	5750	20,125	

6027 38,573 6695 42,848

310 589 270 513

 5 6 7 8 9

- - - -

210 431 160 328

- - - -

1 Km.	5,000	1 Km.	5,000
	=====		=====
	60,220		68,814
	=====		=====
	1,806		2,064
	- - - -		- - - -
	62,026		70,878
	1,240		1,417
	=====		=====
	63,266		72,295
	=====		=====

URMODI IRRIGATION PROJECT

236

Tal-Satara Dist-Satara

'M' - PLANTATION

ABSTRACT

Qty	Unit	Items	Rate	Pcr	Amount in Lakhs.
JOB	-	1) Establishing Nursery including manure seeds 20% cost of item No.3. below. Lumpsum			0.570.
Job	-	2) Establishing Gardens in the colony and at dam site including the levelling the plots, floors,bcds, lauowres etc. 20% cost of Item No. 3 below.	-"-		0.570.
6000 57. K.M.		3) Planting and maintaining the canal side trees, 100.trees per Km. at Rs.50 per tree 100 x 50	5000.	K.M.	2.85
Job	-	4) Other Miscellaneous work at 20 % of Item No.3	Lump	-	0.5700.
			Total		4.560.

Say Rs. 4.56 Lakhs.

URMODI IRRIGATION PROJECTTal-Satara Dist-Satara.II-Main Canal and Branches'O' - Miscellaneous-: ABSTRACT -:

Qty	Unit	Items	Rate	Per	Amount Rs.
		'O' Miscellaneous			1,22,761.
		'A' Canal Works			8,13,100.
		'B' Other works.			
Grand Total					9,35,861.
Say Rs.					9.36.Lakhs

'A' - CANAL WORK

1140	Nos	1) Providing and fixing guard stone 20.Nos.per K.M. for 56.Km.	10.00	No.	11,400.00
1140	Nos	2) Providing and fixing boundry stone 20.Nos. per K.M. for 56.K.M.	10.00	No.	11,400.00
40	Nos	3) Providing sign boards on major road and bridge.	250.00	No.	10,000.00
135	Nos.	4) Providing sign boards on distributary etc.	150.00	No.	20,250.00
57	Nos	5) Providing and fixing R.C.C. stone for standard size including fixing pointing and lettering etc. complete.	78.00	No.	4,446.00.

Qty	Unit	Items	Rate	Per	Amount Rs.
114	Nos.	6) Providing and fixing half K.M. stone.	30.00	No.	3,420.00.
285	Nos	7) Providing canal bed stone at 1/5 Km. length for 57.K.M.	17.00	No	4,845.00
57.	Nos	8) Providing temporary service roads along canal alignment.	1000.	K.M.	57,0000.00
Total Amountt					<u>1,22,761.00</u>

ABSTRACT

239

Qty	Unit	Items	Rate	Per	Amount
<u>'B' - OTHER WORKS</u>					
Job	-	1) Equiping dispensary (addition to exist)	Lumpsum		50,900.
5	Year	b) Antimaterial measures	2000.	Year	10,000.
5	"	2(a)-Security services Department, workman 2.Nos.at Rs.400/- per 12 month i.e. Rs.9600/- Year Say-10,000/-	10,000	"	50,000.
57	K.M.	3)(a) Rent of lines installed as Rs.500/- per year per Km. for 5 years.	25,000	K.M?	1,42,500.
5.	Year	4(a)-Installation of internal system 6 Nos at 400/year.	2400	Year	12,000.
60	Month	5) Work charges. i) Signaller's pay at 400/- P.M.	400/-	Month	24,000.
60	"	ii) Attendant 2.Nos at Rs. 230/- P.M.	460/-	"	27,600.
5.	Year	4)(a) Running charges at repairs at 15000/- year per colony.	15000/-	Year	75,000.
80		b) Street light 40 Nos per Centre for 2 centre at 50 per year for 5 year.	250/-	No.	20,000.

Qty	Unit	Items	Rate	Per	Amount Rs.
Job -		4)-Equipment and external installation and collection etc.	Lumpsum		10,000.00.
Job .		5) - Recreation amenities.	Lumpsum		25,000.00.
Job -		6) - Work mans compensation	"		50,000.00.
Job -		7) . Testing of materials.	"		25,000.00.
Job -		8) Experiments on soil slipping.	"		15,000.00.
Job -		9) Technical literature	"		10,000.00
Job -"		10) Photographic Record	"		10,000.00.
Job -		11) Printing of report and brochures.	"		5,000.00
Job -		12) Economic survey of land	"		5,000.00.
Job -		13) Observation of sub-soil water level.	"		10,000.00.
Job -		14) Officiating ceremonies	"		5,000.00.
Job -		15) Visit of h ^{gh} . dignitaries.	"		10,000.00.
Job -		16) Models	"		10,000.00
62.	K.M.	17) Departmental telephone and telegraph lines along canal alignment.	1000.	K.M.	62,000.00.

Qty	Unit	Items	Rate	Per	Amount
5.	Year	18) Working of transport vehicles M.& R.charges inspection for vehicles at Rs. Annun ²⁵⁰⁰ /Annum. vehicles for 2 vehicles.	30,000.	Year	1,50,000.
Total :-					7,10,600.

URMODI IRRIGATION PROJECT.Tal-Satara Dist-Satara.II-Main Canal & Branches.'P' - MAINTENANCE

I) - Maintenance of 'K' Building during construction at 2% on the cost of 'K' Building (Rs. 22.05. Lakhs).

% Age	Year	Expenditure in Lakhs of Rs.	Progressive Expenditure.	Maintenance Cost at 2% of the cost of 'K' -Building.
1	2	3	4	5
60	I	13.23	13.23	-
40	II	8.82	22.05	0.265.
	III	--	22.05	0.441.
	IV	--	22.05	0.441.
	V	--	22.05	0.441.
Total :-				1.588. Lakhs

II) - Maintenance of canals during the construction of 0.25% on the cost of 'L' Earth work amounting to Rs. 72.29. Lakhs.

15	I	10.85	10.85	-
30	II	21.69	32.54	0.027.
30	III	21.69	54.24	0.081.
20	IV	14.45	68.68	0.136
5	V	3.61	72.29	0.172
Total :-				0.416.Lakh

(3) :- Maintenance of Road during the construction at 5% of the cost occupation amount to Rs. 10.45. Lakhs.

% Age	Year	Expenditure in Lakhs.	Progressive Expenditure.	Maintenance Cost.
50	I	5.22	5.22	-
30	II	3.14	8.36	0.26.
10	III	1.05	9.41	0.42.
5	IV	0.52	9.93	0.47.
5	V	0.52	10.45	0.50.
			Total :-	1.65.

Total :- 1 + 2 + 3 = 1.588 + 0.416 + 1.65 = 3.654. Lakhs.

Say Rs. 3.65. Lakhs.

URMODI IRRIGATION PROJECTTal-Satara Dist-Satara.II-MAIN CANAL & BRANCHES. 'O' SPECIAL T.&P.

Qty	Unit	Items	Amount in Rs. of Lakhs.
-----	------	-------	-------------------------

A) Rated equipment of special
Tools and plants.

(As per Sub-Estimate No.I) .. 35.02.

B) Non-Rated equipment of
special Tools and Plants.

(As per Sub-Estimate No.II). 01.92.

Total : 36.94.

Deduct for Receipt and Recoveries
on capital account.

a) Rated equipment due to
depreciation transferred to
concerned items and balance
residual value realised by
resale at 100%

35.02.

b) Non-rated equipment due to
resale value at 10%

00.19.

Total 35.21.

Net Expenditure debitable to work.

Say Rs. 1.73. Lakhs.

URMODI IRRIGATION PROJECTTal-Satara Dist- Satara.'0' - Special Tools and Plants URMODI Right & Left Bank Canal.

Qty	Unit	Items	Rate	Per	Amount Rs.
-----	------	-------	------	-----	---------------

SUB: ESTIMATE NO. I (A) RATEDEQUIPMENTS PNEUMATIC DRILLINGAND BLASTING UNIT

1	No.	1) Air compressor of 365 cft.capacity.	1,40,000/-	No.	1,40,000.00.
		II) Blasting equipment	12,000/-	No.	12,000.00.

				Total for I :	1,52,000.00.

II-EARTH MOVING MACHINERY

2	Nos	2) Water Tanker 8000.Ltr. Capacity.	1,60,000/-	No.	3,20,000.00.
3	Nos	3) Diesel Road Roller	1,60,000/-	No.	4,80,000.00.

					8,00,000.00.

IV-CONCRETE AND MORTER PLANT

1	No.	4) Crusher 10.Ton Capacity	75,000/-	No.	75,000.00.
2	Nos	5) Concrete Mixer	40,000/-	No.	80,000.00
1	No	6) Morter Mixture	25,000/-	No.	25,000.00.

					1,80,000.00.

Qty	Unit	Items	Rate	Per	Amount Rs.
<u>V-TRANSPORT EQUIPMENT</u>					
10	Nos.	7) Heavy Truck 5.Ton. Capacity.	1,80,000/-	No.	18,00,000.00.
4	Nos.	8) Jeep with trailer	1,00,000/-	No.	4,00,000.00.
					----- 22,00,000.00. -----
1	No.	9) Station Wagon.	85,000/-	No.	85,000.00.
1	No.	10) Pick up Van	85,000/-	No.	85,000.00.
Total :-					----- 23,70,000/- -----
G.T. Rs:-					----- 35.02.Lakhs. -----

URMODI IRRIGATION PROJECTTal- Satara Dist: Satara.'Q'-SPECIAL TOOLS & PLANTS.

Qty	Unit	Items	Rate	Per	Amount Rs.
<u>SUB: ESTIMATE NO. II 'B' NON-RATED EQUIPMENTS.</u>					
2	Nos.	1) Jack hammer	4,000/-	No.	8,000.00.
2	"	2) Vibrators	6,000/-	No.	12,000.00.
2	"	3) Mechanical hammers	750/-	No.	1,500.00.
<u>PUMPS:-</u>					
2	"	4) 1/2 cusecs. 5.H.P.	5,000/-	No.	10,000.00.
3	"	b) 1 Cusecs 20 H.P.	8,000/-	No.	24,000.00.
2	Nos	5) Concreting set 25 K.W.	40,000/-	No.	80,000.00.
2	"	a) Tripod with chain and pulley	6,000	No	12,000.00.
2	"	b) Screw Jack	1,500/-	No.	3,000.00
1	No	7) Workshop Unit	12,000/-	No	12,000.00.
1	No	<u>Equipment compressors</u> testing machines.	9,600/-	No.	9,600.00.
		8) Miscellaneous	Lump Sum	-	10,000.00.
Job	-	9) Misc. Electrical goods.	Lumpsum		10,000.00.

Total :-					1,92,100.00

-: URMODI IRRIGATION PROJECT :-Tal-Satara Dist-Satara.II-MAIN CANAL AND BRANCHES.'R'- COMMUNICATIONS.ABSTRACT

Qty	Unit	Items	Rate	Per	Amount Rs.
12.	K.M.	1) Construction of Roads to quarries 20% of Canal Length $\frac{56 \times 20}{100} = 11.2$. Say 12.	25,000/-	K.M.	3,00,000.00.
28.	K.M.	2) Construction of Temporary Road in the work area 50% of 56.Km. Canal length.	25,000/-	K.M.	7,00,000.00.
Job No.		3) Temporary River Crossing on River.	Job	-	10,000.00.
5.	Nos.	4) Providing temporary crossing on big Nalla.	2,000/-	No.	10,000.00.
25.	Nos	5) Providing temporary crossing on small Nalla.	1,000/-	No.	25,000.00.
Total :-					10,45,000.00
Say Rs. 10.45. Lakhs.					

URMODI IRRIGATION PROJECTPal-Satara Dist: Satara.III-DISTRIBUTARIES.ABSTRACT.

Qty	Unit	Items	Rate	Per	Amount in Lakhs of Rs.
8822	Ha.	1) Distribution system for command area of Urmodi left and right bank canal. (a)-URMODI L.B.C. (b)-URMODI R.B.C.	250.00	Ha.	22.055. Lakhs.
6030	Ha.	2) Provision for land drainage and water logging.	200.00	Ha.	12.060. Lakhs.
Total :-					34.115. Lakhs.

APPENDICES

URMODI IRRIGATION PROJECTTAL.: SAFARADIST. SAFARA

Statement showing the List of Bench Marks in the
submergence area under Urmodi Irrigation Project
at Parali Storage.

Sr. No.	Description	Reduced R.L. in Meters	Field Book No.	Page No.	Remarks
1	2	3	4	5	6
	F.B.M. on the N.E. corner of plinth about 0.3 m. 1. above G.L. of Ganapati Temple in Jadhavwadi village Parali on Parali-Jadhavwadi Road.	680.842	1273/55	52	-
	F.B.M. on the N.E. corner of plinth about 0.6 m. above G.L. of Waghajai 2. Temple in Pophelkarwadi Village Kamathi on Parali-Nitral road.	673.595	1373/65	9	-
	F.B.M. on N.W. corner of plinth about 0.3 m. 3. above G.L. of Primary School Building, in Village Lumanekhol.	680.948	361/63	24	-

Appendix No.1/1(a) 251-B
Ref. Para No.

.....
Sketches
.....

252-A

1

2

3

4

5

6

I.B.M. on N.W. corner
of plinth about 0.6 m.

4. above G.L. of primary

School Building, in

Village Dahiwadi.

678.622

861/63

53

252-B

.....
.....
.....

253-A

URMODI IRRIGATION PROJECT

TAL. SATARA

DIST. SATARA

Farali U/S Site II Main Canal and Branches.

Statement showing the list of Bench Marks in the Command Area of Left Bank Canal.

Sr. No.	Description	Reduced R.L. in m.	Field Book No.	Page No.	Remarks
1.	F.B.M. on the D/s of Left hand corner of parapet of bridge on river, of Urmodi on Satara-Farali Road.	650.957	861/63	33	
2.	F.B.M. on S.E. Corner of plinth of Gram-panchayat office building, in Village Wechale.	633.00	1375/65	98	
3.	G.T.S.D.M. about 0.6 m. below ground level in the compound of Govt. Veterinary Dispensary at Nagthane.	621.746			

253-B

Appendix No. 1/1(b)

Sketches

254-A

Sr. No.	Description	Reduced R.L. in m.	Field Book No.	Page No.	Remarks
---------	-------------	--------------------	----------------	----------	---------

4. C.T.S.B.M. about 0.3 m. below ground level in the compound of and at a distance of 20 m. from North and East corner of Inspection Bungalow at Atit.

595.579

254-B

Sketches

255-A

WAMODI IRRIGATION PROJECT

TAL.: SATARA

DIST.: SATARA

Parali U/S site II-main Canal and Branches.

Statement showing the list of Bench marks in command Area of
Right Bank Canal.

Sr. No.	Description	Reduced R.L.in m.	Field Book No.	Page No.	Remarks
1	2	3	4	5	6
1.	I.B.M. on top of Furlong Stone No.2/2 of old Satara-Shendra Road.	656.517	1362/66	23	-
2.	C.I.S.B.M. on parapet of Culvert No.27C on Poona-Bangalore road N.H. No. 4	613.592	-	-	-
3.	C.I.S. B.M. parapet of Culvert No.258 on Poona-Bangalore Road N.H. No. 4.	669.229	-	-	-

255-B

..... Appendix No. 1/1(c)

Sketches

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..... 7

256-A

Sr. No.	Description	Reduced R.L. in m. in Book	Field Page No.	Page No.	Remarks
1	2	3	4	5	6
4.	C.I.S. B.M. on Stone near south end of west parapet wall of culvert No.232 on Poona- Bangalore Road N.H.No.4 near mile No.73/2 in Shendra village.	669.924	-	-	-
5.	F.B.M. on plinth of Memorial Pillars on North corner in Village Apshinge.	629.325	3021/69	96	-

256-B

.....
..... Sketches
.....
..... 7
.....

URMODI IRRIGATION PROJECTTALUKA : SATARA DISTRICT : SATARAStatement showing Comparative merits and Demerits of
Alternative Sites.

Sr. No.	Location	Catchment Area in Sq. miles	Estimated 75% dependable yield (Mcum) Mcft	Gross Annual utilization (Mcum) Mcft	Gross capacity of Reser-voir (Mcum) Mcft	Max. water level (m) ft	Area under submergence (ha) Ac.
1	2	3	4	5	6	7	8

1. Alternative

site at

Lumanekhol

(Site No.1)	21.20	114.116	107.459	83.202	702.10	5.44
		4030	3795	2938	2303.15	13.43

2. Alternative

site at

Kamathi

(Site No.2)

33.40	170.749	106.556	82.824	685.20	756
	6030	3798	2924	2248	1868

3. Parali U/S
site

(site No.3)	45.12	201.05	107.718	82.94	680.00	870
finally		7100	3804	2929	2231	2150

selected.

Height of dam in (<u>m</u>) ft	Length of dam (<u>m</u>) ft.	Qty. of earth work Mcum	Cost of the pro- ject in lakhs of Rs.	Cost per Mcft Rs.	Irri- gable Area in Ac.	Ratio of sub- mer- gence to Irri- gated command	Cost per Acre of ICA	B.C. Ratio	Remarks
9	10	11	12	13	14	15	16	17	18

41.50	1300	3.16	2589.97	41831	13050	11%	18314	0.79	
-------	------	------	---------	-------	-------	-----	-------	------	--

Note 1

Cost of the
Project
before
finalisa-
tion of
the detail
estimate.

32.60	1450	1.98	1617.67	28454	12650	15%	12788	1.12	
-------	------	------	---------	-------	-------	-----	-------	------	--

23.30	1527	1.283	1084.93	97053	11900	6.95%	7287	1.65	Finally selected site.
-------	------	-------	---------	-------	-------	-------	------	------	------------------------------

URMODI IRRIGATION PROJECT

App. No. 11/1
Ref. para 3.1.01

TALUKA: SATARA

DISTRICT: SATARA

Statement showing the Discharge Data of Urmodi river observed at Parali Station, Taluka and District: Satara from the year 1964 to 1970.

C.A. at the R.G. Site;

C.A. at the selected dam site : ~~423~~ 45.12 sq.miles

Sr. No.	Year	Yield in Mcum	Yield in Mcft.
1.	7-64 to 6-65	226.404	7995.6264
2.	7-65 to 6-66	214.827	7586.829
3.	7-66 to 6-67	284.783	10057.009
4.	7-67 to 6-68	322.167	11377.225
5.	7-68 to 6-69	245.108	8655.886
6.	7-'69 to 6-70	310.657	10970.700
total yield		1603.946	56641.2754
Average		267.324 Mcum	944.712 Mcft.
		9.44 mc (267.31 mcum).	

Applying reduction factor of 0.935% (please refer Plate No. 2A and 3). . . Average annual yield = $9.252 \times 0.935 = 8.650$ f.m.c.

75% dependable yield = $7.751 \times 0.935 = 7.24$ f.m.c.

. . . For "Kas Hydro Electric" project, yield is reserved as 0.12 f.m.c. Therefore, 75% dependable yield from free catchment area of $45.12 - 2.70 = 42.42$ sq. miles upto Parali works out to $7.24 - 0.12 = 7.12$ f.m.c.

Say 7.10 f.m.c./201.05 Mcum.

Due to the restrictions on total use of waters in the Krishna Basin, the finalised utilisation in Urmodi valley is 3.8 f.m.c.

PROPOSED IRRIGATION PROJECT

Appendix No. 2.1/1
Ref. Para 5.5.01

TALUKA : SATARA DISTRICT : SAHAYA

statement showing the irrigated crop-pattern, existing crop-pattern of Taluka-Satara, Karad and existing crop pattern ex-walse Bandhara.

Sr. No.	Proposed Irrigated crops pattern			Existing Crop Pattern											
	Name of Crop	%	age	Taluka-Satara			Taluka-Karad			Existing Walse Bandhara					
				Sr. No.	Name of Crop	%	age	Sr. No.	Name of Crop	%	age	Sr. No.	Name of Crop	%	age
1	2	3	4	5	6	7	8	9	10	11	12				
1.	Sugarcane	15		1.	Chillies	3		1.	Kh. Jawar	30		1.	Sugarcane	4	
2.	Other Perennials	5		2.	Jawar	37		2.	Kh. Bajari	5		2.	Chillies	8	
3.	Chillies	5		3.	Bajari	8		3.	Pulses(Mug)	5		3.	Paddy	37	
4.	Ginger & Turmeric			4.	Gr. Nut	20		4.	Paddy	6		4.	Jawar	23	
				5.	Paddy	3		5.	Gr. Nut	28		5.	Bajari	1	
5.	Green Manure	2		6.	Pulses	8		6.	Kh. Follows	26		6.	Pulses	24	
6.	Paddy late variety	10		7.	Grass	17		<u>100</u>				7.	Gr. Nut	2	
				8.	Rabi Jawar	2		<u>Follow on Crops</u>				8.	Miso, Fodder	<u>1</u> 100	
7.	Kh. Hy. Jawar	15		9.	wheat	1		7.	Rabi Jawar	4		8.	<u>Follow on Crops</u>		
8.	Kh. Hy. Maize	10		10.	Gram	<u>4</u> 100		8.	Gram	2		9.	<u>Follow on Crops</u>		
								9.	Wheat	<u>1</u> 107		9.	Wheat	22	

1	2	3	1	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

9.	Kh. U. I. Pulses	
	(Mug)	10
10.	Kh. Gr. Nut	15
11.	Kh. Vegetables	3
12.	Gram on Paddy	10
13.	wheat on G.M.	7
14.	Rabi Hy. Jawar	10
15.	Rabi Hy. Maize	15
16.	Rabi Vegetable	3
17.	H.W. Gr. Nut	15
18.	H.W. Fodder	5

URMODI IRRIGATION PROJECTTALUKA : SATARA DISTRICT : SATARA

LETTER FROM ADDITIONAL DIRECTOR OF AGRICULTURE, POONA,
REGARDING APPROVAL TO THE CROP PATTERN.

NO. IRP/54/1/19.
Department of Agriculture,
Maharashtra State,
Poona-5

27th August, 1966.

To

The Superintending Engineer,
Irrigation Project Investigation Circle,
Poona-1.

Subject : Extension of Irrigation under the
existing Farali and Urmodi Bandharas.

Reference : Your letter no. 2045 dated 10th May 1966.

The following crop-pattern may be adopted for Farali Project, two separate crop patterns for the area under command situated in two talukas i.e. Karad and Patan may be adopted for respective area.

Karad Taluka

Sugarcane	15
Other Perennials	5
Chillies	5

Patan Taluka

Sugarcane	10
Other Perennials	3
Green Manure	7

Karad Taluka

Ginger & Turmeric	5
Green Manure	2
Paddy	10
Hy. Jowar	15
Hy. Maize	10
Unirrigated Pulses	10
Gr. Nut	15
Kh. Vegetables	3
====	
	95

FOLLOW ON CROPS

Gram on peas on Paddy	10
Wheat on green manure	7
Rabi Hy. Jowar on unirrigated pulses	10
Rabi Hy. Maize on Gr. Nut	15
Rabi Vegetable on kh. Gr. Nut	15
Rabi Veg. on Kh. Veg	3
H.W. Gr. Nut	15
H.W. Fodder	5
=====	
	65

Katan Taluka

Early Paddy unirrigated	20
Late Paddy	20
Kharif Hy. Jowar	10
Kh. Hy. Maize	10
Unirrigated pulses	7
Kharif Vegetables	3
Irrigated Gr. Nut	10
====	
	100

FOLLOW ON CROPS

Rabi Paddy on early Paddy.	20
Gram on peas on late paddy	10
Wheat on green manure	7
Rabi Hy. Jowar on U.I. pulses	7
Rabi Hy. Maize on U.I. Gr. Nut	10
Rabi Veg. on Kh. Veg.	3
H.W. Gr. Nut	10
H.W. Fodder	3
=====	
	72

The crop pattern given above for Karad Taluka
may be adopted for the entire command area in Urmodi Project.

Sd/- xxx

For Additional Director of

Agriculture

Pune-1.

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URMODI IRRIGATION PROJECT

TALUKA: SAHARA DISTRICT: SAHARA

Site Parali b/s . Contents table.

Sr.	R.L.	Area in msqm.	Contents in Mcum.	Progressive contents in Mcum	Remarks
1	2	3	4	5	6
1.	650.50	0	0	0	river bed.
2.	651.00	0.009	0.0038	0.0038	
3.	651.50	0.0181	0.0069	0.0107	
4.	652.00	0.0305	0.0124	0.0231	
5.	652.50	0.0463	0.01942	0.0425	
6.	653.00	0.0650	0.02836	0.0709	
7.	653.50	0.087	0.03876	0.110	
8.	654.00	0.113	0.0510	0.161	
9.	654.50	0.142	0.06330	0.224	
10.	655.00	0.174	0.0810	0.305	
11.	655.50	0.207	0.0970	0.402	
12.	656.00	0.246	0.1155	0.517	
13.	656.50	0.287	0.1359	0.653	
14.	657.00	0.334	0.1581	0.811	Surveyed contour
15.	657.50	0.348	0.1830	0.994	
16.	658.00	0.442	0.2120	1.206	
17.	658.50	0.510	0.242	1.448	
18.	659.00	0.580	0.278	1.726	
19.	659.50	0.660	0.316	2.042	
20.	660.00	0.740	0.357	2.399	

1	2	3	4	5	6
21.	660.50	0.825	0.3990	2.798	
22.	661.00	0.915	0.4435	3.242	
23.	661.50	1.000	0.488	3.730	
24.	661.70	1.020	0.180	3.910	C.D.L.
25.	662.00	1.113	0.359	4.269	
26.	662.50	1.210	0.592	4.861	
27.	663.00	1.313	0.645	5.506	
28.	663.50	1.450	0.706	6.212	M.D.D.L.
29.	664.00	1.560	0.765	6.977	
30.	664.50	1.690	0.828	7.805	
31.	665.00	1.830	0.898	8.703	
32.	665.50	1.960	0.965	9.663	
33.	666.00	2.140	1.045	11.71	Surveyed Contour.
34.	666.50	2.29	1.130	12.89	
35.	667.00	2.46	1.210	14.05	
36.	667.50	2.65	1.303	15.85	
37.	668.00	2.88	1.397	16.75	
38.	668.50	3.04	1.496	18.25	
39.	669.00	3.25	1.600	19.85	Surveyed Contour.
40.	669.50	3.45	1.710	21.56	
41.	670.00	3.68	1.830	23.39	
42.	670.50	3.92	1.940	25.3	
43.	671.00	4.16	2.060	27.39	
44.	671.50	4.40	2.180	29.57	
45.	672.00	4.65	2.307	31.27	Surveyed Contour

1	2	3	4	5	6
46.	672.50	4.90	2.435	34.31	
47.	673.00	5.15	2.560	36.87	
48.	673.50	5.40	2.690	39.56	
49.	674.00	5.68	2.820	42.38	
50.	674.50	5.92	2.960	45.34	
51.	675.00	6.24	3.100	48.44	Surveyed Contour
52.	675.50	6.52	3.250	51.69	
53.	676.00	6.80	3.390	55.08	
54.	676.50	7.10	3.54	58.62	
55.	677.00	7.40	3.70	62.32	
56.	677.50	7.70	3.85	66.17	
57.	678.00	7.99	4.02	70.19	Surveyed Contour
58.	678.50	8.20	4.13	74.32	
59.	679.00	8.45	4.25	78.57	
60.	679.50	8.70	4.37	82.94	F.S.L. R.L.
61.	680.00	9.00	4.51	87.45	H.F.L. R.L.
62.	680.50	9.18	4.64	92.09	
63.	681.00	9.40	4.73	96.82	Surveyed Contour
64.	681.50	9.65	4.86	101.68	
65.	682.00	9.90	4.995	106.665	
66.	682.50	10.20	5.130	111.795	
67.	683.00	10.40	5.250	117.045	
68.	683.50	10.70	5.380	122.425	
69.	684.00	10.95	5.520	127.945	Surveyed Contour
70.	684.50	11.20	5.850	133.795	
71.	685.00	11.60	5.820	--	

URMODI IRRIGATION PROJECTFALUKA : SALUDA Dist. : SALUDA

Statement showing the water requirement for 10000 Acres.

Sr. no.	Name of Crop	%age	Area in Acres	Kharif		Rabi		H.W.	
				D.	Q.	D.	Q.	D.	Q.
1	2	3	4	5	6	7	8	9	10
1.	Sugar Cane	15	1500	65	23.08	70	21.43	50	30.0
	Over laps								
	30,40,10	-	-	-	6.92	-	8.57	-	3.0
2.	Other perennials	5	500	100	5.00	105	4.76	75	6.57
3.	Chillies	5	500	300	1.67	140	3.57	-	-
4.	Ginger & Turmeric	5	500	300	1.67	140	3.57	-	-
5.	Green Manure	2	200	400	0.50	-	-	-	-
6.	Paddy Late								
	variety 1/10th seedling.	10	1000	65	15.38	400	2.50	200	0.50
7.	Kh.Hy. Jowar	15	1500	400	3.75	-	-	-	-
8.	Kh.Hy. Maize	10	1000	400	2.50	-	-	-	-
9.	Kh.Pulses (U.I.)	10	1000	-	-	-	-	-	-
10.	Kh. Gr.Nut	15	1500	200	7.50	-	-	-	-
11.	kh. Vegetables	3	300	130	2.31	-	-	-	-
<u>Follow-on Crops</u>									
12.	Gram on Paddy	10	1000	-	-	400	2.50	-	-
13.	wheat on G.Manure & Kh.Hy.Maize	7	700	-	-	150	4.67	-	-

1	2	3	4	5	6	7	8	9	10

14. Rabi Hy. Jawar									
on pulses	10	1000	-	-	110	9.09	-	-	
15. Rabi Hy. Maize on									
Gr. Nut	15	1500	-	-	110	13.64	-	-	
16. Rabi Vegetables	5	300	-	-	14	2.14	-	-	
17. H.W. Gr. Nut on Kh.									
Jowar	15	1500	-	-	-	-	100	15.0	
18. H.W. Fodder on									
Maize	5	500	-	-	-	-	100	5.00	

Total :					70.28	76.44	60.17		
					x 10.54	10.62	10.37		
					=====	=====	=====		
					740.8 Mcft	811.7 Mcft	623.8 Mcft		
					(20.98 Mcum)	(22.98 Mcum)	(17.66 Mcum)		

Total for 10000 Acres 2176.3 Mcft/61.62 Mcum.

22 days carry over : Perennial H.W. requirement 40.17 Mcft.

Hence requirement (in Mcft) for 22 days for 10000 Acres

$$= \frac{40.17 \times 22 \times 24 \times 3600}{10^6}$$

$$= 76.35 \text{ Mcft} / 2.16 \text{ Mcum.}$$

NOTE:

Transit losses are already considered while working out water requirements. The capacities of M.B.C./A.B.C. are 96.9 cusecs; 91.6 cusecs, respectively.

URMODI IRRIGATION PROJECTTALUKA : SARARA DIS. : SARARA

1) Storage Calculations :

i) Catchment area	116.86 Sq.Km. (45.12 Sq.miles)
ii) Free Catchment area	109.87 Sq.Km. (42.42 Sq.miles)
iii) 75% Dep. Yield	7.10 MC/201.05 mcum.
iv) Proposed utilisation	3.80 MC/107.664 mcum.
v) Life of tank assumed	100 years
vi) Rate of silting	75 Acre feet/year/100 sq.miles.

$$\frac{75 \times 100 \times 42.42}{25 \times 100}$$

= 138 Mcft (3.91 Mcum)

These contents are available at R.L. 661.700 m., where contents available are 3.910 Mcum and water spread area is 1.020 Msqm. Hence, C.B.L. is fixed at R.L. 661.700 m. and M.D.D.L. is fixed at R.L. 663.50 m. considering F.S.D. 1.22 m. + driving head 0.58 m. where actual contents available are 6.212 Mcum. and water spread area is 1.450 Msq.m.

ii) Water requirement for 10000 Acres.

i) Kharif requirement	20.98 Mcum (740.8 mcft)
ii) Rabi requirement	22.98 Mcum (811.7 mcft)
iii) H.W. Requirement	17.66 mcum (623.8 mcft)
iv) 22 days carry over.	2.16 Mcum (76.35 mcft)

III) Water requirement for proposed Irrigation : 14900 Acres.

i) Kharif requirement	31.26 Mcum.
ii) Rabi requirement	34.24 Mcum.
iii) H.W. requirement	26.31 Mcum.
iv) 22 days carry over	3.22 Mcum.
	=====
	95.03 Mcum.
	=====

IV) Storage Requirement :

i) 20% Kh. requirement	6.252 Mcum.
ii) Full Rabi requirement	34.240 Mcum.
iii) H.W. Requirement	26.310 Mcum.
iv) 22 days carry over	3.220 Mcum.
v) Satara city water supply	4.530 Mcum.
vi) Lake Losses	10.145 Mcum.
	=====

84.697 Mcum
=====

Deduct : 5% P.M. flow 10.053 Mcum.

on 75% dependable yield = =====

(7.1 F.M.C.) 74.644 Mcum.

Add : Dead Storage 6.212 Mcum.

=====

80.856 Mcum.

=====

These contents are available at R.L. 679.50 m. where actual contents are available 82.94 Mcum and water spread area is 8.700 Msm.

Hence, F.R.L. is fixed at R.L. 679.500 m.

.....
 V Evaporation Losses :

i) Area at M.D.D.L.	1.450 msm.
ii) Area at F.R.L.	8.700 msm.
	=====
Total	10.150 msm.
Mean Area	5.075 Msm.

a) Seasonal Losses

i) Kharif Losses(Annual)	5.075 x 0.5 = 2.538 mcum.
ii) Kharif losses (Storage)	8.700 x 0.15 = 1.305 mcum.

b) Rabi Losses

Contents at the end of Rabi Season :

$$= \text{Gross Storage} - (20\% \text{ Kh. req.} + \text{Kh. Losses} + \text{Rabi req.} + \text{Rabi Losses})$$

Assuming Rabi losses = 5.6 Mcum;

$$= 82.94 - (6.252 + 1.305 + 34.24 + 5.60)$$

$$= 82.94 - 47.397$$

$$= 35.543 \text{ mcum.}$$

These contents are available at R.L. 673.00 m. where actual contents available are 36.87 mcum. and water spread area is 5.15 Msq.m.

$$\therefore \text{Actual Rabi Losses} = \frac{8.700 + 5.150}{2} \times 0.8$$

$$= 5.540 \text{ Mcum.}$$

VI) H.W. Losses

$$= \frac{5.15 + 1.450}{2} \times 1 = 3.30 \text{ Mcum.}$$

$$\therefore \text{Total annual losses} = 2.538 + 5.540 + 3.300 \\ = 11.378 \text{ Mcum.}$$

$$\text{ii) F.W. Losses} = 1.305 + 5.540 + 3.300 = 10.145 \text{ Mcum.}$$

VII) Annual Utilisation

i) Kharif requirement	31.26 mcum.
ii) rabi requirement	34.24 mcum.
iii) n.w. requirement	26.31 mcum.
iv) Satara City Water Supply	4.53 mcum.
v) Annual losses	11.378 mcum.
	=====
	107.718 mcum/3804 mft.

As against proposed yield 107.664 Mcum/Msft

VIII) Controlling Levels

i) River Bed R.L.	650.500 m.
ii) C.B.L. R.L.	661.700 m.
iii) M.D.D.L. R.L.	663.500 m.
iv) F.R.L. R.L.	679.500 m.
v) H.F.L. R.L.	680.000 m.
vi) Top of Dam R.L.	682.500 m.

URMODI IRRIGATION PROJECTTALUKA: SAHARA DIST: SAHARA

Statement showing the Canal capacity for 10000 Acres of
Irrigated area under Right and Left Bank Canal.

Sr. No.	Name of Crop	% age	Area	C.F.	Kh.	Rabi	H.W.
1.	Sugar Cane	15	1500	1	1500	1500	1500
	Over laps 30,40, 10	-	-	-	450	600	150
2.	Other Perennials	5	500	1	500	500	500
3.	Chillies (Two- Seasonals)	5	500	1/2	250	250	-
4.	Ginger and Turmeric	5	500	1/2	250	250	-
5.	Green Manure	2	200	1/2	100	-	-
6.	Paddy late variety 1/10th seedling	10	1000	1.1/2	1000	500	100
7.	Kh. Hy. Jcwar	15	1500	1/2	750	-	-
8.	Kh. Hy. Maize	10	1000	1/2	500	-	-
9.	Kh. Pulses (UI)	10	1000	(Unirrigated)	-	-	-
10.	Kh. Gr. Nut	15	1500	1/2	750	-	-
11.	Kh. Vegetables	3	300	1/2	150	-	-
<u>Follow on Crops</u>							
12.	Gram on Paddy	10	1000	1/2	-	500	-
13.	wheat on G. Manure and Kh. Hy. Maize	7	700	1/2	-	350	-

Sr. No.	Name of Crop	% age	Area	C.F.	Kh.	Rabi	H.W.	
14.	Rabi Hy. Jowar							
	on pulses.	10	1000	1/2	-	500	-	
15.	Rabi Hy. Maize							
	on Gr. Nut	15	1500	1/2	-	750	-	
16.	Rabi Vegetables	3	300	1/2	-	150	-	
17.	H.W. Gr. Nut on							
	Kh. Jawar	15	1500	1	-	-	1500	
18.	H.W. Fodder							
	On Maize	5	500	1	-	-	500	
Total :						6200	5850	4250

Hence, Kharif requirement has been considered for canal design.

- Canal capacity with $\frac{\Delta I}{DC} = 4$ rotation of 12 days
- canal capacity required for 10,000 Acres.

$$= \frac{6200}{12 \times 4} = 129.2 \text{ cusecs}$$

i) Discharge required at the head of L.B. Canal.

Total Irrigable area 7500 Acres.

As 10,000 Acres require 129.2 cusecs discharge,

- 7500 Acres will be required - 96.90 cusecs.

- Discharge required at the head of L.B. Canal 96.90 cusecs (2.74 m cum.).

ii) Discharge required at the head of R.S. Canal.

Irrigable area = 7400 Acres.

As 10,000 Acres require 129.2 cusecs discharge

∴ 7400 Acres will require 95.61 cusecs (2.71 mcm).

∴ Discharge required at the head of R.S. canal - 95.61
cusecs.

Appendix No. I11/7
 Ref. Para No. 3.10.04
 11.9.01

URMODI IRRIGATION PROJECT

FALUKA: SARANA

District: SARANA

statement showing the land use in each season.

Irrigable area 14900 Acres/6030 ha.

Sr. No.	Name of Crop	% age	Total Acreage in Ac.	Kharif Acreage in Ac.	Rabi Acreage in Ac.	H.W. Acreage in Ac.
1	2	3	4	5	6	7
1.	Sugar Cane	15	2235	2235	2235	2235
2.	Other					
	Perennials	5	745	745	745	745
3.	Chillies	5	745	745	745	-
4.	Ginger and Turmeric	5	745	745	745	-
5.	Paddy Late					
	Variety	10	1490	1490	1490	1490
6.	Green Manure	2	298	298	-	-
7.	Kh. Hy. Jowar	15	2235	2235	-	-
8.	Kh. Hy. Maize	10	1490	1490	-	-
9.	Kh. Pulses (LI)	10	1490	1490	-	-
10.	Kh. Gr. Nut	15	2235	2235	-	-
11.	Kh. Vegetables	3	447	447	-	-
12.	Gram on Paddy	10	1490	-	1490	-
13.	Wheat on					
	Green Manure	7	1043	-	1043	-

1	2	3	4	5	6	7
14.	Rabi Hy. Jowar					
	on Gr. Pulses	10	1490	-	1490	-
15.	Rabi Hy. Maize					
	on Gr. Nut	15	2235	-	2235	-
16.	Rabi Vegetables	3	417	-	417	-
17.	H.W. Gr. Nut on					
	Kh. Jowar	15	2235	-	-	2235
18.	H.W. Fodder on					
	Maize	5	745	-	-	745
				=====		
Acres				14155	12665	7450
Hectares				5729	5126	3015

Appendix No. 111/8
 Ref. Para No. 3.10.04
 11.9.01

URMUDI IRRIGATION PROJECT

TALUKA : SAJJARA DIST. : SAJJARA

Statement showing the area proposed for irrigation on Seasonal basis for 14900 Acres.

Sr. no.	Name of Crop	% age	Total Area in Acres	Conversion Factor	Equivalent area on seasonal basis in Acres.
1	2	3	4	5	6
1.	Sugar Cane	15	2235	9	20115
2.	Other				
	Perennials	5	745	6	4470
3.	Chillies	5	745	3	2235
4.	Ginger and Turmeric	5	745	3	2235
5.	Green Manure	2	298	1	298
6.	Paddy Late Variety	10	1490	3	4470
7.	Kh. Hy. Jowar	15	2235	3	6705
8.	Kh. Hy. Maize	10	1490	3	4470
9.	Kh. Pulses (UI)	10	1490	-	-
10.	Kh. Gr. Nut	15	2235	1	2235
11.	Kh. Vegetables	3	447	2	894
12.	Gram on Paddy	10	1490	1	1490

1	2	3	4	5	6
13.	Wheat on Green				
	Mannure	7	1043	1	1043
14.	Rabi Jowar on				
	Pulses	10	1490	3	4470
15.	Rabi Hy. Maize				
	on Gr. Nut	15	2235	3	6705
16.	Rabi Vegetables	3	447	2	894
17.	H.W. Gr. Nut on				
	Kh. Jowar	15	2235	1	2235
18.	H.W. Fodder on				
	Maize	5	745	1	745
					=====
				Total Acres	65709
				Hectares	(26592)

Appendix No. IV/1
Ref. Para No. S.S.02

URMODI IRRIGATION PROJECT

TALUKA - SATARA DIST. SATARA

A note on the Geological Inspection of Urmodi Irrigation Project; Taluka- Satara, District-Satara, by Shri S.W. Diwanji, Assistant Geologist, Geological Sub-Unit, I.P. & W.R.I. Circle, Poona-1.

- 1.0.01 The Note deals with the geological investigations carried out for a 32.3 m. high composite dam, across Urmodi River near Parali village in Satara Taluka of Satara District.
- 1.0.01 The nearest town to the dam site is Parali, which is approachable from Satara city by a 14 km. asphalt road.
- 1.0.02 Some of the salient features of the Project are as mentioned below :

Topo Sheet No.	47.. G/14
Latitude	17°-37' (N)
Longitude	73°-54' (E)
Catchment Area	116.86 sq. Km. (45.12 sq.miles)
Inglis Flood	1274 cumecs (45070 cusecs)
Top of Dam R.L.	682.50 m.
H.F.L. R.L.	680.00 m.
F.R.L. R.L.	679.50 m.
M.D.D.L. R.L.	665.50 m.

- Lowest level in the bed 650.50 m.
- Type of spillway Gated ogee type masonry waste weir between Ch.431 & 453 m.
- No. of Gates 3 Nos.
- 1.0.03 Name of Division I.P.I. Dn. (KB)., Poona-30.
dealing with the Project.
- Name of Sub-Division River Gauging sub-Division,
dealing with the Satara.
Project.
- 2.00 General Geology
- 2.01 The area nearabout the dam site forms a part of Deccan trap formation of rocks, comprising of dark grey, compact basalt, amygdaloidal basalts and volcanic breccias with occasional pockets of red tachylites.
- 2.02 At the dam site both the flanks are gradually rising, the right flank is almost entirely covered with soil.
- On the left flank a small nalla which crosses the dam alignment at CH.722 m. exposes highly jointed and weathered basalt in its bed extending towards up stream side by 20 m. and for a considerable distance in the down stream side except for the last 30 m. from its confluence with the river, which is covered with basalt boulders.

In another small nalla, jointed basalt is also exposed in sporadic out crops at about 80 m. D/s of CH. 660 m.

- 2.03 River Urmodi flows towards east at the dam site. No rock out crops are noticed in the river bed along the dam alignment. Few small out crops of jointed grey basalt are noticed at about 40 m. D/s of CH. 855 m.

Highly jointed, weathered basalt is exposed on right bank of river at about 150 m. D/s of CH. 870 m. extending further downstream for more than 100 m.

3.00 Foundation Exploration

- 3.01 Sub surface exploration has been carried out by means of 19 drill holes out of which 17 bores have been drilled on the alignment and two bores in tail channel portion.

- 3.02 Depth of fresh, hard rock as indicated by drill holes, on left flank between CH. 135 m. and 675 m. varies from R.L. 679.55 to R.L. 657.1 m. and from CH. 675 to 915 m. it varies from R.L. 657.1 to 639.35 m. and between 1005 m. to 1615 m. it varies from R.L. 649.50 to R.L. 674.50 m. In view of the deep seated fresh, hard rock between Ch. 700 m. and 1005 m. the possibility of shifting the alignment by about 150 m. down stream where rock is exposed on the right bank and in river bed, may be viewed as fresh and hard rock is likely to be met with at

higher levels in this portion, this may have to be confirmed by taking few bore holes.

3.03 Bore hole-wise, fresh hard rock levels met with are as mentioned in the table below :

TABLE

Sr. No.	B.H. at CH. in M.	G.L. in R.L. in M.	Total depth of Bore in M.	Depth of Fresh, hard rock in M.	Remarks
1	2	3	4	5	6
1.	135	687.06	12.90	7.50(R.L.679.55)	
2.	240	680.07	10.00	3.60(R.L.676.47)	
3.	450	672.78	14.10	3.85(R.L.668.93)	
4.	490	671.20	10.35	3.50(R.L.667.70)	
5.	510/120 D/s	666.50	7.00	0.70(R.L.665.80)	
66.	530	669.00	15.60	9.40(R.L.659.60)	
7.	530/30 D/s	667.50	10.90	5.50(R.L.662.00)	
8.	590	666.50	12.75	4.30(R.L.662.20)	
9.	675	662.90	12.80	5.80(R.L.657.10)	
10.	795	655.20	25.10	12.65(R.L.642.55)	
11.	855/30 D/s	650.50	30.40	8.20(R.L.642.30)	
12.	915	653.20	18.00	13.85(R.L.639.35)	
13.	1005	660.00	15.10	10.45(R.L.649.55)	
14.	1160	665.31	16.10	7.40(R.L.657.91)	
15.	1230	667.70	9.50	4.00(R.L.663.70)	
16.	1350	671.79	11.10	4.00(R.L.667.79)	

1	2	3	4	5	6
17. 1440		675.93	13.45	7.45(R.L.666.48)	
18. 1615		679.50	11.10	5.00(R.L.674.50)	
19. 1715		681.50	15.30	8.70(R.L.672.80)	

4.00 Waste Weir

4.01 Ogee type gated masonry waste weir is proposed between CH. 434 m. and 482 m. Two drill holes taken along the waste weir section viz. CH.450 m. and 490 m. have indicated fresh, hard rock at depth 3.85 m. (R.L. 668.93 m), and 3.50 m. (R.L. 667.70 m.) respectively.

4.02 Two drill holes taken in the tail channel portion i.e. at CH.530/30 m. and 510/120 m. D/s have indicated fresh, hard rock at R.Ls.662.00 and 665.00 m. respectively.

5.00 The details of the Geological logs of the boras along with a Geological section interpreted from bore hole results, are attached to the note.

Sd/-

(S.N. Diwanji)

Assistant Geologist

Geological Sub. Unit, Attached to
S.E., I.P. & W.R.I. Circle, Poona-1.

GEOLOGICAL LOG OF THE BORES TAKEN AT URMODI PROJECT NEAR
VILLAGE PARALI, TALUKA : SAFARA, DISTRICT : SAFARA.

Project : Urmodi

Site Near Parali

B.H. 29

CH. 135 m.

G.L. 687.06 m.

Diamond Drill Dia.

N₄ size.

Percentage core

Recovery

		Draw	%age
0 to			
2.30	Soil, Murum	0-	-
2.30	Highly jointed, dark grey,	2.30	-
to	basalt weathered Broken cores.	3.90	18
7.50		4.60	43
		5.10	20
		6.20	18
		7.50	15
7.50 to	Dark grey compact basalt,	8.50	90
8.50	jointed, joints are strained.		
8.50 to	Dark grey compact basalt, fresh,	9.30	100
12.90	hard.	10.15	94
		10.85	93
		11.85	95
		12.90	95

Remarks : Depth to fresh and hard rock 7.50 m

(R.L. 679.55 m.).

Project : Urmodi
 Site : Near Village Parali

B.H. 20

G.L. 680.07 m.

CH. 240 m.

Diamond Drill

Dia. 1 1/2 size.

Percentage core

Recovery

 Draw %

0 to			
2.40	soil and murum	0	-
2.40 to	Compact basalt, weathered and	2.40	-
3.60	jointed.	3.00	25
		3.60	83
3.60 to	Dark grey compact basalt, fresh,	5.0	96
10.00	hard few amygdales at places.	5.80	100
		6.80	95
		7.50	100
		8.40	94
		10.00	96

Remarks : Depth to fresh and hard rock 3.60 m.

(R.L. 676.47 m.)

Project Urmodi

G.L. 672.78

Site : Near Village Parali

Diamond Drill

B.H.No. 25

Dia. 1 1/2 size.

CH. 450 m.

		Percentage core recovery.	
		Draw	% age
0 to			
3.00	Soil and murum	0	-
3.00 to			
3.85	Weathered compact basalt	3.00	-
		3.80	95
3.85 to	Dark grey compact basalt, fresh	4.20	95
14.10	hard very few amygdalæ at places.	5.65	94
		6.80	91
		7.90	91
		9.60	97
		10.05	95
		11.85	100
		12.95	94
		14.10	91

Remarks: Depth to fresh hard rock 3.85 m. (R.L. 668.9).

Project Urmodi
 Site : Near Parali Village
 B.H. : 38
 Ch. 490 m.

G.L. 671.200
 Diamond Drill
 Dia. 1 1/2 size.

		Percentage core recovery.	
		Draw	% age
0 to			
1.75	Soil and murum	0	-

Percentage Core
Recovery

		Draw	%age
1.75 to			
3.00	Murum and boulders.	3.0	-
3.00 to	Compact basalt, jointed.		
3.50	Joints are stained.	3.50	40
3.50 to	Compact, basalt, fresh, hard,	4.50	90
10.35	sparsely jointed upto 9 m.	5.50	90
		6.55	90
		7.70	91
		9.20	96
		10.35	96

Remarks: Depth to fresh hard rock 3.50 m. (R.L. 667.70 m.).

B.H. 28

G.L. 666.50 m. Diamond

CH. 510 m./120. m. D/s

Drill -Dia. M size

Percentage Core
Recovery

		Draw	%age
0 to			
0.30	Soil and Murum	0	-
0.30 to		0.30	-
0.70	Compact basalt, jointed.	0.70	62

		Percentage Core Recovery	
		Draw	Page
0.70 to	Compact basalt, fresh, hard,	2.10	100
7.00	sparsely jointed upto 4 m.	2.85	100
		4.15	96
		5.75	94
		7.00	96

Remarks : Depth to fresh and hard rock 0.70 m. (R.L. 665.80)

Project : Urmodi

G.L. 669.0

Site : Near Village Parali

Diamond Drill

B.H. 22

Dia. No size.

CH. 530 m.

		Percentage Core Recovery	
		Draw	Page
0 to			
4.50	Soil and Murum	0	-
4.50 to	weath-red basalt broken cores.	4.50	-
6.40		6.00	13
		6.40	25
6.40 to	Compact basalt, fresh (core	7.90	10
9.40	recovery is poor, probably due	9.40	20
	to grinding of cores).		

		Percentage Core Recovery	
		Draw	%age
9.40 to	Compact basalt, fresh hard.	10.15	86
15.60		11.50	96
		12.20	85
		13.85	91
		14.65	93
		15.60	94

Remarks : Depth to hard fresh rock 9.40 m. (R.L. 659.60 m.)

B.H. 37

G.L. 667.50 m.

CH 530/30 m. D/s

Diamond Drill

Dia. 114 size.

		Percentage Core Recovery	
		Draw	%age
0 to	Soil, murum and boulders.	0	-
2.25		2.25	-
2.25 to	Weathered basalt, jointed,	3.00	12
5.50	broken cores.	4.25	24
5.50 to	Compact basalt fresh, hard.	5.50	92
10.90		6.75	92
		8.80	96
		10.00	96
		10.90	94

Remarks : Depth to fresh and hard rock 5.50 m. (R.L. 662.0 m.)

Project : Brmodi

Site : Near Village Parali

B.H. 35

CH. 590 m.

G.L. 666.50 m.

Diamond Drill

Dia. "NA size.

Percentage Core
Recovery

		Draw	%age
0 to 2.70	Soil, murum and boulders.	0	-
2.70 to 4.30	Compact basalt jointed. Joints are stained slightly weathered.	3.20 4.30	70 77
4.30 to 12.75	Compact basalt, fresh hard.	4.30 5.40 6.20 7.40 8.40 8.85 9.85 11.20 12.75	77 95 94 96 95 90 95 96 96

Remarks : Depth to fresh hard rock 4.30 m. (R.L. 662.20 m.)

Project : Urmodi

Site : Near Village Parali

BH 21

CH. 675 m.

G.L. 662.9

Diamond Drill

Dia. No size.

		Percentage core recovery	
		Draw	% age
0 to			
3.00	Soil and Murum	0	-
3.00 to	Weathered compact basalt broken		
5.80	cores Amygdaloidal basalt weathered	3.00	-
	below 5.50 m.	3.35	57
		4.40	38
		5.80	36
5.80 to	Amygdaloidal basalt appears more	6.70	94
7.50	like Volcanic breccia, zeolite	8.00	96
	fresh, hard.	9.20	96
7.50 to	Compact basalt, fresh, hard,	10.40	96
12.80	sparsely jointed.	11.55	91
		12.80	96

Remarks : Depth to Fresh hard rock 5.80 m.

Project : Urmodi
 Site : Near Village Parali
 B.H. 26
 CH 795 m.

G.L. 655.200 m.

Diamond Drill

Dia. No size.

		Percentage Core Recovery -----	
		Draw	Recovery
0 to			
3.50	murum, soil/and boulders.	0	-
3.50 to	Compact basalt, jointed;	3.50	-
6.65	joints are stained.	4.50	30
		6.65	32
6.65 to	Amygdaloidal basalt, weathered	9.20	10
10.25	compact basalt, below 9.58 m.	10.25	85
10.25 to	Compact basalt, fresh, jointed,	11.50	96
11.50	joints are stained.	12.65	91
		13.65	89
11.50 to	Volcanic breccia, purplish to	14.60	91
12.65	reddish in colour, fresh moderately hard.		
12.65 to	Compact basalt, with occasional		
14.60	pheno-crystic of feldspars, fresh, hard.	15.60	95
14.60 to	Compact basalt, fresh. Few	16.20	83
22.70	amygdales of green mineral at places.	17.40	58
		18.60	92
		19.60	100

		Percentage Core Recovery -----	
		Draw	%age
		21.10	100
		22.70	94
22.70 to	Compact basalt, with few	24.30	94
25.10	phenocrysts of feldspars, fresh, hard.	25.10	94

Remarks : Depth to fresh hard rock 12.65 m.

Project : Urmodi
 site : Near Village Parali
 S.H. 30
 Ch. 855/30 m. D/s (River bed)

G.L. 650.50 m.
 Diamond Drill
 Dia. 76 size.

		Percentage Core recovery	
		Draw	%age
0 to	Sand	0	-
0.15			
0.15 to	Compact basalt, highly	0.15	-
3.00	jointed. Joints are stained, broken core.	1.50	85
		3.00	73
3.00 to	volcanic breccia with pockets	4.20	4
4.20	of red bole (core recovery is extremely poor).		
4.20 to	Volcanic breccia, highly	5.00	37
6.80	weathered with horizontal	5.50	-
	veins disintegrated between	6.00	40
	5 m. and 5.50 m.	6.80	37
6.80 to	Amygdaloidal basalt at	8.20	82
8.20	places appears more like	9.00	70
	volcanic breccia comparatively	10.20	83
	less hard and zeolite,	11.50	70
	slightly weathered cores	12.50	60
	below 8.10 to 8.20 m.	13.50	70

		Percentage Core Recovery	
		Draw	%age
8.20 to	Compact basalt, fresh		
9.00			
9.00 to	Amygdaloidal basalt, moderately fresh,		
10.20			
10.20 to	Sparsely amygdaloidal basalt, fresh, hard.		
11.50			
11.50 to	sparsely amygdaloidal basalt	14.40	67
15.30	pinkish in colour, fresh	15.30	72
	broken cores.	16.50	66
15.30 to	Compact basalt, fresh, hard	17.50	66
21.70	broken cores upto 17.50 m.	18.30	75
		19.50	75
		20.20	80
		21.70	73
21.70 to	Compact basalt, fresh, hard,	22.50	93
30.40	very few amygdaloes of	23.95	93
	green minerals at places.	25.35	93
		26.75	96
		28.15	92
		30.40	50

Remarks : Depth to fresh hard rock 8.20 m. (d.L. 642.30 m.)

Project : Urmodi 300
 G.L. 653.200 m.
 Site : Near Village Parali Diamond Drill
 B.H. 33 Dia. NA size
 CH. 915 m.

		Percentage Core Recovery -----	
		Draw	%age
0 to 3.0	Alluvial soil	0	-
3.00 to 4.00	Sand, pebbles	-	-
4.00 to 6.80	Boulders	6.80	-
6.80 to 8.00	Amygdaloidal basalt, at places, associated with volcanic breccia weathered.	8.00	37
8.00 to 9.10	Amygdaloidal basalt, vesicular fresh.	9.10	50
9.10 to 9.95	Sparsely amygdaloidal to compact basalt, upto 9.65 below volcanic breccia, zeolitic fresh.	9.95	89

		Percentage Core	
		Recovery	
		Draw	%age
9.95 to	Amygdaloidal basalt at places associated with volcanic breccia zeolitic fresh, appears to be hard (core recoveries extremely poor between 12.75 and 13.35). Water colour observed to be black, core loss appears to be due to grinding of cores.	11.55	96
13.35		12.75	80
		13.35	8
13.35 to	boulders of basalt (probably fallen from upper zone).	13.35	8
13.85		13.85	50
13.85 to	Amygdaloidal basalt, at places associated with volcanic breccia fresh, zeolitic.	15.20	81
17.10		16.50	96
17.10 to	Sparsely amygdaloidal basalt fresh hard.	18.00	93
18.00			

Remarks :Depth to fresh rock 13.85 m. The rock met with between 13.85 and 17.10 m. is comparatively less hard.

Project : Urmodi
 Site : Near Village Parali
 B.H. 31
 Ch. 1005 m.

G.L.660.00

Diamond Drill

Dia. No size.

		Percentage Core	
		Recovery	
		Draw	Percentage
0 to	Soil	0	-
1.50			
1.50 to	Compact basalt, highly	1.50	-
7.70	jointed joints are stained. (Core recovery is poor.)		
7.70 to	Amygdaloidal basalt,	8.80	95
8.80	moderately weathered Amygdales of green mineral.		
8.80 to	Amygdaloidal basalt, fresh,	9.90	86
9.90	amygdales of zeolite and green mineral.		
9.90 to	Amygdaloidal basalt, with	10.45	90
10.45	pockets of red bole (tackylited) below 10.18 m.		
10.45 to	Amygdaloidal basalt, zeo-	11.55	86
11.55	litic fresh.		
11.55 to	Compact basalt fresh, hard.	12.85	89
15, 10		13.95	91
		15.10	91

Remarks : Depth to fresh rock, hard rock 10.45 m.

project : Urmodi G.L. 665.31 m.
 site ; Near Village Parali Diamond Drill
 B.H. 23 Dia. No. size
 Ch. 1160 m.

		Percentage core recovery	

		Draw	%age
0 to			
4.50	Soil, Murum	0	-
4.50 to	Compact basalt, weathered	4.50	-
7.40	jointed. Joints are stained.	6.20	15
		7.40	20
7.40 to	Compact basalt, fresh,	8.25	89
9.10	hard jointed.	9.10	41
9.10 to	Compact basalt, fresh, hard.	10.10	95
15.60		10.65	89
		11.30	93
		12.00	100
		13.30	100
		13.65	86
		14.50	88
		15.30	87
15.60 to	Amygdaloidal basalt, at		
16.10	places associated with		
	volcanic breccia zeolitic	16.10	100
	fresh.		

Remarks : Depth to fresh hard rock 7.40 m. (R.L. 657.91 m.)
 Rock is jointed upto 9.1 m.

Project : Urmodi
 Site : Near Village Parali
 B.H. 36
 Ch. 1210 m.

G.L. 667.70 m.
 Diamond Drill
 Dia. 1 1/4 size

		Percentage Core Recovery	
		Draw	%age
0 to	Soil, murum and boulders.	0	-
4.0			
4.00 to	Compact basalt, fresh,	4.00	-
7.00	hard and jointed. Joints are stained.	4.65	15
		5.30	92
		5.70	90
7.00 to	Compact basalt, fresh, hard	7.00	92
9.50		8.00	90
		9.50	93

Remarks : Depth to fresh, hard rock 4.0 m. Rock is jointed upto 7.0 m.

B.H. 24
 Ch. 1350 m.

G.L. 671.790 m.
 Diamond Drill
 Dia. 1 1/4 size

		Percentage Core Recovery	
		Draw	%age
0 to	Soil, Murum	0	-
3.00			
3.00 to	Compact basalt, pinkish	3.00	-
4.00	highly jointed, broken cores.	3.50	60
		4.00	30

		Percentage Core Recovery	
		Draw	%age
4.00 to	Compact basalt, fresh, jointed. Yellowish coating on joint planes noticed.	4.20	80
5.25		5.25	100
		6.55	96
5.25 to	Compact basalt, hard, fresh, very few amygdalae at places.	7.25	93
11.10		8.10	100
		8.75	100
		9.20	95
		11.10	92

Remarks : Depth to fresh hard rock 4 m. (R.L. 667.79 m.) rock is jointed upto 5.25 m.

Project : Urmedi

G.L. 673.93

Site : Near Village Parali

Diamond Drill

Dia. NA size.

Ch. 1440 m.

Percentage Core

Recovery

		Draw	%age
0 to	Soil, Murum	0	-
0.30			
0.30 to	Murum and Boulders	4.10	-
4.10			

		Percentage Core Recovery	
		Draw	%age
4.00 to	Compact basalt, fresh, jointed. Yellowish coating on joint planes noticed.	4.80	80
5.25		5.25	100
		6.55	96
5.25 to	Compact basalt, hard, fresh, very few amygdalae at places.	7.25	93
11.10		8.10	100
		8.75	100
		9.80	95
		11.10	92

Remarks : Depth to fresh hard rock 4 m. (R.L. 667.79 m.) rock is jointed upto 5.25 m.

Project : Urmedi

Site : Near Village Parali

Ch. 1440 m.

G.L. 673.93

Diamond Drill

Dia. NA size.

Percentage Core

Recovery

		Draw	%age
0 to	Soil, Murum	0	-
0.30			
0.30 to	Murum and Boulders	4.10	-
4.10			

		Percentage Core recovery	
		Draw	%age
4.10 to 7.45	Compact basalt, highly jointed.	5.00	33
		6.25	32
		7.15	40
		7.45	50
7.45 to 13.45	Compact basalt, fresh, hard.	8.70	80
		9.60	89
		10.40	93
		10.80	90
		11.90	91
		12.50	100
		13.45	90

Remarks: Depth to fresh, hard rock 7.45 m. (R.L. 666.48 m.)

Project : Urmodi

G.L. 679.5 m.

Site : Near Village Parali

Diamond Drill

B.H. 32

Dia. 1 1/2 size.

Ch. 1615 m.

		Percentage Core recovery	
		Draw	%age
0 to 2.50	Soil, Murum	0	-
2.50 to 5.00	Compact basalt, jointed. Joints are stained.	2.50 5.00	- 36
5.00 to 11.10	Compact basalt, fresh, jointed few phenic-crysts of Felspars at places.	5.70 11.10	70 93

Remarks : Depth to fresh rock 5.00 m. (R.L. 674.5 m.)

Project : Urmodi
 Site : Near Village Parali
 B.H. 34
 CH. 1715 m.

G.L. 681.50 m.
 Diamond Drill
 Dia. No. size.

		Percentage Core Recovery -----	
		Draw	%age
0 to	Soil, Murum	0	-
4.15			
4.15 to	Compact basalt with few	4.15	-
7.20	Amygdales upto 5 m. weathered.	7.20	37
7.20 to	Compact basalt, jointed.	8.05	82
8.70		8.70	83
8.70 to	Compact basalt, fresh,	9.30	91
15.30	hard, few amygdales at places.	10.00	97
		11.60	94
		12.80	95
		13.75	94
		15.30	94

Remarks : Depth to hard and fresh rock 8.70 m.
 (R.L. 672.80 m.)

.....

URMODI IRRIGATION PROJECT
TALUKA : SATARA DIST. : SATARA

Comparative cost details of the Dam with ungated and gated Waste Weir for different layouts.

Sr. No.	Proposal	Ungated waste weir flood lift 3 m.		Gated Waste Weir with flood lift 0.5 m.			Remarks
		Left Bank	Gorge	Left Bank	Gorge	Left bank	
		Ch. 420 m to 533 m.	Ch. 840 m. to 950 m.	Ch. 502 m. to 550 m.	Ch. 135 to 113 m.	Ch. 434 m to 412 m.	
1.	Size of gates			12 m x 8 m	12 m x 8 m	12 m x 8 m.	
2.	Length of Spillway	115 m.	115 m.	42 m.	48 m. (including end) piers.	48 m.	
3.	Chainage in metres from to	420 m. to 535 m.	840 m. to 955 m.	502 m. to 550 m.	135 m. to 113 m.	434 m. to 412 m.	
4.	Foundation R.L. in m.	662.70 m.	658.80 m.	656.00 m.	637.50 m.	--	
5.	F.R.L. R.L.	679.50 m.	679.50 m.	679.50 m.	679.50 m.	679.50 m.	
6.	Top of Dam. R.L.	684.90 m.	684.90 m.	682.50 m.	682.50 m.	682.50 m.	

Sr. no.	Items	Rate per Cum.	Qty. in Cum.	Amount in Rs. lakhs	Qty. in Cum.	Amount in Rs. lakhs	Qty. in Cum.	Amount in Rs. lakhs	Qty. in Cum.	Amount in Rs. lakhs	Qty. in Cum.	Amount in Rs. lakhs	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
A. B-Land													
	1) Land	9790/H	940 Ha	92.03	940 Ha	92.03	870 Ha	85.17	870 Ha.	85.17	870 Ha.	85.17	
	ii) Houses	2000/No		14.00	700 No.	14.00	626No.	12.52	626 No.	12.52	626 Nos.	12.52	
		-----	700 No.	-----		-----		-----		-----		-----	
				106.03		106.03		97.69		97.69		97.69	
B. C-Works													
	i) embankment	12.00		182.460	927380	111.286		145.992	914000	112.163	1253000	163.060	
			1520500					1216600					
	ii) waste weir												
	Masonry for face over flow N.O.F.	152.00	12000	18.240	29814	43.317	5720	8.694	23700	36.024	7562	11.494	
	Masonry for hearting	120.80	69730	84.233	278570	336.512	42500	51.340	245020	295.984	2722	3.288	
	Concrete for stilling basin	167.80	-	-	20125	33.769	1780	2.986	10650	17.870	472	0.792	
	R.C.C. for bridge piers, cover in	235.40	15700	36.957	18480	43.455	8200	19.503	9500	22.363	5493	12.960	
	Steel for RCC	5400	1256	67.824	1476.8	79.747	656	35.424	760	41.040	459.4	23.727	
		fons	fons	fons	fons		fons				fons		

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
v) Gates			9000 Sq.m.	-	-	-	-	288 Sqm	25.920	288 Sqm	25.920	288 Sqm	25.920	
vii) Excavation for overflow N.O.F. and Approach and Pail channel.														
a) Soil & S.M.	4.30	53200	2.2.7	60880	2.618	118460	5.091	37000			1.891	16090	0.776	
b) H.M. and boulders	7.20	32180	2.317	184690	13.298	9990	0.719	122000			9.216	20640	1.416	
c) soft rock	9.60	266980	25.630	148030	14.211	124900	11.990	83500	8.016			3400	0.330	
d) H.A.	24.76	20670	5.105	20860	5.152	107050	26.441	22250			5.496	106390	26.278	
viii) Protection work such as guide bund, masonry walls and pilot channel				7.000					1.000				1.300	
Total for 'C' works				429.736		683.365		341.903		581.683		267.797		
Total for 'A' & 'C'				535.766		789.395		439.593		679.373		365.487		

LRMODI IRRIGATION PROJECTFALUK : SAFARI Dist. SindhCalculations for wave heights

wave height by moliter's Formula

$$hw = 0.17 \sqrt{FV} + 2.5 - 4 \sqrt{F}$$

where hw = height of wave in feet

V = Velocity of wind = 100 miles per hour

Fetch = 4.5 miles

$$= \frac{4.5 \times 5200}{6080} = 3.91 \text{ miles}$$

F = Fetch of water in nautical miles.

$$\begin{aligned} \therefore hw &= 0.17 \sqrt{100 \times 3.91} + 2.5 - 4 \sqrt{3.91} \\ &= 3.4 + 2.5 - 1.4 \\ &= 4.5 \end{aligned}$$

$$\therefore \text{Free board} = 1.5 \times 4.5 = 6.75 \text{ Ft.} / 2.1 \text{ m.}$$

provided free board of 2.5 m. above H.F.L.

Controlling levels

i) Top of Dam	R.L.	682.50 m.
ii) H.F.L.	R.L.	680.00 m.
iii) F.R.L.	R.L.	679.50 m.
iv) M.D.D.L.	R.L.	663.50 m.
v) C.B.L.	R.L.	661.70 m.
vi) River Bed	R.L.	650.50 m.

URMUDI IRRIGATION PROJECTALLAHABAD DIVISION Dist. Allahabad1) Design of Spillway

$$\begin{aligned}
 \text{i) Catchment Area} &= 45.12 \text{ sq. miles} \\
 \text{Inglis Q.} &= 45.12 \times 7000 \\
 &= \frac{315840}{7.01} \\
 &= 45,000 \text{ cusecs (1274 cumecs)}
 \end{aligned}$$

$$\text{Length of spillway} = L$$

$$\begin{aligned}
 L &= \frac{Q}{3.8 \times H^{3/2}} \\
 &= \frac{45000}{3.8 \times 26.25^{3/2}}
 \end{aligned}$$

$$= 38.90 \text{ feet Say } 39 \text{ Ft./} 27.13 \text{ m.}$$

Provide three gates of 12 m. x 8 m. in size.

$$\begin{aligned}
 \therefore \text{Length of Spillway} &= 3 \times 12 + 2 \times 3 \\
 &= 42 \text{ m.}
 \end{aligned}$$

Discharge that can be passed through w.w. considering
and contraction.

$$\begin{aligned}
 \text{and contraction factor for pier} &= 0.04 H. \\
 \text{for abutment} &= 0.10 H.
 \end{aligned}$$

$$\begin{aligned}
 \text{Now, effective } L &= 3 \times 39.37 - (4 \times 0.04 + 2 \times 0.10) \\
 &\quad \times 26.25 \\
 &= 118.11 - (4.2 + 5.25) = 108.66 \text{ feet}
 \end{aligned}$$

∴ $3.8 \times 108.66 \times 26.25^{3/2} = 55,500$ cusecs
which is 1.22 times the Inglis flood, and hence
safe.

Discharge at H.F.L. $Q = 3.8 \times 108.66 \times 27.88^{3/2}$
= 60,400 cusecs

This is 1.35 times of Inglis Q .

URMODI IRRIGATION PROJECTTALUKA : SARARA Dist. : SARARAI. Head WorksDESIGN OF BUCKET

- | | | |
|-----|--|---------------|
| 1) | Total Discharge to be passed | 45000 cusecs |
| 2) | Length of Spillway | 108 feet |
| 3) | Discharge per foot (q) | 420 cusecs |
| 4) | Head on crest | 27.88 feet |
| 5) | Reservoir water elevation | 680 Metres. |
| 6) | Tail water elevation | 666.05 metres |
| 7) | hvt Velocity head | 13.95 m. |
| 8) | $V_t = \sqrt{2g hvt}$ $= \sqrt{2 \times 32.2 \times 45.76}$ $= 54.30 \text{ ft./sec.}$ | 45.76 ft. |
| 9) | $Df. = \frac{q}{V_t} = \frac{420}{54.3}$ $= 7.7 \text{ ft.} = 2.35 \text{ m.}$ | |
| 10) | $\text{Froude No.} = \frac{V_t}{g d}$ $= \frac{54.3}{32.2 \times 7.7}$ $= 3.5$ | |

From Figure 214 : (Design of small dams)

For froude No. 3.5

Minimum allowable bucket radius.

$$\frac{R}{d_1 + \frac{vt^2}{2g}} = 0.53$$

$$R = (7.7 + 45.76) 0.46$$

$$= 24.59$$

Say 25 feet

i.e. 8.63 metres.

For froude No. 3.5 and a $\frac{R}{d_1 + hvt}$ value of 0.53

$$f_{\text{max}} = 7.2 \times d_1$$

$$= 7.2 \times 7.7$$

$$= 55.44$$

$$f_{\text{min}} = 5.25 \times 7.7$$

$$= 40.43$$

$$\text{mean} = \frac{50.05 + 40.43}{2} \quad \frac{55.44 + 40.43}{2}$$

$$= 45.24 \text{ feet} \quad = 47.94 \text{ feet}$$

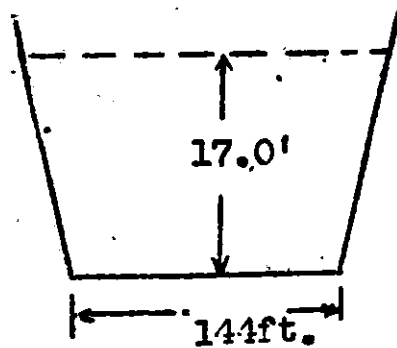
$$= 13.80 \text{ metres} \quad = 14.61 \text{ metres}$$

∴ Provide bucket invert R.L. 666.05

$$- \frac{14.61}{651.44} \text{ metres.}$$

URMODI IRRIGATION PROJECTFALUKA : SITARA Dist. : SITARA

I-Head works

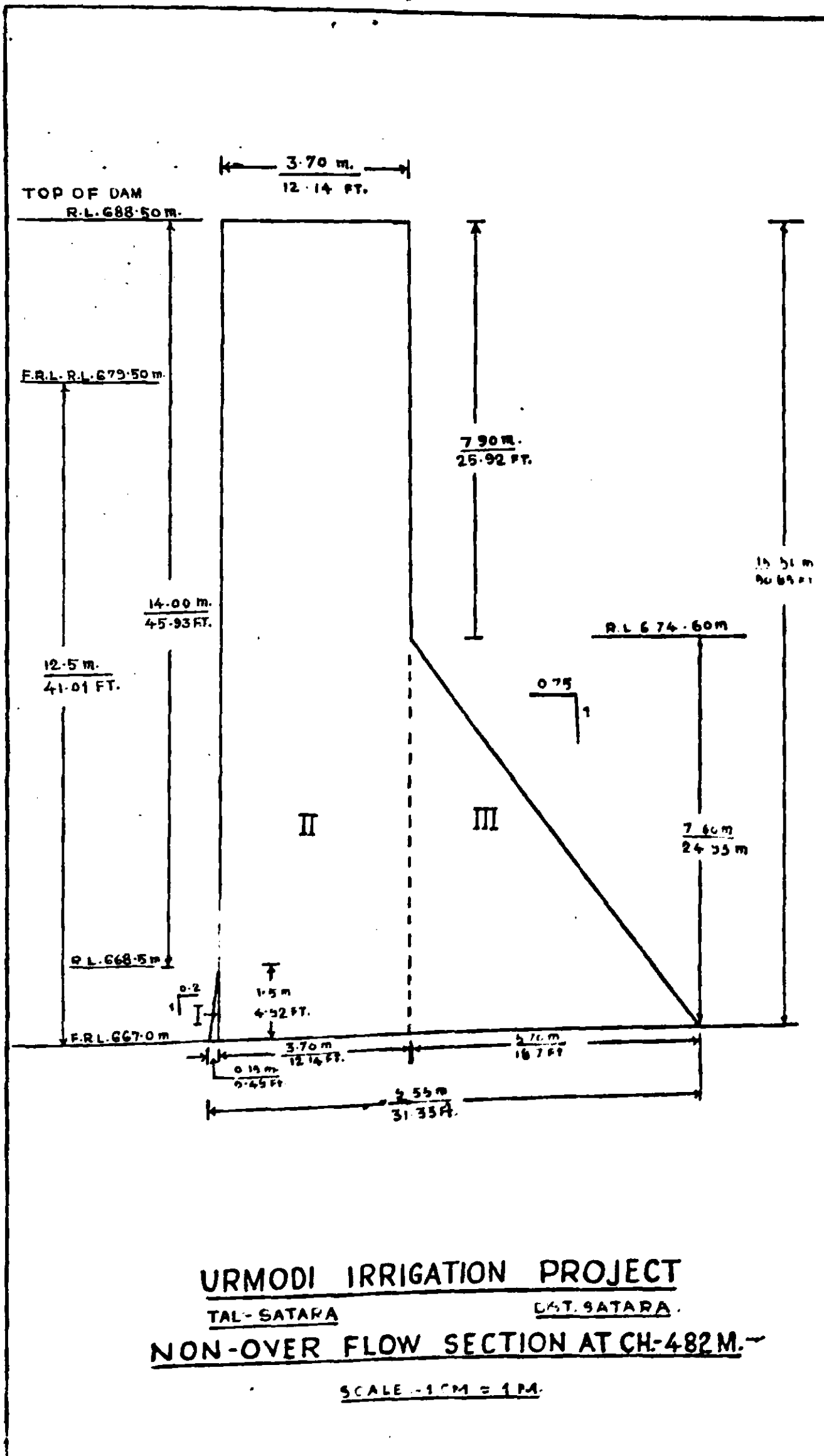
Design of Fall Channel :

Assumptions :

- i) Bed slope(s) 1 in 200
- ii) Value of N = 0.035
- iii) Bed width = 144 ft.
(43.89 m.)
- iv) Full supply
depth = 17 ft.
(5.18 m.)

$$\begin{aligned}
 \text{Area (A)} &= \frac{144 + 144 + 17}{2} \times 17 \\
 &= 2592 \text{ sq. feet} \\
 \text{Wetted perimeter } P &= 2 \sqrt{(8.5)^2 + (17)^2} + 144 \\
 &= 2 \times 19 + 144 \\
 &= 182 \text{ ft.} \\
 R &= \frac{A}{P} = \frac{2592}{182} = 14.24 \\
 V &= \frac{1.486}{N} \times R^{2/3} \times \left(\frac{1}{200}\right)^{1/2} \\
 &= \frac{1.486}{0.035} \times 5.875 \times 0.0707 \\
 &= 17.64 \text{ ft./sec.} \\
 Q &= A \times V \\
 &= 2592 \times 17.64 \\
 &= 45710 \text{ cusecs.}
 \end{aligned}$$

which is more than the Inglis discharge.



URMODI IRRIGATION PROJECT
TAL - SATARA **DIST. SATARA.**
NON-OVER FLOW SECTION AT CH-482 M.
SCALE - 1 CM = 1 M.

URMODI IRRIGATION PROJECTTALUKA : SARADADIST. : SARADAStability calculations for non-overflowMASONRY

Sr. No.	Description	weight
<u>Assumptions :</u>		
1.	Weight of masonry of concrete.	145 lbs/cft (2.35 Ton/Cum)
2.	Weight of water	62.5 lbs/cft (1.0 Ton/Cum)
3.	Earth quake co-efficient	0.11
4.	Height of Waves	2.37 unit m.
5.	Top width	3.7 m. unit
6.	Weight of back fill	135 lbs/cft (2.10 T/Cum)
7.	Weight of dry silt	67.5 lbs/cft (1.08 T/Cum)
8.	wind pressure	30 lbs/sq.ft. (146.30 kg./sq.m.)
9.	Fetch in mile	
10.	Angle of repose of silt and back fill	30°
11.	Minimum s.f.t.	5
12.	Limiting compressive stress	10 T/sq.ft. (10 Kg./sq.m.)
13.	Tension	20 lbs./sq.inch (1.4 kg./sq.m.)
14.	Limiting co-efficient of friction.	0.65

URMODI IRRIGATION PROJECT

RAL. SARADA Dist. Sarada

Stability calculations for non-over flow section

considering unit length and moment in head

(Earthquake = 0.11)

(when reservoir in full condition)

Sr. No.	Description and Dimension	Per Unit Wt. in kgs./cft.	Vertical forces	Horizontal forces	Lever Arm feet	Moment in ft. at U/s
1	2	3	4	5	6	7
<u>1. Weight of Masonry</u>						
i)	1/2 x 0.49 x 4.92 = 1.210	0.145	0.18	-	0.33	0.059
ii)	Mid. strip 12.14 x 50.85 = 617.32	0.145	89.52	-	6.56	587.20
iii)	D/s 1/2 x 18.70 x 24.93 = 233.10	0.145	33.80	-	18.86	637.46
<u>2. Earthquake on Masonry</u>						
i)	0.18 x 0.11 = 0.02	-	-	0.02	1.64	0.03
ii)	89.52 x 0.11 = 9.84	-	-	9.84	25.42	250.13
iii)	33.80 x 0.11 = 3.72	-	-	3.72	8.31	30.92

1 2 3 4 5 6 7

3. Wind Pressure
 when reservoir
 in full condi-
 tion
 $8.2 \times 1 = 8.2$ 0.03 - 0.24 46.7 11.48

4. Weight of Water
 i) $1/2 \times 0.49 \times 4.92$
 $= 1.28$ 0.0625 0.08 - 0.16 00.01
 ii) 0.49×36.09
 $= 17.70$ 0.0625 1.12 - 0.24 0.27

5. Water Pressure
 $1/2 wh^2 = 1/2 \times$
 $(41.01)^2 = 840$ 0.0625 - 52.50 13.67 713.00

6. Earth quake for water
 i) $1/2 \times 0.49 \times 4.92 \times$
 0.11 0.0625 - 0.08 1.64 0.13
 ii) $0.49 \times 36.09 \times 0.11$ 0.0625 - 0.12 22.96 2.76

7. a) Earth quake pressure of water
 $P = \frac{2/3(K_c C_b^2)}{1000}$
 $= 57.19$
 where $K = .51,$
 $C = 1, b = 41.01 =$
 57.19 0.0625 - 3.57 0.4
16.4 58.61

=====

124.70 69.90 2292.05

321

1	2	3	4	5	6	7
---	---	---	---	---	---	---

7. Deduct for up-
 lift pressure
 $1/2 \times 31.33 \times 41.01$

x0.5 = 321	0.0625	20	-	30.44	208.80
	=====				
Total :	104.70	69.99	-	2082.78	
	=====				

UNMODI IRRIGATION PROJECT

1111 SAHARA

DIKALI SAHARA

stability calculations for non-overflow section.

I) Reservoir full with Earth quake.

- | | |
|------------------------------|--------------|
| i) Total vertical forces | 104.59 Kips |
| ii) Total horizontal forces | 69.90 kips |
| iii) Total Moment about heel | 2082.78 kips |

$$\tan \phi = \frac{H}{V} = \frac{69.90}{104.70} = 0.65$$

Hence check for shear friction factor is not necessary.

i) To determine eccentricity

Resultant cuts the base at

$$\frac{M}{V} = \frac{2082.78}{104.70} = 19.90 \text{ feet}$$

$$\text{eccentricity} = 19.90 - 15.66 = 4.24 = e$$

$$\begin{aligned} \text{a) } P \text{ Max. (at toe)} &= \frac{V}{b} \left(1 + 6 \times \frac{e}{b} \right) \\ &= \frac{104.70}{31.53} \times \left(1 + \frac{6 \times 4.24}{31.53} \right) \\ &= 6.05 \text{ kips/sq.ft.} \\ &= 2.72 \text{ tons/sq.ft.} \end{aligned}$$

Compression.

$$\begin{aligned} \text{b) } P \text{ Min (at heel)} &= \frac{V}{b} \left(1 - 6 \times \frac{e}{b} \right) = \frac{104.70}{31.53} \times \left(1 - \frac{6 \times 4.24}{31.53} \right) \\ &= 0.63 \text{ kips/sq.ft.} = 0.27 \text{ tons/sq.ft.} \\ &= 4.4 \text{ lbs/sq.inch.} \end{aligned}$$

which is less than 20 and hence safe (tension).

11) To check for shear friction factor

$$\frac{0.65 \times 104.70 + (0.5 \times 144 \times 31.33)}{\text{-----}}$$

$$69.9$$

$$= 33.24 > 5 \text{ Hence safe.}$$

II - when reservoir in Empty Condition

Dr. no.	Description & Dimensions	Per unit Wt. kips/cft.	Vertical forces	Horizontal forces	Level arm in ft.	Moment in kips ft. at l/s end
1. weight of						
Masonry l/s						
	1/2 x 0.49 x 4.90					
	= 1.21	0.145	0.18	-	0.33	0.059
Mid strip						
	12.14 x 50.85					
	= 617.32	0.145	89.52	-	6.56	587.20
D/S						
	1/2 x 18.70 x					
	24.93 = 233.10	0.145	33.80	-	18.86	637.46
2. Earth quake on masonry -						
i)	0.18 x 0.11					
	= 0.02	-	-	0.02	1.64	0.03
ii)	89.52 x 0.11					
	= 9.84	-	-	9.80	20.42	250.13
iii)	33.80 x 0.11					
	= 3.72	-	-	3.70	8.01	30.92
3. Wind pressure						
	50.85 x 1 = 50.85	0.03	0.0	1.53	25.42	31.60
Total :			123.50	15.05		1537.40

URMCDI Irrigation ProjectCanal Design Design

II) Stability calculations for non-overflow section.

When reservoir in empty condition (contd.)

i) Total vertical forces.	125.50 kips.
ii) Total Horizontal forces	15.05 kips.
iii) Total moments about heel	1537.40 kips.

$$\text{For } \phi \quad \frac{H}{V} = \frac{15.05}{125.50}$$

$$= 0.12 < 0.65$$

Hence, safe against sliding and check for S.P.F. is not necessary.

Resultant cuts the base at

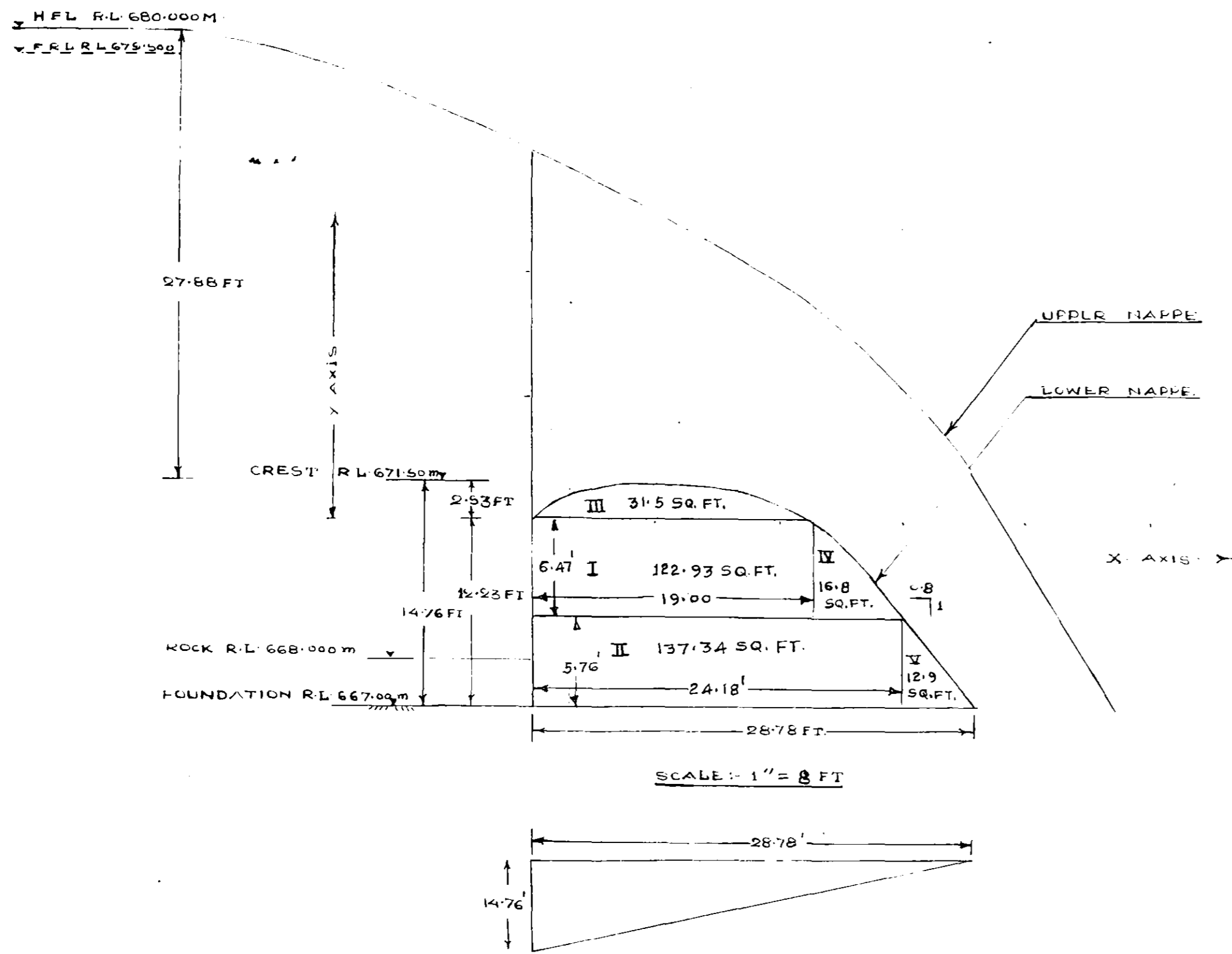
$$\frac{M}{V} = \frac{1537.40}{125.50} = 12.45 \text{ ft.}$$

$$\text{Eccentricity} = 15.66 - 12.45 = 3.21 \text{ feet}$$

$$\begin{aligned} \text{a) } P \text{ Max. (at heel)} &= \frac{V}{b} \times \left(1 + \frac{6 \times e}{b}\right) \\ &= 125.50 \times \left(1 + \frac{6 \times 3.21}{31.33}\right) \\ &= 6.35 \text{ kips/sq.ft.} \\ &= 2.86 \text{ tons/sq.ft.} \end{aligned}$$

$$\begin{aligned} \text{b) } P \text{ Min (at heel)} &= \frac{V}{b} \times \left(1 - \frac{6 \times e}{b}\right) \\ &= \frac{125.50}{31.33} \times \left(1 - \frac{6 \times 3.21}{31.33}\right) \\ &= 1.54 \text{ kips/sq.ft.} \\ &= 10.7 \text{ lbs./sq.inch.} \end{aligned}$$

ension which is less than 20 lbs/sq.inch.



GOVERNMENT OF MAHARASHTRA IRRIGATION DEPARTMENT		
URMUDI IRRIGATION PROJECT TAL:-SATARA DIST:-SATARA STABILITY ANALYSIS FOR OVER-FLOW-SECTION SCALE:- 1"=8'		
TRACED BY: CHECKED BY:	ASSISTANT ENGINEER (II) RIVER GAUGING SUB DIV SATARA EXECUTIVE ENGINEER I.P.I. DIVISION (KB) POONA 30	SUPERINTENDING ENGINEER I.P. & W.R.I. CIRCLE POONA 1 CHIEF ENGI IRRIGATION DEPARTMENT BOMBAY
DATE: 1-9-76	POONA	DRG NO OF 1976

UNODI IRRIGATION PROJECT

TALENA : SAHARA DISTRICT : SAHARA

Stability calculations of over-flow section

Block	Area in sq.ft.	Unit wt. kips/cft	Forces	L.A.	Moment in kips/ft.	Earthquake forces	L.A. earthquake moment	Remarks	
1	2	3	4	5	6	7	8	9	10
1.	122.93	0.145	17.82	9.50	169.29	17.82x 0.11	8.92	17.48	
						= 1.96			
2.	137.34	0.145	19.89	12.09	240.40	19.89x 0.11	2.84	6.22	
						= 2.19			
3.	31.00	0.145	4.50	9.50	42.75	4.5x 0.11	13.41	6.70	
						= 0.50			
4.	16.76	0.145	2.43	20.73	50.54	2.43x 0.11	8.92	2.41	
						= 0.27			
5.	12.89	0.145	1.87	25.69	43.03	1.87x 0.11	2.84	0.60	
						= 0.21			
			46.51		530.81	5.13		33.41	

1	2	3	4	5	6	7	8	9	10
6,	wt. of								
	Radial								
	Gate	89.60	26.08	2336.77	9.86	57.41	568.53		
	Total	136.11	103.59	2887.58	14.99	94.34	601.94		
		Mean L.A. : 17.26		Mean L.A. : 15.72					

LEMODI IRRIGATION PROJECT

Taluka : SAARA District : SAARA

Stability of overflow section

sr. No.	Particulars & Dimensions	Density in kips /cft.	Vertical forces in kips.	Horizontal forces in kips	Lever Arm	Moment about heel in kips	C. Q.	Horizontal forces in kips	Lever Arm	Moment amount heel in kips
1.	Weight of Masonry	0.145	136.11	-	17.26	2349.26	0.11	14.99	15.72	235.64
2.	Water weight and pressure									
	Weight (a) $\frac{6.7 \times 2.5 \times 6.5}{2}$ sq.f.	0.0625	0.53	-	2.23	01.20	0.11	0.06	13.84	0.83
	Pressure (b) $\frac{1}{2} \times (14.68)^2 = 107.8$ sq.ft.	0.0625	-	13.48	4.89	65.89	$0.11 \times \frac{2}{3} \times 51 \times (14.68)^2$			
								0.81	5.87	4.73
			136.64	-	-	2416.35		0.81	5.87	241.20
3.	Uplift (i) $\frac{1}{2} \times 14.6 \times 26.72 \times 0.5 = 105.4$ sq.ft.	0.0625	6.59	-	9.57	63.06	-	-	-	-
1.	Reservoir full with earthquake.	-	130.05	29.34		2594.49				
2.	Reservoir empty with earthquake	-	136.64	14.99		2584.90				

URMODI IRRIGATION PROJECTTaluka : SANADI District : SANADI

stability calculations for over-flow section.

I). Reservoir Full with Earthquake.

- i) Total vertical forces, 130.05 kips
 ii) Total horizontal forces, 29.34 kips
 iii) Total moment about heel
 (with F. γ in the direction of
 water pressure) 2594.49 kips.

$$\text{Factor } \phi = \frac{29.34}{130.05} = 0.226 < 0.65$$

Hence check for shear friction is not necessary.

1) To determine eccentricity :

$$\text{Resultant cuts the base at } \frac{2594.49}{130.05} = 19.95 \text{ feet}$$

$$\text{Therefore, eccentricity} = (19.95 - 14.36) = 5.59 \text{ feet}$$

$$\begin{aligned} \text{a) } P \text{ max. (at toe)} &= \frac{V}{b} \left(1 + \frac{6 \times e}{b} \right) \\ &= \frac{130.05}{28.72} \left(1 + \frac{6 \times 5.59}{28.72} \right) \end{aligned}$$

$$= 9.813 \text{ kips/sq. ft.}$$

$$\begin{aligned} \text{b) } P \text{ min (at heels)} &= \frac{V}{b} \left(1 - \frac{6 \times e}{b} \right) \\ &= \frac{130.05}{28.72} \left(1 - \frac{6 \times 5.59}{28.72} \right) \end{aligned}$$

$$= -0.76 \text{ kip/ft.}$$

$$= 5.3 \text{ lbs/sq. inch} < 20 \text{ lbs./sq. inch.}$$

II) To check for shear friction factor

$$= \frac{(0.65 \times 130.05) + (0.20 \times 144 \times 28.72)}{29.34}$$

$$= 31.07 > 5 \text{ and hence it is safe.}$$

III) Reservoir empty with earthquake.

i) Total vertical forces. 136.64 kips.

ii) Total Horizontal forces 14.99 kips.

iii) Total Moment about heel 2584.90 kips.

$$\text{Factor } \frac{H}{V} = \frac{14.99}{136.64} = 0.110 < 0.65$$

Hence safe against sliding and check for s.f. factor is not necessary.

Resultant cuts the base at

$$\frac{2584.90}{136.64} = 18.92 \text{ feet from heel}$$

$$\text{Eccentricity} = (18.92 - 14.36) = 4.56 \text{ feet}$$

$$\begin{aligned} \text{a) } P \text{ max. at heel} &= \frac{V}{b} = (1 + \frac{6 \cdot X \cdot e}{b^2}) \\ &= \frac{136.64}{28.72} (1 + \frac{6 \times 4.56}{28.72}) \\ &= 9.287 \text{ kips/sq.ft.} \\ &= 4.21 \text{ tons/sq.ft.} \end{aligned}$$

Therefore, 4.21 tons/sq. ft. $<$ 19 tons/sq. ft.
and hence safe.

$$\begin{aligned}
 \text{b) } P_{\text{min at toe}} &= \frac{V}{b} \left(1 - \frac{6 \times a}{b}\right) \\
 &= \frac{136.64}{28.72} \left(1 - \frac{4.56}{28.72}\right) \\
 &= 0.225 \text{ kips/sq.ft.} \\
 &= 0.010 \text{ tons/sq.ft.} \\
 &= 1.56 \text{ lbs/sq. inch.}
 \end{aligned}$$

Therefore, 0.010 tons/sq. ft. = 1.56 lbs/sq. inch

Therefore, 1.56 lbs/sq. inch < 20 lbs/sq. inch.

LRMCDI IRRIGATION PROJECT

TAHUNA I SA'ADA DIST. SA'ADA

stability analysis of earthen dam by Slip Circle Method.

Sr. No.	Circle No. as per Drawing	Radius in M.	F.S. with seismic forces	F.S. without seismic forces	Remarks
1.	C.1	63	1.35	1.54	
2.	C.2	57	1.45	1.64	
3.	C.3	72	1.50	1.72	
4.	C.4	51	1.30	1.44	
5.	C.5	72.2	1.73	2.03	
6.	C.6	45	1.80	2.03	

PROPERTIES OF CONSTRUCTION MATERIAL

Sr. No.	Items	Casing	Hearting	Remarks
1.	Dry Density	103 lbs/cft	88 lbs/cft.	
2.	Wet density	124 lbs/cft	114 lbs/cft	
3.	Saturated density	129 lbs/cft	118 lbs/cft	
4.	Buoyant density	66.5 lbs/cft	56 lbs/cft	
5.	Semi-buoyant density	97 lbs/cft	86 lbs/cft.	
6.	tan ϕ	0.3216 lbs/cft	0.30 lbs/cft	
7.	Cohesion	925 lbs/sq.ft.	587 lbs/sq.ft.	

664-A

Sr. no.	Field no.	Lab. no.	Depth below GL	Visual description with location	Alterberg Limits				Test on minus 0.423 mm fraction, %age of minus 0.423 mm fraction in sample	Classification
					L.L.	P.L.	P.L.	S.L.		
	2	3	4	5	6	7	8	9	10	11
1.	-	5.5.1	-	Soil Sample	61.0	26.5	34.5	15.97	-	CH
2.	-	5.5.2	-	-	61.4	33.5	27.9	15.2	-	CH
3.	-	5.5.3	-	-	61.2	23.6	35.6	27.84	-	CH
4.	-	5.5.4	-	-	61.2	23.9	37.3	17.71	-	CH
5.	-	5.5.5	-	-	59.0	24.5	34.52	18.55	-	CH
6.	-	5.5.6	-	-	62.2	27.78	34.42	19.44	-	CH
7.	-	5.5.7	-	-	53.0	34.18	18.42	22.84	-	Md
8.	-	M.S.1	-	-	58.2	24.3	33.9	28.93	1.0%	GW
9.	-	M.S.2	-	-	68.7	38.85	33.85	26.26	1.8%	GP
10.	-	M.S.3	-	-	35.5	Not possible	24.25	1.0%	GP	
11.	-	M.S.4	-	-	40.2	"	28.07	2.0%	GP	
12.	-	M.S.5	-	-	Not possible			4.0%	GW	
13.	-	M.S.6	-	-	62.0	37.1	24.9	32.56	2.0%	GW
14.	-	M.S.7	-	-	Not possible			4.0%	GW	
15.	-	M.S.8	-	-	64.0	31.8	32.2	31.7	5.0%	GW
16.	-	M.S.9	-	-	Not possible		28.38	2.0%	GW	
17.	-	M.S.10	-	-	39.5	Not possible	30.29	2.0%	GW	

Mechanical Analysis Gravel Sand

Standard proctor compaction on minus 19.052 mm friction (3/4")

Mechanical Analysis Gravel Sand			Standard proctor compaction on minus 19.052 mm friction (3/4")		
1.76 m. above in %	0.074 to 4.76 in %	Silt Clay below 0.074 in % age	O.M.C. n %	M.D.D. in 6 M/cc.	% age of minus 19.052 mm fraction in sample
12	13	14	15	16	17
0	23.5	76.5	29.5	1.48 (92.6)	-
0	11.5	88.5	31.0	1.43 (89.35)	-
0	32.5	67.5	27.5	1.44 (99.0)	-
6	17.0	77.0	31.5	1.40 (87.62)	-
0.5	37.0	62.5	27.0	-	and shear sample final
0	32.0	68.0	28.5	2.395 (87.15)	-
0	32.5	67.5	33.5	1.30 (81.15)	-
88.6	11.4	0	0	-	-
73.2	10.2	16.6	-	-	81.2%
94.94	4.64	0.42	16.2	1.86 (116.2)	47.4%
86.9	12.2	0.9	23.0	1.64 (102.5)	29.0%
78.0	21.0	1.0	Not possible	-	52.5%
91.08	8.24	0.68	21.6	1.65 (103.2)	42.02%
85.8	13.4	1.06	-	-	52.96%
95.56	23.20	1.24	-	-	49.4%
88.98	10.14	0.88	15.0	1.8 (112.5)	31.56%
80.14	8.34	1.326	23.0	1.65 (103.2)	48.96%

Permeability in G.M. Secs.	Direct shear test on minus 2.411 mm fraction	Tan ϕ	%age of minus 2.411 mm fraction in sample.	Specific gravity	Remarks
18	19	20	21	22	23
	6.24	-	-	2.612	1-7 are bearing and flaming casing.
	0.39	-	-	2.710	
	0.16	-	-	2.739	
	0.36	-	-	2.729	
	0.28	-	-	2.649	Limit test and shear test on murum samples are carried on final friction and P.C.
	0.31	-	-	2.669	such final fraction and total samples is indicated for helping the interpretation of test and results and their representativeness as far as behaviour of total sample is concerned.
	0.26	-	-	2.559	
	0.43	-	6.5%	2.906	
Not Possible			22.6%	2.858	
			2.4%	2.908	
			8.8%	3.132	
	0.52	-	13.7%	2.796	
	0.42	-	5.2%	2.615	
Not possible			8.86%	2.696	
	0.32	-	16.1%	2.624	
Not possible			6.6%	2.249	
			5.2%	2.796	

335-A

1	2	3	4	5	6	7	8	9	10	11		
18.	-	M.S.11	-	75.5	33.95	41.57	30.30	2.0%		GW		
19.	-	M.S.12	-	53.0	26.2	26.2	21.58	4.0%		GP		
20.	-	M.S.13	-	64.2	34.47	29.73	30.76	1.0%		GW		
21.	-	M.S.14	-	Not possible								GP
22.	-	Sand	-	"								SP

12	13	14	15	16	
£1.49	17.16	1.35	-	-	
£3.06	15.2	1.62	20.0	1.69(105.5)	
£7.40	12.08	0.52	22.0	1.45(90.6)	
67.14	24.14	8.72	26.5	1.495(93.5)	65.2
36.75	61.75	1.50	12.0	1.9 (123)	100.0%

335-C

18	19	20	21	22	23
-	Not possible	-	10.81%	2.714	
-	0.61	0.2679	6.64	2.616	
-	0.44	0.3249	13.04	2.729	
-	0.36	0.3249	21.72%	2.628	
-	-	-	48.5%	2.875	

Appendix No. IV/10

Ref. Para No. 4.7.02

URMODI IRRIGATION PROJECTTaluka : SATARADistrict : SATARA

Design of Left Bank and Right Bank Canal outlet.

The maximum discharge for outlet of left and right bank canal for Irrigation purpose is 96.60 and 95.61 cusecs respectively.

1)	Discharge at head of canal	96.6 cusecs
2)	Canal bed level	661.700 m.
3)	M.D.D.L. R.L.	663.50 m.
4)	F.R.L. R.L.	679.50 m.
5)	H.F.L. R.L.	680.50 m.
6)	F.S.D. in Canal at head	1.22 m/4 ft.
7)	Minimum driving head	0.58 m/1.9 ft.

$$Q = cd \times A \times \sqrt{2gh}$$

where

Q = Discharge in cusecs.

cd = coefficient of discharge 0.70

A = Area of outlet in ft.

h = cut off in ft. = 1.80

Driving head

$$96.6 = 0.70 \times A \times \sqrt{2 \times 32.2 \times 1.8}$$

$$A = \frac{96.6}{0.7 \times \sqrt{2 \times 32.2 \times 1.8}}$$

$$= \frac{96.6}{7.73} = 12.50 \text{ sq. ft.}$$

Therefore, provide one gate of 4' x 4' with one addition standby i.e. in all two gates.

$$Q = C_d \times A \times \sqrt{2gh} = 0.7 \times 16 \times \sqrt{2 \times 32.2 \times 1.8}$$

$$= 123.9 \text{ cusecs} > 97 \text{ cusecs} \therefore \text{it is adopted.}$$

URMODI IRRIGATION PROJECT

TALUKA : SATARA DIST. : SATARA

11 Main Canal and Branches.

Statement showing the village-wise G.C.A., C.C.A. population of villages coming under command of Left Bank Canal.

Sr. no.	Name of Village	Gross Command area in acres.	Culturable area in acres.	Population as per census 1971	Remarks
1	2	3	4	5	6
<u>Satara Taluka</u>					
1.	Ambavade Bk.	272	207	1,294	
2.	Bhendvade	98	75	433	
3.	Ambavade Kd.	214	163	67676	
4.	Shahapur	476	362	2,239	
5.	Songaon	600	456	1,460	
6.	Shendre	747	568	1,241	
7.	Valse	550	418	513	
8.	Dharatngaon	1035	787	1,813	
9.	Dorgaon	1266	962	2,075	
10.	Apshinge	1512	1150	2,683	
11.	Majgaon	1251	950	1,152	
12.	Malyapur	576	441	472	
13.	Khojawadi	1420	1079	1,476	
14.	Nisrale	832	630	1,006	
15.	Nandgaon	126	87	2,547	
Total area in Acres		10975	8335	21,080	
			76%		

Appendix No.V/2
 Ref. para 5.2.02
 5.2.03

URMODI IRRIGATION PROJECT

TALUKA : SATARA DIST. SATARA

11-main Canal and branches.

Statement showing the village-wise G.C.A., C.C.A., Population of villages coming under command of Urmodi R.S. Canal.

Sr. no.	Name of village	Gross commanded area in acres	Culturable area in acres	Population as per census 1971	Remarks
1	2	3	4	5	6
<u>Satara Taluka</u>					
1.	Parali	60	46	1,750	
2.	Gajawadi	110	84	906	
3.	Senawadi	150	114	906	
4.	Pogarwadi	260	197	377	
5.	Karandi	220	167	1,186	
6.	Upali	250	190	257	
7.	Shelkewadi	500	380	587	
8.	Wechale	1010	768	1,719	
9.	Bhatmarali	55	42	794	
10.	Delegaon	630	479	841	
11.	Padoli	1900	1444	3,208	
12.	Nagothana	2700	2052	4,737	
13.	Atit	2650	2014	3,116	
14.	Khodad	380	248	793	
Local area in Acres		10825	8225	21,177	

76%

BRMODI IRRIGATION PROJECT

ALONG: DATTAM - DIST: SARANA

and placement, showing the distribution of command area and the discharge required at the fall of each section for Brmodi Canals.

LEFT BANK CANAL

Sr. No.	Section in Km. From to	Length of section in Km.	G.C.A. Acres	G.C.A. 76%	I.A. 90%	Residual Area in Acres	Discharge required
	At Head					7500	96.60
1.	0-18.5	18.5	3567	2711	2440	5060	65.38
2.	18.5 to 29.5	11.0			5060		

RIGHT BANK CANAL

Sr. No.	Section in Km. From to	Length of section in Km.	G.C.A. Acr.	G.C.A. 76%	I.A. 90%	Residual area in acres	Discharge required
	At Head					7400	95.61
1.	0-15.2	15.2	2635	2000	1800	5600	72.35
2.	15.2-23.3	8.10	3420	2600	2340	3260	42.10
3.	23.3-27.5	4.2			3260		

$R = \frac{A}{F}$	Value of N	bed slope	Velocity in feet/sec	Calculated discharge in cusecs	V_0 in feet/sec.	V/V_0	Ratio of B/D	Remarks
11	12	13	14	15	16	17	18	19
2.588	0.025	1 in 4000	1.772	107.00	1.873	0.95	4.29	
2.446	0.0275	1 in 3500	1.567	72.86	1.696	0.92	4.67	
2.588	0.025	1 in 4000	1.772	107.00	1.873	0.95	4.29	
2.265	0.0275	1 in 3500	1.575	75.58	1.696	0.93	4.67	
1.845	0.0275	1 in 3500	1.375	42.10	1.393	0.90	5.00	

URMODI IRRIGATION PROJECT

TALUKA : SAHAY DIST. : SAHAY

Statement showing the available material from
excavated stuff.

Sr. no.	Items	Soil in cum.	H.M. & boulders in cum.	Soft Rock in Cum.	Hard rock in Cum.	Remarks
1.	Excavation for C.C.P.	33,380	9250	27330	1110	
2.	Excavation for L.S.C.S.L. toe drains.	15,173	-	-	-	
3.	Excavation for Approach channel for outlet -					
	L.D.C.	17,076	-	3410	11980	
	R.D.C.	20,626	-	600	735	
4.	Excavation for seat of dam	39,700	-	-	-	
5.	Excavation for w.w. tail and approach channel.	18,091	20638	3411	106395	
	Total :	144,046	29888	34781	120220	
	Material useful 80%					
	1.5 times in Hard Rock	115,237	23910	27825	180330	

51735

Sr. No.	Items	Available stuff @ 80% in cum	Quantity required from borrow area in cum.
1.	Hearting (4,07,100 cum.)	100,764(Soil)	3,00,336
2.	Casing (8,04,820 cum.)	35,225	7,69,595
3.	Filling C.C.P. (71,070 cum.)	-	71,070
4.	Rock toe (26,860 cum.)	26,860	-
5.	Pitching Material (35,535 cum)	35,535	-
6.	Quarry spalls (8,885 cum.)	8,885	-
7.	Guide bund for fail channel casing material) 20050)	16510	3,540
8.	Guide bund hearting material (20600)	9,703(soil)	10,897
9.	-do- pitching (3690)	3,690	-
10.	Filling foundation gaps of N.C.P. and training wall (4770)	4,770(soil)	-

LIMODI IRRIGATION PROJECT

TALUKA : SALANA

DISTRICT : SALANA

Statement showing the availability of Murum and Soil in the vicinity of Dam Site.

Sr. No.	Name of Village	Type of Material	Block No.	Area of Block	Average depth of material in the block in M.	Quantity in Mcum	Remarks
1	2	3	4	5	6	7	8
1.	Parali Kamathi	Soil	Block-A "-	11,39,593 Sq.M.	1.675	1.91	Required Quantity - 0.778 Mcum soil.
2.	Ashta Dahiwadi	Murum	Block-B "-	13,27,367 Sq.M.	0.900	1.195	
3.	Parali Banaghar	"	Block-C "-	14,21,254 Sq.M.	0.945	1.343	
4.	Ambawade	"	Block-D	4,04,693 Sq.M.	0.750	0.304	Required Quantity 1.437 Mcum

URMODI IRRIGATION PROJECTTALUKA : SATARA DISTRICT : SATARAStatement showing the requirement of Machinery for
construction of Urmodi Irrigation Project.I- Head Works

Sr. no.	Items	Qty. in Mcft cum	Type of machinery	Cost per Mcft per year	Mac- hinc year	Peri- od of struc- tion	Mac hinc req- uired	Mac hinc req. with stand by	Total mac- hinc
1	2	3	4	5	6	7	8	9	10
1.	Stripping Seat of Dam	<u>1.41</u> 39700	Bull. Dozer	7	1	1	1	1	2
2.	Excavation for cut-off trench L & C drain								
	Masonry, tail and Approach channel in soft strata.								
	a) Soil & Murum	<u>4.59</u> 134232	Moto- rised Scraper Rooter	4	1	5	1	1	2
3.	Filling in Heart- ing cut-off, Puddle hearting.	<u>17.30</u> 48787	Tractor	8	2	4	1	1	2
4.	Filling in sand L & C	<u>0.35</u> 15173	Ripper	3	1	2	1	-	1
5.	Murum for casing & Guide Bund	<u>37.07</u> 1052921	shovel	1	4	4	1	1	2
6.	Excavation in Rock -								
	i) Cut-off trench	<u>1.06</u> 28440	Jack Hammer	0.5	2	4	1	1	2
	ii) Masonry Tail & Approach Channel	<u>3.88</u> 109836	Air Compres- sor	1	4	4	1	1	2
	iii) Regulators	<u>4.24</u> 16725							

1	2	3	4	5	6	7	8	9	10
6.	iv) Rubble for Masonry	<u>6.00</u> 170000							
7.	Aggregate for concrete.	<u>0.25</u> 7000	Crusher	0.26	1	2	1	1	2
8.	Concrete	<u>0.25</u> 7000	Concrete Mixer	0.1	3	2	2	1	3
9.	Mortar for Masonry, building and Dam.	<u>1.06</u> 29000	Mortar Mixer	0.1	11	5	2	1	3
10.	Dewatering for foundation	<u>1/2</u> Cusecs	Pump	-	-	-	1	1	2
		1 Cusec	"	-	-	-	1	1	2
		2 Cu	"	-	-	-	1	1	2
11.	Concreting	<u>0.250</u> 7000	Vibra- tor	0.1	3	2	2	1	3
12.	Water Pump	<u>8.83</u> 248320	Water Pump 2000 Gallon	0.7	13	5	3	2	5
13.	Conveying material								
	i) Stone 170000	<u>07.06</u> 202000	Diesel trucks						
	ii) Sand 22000		tons capacity	0.4	18	5	4	2	6
	iii) Cement steel 10000 202000								
14.	Consolidation for								
	i) Hearting	<u>14.48</u> 407100	sheep Foot Roller	8	2	4	1	1	2
	ii) Cas-ing, cut-off trench.	<u>28.35</u> 803100	Road Roller	10	3	5	1	1	2

1	2	3	4	5	6	7	8	9	10
15. Quarry-									
	Roads	-	MOTOR Grador	-	-	4	-	1	1
16. Resolling Equipment for earth work.									
		45,3	Dumper	8	4	4	2	1	3
		<u>1283200</u>							

URMODI IRRIGATION PROJECTTaluka : SATARA : District : SATARA

II-main Canal and Branches

Statement showing requirement of Machinery for
Canal Construction.

Sr. no.	Item	Qty. in Mcum	Type of machinery	Output of machine per year	Machinery year	Period of construction	Machinery required	Std by	Total
1	2	3	4	5	6	7	8	9	10
1.	Excavation in Rock for		Air Comp-ressor						
	i) Canal	0.11		0.028	5	5	1	-	1
	ii) H.R.	0.01	365						
	iii) C.D. Works	<u>0.01</u> 0.13	capa-city						
			2 Jack Hammer						
2.	Concrete for C.D.Works								
	1) Foundation work	0.01	1)Mixer	0.002	1	5	1	1	2
	2) For other work	<u>0.02</u> 0.03	2)vibra-tor	0.014	2	5	1	1	2
3.	Metal for concrete work	0.03	Crusher	0.007	4	5	1	-	1

1	2	3	4	5	6	7	8	9	10
4. Transporting material									
1) Bankwork									
	for Canal	0.37	Heavy Truck	0.014	26	5	6	2	8
	75%								
2) Material for C.D. Works.									
		0.03	-do-	0.014	2	5	1	1	2
5. Watering for Earth-work for canal 16% of Bank work.									
		0.08	Water Tanker	0.21	5	5	2	-	2
6. Consolidation of canal work Approach and Colony Road.									
		0.51	Road Roller 10 Ton	0.283	2	5	1	1	2
					1	1	1	-	1
7. Dewatering of foundation on cusec.									
	1) Pump				5	3	2	1	3
	2) Pump on $\frac{1}{2}$ cusec				5	1	1	1	2

Appendix No. VI/5
 Ref. Para 6.11.01
 10.5.01

URMODI IRRIGATION PROJECT

TALUKA : SALUDA DIST. : SALUDA

Statement showing the Additional Machinery required, for
 construction of Urmodi Irrigation Project.

I-Head Works.

Sr. no.	Name of Machinery	No. of Machines required	Remarks
1	2	3	4
1.	Core drilling machine with Accessories.	1	
2.	Jeep with trailers	4	
3.	Air compressor 105 CM. capacity	2	
4.	Station wagon	1	
5.	Pick-up Van	2	
6.	Explosive Van	1	
7.	Ambulance	1	
8.	Compression Testing Machine	1	
9.	welding Machine	1	
10.	Platform for weighing	1	
11.	Wheel tractor with trailer	1	
12.	Boat	1	
13.	Generator 10 to 25 KV.	2	
14.	Flood Lights	6	
15.	Diesel engine 10 H.P.	2	
16.	hoisting equipment		
	i) Crane 5 to 10 tons	1	
	ii) Winches	2	

: 2 :

1	2	3	4
16.	iii) Chain and Pulley Blocks	2	
	iv) Screw Jack	5	
17.	Grout Pumps with accessories	2	
18.	Oil Tanker	1	
19.	Light Truck for driving purpose	3.	

Appendix No. VI/6

Ref. Para No. 6.11.01
10.5.01URMODI IRRIGATION PROJECTTALUKA : SAFARA DISTRICT : SAFARA

11-Main Canal and Branches.

Statement showing requirement of additional machinery for
construction of Urmodi L.S. Canal and R.S. Canal.

Sr. no.	Items	Nos.
1.	Jeep with Trailors	4
2.	Station wagon	1
3.	Pick up Van	1
4.	Hoisting Machinery	
	i) Tripods	2
	ii) Chain & Pulley Blocks	2
	iii) Screw Jack - 3 Tons	1
	-do- 5 Tons	1
5.	Diesel set with Generator	
	25 K.W.	1
6.	Miscellaneous electrical	
	Goods	lump
7.	Compression Testing Machine	1
8.	Weighing Platform	1
9.	Workshop unit	1
10.	Miscellaneous equipment	lump
11.	Blasting equipment	lump

URMODI IRRIGATION PROJECT

Taluka : Satara

District : Satara

Statement showing the requirement of material for construction of Urmodi Irrigation Project.

Sr. No.	Items	Total Qty. in Mcum	Rate per 100 Mcum	Requirement in Mcum	Rate per 100 Mcum	Requirement in Mcum	Rate per 100 Mcum	Requirement in Mcum	Rate per 100 Mcum	Requirement in Mcum
1	2	3	4	5	6	7	8	9	10	11
1.	C.C.R. Masonry for overflow and non-overflow wall.									
	1) O.F.N.O.F. Draining wall 10287									
	ii) D. Regulator 3471	0.014	120	0.017	45	0.006	-	0.003	-	0.007
	Total 13758									
2.	Rock for and stone pitching									
	1) Stone pitching 48109	0.080	120	0.096	-	-	-	-	-	-
	ii) Rock for 52290									
	80399									

1	2	3	4	5	6	7	8	9	10	11	12
3.	Plain cement concrete 1:3:6										
	i) W.W. 472										
	ii) De Regu- lator <u>86</u> 558	0.001	100	0.001	-	-	33%	0.001	5%	0.001	
4.	R.C.C. 1:2:4										
	i) W.W. 5493										
	ii) D-Regu- lator <u>796</u> 6289	0.006	100	0.006	-	-	33%	0.001	50%	0.003	
5.	Colony	0.050	100	0.050	45%	0.023	20%	0.005	45%	0.011	
6.	Murum for Casing 1032871										
	Soil for heating 407100										
	Soil for (riddle trench of guide bund) 20600										
	Murum for guide bund 20050	-	-	0.170	-	0.029	-	0.010	-	0.022	

Appendix No. VI/8
Ref. Para 6.13.01

URMODI IRRIGATION PROJECT

Taluka: Satara District: Satara

Statement showing the quantities of work and labour units required for the Urmodi Irrigation Project.

Sr. no.	Item	Qty. in Mcum	Task in Man Day	Unskilled labour in lakhs Man day	Skilled labour in man day	Operator and Drivers lakhs Man day	Total labour Man-days including standby
1	2	3	4	5	6	7	8
1.	Excavation soft Strata	104350	1.42	0.735	-	-	0.735
2.	Excavation in H.M.S.	20640	0.70	0.295	-	-	0.295
3.	Excavation in H.R. and S.R.	109840	0.23	0.477	-	-	0.477
4.	Embankment	1283200	1.42	9.035	-	-	9.035
5.	Working of Air Compressor 6 x 2 = 12	145800	750 Cft	0.069	-	-	0.069
6.	Collecting Sand and Shingles	22173	2.83	0.078	-	-	0.078

1	2	3	4	5	6	7	8
7.	Laying masonry	170000	0.34 for un- skilled and 0.42 skilled	5.0	4052	-	9.052
8.	Mixing and laying cement concrete	36000	2.83 for skilled and 0.42 for unskil- led	0.127	0.857	-	0.984
9.	Running of Air Compressor, Jack Hammer & Crusher 6x2 =12	-	12 nos.	-	-	-	-
10.	Bull Dozer 2 x 2 = 4	-	-	-	-	0.068	0.068
11.	Water tanker 6 x 2 = 12	-	-	-	-	0.207	0.207
12.	Transporting truck loading and un- loading - 6 nos. x 8 labour - per truck	-	-	0.82	0.16	0.16	1.14
13.	Road roller 4 x 2 and sheep foot.	-	-	-	-	0.140	0.14

1	2	3	4	5	6	7	8
14.	Running workshop	-	20				
			nos.				
15.	Pump Operators		12				
	6 x 2 = 12	-	nos.				
16.	Tractor 2x2 = 4	-	4				
			nos.				
17.	Jeep & Pick-up Van		14				
	Driver 7x2 = 14	-	nos.				
18.	Earth moving						
	machinery						
	10 x 2 = 20	-	20				
			nos.				
			10				
			nos.				

URMODI IRRIGATION PROJECT

TALUKA : SAHARA DIST. : SAHARA

Statement showing the requirement of Labour for Canal Construction of Urmodi Canal

Sr. No.	Items	Quantity	Task work per day	per	Un-skilled	Man-days Skilled	Operator	Total
1	2	3	4	5	6	7	8	9
1.	Excavation in soft strata such as soil, soft murum.	2,09,625	1.42	Cum	1,47,625	-	-	1,47,625
2.	Excavation in H.M. & boulders	4,68,940	0.70	Cum	6,69,915	-	-	6,69,915
3.	Excavation in soft rock & hard rock	1,16,565	0.42	Cum	2,77,535	-	-	2,77,535
4.	earth work in Bank	6,06,880	1.42	Cum	3,57,000	-	-	3,57,000
5.	handling air compressor and Jack Hammers 1 + 2 = 3	3 nos.	1200		3,600	-	3600	7,200
			for 5 years (20 days in a month)					

1	2	3	4	5	6	7	8	9
6. Transportation, loading and unloading from truck.		10 nos.	1200 days for 5 years (20 days in a month)		96,000	12,000	12000	1,20,000
							8 nos. per day	
7. Running of various machines								
a) Ramp Operators		5 nos.	1200 days for 5 years (20 days in a month)		-	-	6000	6,000
b) Jeep Drivers 4 station wagons = 4 + 1 = 5		5 nos.	-do-		-	-	6000	6,000
c) Roller Driver		3 nos.	-do-		-	-	3600	3,600
					15,51,675	12,000	31200	1594,175
			say		15.52 lakhs	0.12 lakhs	0.31 lakhs	15.95 lakhs

URMODI IRRIGATION PROJECT

TAL. SAFARA

Dist. SATARA

Statement showing the permanent staff structure for Maintenance of Urmodi Irrigation Project.

I-Head works

1 - General building

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Sr. no.	Category	For Division at Satara	For Sub-Division at Parali	Total	Remarks
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1. Chowkidar for Inspection Bungalow. - 1 1 IV-A

2. Khansama for Inspection Bungalow. - 1 1 IV

.....

Permanent inspection bungalow is proposed at Parali.

II Office and Works

- 1) Section Office 1 at Satara - L.S. Canal
- 2) Section Office 1 at Parali - R.D. Canal

and dam maintenance.

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URMODI IRRIGATION PROJECT.Taluka : Satara District : SataraI-Head WorksStatement showing the Temporary Staff structure required
for the construction of Urmodi Project.

Sr. No.	Category	For Head Works		Total	Type
		Divi- sion	Sub-Dn. at Parali		
1	2	3	4	5	6
1.	Executive Engineer	1	-	1	I
2.	Deputy Engineer	1	2	3	II
3.	Land-Acquisition Officer	1	-	1	II
4.	Junior Engineers	3+2	12	17	III-A
5.	Research Asstt.	1	-	1	III-A
6.	Head Laboratory Assistant	1	-	1	III-A
7.	Laboratory Asstt.	2	-	2	III-A
8.	Accountant	1	-	1	III-A
9.	First Clerk	1	-	1	III-A
10.	Senior Accounts Clerk	1	-	1	III-A
11.	Store Keeper	1	-	1	III-A
12.	Senior Clerk	4	2	6	III-A

1	2	3	4	5	6
13. Junior Clerk		6	4	10	III-B
14. Typists		3	2	5	III-B
15. Asstt. Store Keeper	1		-	1	III-B
16. Draftsman	1		-	1	III-A
17. Asstt. Draftsman	1		-	1	III-B
18. Tracers		4	2	6	III-B
19. Record Keeper	1		-	1	III-B
20. Peon & Chowkidars	7		6	13	IV-A
21. Attendants		-	6	6	IV-A

 44 36 80
 =====

Sr. no.	Name of Office	Head Quarter	Work Allotted
1.	Dam Division	Satara	Incharge Division
2.	Dam Sub Division No. 1	Parali	Earth work, Colony and Roads.
3.	Dam Sub-Division No. 2	Parali	Masonry work, Quality Control and allied works.

URMODI IRRIGATION PROJECT
Taluka. Satara Dist. Satara

Statement showing the requirement of temporary quarters
at Satara and Parali for I-Head Works.

Sr. no.	Station	Class of Accommodation					Total	Remarks
		I	II	III-A	III-B	IV-A		
1.	Satara	1	2	18	16	7	44	
2.	Parali	-	2	14	8	12	36	
Total :		1	4	32	24	19	80	

Appendix No.VII/3
Ref.Para 7.10.02

URMODI IRRIGATION PROJECT

Taluka : Satara Dist. : Satara

Statement showing the permanent buildings proposed
for maintenance of Urmodi Project.

1-Head Works I.B. Non-Residential

Sr. no.	Category	At Parali	Total	Total No. x Sq.ft.
1.	Inspection Bungalow			
	1-Class: 2-Suits	1	1	1 x 2270 = 2270
2.	Garage	2	2	2 x 550 = 1100
3.	Chowkidar and Staff quarters.	3	3	3 x 410 = 1230
4.	Sanitary Block	2	2	2 x 55 = 110

Appendix No.VII/4
Ref.Para No.7.2.01

URMODI IRRIGATION PROJECT

Taluka : Satara District : Satara

statement showing the List of Temporary Buildings proposed for construction of Urmodi Irrigation Project.

I-Head Works

Sr. no.	Description	Division at Satara	Two Sub-Divisions at Parali	Total No. x Sq.ft.
1	2	3	4	5
<u>II-A Temporary Residential Buildings</u>				
1.	Executive Engineer Residential	1	-	1 x 1611 sq.ft.
2.	Garage and Servants	1	-	1 x 268 = 268
3.	S.D.O's Residential	1	2	3 x 1190 = 3570
4.	Land Acquisition Officer's residence	1	-	1 x 1190 = 1190
5.	Class-III-A Quarters	18	14	32 x 691 = 22,112
6.	Class III-B Quarters	16	8	24 x 460 = 11,040
7.	Class IV-A Quarters	7	12	19 x 277 = 5,263
8.	Sanitary Block for Class-IV A	2	3	5 x 55 = 275
9.	Two room hutment	-	6	6 x 277 = 1662
10.	One room hutment	-	12	12 x 109 = 1308
11.	Sanitary Block for two and one-room hutment	-	3	3 x 55 = 165

1	2	3	4	5
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11-B Non-Residential Buildings

1.	Executive Engineer's office	1	-	1x3960 = 3960
2.	Garage & Chowkidar	1	-	1 x 268 = 268
3.	Sanitary Block for Divisional Office	2	-	2 x 94 = 188
4.	Sub-Divisional Office	-	2	2 x 1039 = 2078
5.	Garage and Chowkidar for S.D.O's office.	-	2	2 x 268 = 536
6.	Sanitary block for SDO's office	-	2	2 x 55 = 110
7.	Laboratory	1		1 x 1315 = 1315
8.	Divisional Store	1	-	1x 2000 = 2000
9.	S.D.O's Office Store	-	2	2 x 600 = 1200

B-Building for Machinery work-shop

1.	Machine work shop and repair work	-	1	1 x 2400 = 2400
2.	Structural Shop	-	1	1 x 600 = 600
3.	Electrical shop & Store	-	1	1 x 600 = 600
4.	Hardware and spare Parts Store	-	1	1 x 600 = 600
5.	Fyre and tools Store	-	1	1 x 1000 = 1000

1	2	3	4	5
<u>C - Building for Earth Moving Machinery</u>				
1.	Repair work shop	-	1	1 x 900 = 900
2.	Parking Shed	-	1	1 x 4500 = 4500
<u>D - Construction for Plant</u>				
1.	Cement Store	-	1	1 x 2400 = 2400
2.	Hardware and Building material store	-	1	1 x 800 = 800
3.	I & P Stores	-	1	1 x 800 = 800
4.	Magazine store	-	1	1 x 250 = 250
5.	store shed at Mahuli (Cement)	1	-	1 x 1800 = 1800
<u>F - Service Building</u>				
1.	Dispensary	Since adequate facilities are already available at Parali site separate provision is not considered in estimate.		
2.	Police Station			
3.	Bus Station			
4.	Bazar Place			
5.	Community building	-	1	1 x 2000 = 2000
6.	Power House	-	1	1 x 1000 = 1000
7.	Pump House	-	1	1 x 500 = 500
8.	Reservoir	-	1	1 x 1000 = 1000
9.	Canteen	-	1	1 x 800 = 800

Appendix No.VII/5
Ref. Para No.7.1.02

URMODI IRRIGATION PROJECT

Taluka : Satara District : Satara

II-main Canals and Branches

Statement showing the permanent staff structure for the
Urmodi Irrigation Project.

Sr. no.	Category	For Sectional Office		Total	Class	Remarks
		Satara	Parali			
1	2	3	4	5	6	7
1.	Sectional Officer	1	1	2	III-A	
2.	Sectional Clerk	1	1	2	III-B	
3.	Canal Inspector	4	4	8	III-B	
4.	Measurer	1	1	2	III-B	
5.	Peons	2	2	4	IV-A	
6.	Attendant	2	2	4	IV-A	
7.	Canal Chowkidar	2	2	4	IV-A	
8.	Signaller Office & Residence	1	1	2	III-B	
9.	Dafter Karkoon & Gauge Karkoon	1	1	2	III-B	
10.	Patkari	1	1	2	III-B	
11.	Chowkidar	1	1	2	IV-A	
Total :		17	17	34		

sr. no.	Type	III-A	III-B	IV	Total
1.	Satara	1	9	7	17
2.	Parali	1	9	7	17
TOTAL :		2	18	14	34

Appendix No. VII/6
Ref. Para No. 7.2.01

URMODI IRRIGATION PROJECT

Taluka : Satara District : Satara

11-Main Canal & Branches

Statement showing the temporary Staff structure required for constructing of Urmodi Irrigation Project.

Sr. no.	Category	For 1 Satara Sub-Dn.	For 2 Satara Sub-Dn.	Total	Type of building
1.	Deputy Engineer	1	1	2	II
2.	Junior Engineer	6	6	12	III-A
3.	Senior Clerk	1	1	2	III-A
4.	Junior Clerk	2	2	4	III-B
5.	Tracer	1	1	2	III-B
6.	Peons & Chowkidars	3	3	6	IV-A
7.	Attendants	3	3	6	IV-A
Total		17	17	34	

Sub-Division Required for Canal

- 1) Canal Sub-Division 1 Satara construction of R.B. Canal
- 2) Canal Sub-Division No.2 Satara construction of L.B. Canal

Sr. no.	Name of H.Q.	II	III-A	III-B	IV-A	Total
1.	Satara 1	1	7	3	6	17
2.	Satara 2	1	7	3	6	17
Total :		2	14	6	12	34

Appendix No. VII/7
Ref. Para No. 7.1.04

URMODI IRRIGATION PROJECT

Paluka : Satara District : Satara

II - Main Canal and Branches

Statement showing the list of permanent buildings proposed for the Urmodi Left Bank and Right Bank Canal.

Sr. no.	Name of Buildings	Satara	Parali	Total
B - Permanent Buildings				
(Non-Residential)				
1.	Sectional Office	1	1	2
2.	Sanitary Block for Sectional Office	1	1	2
3.	waiting Shed	1	1	2
4.	Signallers Office with residence	1	1	2
5.	Sanitary Block for Signallers	1	1	2
I-A Permanent Buildings				
(Residential)				
1.	Sectional Officer quarter Class III-A	1	1	2
2.	Class III-B quarter	9	9	18
3.	Class IV-A quarters	7	7	14
4.	Sanitary Block for item No.6	2	2	4
5.	Inspection Chowki at i) Apshinge, ii) Nagthane	1	1	2
6.	Canal Chowki	2	2	4

Appendix No. VII/8
Ref. Para No. 7.2.01

URMODI IRRIGATION PROJECT

Taluka : Satara Dist. : Satara

II-Main Canal and Branches

Statement showing the list of Temporary Building proposed during the construction.

Sr. no.	Name of Building	For Sub Dn. at Satara	For Sub Division at Satara	Total no. of Temp. Building provided
1	2	3	4	5
<u>II-A Temporary buildings (Residential)</u>				
1.	S.D.O's Residence	1	1	2
2.	Sanitary Block	1	1	2
3.	Class-III-A Quarter	7	7	14
4.	Class III-B Quarter	3	3	6
5.	Class IV-A Quarter	6	6	12
6.	Sanitary Block for Class IV-A Quarter	2	2	4
7.	Two room hutment	3	3	6
8.	One-room hutment	5	5	10
9.	Sanitary Block for hutment	2	2	4

URMODI IRRIGATION PROJECT

Taluka: Satara Dist.: Satara

II-Main Canal and Branches.

Statement showing the list of temporary buildings proposed during the construction.

Sr. no.	Name of Building	Sub-Dn.1 office at Satara	Sub-Dn-2 office at Satara	Total no. of temp. buildings
---------	------------------	---------------------------	---------------------------	------------------------------

II-B Non-Residential Buildings

1.	Sub-Dnl. office	1	1	2
2.	Garage & Chowkidar for S.D.O.	1	1	2
3.	Sanitary block for S.D.O. Office	1	1	2
4.	S.D.O. Office Store	1	1	2
E- <u>Civil Store</u>				
1.	Cement Store	-	1	1
2.	building Material Store	1	-	1
3.	Hardware Store	-	1	1
4.	F & P Store	1	-	1
5.	Magazine store	-	1	1
F - <u>Service building at Satara</u>				
1.	Community Hall	-	1	1
2.	Power house	-	1	1
3.	Pump House	-	1	1
4.	Reservoir	-	1	1

URMODI IRRIGATION PROJECTTaluka : Satara District : Satara

Statement showing the various permanent buildings to be overlapped during construction period.

Sr. no.	Type of Building	Colony at Satara I-Head Works			Remarks
		Req. Temp. Bldg.	Perma- nent Bldg.	Balance	
1	2	3	4	5	6
I. Non-Residential					
1.	Executive Engineer's Office	1	-	1	-
2.	Garage & Chowkidar	1	-	1	-
3.	Sanitary Block for Division	2	-	2	-
4.	Sub-Dnl. Office	-	-	-	-
5.	Garage & Chowkidar for S.D.O.	-	-	-	-
6.	Sanitary Block for S.D.O.	-	-	-	-
7.	Divisional Store	1	-	1	-
8.	Laboratory	1	-	1	-
9.	S.D.O.'s Office Store building for machinery work shop.	-	-	-	-

II - Main Canal		Balance	Remarks
Req. Temp. Building	Perm. Building		
7	8	9	10
-	-	-	-
-	-	-	-
-	-	-	-
2	1	1	S.O. Office & Signaller's Office
2	1	1	
2	2	-	S.O.+Signaller
-	-	-	-
-	-	-	-
2	-	2	-

<u>Corony at Parali I-Head Works</u>				To be considered at		
Rec. Temp Bldg.	Perma- nent Bldg.	balance	Remarks	Temporary structures I-Head work no.	II-main Canal no.	Remarks
11	12	13	14	15	16	17
-	-	-	-	1	-	-
-	-	-	-	1	-	-
-	-	-	-	2	-	-
2	1	1	S.O. Office & Signaller Office	1	1	-
2	1	1	-	1	1	-
2	2	-	S.O.+Sign.	-	-	-
-	-	-	-	1	-	-
-	-	-	-	1	-	-
2	-	2	-	2	2	-

375-A

1	2	3	4	5	6
10.	Hardware & Spare Part Store	-	-	-	-
11.	Electrical Store	-	-	-	-
12.	Tyres & Tools Store	-	-	-	-
<u>Residential Buildings</u>					
13.	Executive Engineer's residence	1	-	1	-
14.	Garage & Servants	1	-	1	-
15.	i) S.D.O's Residence	2	-	2	-
	ii) Sanitary Block	-	-	-	-
16.	III-A Quarters	18	-	18	-
17.	Class III-B Quarters	16	1	15	IV-A + San.
18.	Class-IV-A Quarters	7	-	7	-
19.	Sanitary Block For Class IV-A Quarters.	2	-	2	-

375-B

.....
7 8
.....

.....
9 10
.....

1 -

1 -

1 -

- -

- -

2 1

2 1

14 9

6 6

12

1 -

1 -

1 -

- -

- -

1 III-A

1 III-B

5 -

- IV-A* Sanitary

12 -

11	12	13	14	15	16	17
1	-	1	-	1	1	-
1	-	1	-	1	1	-
1	-	1	-	1	1	-
-	-	-	-	1	-	-
-	-	-	-	1	-	-
2	1	1	III-A	3	1	-
2	1	1	III-B			-
14	9	5	-	23	5	-
8	7	1	IV-A ⁺ San.	16	-	-
12	-	12	-	19	12	-
3	-	3	-	5	4	-

Appendix No. VIII/1
Ref. Para 8.6.01

URMODI IRRIGATION PROJECT

Taluka: Satara Dist.: Satara

Letter from the Archeological Survey of India

Archeological Survey of India
South Western Circle
East Wing Bibi-Ka-Makbara
Aurangabad. Dt. 9.6.1966

To

The Executive Engineer
Irrigation Project Investigation
Division (Central),
Poona-1.

Subject : Archeological monuments in the
Submergence of Urmudi Irrigation Project,
Taluka and District- Satara.

Reference Your letter No. Ds/Urmudi/03/2720
dated 21/4/1966.

Sir,

With reference to the above, I have the honour to
inform you that no protected monuments of this survey is
involved in the area of submergence in question.

Yours faithfully,

sd/-

Superintending.

/TRUE COPY/

URMODI IRRIGATION PROJECTTaluka : SataraDistrict : Satara

Statement showing the village-wise area coming under the submergence up to R.L. 679.50 m.(870 Ha/2150 Ac.) of Farali Dam Site.

Sr. no.	Name of Village	Popula- tion as per 1971 census	Jirayat land in acres	Bagayat land in acres	Fari land in acres	Waste land in acres
1	2	3	4	5	6	7
1.	Ambavade Kh.	-	37	-	-	-
2.	Ashta	738	149	12	12	50
3.	Punavadi	267	128	35	32	3
4.	Daniwadi	533	74	67	-	7
5.	Lumnekhola	361	37	22	25	2
6.	Rohat	-	82	69	17	5
7.	Farali	300	149	86	30	7
8.	Banaghar	-	15	52	2	5
9.	Kamathi	625	84	86	37	3
10.	Katewadi Bk.	-	137	86	17	7
11.	Revadi	309	149	73	20	5

Total land in acres	Govt. land in acres	Houses		Wells		Mango trees	Remarks
8	9	10	11	12	13	14	15
37	-	-	-	-	-	-	
223	-	58	6	4	3	30	Gaothan going under submergence.
198	-	65	2	2	2	40	"-
148	-	135	5	2	1	35	"-
86	-	71	1	1	-	25	"-
173	-	-	-	1	-	40	"-
272	124	50	1	4	4	20	2 Wadies under submergence.
74	-	-	-	1	-	15	--
210	-	86	-	1	-	60	Gaothan going underssubmergence.
247	-	-	-	-	-	25	--
247	-	36	-	1	1	40	Gaothan going under submergence.

378-A

1	2	3	4	5	6	7
12.	Nitral	503	12	40	5	2
13.	Katawadi Kh.	-	20	-	12	3
14.	Madagaon	-	10	5	2	-
	Total :	3636	1083	633	211	99

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378-B

8	9	10	11	12	13	14	15
59	-	110	-	1	1	50	Part gaothan Maharwadi.
35	-	-	-	-	-	50	--
17	-	-	-	-	-	5	--
2026	124	611	15	18	11	435	

नं.आर टी प्स । वशति - 812
तहसिलदार कार्यालय, सातारा
सातारा : ९.१९६०

प्रति,

मै. उप विभागीय अभियंता,
पाटबंधारे प्रकल्प अन्वेषण उप विभाग
क्रमांक- ३ कोल्हापूर

विषय :- जमनीच्या किंमतीबाबत
उरमांडी पाटबंधारे प्रकल्प ता. सातारा

संदर्भ :- आपले कार्यालयाकडील पत्र क्र. प्र.शा
३६४० सन १९६० ता. ६-९-१९६०

महाशय,

उपरनिर्दिष्ट पत्रात नमूद केले प्रमाणे सांबत संपूर्ण ना हिते
१) बैकले २) भाटभरतों ३) उधरि ४) करंडी ५) सोनवडी ६) पांगरवाडी
७) शौन्द्रे ८) शौबेवाडी ९) शहापूर १०) सोनगाव उर्फ सातारा
११) आंबवडे खुर्द १२) आंबवडे बुद्रुक १३) भांदवडे तसेच जागायत हीं गावे तक्त्यातील
ना हिते या सांबत पाठविली आहे.

आपला विश्वासू

सही।-

तहसिलदार सातारा करिता

सत्यप्रत

उप विभागीय अभियंता,
पाटबंधारे प्रकल्प अन्वेषण उप विभाग क्र ३
कोल्हापूर

अच. अ. व्यु. डब्ल्यु. १११७
सातारा . ११-७-१९७६.

यांसी साभार परत.

१. मे. तहसीलदार यांनी कळविलेले दर हे त्यांचेकडील रेकॉर्ड पाहून
कळविलेले आहेत तरी त्यांस मंजूरी अिकेकडील कोणते आधारे मागवणेत आलेली
आहे याचा दुलासा करावा.

सही

अुपविभागीय अधिकारी
सातारा विभाग
सातारा.

नक्कल प्रत

घरणाच्या व बुडित क्षेत्रासाठी

क्र.सं.	गावाचे नांव	बागायत दर एकरा रू.	तरी दरएकरा रू.	जिरायत दर एकरा रू.	माल दर एकरा रू.
१.	आंबवडे बु.	४०००	३५००	४४५०	२०००
२.	आंबवडे बु.	४०००	३५००	५८६०	२०००
३.	आष्टे	४०००	३५००	३०००	२०००
४.	पुन वडी	३५००	३०००	२५००	२०००
५.	दहीवड	३५००	३०००	६०००	२०००
६.	लुमणै खोल	३५००	३०००	२५००	२०००
७.	वडगांव	४०००	३५००	५७५	२०००
८.	रौहीट	४०००	३५००	३२४०	२०००
९.	परळी	५०००	२१२७	२५२३	७२३
१०.	कुशानि	४०४८५	४०००	१२१४५	३०००
११.	कामश्री त. परळी	४०००	३०००	५७८६	२०००
१२.	कातवडी बु	२०२४	३०००	२५००	१५००
१३.	कातवडी बु.	३५००	३०००	२५००	१५००
सरासरी दर		६५७७	३२०२	४१२२	१९०१
		(१६, २५० हेक्टर) (८००० हेक्टर) (१० २०० हेक्टर) (४७०० हेक्टर)			

कालव्यासाठी

अ. क्र.	गावाचे नाव	बागायत दरपुकरा रु.	तरा दरपुकरा रु.	जिरायत दर पुकरा रु.	माल दर पुकरा रु.
१४.	गजवडी	३५००	५४०	२९८०	२९०
१५.	सोनवडी	११५२०	३०००	८२२०	१५००
१६.	पांगरवाडी	३०००	३५००	१०१५	२०००
१७.	करंडी	३०००	३०००	२२२५	१५००
१८.	उपळी	३२६५	३०००	१७८५	१५००
१९.	शौळकवाडी	३०००	३०००	३५७५	१५००
२०.	भांदवडे	३०००	३०००	२५७५	१५००
२१.	शहापूर	३०००	३०००	४६००	१५००
२२.	सोनगाव	३०००	३०००	१३५०	१५००
२३.	शौंदे	३०००	३०००	११२५	१५००
२४.	वैकळे	१००००	-	३८९०	-
२५.	भाटभरळी	१५०००	-	६५५०	-
२६.	पाडळी	६३२६	३६४८	५०६०	-
२७.	नागठाणी	५७८५	६८७०	६०००	-
२८.	भरतगाव	९०००	-	१७८१	-
२९.	बौरगाव	१२०००	१७३७	६४४६	-
३०.	वळी	९०००	१०५८८	३३४६	४२४
३१.	खोजीवाडी	३५८७	-	२८३४	५८
सरासरी दर		६११०	३६३४	३३५३	१२३१
(१५१००१ हेक्टर) (९०००१ हेक्टर) (८३००१ हेक्टर) (३०५०१ हेक्टर)					

सही :-

उप विभागीय अभियंता,
पाटव्यार प्रकल्प अन्वेषण उप विभाग
क्रमांक - ३ कोल्हापूर

ड. अरिगेशन कावि ४१८-४१९
सातारा १९-६-७६.

प्रति,

मे. सहायक अभियंता ,

सरिता मापन उप-विभाग , सातारा.

विषय :- जमिनीच्या किमतीबाबत

अरमोडी पाटबंधारे प्रकल्प, सातारा.

संदर्भ :- आपलेकडील पत्र ड. १६६६-७५ ता. १७-१२-७५

व नं. पी. बी. अरमोडी ७७-७६ ता. १७-१-७६.

महाशय,

अरमोडी नदीवरील पाटबंधारे प्रकल्पाच्या कामासाठी जमिनीचे

दर अेकरी सरासरी दराबाबतचे माहितीपत्रक खालीलप्रमाणे आहे .

U.P. No. 111/2
M. S. 222

URMODI IRRIGATION

Taluka : Datara District : Datara

II-Main Canal and Branches 'B' Land Estimate.

Statement showing clarification of land proposed to be
acquired for Canal.

Sr. No.	Taluka and Canal	Bagayat land in Hectares	Orayat land in hectares	Waste land in hectares	Total in ha.
		4%	76%	20%	
1.	Colony	1.00	19.00	5.00	25.00
2.	Datara Urmodi L.B.C.	8.89	168.97	44.47	222.33
3.	Datara Urmodi R.B.C.	6.55	124.51	32.77	163.83
=====					
	Total	16.44	312.48	82.24	411.16

Details of Colonies :

- i) At Datara 10 Ha.
- ii) At Karali 10 Ha.
- iii) At Bagthana 5 Ha.

Total : 25 Ha.

385-A

URMODI IRRIGATION PROJECT

Taluka: Satara District: Satara

Statement of Land width required for Urmodi Left Bank Canal.

sr. no.	sec- tion no.	Chainage From	Chainage To	Length	Height of bank	base Width of canal	Water depth	Free Board	Service Road
1	2	3	4	5	6	7	8	9	10
1.	1	32	18500	18468	7.37	4.72	1.07	0.6	3.0
2.	2	18500	29500	11000	2.51	4.27	0.91	0.6	3.0

Statement of Land Width required for Urmodi Right Bank Canal.

1.	1	50	15200	15150	2.97	4.72	1.07	0.6	3.0
2.	2	15200	23300	8100	3.61	4.42	0.91	0.6	3.0
3.	3	23300	27500	4200	2.36	3.35	0.76	0.6	3.0

Inspection Path	Land width required for canal section	Width required for ML.1.	Width required for ML.2	Extra width	Gutter	Total Land width required Col. Nos. 11 to 15	Area in Hectares	Remarks
11	12	13	14	15	16	17	18	19
1.83	53.35	5.0	3.35	22.50	3.20	87.4	161.41	-
1.83	24.00	5.0	3.35	19.87	3.20	55.40	60.92	-
							===== 222.33	

Total land required under Urmodi L.B.C. 222.33 Ha. i.e. 549.38 Acres . Say 549 Acres.

1.83	26.94	5.0	3.35	22.50	3.20	60.99	92.40	-
1.83	28.58	5.00	3.35	22.50	3.20	62.63	50.73	-
1.83	21.89	5.00	3.35	14.80	3.20	49.24	20.70	-
							===== 163.83	

Total land required under Urmodi R.B. Canal -163.83 Hect. i.e. 404.83 Acres . Say 405 Acres.

Total land required for Urmodi

L.B.C. and R.B.C.

386.16 Ha.

For colony

25.00 Ha.
=====

411.16 Hectares

URMODI IRRIGATION PROJECTApp. No. VIII/5
Ref. Para 8.8.02Tal- Satara Dist- Satara.Statement showing abutment of Land at the Rate.

Sr. No.	Type of Land	Average in Ha.	Rate Assessment.	Amount in Rs.	Remarks.
(I) HEAD-WORKS					
	a)-Bagayat Land	257	7.40	1901.80	
	b)-Jirayat & Tari Land	532	3.10	1649.20	
(II) MAIN CANAL					
	a)-Bagayat Land	16	7.40	118.40	
	b)-Jirayat Land	313	3.10	970.30	
				Total :-	4639.70

Capitalised value @ 6.5% rate of interest would be

$$\text{Rs. } \frac{(4639.70 \times 100)}{6.50} = 71,360/-$$

Say Rs:- 00.71. Lakhs

URMODI IRRIGATION PROJECT

Taluka : Satara

District : Satara

Statement showing the details of important rates adopted for estimate.

Sr. no.	Items	Initial rate with initial lift of 2 m and lead of 50 m.	Average additional lift in M.	Amount in Rs.
1	2	3	4	5

A-Earthen Dam

1. Excavation for Seat of Dam

L. & C. drains in soft strata (average rate of soil and soft murum)

$$\frac{(3.00 + 4.00)}{2} = 3.50$$

3.50

2. Excavation for cut-off trench :

a) Soft strata

3.50

b) Hard Murum and Boulders

6.00

1

0.40

c) Soft Rock

8.00

2

0.80

d) Hard Rock

21.00

3

1.20

3. Filling L & C drains with filter materials.

11.00

4. Filling C.O.F. with selected material.

5.30

Amount of Additional Lead Average additio- nal lead in Mt.	Amount in "s.	Rate adopted for Estimates	Remarks
6	7	8	9

3.50

55 0.80 4.30

55 0.80 7.20

55 0.80 9.60

55 0.80 23.00

17.44 28.50

100 to 500 2.50 7.80

1	2	3	4	5
5. Embankment of Hearting				
	Zone (a) From available material	2.05	-	-
	(b) From borrow area	6.00	-	-
6. Embankment for casing zone				
	(a) From available material	1.90	-	-
	(b) From borrow area materials	7.30	-	-
7.	Rock toe (Available)	8.70	-	-
8.	Providing quarry pitching	12.40	: 3	0.90
	Spauls	4.00	: 3	0.90

B-WASTE WEIR

9. Excavation to approach tail channel -				
	A) Soft Strata	3.50	-	-
	B) Hard Murum and Boulders	6.00	-	0.40
	C) Soft Rock	8.00	2	0.80
	D) Hard Rock 4 to 7 Mtr.	21.00	3	1.20

URMODI IRRIGATION PROJECTTaluka : SataraDistrict : Satara

Sr. no.	Items	Basic rate with initial lift of 2 m and lead of 50 m.	Ref. for Basic rate	Add lift charges	Lead Charges for Rubble or Metal upto 50 m.	Qty. in Cum.	Amt. @ Rs. 2.50 per Cum.
1	2	3	4	5	6	7	

10. U.C.R. Masonry

5 m. lift in

c.m. (1:5) 40%

mortar.

106.90

I.No. 16
Pg.No. 42

0.90

1.25

3.13

11. C.R. Masonry 1 Ind

sort in C.M.

(1:5) 34% mortar 136.40

I.No. 14
P.No. 42

0.90

1.25

3.13

12. CONCRETE

i) C.C. Plan (1:4:8)

137.00

137.90

I.No. 4
P.No. 16

1

2.50

ii) Plan C.C.

(1:3:6)

156.70

I.No. 5

0.90

1

2.50

Lead Charges for Sand 20 K.M.		Lead Charges for Cement 20 K.M.		Final Rate	Remarks
Qty. in Cum.	Amount @ Rs. 19.06	Qty. in bags	Amount @ Rs. per bag		
8	9	10	11	12	13
0.45	8.58	2.50	1.28 = 120.74	120.80	Without C.F. cement requirement is
		2.70	138.00	124.89	taken considering C.F. (1:3)
			4.00 Cost of cement 5.28 say 124.90		
0.34	6.48	2.10	1.07	151.98	
			4.00 say 5.07	152.00	-do-
0.25	4.76	3.40	1.73	146.89	
				say 146.90	
0.50	9.53	6.75	3.44	205.37	
				say 205.40	

<u>Amount of additional lift</u>		<u>Amount of Additional lead</u>		Final date	Remarks
Average additional lift in m.	Amount in Rs.	Average additional lead in m.	Amount		
-	-	-	-	3.50	
1	0.40	-	-	6.40	
2	0.80	-	-	8.80	
-	-	-	-	21.00	
-	-	-	-	2.05	Spreading 0.60 watering 0.60 Consolidating 0.85 Total: 2.05
-	-	-	-	6.00	

392-A

sr. no.	Items	Basic Rate	Ref. for Basic Rate	Amount of Additional lift Average Amount Addl. Lift in Rs. in m.
14. Embankment for Casing Zone				
	a) From available materials	1.90	Vide remark	-
	b) From borrow Area	7.30	<u>I.No.8</u> <u>P.No.12</u>	-
15. Filling puddle trench		4.10	<u>I.No.11</u> <u>P.No.12</u>	-
16. Service Road and Inspection Path		-	AT THE RATE OF Rs.5000/- PER K.M. LENGTH	

<u>Amount of Additional Lead</u>	<u>Final Rate</u>	<u>Remarks</u>
<u>Average Addl. Amount in</u>		
<u>lead in m. Rs.</u>		

5.20	Spreading	0.45
	Watering	0.00
	Consoli-	
	dation	1.45
	Total :	1.90

7.30

4.10

It is anticipated that inspection path service road will be constructed out of excavated stuff available from canal excavation in general.

RATE ANALYSIS

393

ITEM :- Providing and laying non pipe 1200 mm ϕ
Np.2 class pipes including c.m. 1:1 etc. complete.

Basic Rate as per C.S.R. 1979 : 80 Rs. 342.70.

B) - Lead charges from Karad to site of work 80 (82-2) K.Ms.
One truck of 7-1/2 Tonne capacity can transport 3. Nos. of pipes Length 7.5 R.mt) in one trip considering 2 trips in a day.

- i) Truck charges fixed per day Rs. 60.00.
- ii) Running charges for 320 K.M. @ Rs. 1.75/- K.M. Rs. 560.00.
- iii) Loading and unloading @ Rs. 20.00/Trip. Rs. 40.00.

Total for Rs. :- 660.00.

Rate per R.Mt. = $\frac{660}{15}$ = 44.00.

Total rate for the item Rs: 342.70

44.00.

= 386.70.

URMODI IRRIGATION PROJECTTaluka : Satara District : Satara

Statement showing Year-wise expenditure against each Sub-Head

All figures are in Lakhs of Rupees.

(I-Head Works)

Sr. no.	Sub-Head	Total estimated cost	Expenditure during First Year		Second Year	
			%age	Amount	%age	Amount
1	2	3	4	5	6	7
1.	A-Preliminaries	15.16	100	5.16	-	-
2.	B-Lands	210.98	5	10.55	25	52.74
3.	C-Works	275.16	10	27.52	15	41.27
4.	D-Regulator	18.17	20	3.63	20	3.63
5.	K-Buildings	32.75	60	19.65	40	13.10
6.	M-Plantation	2.00	-	-	-	-
7.	O-Miscellaneous	21.60	30	6.48	30	6.48
8.	F-Maintenance	5.40	-	-	-	0.75
9.	Q-Special I & P	129.75	30	38.92	50	64.87
10.	R-Communication	11.75	50	5.87	25	2.94
Total		712.71		114.15		185.79

Third Year		Fourth Year		Fifth Year		Remarks
% age	Amount	% age	Amount	% age	Amount	
8	9	10	11	12	13	14
20	42.20	20	42.20	30	63.28	
25	68.79	30	82.55	20	55.03	
50	9.08	15	2.73	15	2.73	
80	-1.60	10	0.20	10	0.20	
20	4.32	10	2.16	10	2.16	
	1.27		1.59		1.79	
20	25.95					
25	2.94					
=====		=====		=====		
	156.15		131.43		125.19	
=====		=====		=====		

URMODI IRRIGATION PROJECTTaluka : SataraDistrict : Satara

statement showing Year-wise allocation of expenditure against each sub-head.

(All figures are in lakhs of rupees)

II Main Canal and

Branches.

Sr. no.	Name of work	Total estimated cost	Expenditure during First Year		Second Year	
			%age	Amount	%age	Amount
1	2	3	4	5	6	7
1.	A-Preliminary	3.47	60	2.08	40	1.39
2.	B-Lands	38.37	40	15.35	40	15.35
3.	C-works	-	-	-	-	-
4.	D-regulator	3.34	-	-	-	-
5.	F-R.H.F.works	130.82	-	-	20	26.16
6.	G-Bridges	6.20	-	-	10	0.62
7.	H-Escapes	0.51	-	-	-	-
8.	K-buildings	22.05	60	13.23	40	8.82
9.	L-Earth work	72.29	15	10.85	30	21.69
10.	M-Plantation	4.56	-	-	-	-
11.	O-Miscellaneous	9.36	40	3.74	40	3.74
12.	P-Maintenance	3.65	-	-	-	0.55
13.	Q-Special					
	F & P	36.94	50	18.47	30	11.09

Third Year		Fourth Year		Fifth Year		Remarks
%age	Amount	%age	Amount	%age	Amount	
8	9	10	11	12	13	14
-	-	-	-	-	-	-
20	7.67	-	-	-	-	-
-	-	-	-	-	-	-
40	1.34	30	1.00	30	1.00	-
20	26.16	30	39.25	30	39.25	-
10	0.62	40	2.48	40	2.48	-
-	-	50	0.25	50	0.26	-
-	-	-	-	-	-	-
30	21.69	20	14.45	5	3.61	-
-	-	50	2.28	50	2.28	-
10	0.94	5	0.47	5	0.47	-
-	0.94	-	1.05	-	1.11	(Actual figure as per estimate)
10	3.69	10	3.69	-	-	-

8	9	10	11	12	13	14
10	1.05	5	0.52	5	0.52	
		50	17.06	50	17.06	
	64.10		82.50		68.04	

UNMODI IRRIGATION PROJECTTALUKA : SARANA Dist. : SARANA

Yearwise Abstract of direct and indirect charges.

(All figures in lakhs Rs.)

Sr. no.	Items	Total Cost	1-Year
A)	<u>DIRECT CHARGES :</u>		
1.	I) Head Work	712.71	114.15
	II) Main Canal and Branches	342.01	68.94
	III) Distributories	34.12	-
		1088.84	183.09
2.	Establishment charges @ 14% excluding B-Lands i.e. on	117.53	22.02
3.	Ordinary I. & P. @ 2.5% on W. excluding B-lands i.e.	20.99	3.93
4.	Leave and Personary Charges at 3.5% of Estt. Ch.	4.11	000.77
	Total	1231.47	209.84
	<u>DEDUCTIONS</u>		
1.	Receipts and recoveries as capital outlay on account of -		
	a) Rated equipment of Spl. I. & P. @ 100%	152.99	-
	b) Non-rated equipments @10% due to re-sale	1.37	-
2.	Salvage value of temporary building @ 15%	5.79	-
	Total :	160.15	-

II-Year	III-Year	IV-Year	V-Year	Remarks
185.79	156.15	151.43	125.19	
92.55	64.10	66.44	50.98	
-	-	17.06	17.06	
278.34	220.25	213.93	193.23	
29.43	23.85	24.04	18.19	
5.26	4.26	4.29	3.25	
1.03	00.83	00.84	00.64	
314.06	249.19	243.10	215.31	
-	-	-	152.99	
-	-	-	1.37	
-	-	-	5.79	
-	-	-	160.15	
314.06	249.19	243.10	55.16	

398-A

Sr. No.	Items	Total Cost	1st Year
	Total for (A)	1071.32	209.81
B) <u>INDIRECT CHARGES</u>			
I)	Capitalisation of abutment of land revenue with 6.5% rate of interest	00.71	00.00
II)	Audit and Account charges @ 1% on Rs.12.31		2.10
III)	Secretariat charges at 0.5% of Estt. Charges i.e. on Rs.117.14	00.59	00.11
	Total for (B)	13.61	2.21
TOTAL COST OF PROJECT (A + B)		1084.93	212.02

II-Year	III-Year	IV-Year	V-Year	remarks
314.06	249.19	243.10	55.16	
			00.71	
3.15	2.49	2.43	2.15	
00.17	00.11	00.11	00.09	
3.31	2.60	2.54	2.95	
317.37	251.79	245.64	58.11	

URMODI IRRIGATION PROJECT

Taluka : Satara

District: Satara

Statement showing physical construction schedule.

Sr. no.	Items	First Year	Second Year	Third Year	Fourth Year	Fifth Year	Total
1.	Excavation for Seat of Dam	30650	-	-	9050	-	39700
2.	Excavation and filling cut-off trench	59600	-	-	11410	-	71070
3.	Earth work for dam	-	106780	364320	328370	423730	1283200
4.	Excavation for Fall and Approach Channel and w.w.						
	i) Soft strata	38729	-	-	-	-	38729
	ii) H.R.	60000	49836	-	-	-	109836
	iii) S.R.	1753	-	-	-	-	1753
5.	Gridding	-	-	12580	25010	6830	44420
6.	Filling L and C Drains	-	2240	4000	2200	633	9073
7.	Excavation for w.w. L.C.R. masonry	-	10287	-	-	-	10287
8.	Cement Concrete	-	472	-	-	-	472
9.	R.C.C.	-	-	2680	2685	-	5365

Appendix No. I/1
 def. Para 11.4.01
 11.6.01
 11.5.01

URMODI IRRIGATION PROJECT

Taluka : Satara

District : Satara

Statement showing realisation of water rates, revenue and betterment levy for area proposed to be irrigated under

Urmodi Left Bank and Right Bank Canals (L.C.A. 6030 Ha./14900

Sr. no.	Name of Crop	% age	Area in Acres	Water Rate per acre	Revenue realised	Work- ing expen- ses Rs. 10/ Ac.	Better- ment Levy
1	2	3	4	5	6	7	8
1.	Sugarcane	15	2235	300	670500	-	1) At
2.	Other Perennial	5	745	200	149000	-	Rs. 150/Ac.
3.	Chillies	5	745	50	37250	-	for 12665
4.	Ginger & Turmeric	5	745	50	37250	-	Acres
5.	Green Manure	2	298	20	5960	-	12665 x 100
6.	Paddy late variety.	10	1480	50	74500	-	= 1899750
7.	Kh. Hy. Jawar	15	2235	20	44700	-	11) At
8.	Kh. Hy. Maize	10	1490	20	29800	-	Rs. 500/Ac.
9.	Kh. pulses (Ut)	10	1490	-	-	-	for 2235
10.	Kh. Gr. Nut	15	2235	20	44700	-	Ac. of sugar
11.	Kh. Vegetables	3	447	20	8940	-	cane
12.	Gram on Paddy	10	1490	50	44700	-	2235x500
13.	wheat on G. Manure	7	1043	30	31290	-	= 1117500

1	2	3	4	5	6	7	8
14.	Rabi Hy. Jawar						Total
	on pulses	10	1490	30	44700	-	Dist. tax
15.	Rabi Hy. Maize						levy =
	G. Nut	15	2235	30	67050	-	189000
							+111500
16.	Rabi Vegetables	3	447	30	13410	-	=3017250
17.	H. W. Gr. Nut						Say Rs. 30.17
	Kh. Jawar	15	2235	100	223500	-	lakhs.
18.	H. W. Fodder on						
	Maize	5	745	60	44700	-	
			22840		1571950		

Therefore, working expenses at Rs. 10/Acre of Irrigable Area

$$= 14,900 \times 10$$

$$= 149000$$

$$\therefore \text{Net Revenue} = 1571950 - 149000 = 1422950$$

$$= \text{Rs. } 1422950.$$

LRMODI IRRIGATION PROJECT

Taluka : Satara Dist. : Satara

Statement showing Yearwise Development of Irrigation, Net Revenue and Working Expenses.

Sr. no.	% age development	Acreage	Sugarcane 15% at Rs.300/Ac.		Other Perennials at Rs.200/Acre		Chillies 5% at Rs.50/Acre		Ginger and Turmeric 5% at Rs.50/Acre		Green Mannure at 2% at Rs.50/Acre	
			Acreage	Amount in Rs.	Acreage	Amount in Rs.	Acreage	Amount in Rs.	Acreage	Amount in Rs.	Acreage	Amount in Rs.
1	2	3	4	5	6	7	8	9	10	11	12	13
V	20	2980	447	134100	149	29800	149	7450	149	7450	59.6	1192
VI	40	5960	894	268200	298	59600	298	14900	298	14900	119.2	2384
VII	60	8940	1341	402300	447	89400	447	22350	447	22350	178.8	3576
VIII	80	11920	1788	536400	596	119200	596	29800	596	29800	238.4	4768
X	90	13410	2011.5	603450	670.5	134100	670.5	33525	670.5	33526	268.2	5364
XI	100	14900	2235	670500	745	149000	745	37250	745	37250	298	5960

Paddy 10% at Rs.50/Acre		Kh.Hy.Jawar 15% at Rs.20/Acre		Kh.Hy.Maize 10% at Rs.20/Acre		Kh.Gr.Nut 15% at Rs.20/Acre		Kh.Vegetables 3% at Rs.20/Acre		Gram on Paddy 10% at Rs.30/Acre	
Acre- age	Amount in Rs.	Acre- age	Amount in Rs.	Acre- age	Amount in Rs.	Acre- age	Amount in Rs.	Acre- age	Amount in Rs.	Acre- age	Amount in Rs.
14	15	16	17	18	19	20	21	22	23	24	25
298	14900	447	8940	298	5960	447	8940	89.4	1788	298	8940
596	29800	894	17880	596	11920	894	17880	178.8	3576	896	17880
894	44700	1341	26820	894	17880	1341	26820	268.2	5364	894	26820
1192	59600	1788	35760	1192	23840	1788	35760	357.6	7152	1192	35760
1341	67050	2011.5	40230	1341	26820	2011.5	50230	402.3	8046	1341	40230
1490	74500	2235	44700	1490	29800	2235	44700	447	8940	1490	44700

Wheat on Gr. manure 7% at Rs. 50/Acre		Rabi Hy. Jawar on Pulses 10% at Rs. 30/Acre		Rabi Hy. Maize on Gr. Nut 15% at Rs. 30/Acre		Rabi Vegetables 3% at Rs. 30/Acre		H. W. Gr. Nut 15% at Rs. 100/Acre		H. W. Fodder on Maize 5% at Rs. 60/Acre		Gross Revenue	Working Expenses	Net Revenue
Acr.	Amount in Rs.	Acr.	Amount in Rs.	Acr.	Amount in Rs.	Acr.	Amount in Rs.	Acr.	Amount in Rs.	Acr.	Amount in Rs.			
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
208.6	6257	298	8940	447	13410	89.4	2682	447	44700	149	8940	314390		284590
													29800	
417.2	12516	596	17880	894	26820	178.8	5364	894	29400	298	17880	628780	59600	569180
625.8	18774	894	26820	1341	40230	368.2	8046	1341	154100	447	26820	943170	89400	853770
834.4	25032	1192	35760	1788	53640	357.6	10728	1788	178800	596	35760	1257560	119200	113836
938.7	28161	1341	40230	2011.5	60345	402.3	12070	2011.5	201150	670.5	40230	1414756	134100	128065
1043	31290	1490	44700	2235	67050	447	13410	2235	223500	745	44700	1571950	149000	142295

URMODI IRRIGATION PROJECTTaluka : Satara Dist. : Satara

Statement showing the percentage return on sum at Charges.

Sr. no.	expenditure during the year			Expenditure upto the end of year			Capital outlay on which interest is calculated 1/2 of Col.4+ Col.7	Simple interest at 6.5% of Col.8
	Direct	In-direct	Total	Direct	In-Direct	Total		
1	2	3	4	5	6	7	8	9
1	209.81	2.21	212.02	209.81	2.21	212.02	106.01	6.89
2	314.06	3.31	317.37	523.87	5.52	529.39	370.70	24.10
3.	249.19	2.60	251.79	773.06	8.12	781.18	655.29	42.59
4.	245.10	2.54	245.64	1016.16	10.66	1026.82	904.00	58.76
5.	55.16	2.95	58.11	1071.32	13.61	1084.93	1055.88	68.63
6.	-	-	-	-	-	1084.93	1084.93	70.56
7.	-	-	-	-	-	1084.93	1084.93	-
8.	-	-	-	-	-	1084.93	1084.93	-
9.	-	-	-	-	-	1084.93	1084.93	-
10.	-	-	-	-	-	1084.93	1084.93	-
11.	-	-	-	-	-	1084.93	1084.93	-

106-A

	2	3	4	5	6	7	8	9
12.	-	-	-	-	-	1084.93	1084.93	-
13.	-	-	-	-	-	1084.93	1084.93	-
14.	-	-	-	-	-	1084.93	1084.93	-
15.	-	-	-	-	-	1084.93	1084.93	-
16.	-	-	-	-	-	1084.93	1084.93	-

i) Percentage return on capital outlay

$$\frac{14.230}{1084.93} \times 100 = 1.28 \text{ Say } 1.29$$

ii) The percentage return on the sum at charges

$$\frac{14.230}{1653.77} \times 100 = 0.86$$

Accumulated simple interest	Net Revenue	Accumulated net revenue	Accumulated simple interest accumulated Net Revenue Col. (10-12)	Sum of charges Col. (7-13)	%age return Col. 11 Col. 14	Remarks 100
10	11	12	13	14	15	16
6.89	-	-	6.89	218.91	-	Concess
30.99	-	-	30.99	560.38	-	-
73.58	-	-	73.58	854.76	-	-
132.34	-	-	132.34	1159.16	-	-
200.97	-	-	200.97	1285.90	-	-
271.53	2.25	2.85	268.68	1353.61	0.21	Imp. start.
342.09	5.69	8.54	333.55	1418.48	00.48	-
412.65	8.540	17.08	395.57	1580.50	00.58	-
483.21	11.380	28.460	454.75	1539.68	0.74	-
553.77	12.800	41.260	512.51	1597.40	0.80	-
624.33	14.230	55.490	568.84	1653.77	0.86	-

10	11	12	13	14	15	16
691.89	14.230	69.720	625.17	1710.10	0.83	-
765.45	14.230	83.950	681.50	1762.43	0.81	-
836.01	14.230	98.180	737.83	1822.76	0.78	-
906.27	14.230	112.410	794.16	1879.09	0.76	-
977.13	14.230	126.640	850.49	1935.42	0.74	--

Appendix No. 1/1
 Ref. Para 11.11.02
 11.13.02

BRAMODI IRRIGATION PROJECT
ILUKA - SARDAR DISTRICT - GUJARAT

BENEFIT COST RATIO

		Amount in Rs. of lakhs
A)	1) Value of irrigated produce for 6030 Ha. (14900 Acres)	238.55
	Deduct the value of existing produce in the command for 6030 Ha. (14900 Acres)	31.89 =====
	Net benefit after deduction	199.66 =====
	Cost of the Project	1004.93
B)	Annual Cost	
	a) Simple interest at 10%	101.49
	b) Depreciation charges at 1%	10.85
	c) Administrative charges at Rs. 25/-Ha. of irrigable area (6030 Ha.)	1.51 =====
	Total for B	120.85

$$\therefore \text{Benefit cost ratio} = \frac{A}{B}$$

$$= \frac{199.66}{120.85} = 1.653$$

say 1.65

URMODI IRRIGATION PROJECT

408
App. no. AI/5(a)

Tal-Satara Dist-Satara.

Statement showing the value of existing produce in the command
of Satara for 1000.Hector.

Sr. No.	Name of Crop.	%age.	Area in Hecter.	Net Benefits in R. Per Ha.	Total Benefits in R.
1	2	3	4	5	6
1)	Chillies	3	30	1987.50	59,625
2)	Kh.Jawar Levy	37	37	484.00	17,908
	-"- (without)		333	740.50	2,46,586
3)	Bajari (with levy)	8	8	227.50	1,820
	-"- (without)		72	281.30	20,254
4)	Kh.ground nat	20	200	934.40	1,86,880
5)	Paddy (with levy)	3	3	813.25	2,439
	-"- (without)		27	813.25	21,958
6)	Pulses	8	80	723.90	57,912
7)	Grass	17	170	15.90	2,703
8)	Rabi Jawar (with levy)	2	2	484.00	968
	-"- (without)		18	740.50	13,329
9)	Wheat (with levy)	1	1	779.08	779
	-"- (withcut)		9	779.08	7,012
10)	Gram	1	10	509.40	5,094.
					<u>6,45,267.</u>

Say Rs:- 6.45 Lakhs.

Net Benefits for 6020.Hector.
= $\frac{6020 \times 6.45}{1000}$ = Rs. 38.89 Lakhs.

URMODI IRRIGATION PROJECT

Taluka : Satara

District : Satara

Statement showing the value of existing produce in the Command
of Urmodi L.B.C. and R.B.C. for 1 ha.

Sr. No.	Name of Crop	Yield per ha. in Qtls.	Rate per Qtl.	Price in Rs.	Deduct 10% of Col.5 for F.H.P. in Rs.	Net Price in Rs. (5-6)	Fodder received 25% at Col.7 for Rabi Jawar Paddy @5% for Hy. Jawar and @10% for Wheat.
1	2	3	4	5	6	7	8
1.	Chillies	-	3750.0	3750.00	375.00	3375.00	-
2.	Jawar (Levy)	6	100.0	600.0	60.00	540.0	135.0
	Jawar	6	150.00	900.00	90.00	810.00	202.5
3.	Bajari (Levy)	3	100	300.0	30.00	270.00	67.5
	Bajari	3	121	363.00	36.30	326.70	81.70
4.	Ground Nut	10	263	2630.00	263.0	2367.00	-
5.	Paddy (Levy)	15	105	1575.00	157.50	1421.50	213.20
	Paddy	15	105	1575.00	157.50	1421.50	213.20

 Dung Receipt
 @ 3%
 of
 Col. 7
 Rs.

Total
 Benefit
 in Rs.
 (7+8+9)

 9 10

101.00	3476.00
16.2	691.20
24.3	1036.80
7.1	344.60
9.80	418.20
71.01	2438.01
42.60	1677.30
42.60	1677.30

 Expenses

 Seed Fertilizer & Total
 cost Manure (11+12)
 per cost per
 Ha. Ha. in
 Rs.

 11 12

375.00	-	375.00
4.00	25.00	29.00
4.00	25.00	29.00
4.00	25.00	29.00
4.00	25.00	29.00
450.00	227.5	677.50
80.0	275.0	355.00
80.0	275.0	355.0

Add for Fodder @ 10% of Col.7 Rs.	Imple- ment Charges @5% of Col.7 Rs.	Labour charges @20% of Col.7 Rs.	Cost of pesticides in Rs.	Total expenses Col. 15 to 17	Net benefit Col.(16-18)
14	15	16	17	18	19
337.50	161.00	675.00	-	1488.50	1987.50
54.0	16.2	108.0	-	207.20	484.00
81.0	24.3	162.0	-	296.30	740.50
27.0	7.1	54.0	-	117.10	227.5
32.70	9.80	65.40	-	136.40	281.3
236.70	71.01	473.40	45.00	1503.61	934.40
42.15	42.60	284.30	40.00	864.05	813.25
42.15	42.60	284.30	40.00	864.05	813.25

410-A

1	2	3	4	5	6	7	8
6.	Pulses(Mug)	5	286	1430.0	143.0	1287.0	-
7.	Grass		25	25.0	2.50	22.50	-
	<u>Rabi Crop</u>						
8.	Jawar(Levy)	6	100	600.0	60.0	540.0	1.5
	Jawar	6	150	900.0	90.0	810.0	202.5
9.	Wheat(Levy)	7	188	1316.00	131.60	1184.40	-
	Wheat	7	188	1316.00	131.60	1184.40	-
10.	Gram	4	220	880.00	88.0	792.00	-

410-C

	9	10
6.	38.61	1325.61
7.	0.70	23.20
8.	16.2	691.20
9.	24.3	1036.80
9.	35.53	1219.93
	35.53	1219.93
10.	25.90	815.80

17	18	19
-	601.71	723.90
-	7.30	15.90
-	207.20	484.00
-	296.30	740.50
-	440.85	779.08
-	440.85	779.08
-	306.40	509.40

410-A

410

1	2	3	4	11	12	13
6.	Pulses (Mug)	5	286	25.00	152.5	177.
7.	Grass		25	-	-	-
	<u>Rabi Crop</u>					
8.	Jawar (Levy)	6	100	4.00	25.00	29.0
	Jawar	6	150	4.00	25.00	29.0
9.	Wheat (Levy)	7	188	25.00	25.0	50.00
	Wheat	7	188	25.00	25.00	50.00
10.	Gram	4	220	20.00	25.00	45.00

	14	15	16	17	18	19
6.	28.70	38.61	257.40	-	601.71	723.90
7.	2.20	0.70	4.4	-	7.30	15.90
8.	54.0	16.2	108.0	-	207.20	484.00
	81.0	24.3	162.0	-	296.30	740.50
	18.44	35.53	236.88	-	440.85	779.08
	18.44	35.53	236.88	-	440.85	779.08
9.	79.20	23.80	158.40	-	306.40	509.40

URMODI IRRIGATION PROJECT

Tal-Satara Dist-Satara

Statement showing benefits for 1000 Ha. for
Irrigated produce.

Sr. No.	Name of Crops.	% Age.	Area in Ha.	Net Benefits per Ha. Rs.	Total Benefit for 1000 x Ha (Col.4 x 5)
1	2	3	4	5	6
1.	Sugarcane	15	150	8387.50	12,58,125
2.	Other Berinnials	5	50	3375.00	1,62,750
3.	Chillies	5	50	5392.60	2,54,630
4.	Ginger and Turmier	5	50	4628.35	2,31,417
5.	Green Manure	2	20	221.00	4,420
6.	Paddy Late/levy ^{variety}	10	10	1088.85	10,888
	Market		90	1918.90	1,72,701
7.	Kh.Hy.Jawar i) (Levy)	15	15	1017.50	15,262
	Market ii)		135	1476.50	1,99,327
8.	Kh.Hy.Maiza i) Levy	10	100	1301.50	1,30,150
	Market ii)				
9.	Kh.U.I. Pulses	10	100	723.40	72,340
10.	Kh. Ground Nut	15	150	1348.30	2,02,215
11.	Kh. Vegetables	3	30	4607.50	1,38,225
	<u>Follow on Crops</u>				
12.	Gram on Paddy	10	100	1108.50	1,10,850
13.	Wheat on G.M. I. Levy	7	7	477.00	3,339
	Market II		63	1672.20	1,05,349
14.	Rabi Hy.Jawar I. on Pulses (Lavy).	15	150	1301.50	1,95,225
	Market II				

1.	2.	3.	4.	5.	6.
15.	Rabi Hy.Maize I Levy	10	10	1017.50	10,175
	Market II		90	1476.50	1,32,885
16.	Rabi Vegetables	3	30	4607.50	1,38,225
17.	H.W,Ground Nut	15	150	2102.10	3,15,315
18.	H.W.Fodder as Maize	5	50	1722.50	86,125
					39,55,968
Say					39.56 Lakhs/ 1000 Ha.

For 6030 Ha. Irrigable Area

Benefits $6.03 \times 39.56 = 238.55$ Lakhs.

URMODI IRRIGATION PROJECTTaluka: SataraDistrict: Satara

Statement showing the value of Net Benefit for the proposed

Crop Pattern for 1 Hectare.

Sr. no.	Name of Crop	Yield in Ha. in Qtls.	Rate per Qtl.	Price in Rs.	Deduction 10% of Col.5 for FHP	Net price in Rs.	Fodder receipt @25% or 15% of Col.7
1	2	3	4	5	6	7	8
1.	Sugar Cane	1500	15.50	20250	2025	18225	-
2.	Other						
	Perennials	50	120.00	6000	600	5400	-
3.	Chillies	16	688.00	11008	1100.80	9907.20	-
4.	Ginger & Turmeric	27.50	524.00	14410	1441	12969	-
5.	Green Manure		450.00 per Ha.	450	45	405	-
6.	Paddy Late						
	Variety (i)	35	105.00	3675	367.5	3307.50	496.15
	(ii)	35	74.00	2590	259	2331.00	349.65
7.	Kh.Hy.Jawar (i)	30	100.00	3000	300	2700	405.00
	(ii)	30	80.00	2400	240	2160	324.00
8.	Kh.Hy.Maize (i)	30	110.00	3300	330	2970	-
	(ii)	30	110.00	3300	330	2970	-

1	9	Total Benefit in Rs. Col. 7+8+9	Total expenses			
			Seed cost per Ha. in Rs.	Fert. & manure cost per Ha.	Total of Col. Nos. 11 + 12	
		10	11	12	13	
1.	Suga	546.75	18771.75	1000	3170	4170
2.	Other					
	Pera	162.00	5562.00	-	345	345
3.	Chi	297.20	10204.40	50	1417	1467.50
4.		389.10	13358.10	3000	1375	4375
5.		12.15	417.15	6250/Ha.		6250
6.		99.25	3902.90	80	712.50	792.50
		69.90	2750.55	80	712.50	792.50
7.		81.00	3186.00	56	612.50	668.50
		64.80	2548.80	56	612.50	668.50
8.		89.10	3059.10	30	687.50	717.50
		89.10	3059.10	30	687.50	717.50

	Add for Fodder Exp. of 10% of Col.7	Implementation charges @ 3% of Col.No.7	Labour charges in Rs. @20% of Col.7	Cost of pesticides per Ha. in Rs.	Total expenses in Rs. Col.Nos. 13 to 17	Net Benefit in Rs. Col.18-19
	14	15	16	17	18	19
1.	1822.50	546.75	3645	200	10384.25	8387.50
2.	540.00	162.00	1080	60	2187.00	3375.00
3.	990.70	297.20	1981.40	75	4811.80	5392.60
4.	1296.90	389.10	2593.80	75	8229.77	4628.55
5.	40.50	12.15	81.00	-	196.15	221.00
6.	330.75	99.25	661.50	100	1984.00	1915.90
6.	233.10	69.90	466.20	100	1661.70	4462.50
7.	270.00	81.00	540.00	150	1709.50	1476.50
7.	216.00	64.80	432.00	150	1631.30	1017.50
8.	297.00	89.10	594.00	60	1757.60	1301.50
8.	297.00	89.10	594.00	60	1757.60	1301.50

1	2	3	4	5	6	7	8
9.	Kh. U. I. Pulses (Mug)	5	226	1430	143	1287	-
10.	Kh. Gr. Nut	12.50	263	3287.50	328.75	2958.75	-
11.	M. Vegetables	100	100	10000.00	1000	9000	-
12.	Gram on raddy	10	220	2200	220	1980	-
13.	Wheat on G.M.	(1) 20	188	3760	376	3384	338.40
		(11) 20	105	2100	210	1890	181.00
14.	Rabi Hy. Jawar	(1) 30	100	3000	300	2700	405.00
		(11) 30	80	2400	240	2160	324.00
15.	Rabi Hy. Maize						
	Gr. Nut (1)	30	110	3300	330	2970	-
	(11)	30	110	3300	330	2970	-
16.	Rabi Vega.	100	100	10000	1000	9000	-
17.	N. W. G. Nut on Kh. Jawar	17.50	263	4602.50	460.25	4142.25	-
18.	n.w. Fodder on Maize	300	10	3000	300	2700	-

	9.	10	11	12	13
9.	38.60	1325.60	25	152.50	177.50
10.	88.75	3047.50	450	227.50	677.50
11.	270.00	9270.00	200	1417.50	1617.50
12.	59.40	2039.40	100	152.50	252.50
13.	101.50	3823.90	250	725.00	975.00
	56.70	2135.70	250	725.00	975.00
14.	81.00	3180.00	56	612.50	668.50
	64.80	2548.80	56	612.50	668.50
15.	89.10	3059.10	30	687.50	717.50
	89.10	3059.10	30	687.50	717.50
16.	270.00	9270.00	200	1417.50	1617.50
17.	124.25	4266.50	450	302.50	752.50
18.	81.00	2781.00	67.50	100.00	167.50

	14	15	16	17	18	19
9.	128.70	38.10	257.40		602.20	723.40
10.	295.90	88.75	591.75	45	1698.90	1348.30
11.	900.00	270.00	1800.00	75	1462.50	4607.50
12.	198.00	59.40	396.00	25	930.90	1108.50
13.	338.40	101.50	676.80	60	2151.70	1672.20
	189.00	56.70	378.00	60	1658.70	477.00
14.	270.00	81.00	540.00	150	1709.50	1476.50
	216.00	64.80	432.00	150	1531.50	1017.50
15.	297.00	89.10	594.00	60	1757.60	1301.50
	297.00	89.10	594.00	60	1757.60	1301.50
16.	900.00	270.00	1800.00	75	1462.50	4607.50
17.	414.20	124.25	828.45	45	2164.40	2102.10
18.	270.00	81.00	540.00		1058.50	1722.50

LRMODI IRRIGATION PROJECT

Taluka: Satara District: Satara

Statement showing the average rates worked out for the
different Agricultural produce

Sr. no.	Name of Crops	Price of Produce for the Year				
		1976-77	1977-78	1978-79	1979-80	
1	2	3	4	5	6	
1.	Sugar Cane	129	122	150.50	Av. Rate 133.83/ Bag	
2.	Other Perennials	As per Project Report				
3.	Chillies	--	5454	550	860	
4.	Ginger & Turmeric	--	654	555	362	
5.	Green Mannure	---As per Project Report ---				
6.	Paddy, Late Variety(i)	--	100	110	105	
	(ii)	--	100	110	105	
7.	Kh.Hy Jawar	(i)	----As per Project Report ----			
	(ii)		----As per Project Report ----			
8.	Kh.Hy. Maize	(i)	--	110	103	118
	(ii)		--	110	103	118
9.	Kh.U.I. Pulses	--	210	250	360	
10.	Ground Nut	--	238	235	315	

Average rate		Remarks
per Quintal		
1.	13.50	Average rate for Sahyadri Sahakari Sakhar Karkhana.
2.	120.00	
3.	688.00	Rates obtained from (Karad) Agr. Product Committee Market, Karad.
4.	524.00	
5.	450.00	
6.	105	
7.	100	
	150	
8.	110	
	110	
9.	286	
10.	263	

416-A

1	2	3	4	5	6
11.	Kh. Vegetables				--- As per Project Report ---
12.	Gram on Paddy	170	261	230	151
13.	Wheat on G.M.	i)	190	185	188
		ii)	190	185	188
14.	Rabi Hy. Jawar				
	on Pulses	i)			--- As per Project Report ---
		ii)			--- As per Project Report ---
15.	Rabi Hy. Maize				
	on Ground Nut	i)	110	103	118
		ii)	238	235	315
16.	Rabi Vegetables				--- As per Project Report ---
17.	H.W. Gr. Nut on				
	Kh.		238	235	315
18.	H.W. Fodder on Maize				--- As per Project Report ---

श्रीती उत्पन्न बाजार समिती, कराड

सन १९७६-७७

महिना	शिंग	गुळ	हळद	मिरची	घना	ज्वारी	बाजरी	तुर	मका	कौदा	गहू
ऑक्टोबर	११०	१९०	३००	६२५	६६०	१७०	११५	११०	११५	४०	१६०
नोव्हेंबर	११०	२००	४००	७२५	७५५	१६०	११०	१२५	११५	६०	१६०
डिसेंबर	११५	२००	४००	६००	७५५	१६०	११५	११५	११५	८५	१६०
जानेवारी	१५०	२००	४००	६६०	७५५	१६०	११५	११५	११५	८५	१७०
फेब्रुवारी	१२०	२०५	४००	६६०	७५५	१५०	११५	१५०	११५	८५	१७०
मार्च	११५	१९०	४००	६००	७५५	१३०	११०	१३०	११५	८५	१९०
एप्रिल	१६०	१९०	५००	६००	७५५	१३०	११०	१३०	११५	८५	१८०
मे	२००	१९५	५००	७००	७५५	१३५	११०	१५०	१२०	६०	१७०
जून	२८०	२०८	५२५	८००	७५५	१३५	११०	१७०	१२५	६०	१७५
जुलै	२८०	२१०	५२०	७२५	७००	१४०	१२०	१७०	१२५	९०	१७५
ऑगस्ट	१९०	१७४	६००	६५०	७०५	१४०	११५	१७०	१२५	१००	१६२
सप्टेंबर	१६४	१५८	७८४	७१४	७११	१४४	११७	२०५	११५	१०९	१६४
वार्षिक सर्व	१६०	१९३	४८८	६८९	७०६	१४६	११४	१४८	११७	१०१	१६७
साधारण दर											

सत्य प्रत

श्रीती
उपविभागीय अभियंता
पाटबंधारे प्रकल्प अन्वेषण उप विभाग ५-३
कोल्हापूर

श्रीती
सचिव

श्रीती उत्पन्न बाजार समिती
कराड

श्रीती उत्पन्न बाजार समिती, कराड

सन १९७७-७८

महिना	शींग	गुळ	हळद	मिरची	धाना	ज्वारी	बाजरी	खडी	मका	कांदा	गहू
ऑक्टोबर	१९७	१५८	७०८	५५०	५७३	१०६	११३	२१५	१०५	१०५	१६३
नोव्हेंबर	२२५	१७०	६८०	४२०	५४५	११०	११०	२०५	११०	९६	१६५
डिसेंबर	२४०	१६०	६००	४५०	६००	१३५	१२०	२२०	११०	८०	१७०
जानेवारी	२५०	१५०	५५०	५५०	५५०	१३०	१२०	२२०	११०	७०	२००
फेब्रुवारी	२५०	१३७	६००	५००	६००	१२५	१२०	२००	११०	६५	१९०
मार्च	२५०	१३७	६००	७००	६००	१४५	१२०	१८०	१०५	६०	१९०
एप्रिल	२५६	१३२	६४२	७००	६००	१३५	१२०	१९०	८५	५७	१९०
मे	२६०	१४२	६७७	७००	६००	१३५	१२०	१९०	८५	६०	२००
जून	२६०	१५२	७१५	७००	५००	१३५	१३०	१९०	८५	५०	२००
जुलै	२५५	१५७	७८०	५००	५००	१३५	१३०	१९०	९०	७५	२००
ऑगस्ट	२१४	१५०	७८०	५००	५००	१३५	१३०	२५०	९०	७५	२००
सप्टेंबर	१९१	१४७	७२०	५००	५००	१२८	१३०	३००	११०	९४	१९०
वार्षिक सर्व साधारण दर	२३६	१५०	६५४	५४५	५५५	१२८	१२२	२१०	११०	७३	१९०

सत्य प्रत.

सही
उप विभागीय अभियंता
पाटवारी प्रकल्प अन्वेषण उप विभाग १-३
कोल्हापूर

सही
सचिव
श्रीती उत्पन्न बाजार समिती,
कराड (बि.सातारा)

श्रीती उत्पन्न बाजार समिती, कराड

सन १९७८-७९

महिना	शौंग	मुळ	हळद	मिरची	धना	बाजरी	ज्वारी	अुडीद	मका	कांदा	गहू
ऑक्टोबर	१८०	१५५	७२०	७०४	२००	१३०	१४०	१३०	१००	१००	१९०
नोव्हेंबर	२२२	१५९	७२०	५५६	२००	१३०	१३५	१३०	११०	९२	१९०
डिसेंबर	२०६	१३९	७२०	५४४	२००	१२५	१३०	१३०	१००	८०	१९०
जानेवारी	२३०	१२८	७२०	५६०	२००	१२५	१३०	३००	१००	८०	१९०
फेब्रुवारी	२३२	१२०	७२०	५६०	२००	१२५	१३०	३००	१००	८०	१९०
मार्च	२३५	१४०	६००	६००	२५०	१२०	१३०	३५०	१००	८०	१९०
एप्रिल	२३७	१५५	४४५	६००	२५०	१२०	१३०	३५०	१००	८०	१९०
मे	२४०	१६०	४७०	७००	२५०	१२०	१३०	३५०	१००	६०	१९०
जून	२४७	१८०	३५०	७००	२५०	१२०	१३५	३५०	१००	८०	१९०
जुलै	२५५	२००	३५०	८००	२५०	१४०	१५०	३५०	११०	१००	१७५
ऑगस्ट	२७०	२४८	४५०	८००	२५०	१४०	१५०	३५०	११०	१३०	१८०
सप्टेंबर	२८०	२५५	४४५	८००	२५०	१४०	१५०	३५०	११०	१३०	१८०
सर्वसाधारण वा र्शिक दर	२३५	१७०	५५५	६६०	२३०	१२८	१३५	२००	१०३	९०	१८५

सत्यमेव

सही १-

उप विभागीय अभियंता
पाटवारे प्रकल्प अन्वेषण उप विभाग क्र. ३
कोल्हापूर

सही

सचिव
श्रीती उत्पन्न बाजार समिती
कराड

URMODI-IRRIGATION PROJECTTAL. SAFARADIST. SAFARA

Proposed Irrigable Area = 6030 Ha. i.e. 14900 Acres)

Sr. no.	Name of Crop	Total Food production after irrigation in Qtl.	Total Food production before irrigation in Qtl.	Net increase in food production in Qtl.
1	2	3	4	5
1.	Sugarcane	9,06,750	-	13,56,750
2.	Other Perennials	15,075	-	15,075
3.	Chillies	4,824	-	4,824
4.	Ginger & Turmeric	8,291	-	8,291
5.	Green manure	-	-	-
6.	Paddy	21,105	2,714	18,391
7.	Kh. Hy. Jawar	27,135	13,387	13,748
8.	Kh. Hy. Maize	18,090	-	18,090
9.	Kh. Pulses (U.I.)	3,015	2,412	603
10.	Kh. Gr. Nut	11,306	12,060	15,075
11.	Kh. Vegetables	18,090	-	18,090
12.	Gram on Paddy	6,030	241	5,789
13.	wheat on Gr. Mannure	8,442	422	8,020
14.	Rabi Hy. Jawar	18,090	724	17,366
15.	Rabi Hy. Maize	27,135	-	27,135
16.	Rabi Vegetables	18,090	-	18,090
17.	H.W. Gr. Nut	15,829	-	-
18.	H.W. Fodder	90,450	-	90,450

Note: For counting net production of Ground Nut proposed production of H.W. Ground Nut has been considered in addition to kh. Ground Nut,

URMODI IRRIGATION PROJECT

TAL. SARARA

DIST. : SARARA

Statement showing the increase in food production
(Proposed Irrigable area 6030 Ha. i.e. 14900 Acres)

Sr. no.	Proposed Crop Pattern				
	Name of Crop	%age	Area in Ha.	Yield Rate Qtl./Ha.	Yield in Qtl.
1	2	3	4	5	6
1.	Sugarcane	15	904.5	1500	13,56,750
2.	Other				
	Perennials	6	301.5	50	15,075
3.	Chillies	5	301.5	16	4,824
4.	Ginger & Turmeric	5	301.5	27.50	8,291
5.	Green Manure	2	120.6	-	
6.	Paddy	10	603	35	21,105
7.	Kh. Hy. Jawar	15	904.5	30	27,135
8.	Kh. Hy. Maize	10	603	30	18,090
9.	Kh. Pulses (U.I.)	10	603	5	3,015
10.	Kh. Ground Nut	15	904.5	12.50	11,306
11.	Kh. Vegetables	3	180.9	100.0	18,090
12.	Gram on Paddy	10	603	10	6,030
13.	Wheat on G. Manure	7	422.1	20	8,442
14.	Rabi Hy. Jawar	10	603	30	18,090
15.	Rabi Hy. Maize	15	904.5	30	27,135
16.	Rabi Vegetables	3	180.9	100	18,090
17.	N.W. Ground Nut	15	904.5	17.5	15,829
18.	N.W. Fodder	5	301.5	300	90,450

Existing Crop Pattern					Remarks
Name of Crop	% age	Area in Ha.	Yield rate Qtl./Rs.	Yield in Qtl.	
7	8	9	10	11	12
	-	-	-	-	
Chillies	3	180.9	-	-	
Kh. Jawar	37	2231.1	6	13,387	
Bajari	8	482.4	3	1,447	
Kh. Gr. Nut	20	1206	10	12,060	
Paddy	3	180.9	15	2,714	
Pulses	8	482.4	5	2,412	
Grass	17	1025.1	-	-	
Rabi Jawar	2	120.6	6	724	
Wheat	1	60.3	7	422	
Gram	1	60.3	4	241	