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Government of Maharashtra
Irrigation and Power Department

Jayakwadi Project Stage II

(Irrigation Scheme)

October 1973

• Report • Es
and
• Drawings

GENERAL INDEX

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C. W. & P. C. Proforma	(i)
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FOREWORD

In the year 1964, Jayakwadi Project Report was submitted to Central Water and Power Commission and Planning Commission. This Project report envisaged :-

- a) A dam near Paithan in Aurangabad District of Maharashtra State on Godavari river.
- b) Paithan Left Bank Canal to irrigate 1,41,637 Ha - (3,50,000 acres) in Aurangabad and Parbhani Districts.
- c) Paithan Right Bank Canal to irrigate 41,682 Ha (1,03,000 acres) in Aurangabad, Ahmednagar and Bhir Districts.
- d) A dam near Majalgaon in Bhir District of Maharashtra State on Sindphana river.
- e) Majalgaon Right Bank Canal to irrigate 93,885 Ha (2,32,000 acres) in Bhir, Parbhani and Nanded Districts.

Central Water and Power Commission scrutinised the report and suggested that the Paithan Dam with its Left Bank Canal only should be taken up as Jayakwadi Project Stage-I and the remaining components of the Project should be covered by a separate report as Jayakwadi Project Stage-II.

Accordingly Stage-I of the Project was cleared by Planning Commission under their letter No.III-2 (23)/64-I. & P.Dated 3-2-1965.

On clearance, the work of Stage-I was taken up immediately and is now in full swing. The earthen dam is completed and Masonry dam (without gates) will be ready by June 1974 when irrigation potential of about 16,000 Ha will also have been created. The

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installation of gates will be completed by June 1976 and entire canal and distribution system is programmed to be completed by 1979-80.

The Paithan dam will impound a live storage of 1965.90 Mm^3 , out of which 750 Mm^3 , (26.5 T.M.C.) net is meant for utilisation on Paithan Right Bank Canal and Majalgaon Right Bank Canal.

During the unprecedented drought of 1972-73 experienced in Maharashtra, the work of Paithan Right Bank Canal was started as scarcity work and nearly Rs.125.00 lakhs have been spent so far on this work. The work is still in progress.

In view of the facts that the entire water potential required under the Paithan Right Bank Canal will have been impounded at Paithan in 1976, it is imperative that the Paithan Right Bank Canal should be completed on priority so that area of 41,682 Ha in Aurangabad, Ahmednagar and Bhir Districts can be brought under irrigation before the end of the Fifth Five Year Plan. This will help us not only to achieve the badly needed irrigation facility in the above mentioned districts, but will also ensure that the expenditure already incurred on Paithan Right Bank Canal does not become infructuous. Simultaneously a start will also have to be made on the construction of Majalgaon dam and Majalgaon Right Bank Canal, so that an area of 93,885 Ha from Bhir, Parbhani and Nanded Districts (commanded by Majalgaon Right Bank Canal) can be brought under irrigation by about 1980-81.

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Jayakwadi Project Circle, Aurangabad is a fully established organisation and can immediately take up the works of Stage-II. Jayakwadi Canal Circle, Aurangabad can also be gradually entrusted with the work of Majalgaon Right Bank Canal as the work of Paithan Left Bank Canal will go on diminishing year after year. Thus the entire trained and established organisation of Jayakwadi Project Stage-I can be switched over for the construction of Stage-II.

It is with the above back-ground that this report on Jayakwadi Project Stage-II is being submitted to Central Water and Power Commission and Planning Commission for immediate clearance thereto. An early clearance will ensure continued employment for the technical and non-technical, skilled and un-skilled personnel now employed on Jayakwadi Project Stage-I and will also enable the State to create the much needed irrigation potential of the order of 1,35,567 Ha in the Marathwada region of the State which has been badly hit during the three successive drought years of 1970-71, 1971-72 and 1972-73.

S.S.APTE
Chief Engineer (Irrigation) &
Jt. Secretary Irrigation & Power Dept.
Maharashtra.

IRRIGATION AND POWER PROJECTS
LIST OF ITEMS AND REFERENCES

State : Maharashtra
 Name of Project : Jayakwadi Project Stage II
 Category of Project : Major Irrigation Project.
 Estimated Cost : Rs.7825.00 Lakhs.

I. - HYDROLOGICAL AND GENERAL :-

- | | |
|---|---|
| i) Have hydrological and meteorological data been collected showing the following information ? | Mes. |
| a) A map showing sub-Divns. of catchment by tributaries water sheds, rain-gauge and temperature reading station, gauge and discharge sites, contour's isohytes. | Plate No.1. |
| b) Monthly and annual rainfall and temperature data for the catchment. | Chapter - II
Para - 1.1 |
| c) Average, maximum and minimum rainfall and temperature. | Chapter - II
Para - 1.1 |
| d) Gauge and discharge data of tributaries and main river. | Chapter - II
Para - 1.1 |
| e) Hydrographs of the river | Chapter - IV
Para - 3.2. |
| f) Maximum Historical flood with hydrograph and designed maximum flood and its frequency. | Designed Max.
9600 Cumecs.
Observed Max.
flood 3600 Cumecs
(1971) |
| g) Maximum, minimum and average annual run off. | Para - 1.1 |
| h) Suitability of water for irrigation, drinking etc. and treatment contemplated where required. | Suitable. |
| i) Silt data showing maximum and average silt intensities. | Not observed. |

- j) Erosion data and soil conservation measures if any. Nil
- k) Sub-water data in the command area showing depth of water table and its seasonal variation. Chapter - II
Para - 7.0

SEISMIC DATA

Has basinwise development of the river been considered and the following information furnished.

Yes.

- a) A map showing the overall proposals for valley development. Attached in Stage I report.
- b) Alternative proposals, discussions their merits and demerits. Attached in Stage I report.
- c) Extent to which any existing projects will be assisted or affected. Attached in Stage I report.

3) Has reservoir data been collected completely and following information furnished ? Yes.

- a) Reservoir topography area and capacity curves. Chapter - IV
Para - 2.00
Appendix- 3.4
- b) Probable rate of silting in the reservoir, and the life of the reservoir, comparison with silting of existing reservoirs. Chapter - III
Para - 2.0
- c) Live storage, the No. of years in which the reservoir completely fills, average annual utilisation, evaporation losses, extra storage provided for carry over from year to year if any.
- d) Working table for the reservoir. Chapter - III
Para - 2.0
- e) Flood absorption and routing. Chapter - IV
Para - 3.2

(III)

- | | |
|---|---------------------------------|
| f) Back water and tail water curves with bank levels. | Chapter - IV
Para - 3.2 |
| g) Fetch of reservoir, direction and velocity of winds and free board. | Chapter - IV
Para - 3.3 |
| h) Malaria control of reservoir. | Provision made in the estimate. |
| i) Area to be submerged and its classification, acquisition and compensation for land and properties. | Chapter - VII
Para - 1.0 |
| j) Programme of resettlement of population displaced from the reservoir area. | Chapter - VII
Para - 2.0 |

II - HEAD WORKS (DAM OR WEIR)

- | | |
|--|----------------------------|
| 1. Have the following aspects been discussed and shown on a map ? | Yes. |
| a) Dam site and consideration leading to its preference over other sites. | Chapter - IV
Para - 1.0 |
| b) Borrow areas and Quarries. | Chapter - IV
Para - 7.0 |
| c) Colonies, work shops and offices. | Chapter - IX
Para - 3.0 |
| 2. Has a detailed survey map of the dam sites been prepared (Scale 50 ft. to 100 ft.) showing the following ? | Yes. |
| a) All the natural features e.g. out crops of rocks springs etc. . | Plate No.3 |
| b) Dam and appurtenant works. | Plate No.5 |
| c) Site for construction plant e.g. crushing and concreting plants. Construction power plant on pressed air station etc. | -- |

3. Have a geological investigation been made and a report showing the following submitted ? Geological report is awaited.
- a) A brief account of regional geology, major rock types, effects of faulting etc. description of other structural features and their relation to possible leakage grouting proposals. Geological report is awaited.
- b) Laboratory tests of samples of foundation material and their interpretation. -
- c) Levels of ground water table and direction of flow and discussion of percolation tests. -
- d) Reference to any special condition affecting the preliminary design. -
4. Have the following maps been included ? Yes.
- a) Combined topographical and geological map. -
- b) Map showing bed rock contours. Plate No.3 (i)
- c) Logs of drill holes, tests, pits, exploratory tunnels etc. Plate No.3(ii)
- d) Maps, profiles and section showing results of geophysical work and any other special method. Plate No.3 (i)
- e) Ground and aerial photographs if available. No
5. Have investigations of construction material been made and report showing the following attached. Yes.
- a) Various types of embankment materials e.g. pervious, semi-pervious and impervious with quantities in various borrow areas. Chapter - IV
Para - 7.2

(7)

- | | |
|--|----------------------------|
| b) Stone for rip-rap rock fill. | Chapter - IV
Para - 7.2 |
| c) Material for stone masonry and concrete comprising rubble fine and coarse aggregates with quantities and physical properties. | Chapter - IV
Para - 7.2 |
| d) Source of supply of cement. | Chapter - IV
Para - 7.2 |
| e) Laborator tests performed on items 'a' to 'd'. | -- |
| f) Haul roads and transport of construction materials. | Chapter - IV
Para - 8.0 |
| g) Plans of borrow areas and quarries with bore or trial pits data. | - |
| 6. Have the main structures and appurtenants work i.e. dam, spillway power dam, outlet, cofferdam, etc. been designed and the following appended ? | Yes |
| a) General plan upstream and down stream elevation showing natural ground level, and final excavated levels. | Plate No.3(i) & 4 |
| b) Foundation treatment and drainage. | -do- |
| c) Spillway and outlets with energy dissipation arrangements. | Plate No.5,6 & 7. |
| d) Maximum section of overflow non overflow and earth dam. | Plate No.4 to 7 |
| e) Gallaries and openings. | -do- |
| f) Gates, hoists and other central equipment. | -do- |
| g) Diversion works during construction etc. | - |
| h) Design calculations with list of assumptions made and factors of safety adopted together with justification for the types of structures. | Appendix - 4.2 |

III - IRRIGATION :-

- | | |
|--|---------------------------------|
| 1) Have the following investigations been made and report prepared ? | Yes. |
| i) Existing irrigation facilities indicating gross area, cultivable command area, irrigated area and extent of water utilised. | Chapter - II
Para - 4.0 |
| ii) Proposed facilities indicating gross area, culturable command area, and area proposed for irrigation. | Chapter - II
Para - 4.0 |
| b) Soil Survey and pattern of crops indicating existing and proposed areas under various crops. | Chapter - II
Para - 7.0 |
| c) Monthly water requirements of crops based upon the proposed crops pattern. | Chapter - III
Para - 1.0 |
| d) Existing and proposed duties, deltas and intensity of irrigation. | -do- |
| e) Existing and proposed water rates and land revenue rates. | Chapter - X
Para - 3.0 |
| f) Investigation of construction material. | Chapter - IV
Para |
| g) Land Acquisition and compensation for properties. | Chapter - VII ;
Para - 1.0 |
| h) Malaria control, stream sanitation, population control and health services. | Provision made in the estimate. |
| 3) Have the canals, branches and structures on them been designed and report and drawings prepared for the following. | Yes. |

(vii)

- | | |
|--|--|
| a) Remodelling the existing irrigation system if any. | Nil |
| b) Capacity factor, free board and other assumption. | Chapter - V
Para - 2.0 & 2.4 |
| c) Longitudinal sections and cross sections of canals and branches. | Plate No.8 to 18 |
| d) Cross drainage works, bridges regulators etc. | Chapter - V
Para - 3.0 |
| i) Sections and cross sections of main structures and typical drawings for others. | -- |
| e) Method of calculation of discharge of cross drainage works. | Chapter - V
Para - 3.5 |
| f) Distribution system including minor and outlets. | Chapter - VIII
Para - 2.01 |
| g) Field channel and agency for their excavation. | Field channels will be constructed by Cultivators under supervision of Agriculture Department. |
| h) Regulation arrangements of offtake channels. | -- |

IV - POWER DEVELOPMENT :-

- | | |
|---|---|
| i) Have investigation been made and the following details furnished. | No power is expected from the project. |
| a) Present position of power supply in the region system, load factor etc. | Power supply is available from the Grid of Maharashtra State. |
| b) Extent of firm power available from the scheme (working tables and the basis of estimation of firm power should be supplied) and extent of secondary power if any. | Does not arise. |

- c) Load survey, future peak and energy demands anticipated system load factor. Does not arise.
- d) The function which the proposed scheme would perform in relation to the other stations of existing grid, if any, and details indicating how the scheme has been designed to fit in the existing grid. Does not arise
- e) Proposed initial and ultimate installed capacities, number and the size of units, power factor, efficiency etc. Does not arise
- f) The map showing the general layout of the scheme including the dam, water conductor system, power house, step up station, and out going transmission lines. Does not arise
- g) General map showing the transmission system and the location of the present and future loads. Does not arise
- h) A note on the development of power in stages if any. Does not arise
- i) Present and proposed tariff rates comparison of similar rates in other states and reasons for differences. Does not arise.
- j) Proposed sources of coal fuel etc. Does not arise.
- i) Investigation of construction materials. Does not arise

V - OTHER BENEFITS :-

- | | | |
|----|--|----|
| 1) | Has the flood control aspect been investigated and the designs and drawing prepared and the following particulars indicated. | No |
| | a) Peak flood, moderated flood and optimum safe discharge in the flood plan. | - |
| | b) Areas affected by flood at present and areas which will get protection giving location and quantum. | - |
| | c) Special structure required for flood moderation e. g. | - |
| | d) i) Flood embankment | - |
| | ii) Regulation by barrage into various channels old and new. | - |
| | e) Betterment levy if any for the area protected from floods. | - |
| 2) | Has navigation been provided and the following indicated. | No |
| | a) Navigation reaches of river and canals, with depth of drafts and clearance under structures. | - |
| | b) Location and design of locks with data of foundation materials. | - |
| | c) Existing and proposed navigation traffic, both passenger and goods. | - |

(x)

- d) Existing and proposed tollage rate of registration fees of navigation.
- 3) Has fish culture recreation etc. been considered and if so, have following details been given ? No
- a) Present facilities and scope of the scheme. -
- b) Structures required e.g. fish ladder, gardens health and pleasure resorts. -

VI - CONSTRUCTION PROGRAMME :-

- 1) Has a construction programme been drawn up for the execution of the various components in the project with following details ? Yes.
- a) Machinery and equipment available together with proposed requirement. Chapter - VI
Para - 1.0
- b) The quantities of materials involved together with the daily out turn proposed for Major item like masonry, concrete of earth work. Chapter - VI
Para - 2.0
- c) Justification of the construction programme Chapter - IX
Para - 1.0
- d) Yearly requirements of construction staff, technical and non-technical and labour, skilled and unskilled. Chapter - IX
Para - 3.0
- e) Yearly requirements of cement, steel, coal and other essential materials. --

- 2) Have charts been furnished showing the construction programme and target diagrammatically for the various components of the Project.

VII - ESTIMATES AND ANALYSIS OF RATES :-

- 1) Have project estimates together with abstracts of quantities and costs for various components of the project been made and following details furnished.?
- a) Estimated cost of the various stages of the project. Chapter - VIII
- b) The year to which the rates in the estimate pertain. 1973-74.
- c) Allocated cost of irrigation power flood control, navigation and other heads of the Project. Purely irrigation project.
2. Have analysis of rates been made and the following details furnished ? Yes.
- a) Labour out turn for the various items.
- b) Materials required for unit quantities of items of work. These things are attended while preparing D.S.R.
- c) The correct schedule of rates in the area and rates proposed comparasion with rate obtained on analogous works.

VIII - FINANCIAL RETURNS AND BENEFITS :-

- 1) Has the financial aspect of project been discussed and the following details furnished ?
- Yes.
- a) The programme of expenditure on the various unit of the project in the foreign exchange and in rupee. Chapter - IX
Para - 1.1, 1.2, 1.3, 2.0
- b) The programme of development of irrigation, power, navigation etc. Chapter - X
Para - 1.0
- c) Gross revenue statement from the different functions with schedule of water rates, betterment fees, irrigation cess. Power rates and flood levels. Chapter - X
Para - 3.1
- d) Statement showing maintenance and the establishment costs and net revenue available. Chapter - X
Para - 3.2
- e) A note on the productivity of the project stating percentage return, capital cost, of irrigation per acre and of power per Killowatt. Chapter - X
Para - 5.0
- f) Financial resources available for construction of the project e.g. contribution by public load from centre etc. -
- 2) Have total direct and indirect benefits on the project been stated in respect of the following ?
- Yes.
- a) Irrigation Chapter IX
- b) Power -
- c) Flood control -
- d) Navigation -
- e) Employment Chapter VI
- f) Other facilities. -

JAYAKWADI PROJECT STAGE-II

Salient Features

1. Scope of the Scheme An Irrigation Project with Storage on Godavari river @ Paithan and Sindphana @ Majalgaon.
2. Source
 - i) Godavari river.
 - ii) Sindphana river.
3. Yield and Utilisation
 - i) Catchment area.
 - 1) Godavari @ Paithan 21404 Sq.Kms.
 - ii) Sindphana @ Majalgaon 3840 Sq.Kms.
 - ii) a) Average annual yield. | 3888.42 Mm³ *
| (137.4 T.M.C.)*
 - b) 75% dependable yield. | 2832.83 Mm³ *
| (100.1 T.M.C.)*
 - c) Gross average annual utilisation. | | Stage - I 1647.06 Mm³ | |
| | (58.2 T.M.C.) | |
| | Stage - II 1185.77 Mm³ | |
| | (41.9 T.M.C.) | |

| Total 2832.83 Mm³*
| (100.1 T.M.C.)*
 - d) Percentage of annual utilisation to average runoff. | | 72.8% | |

* Note :- The figures are for final stage.

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<u>4. Dam and reservoir.</u>	<u>Majalgaon Dam.</u>
i) Gross Storage.	444.45 Mm ³ (15.7 T.M.C)
ii) Dead Storage.	133.15 Mm ³ (4.7 T.M.C)
iii) Live Storage.	311.30 Mm ³ (11.0 T.M.C)
iv) Minimum Draw Down Level.	+ 426.11 (+ 1398.0 ft.)
v) Full Reservoir level.	+ 431.44 (+ 1415.5 ft.)
vi) Maximum Water Level.	+ 431.70
vii) Top of dam level	+ 435.00
viii) Area under submergence @ F.R.L.	7892 Ha
ix) No. of villages affected.	19 Nos. (2 Nos. deserted)
x) Maximum height of dam in the river bed.	30.5 M.
xi) Free Board.	3.40 M.
xii) Total quantity of earth work for the dam.	6914 Tm ³
xiii) Total quantity of	
Masonry:	210 Tm ³
Concrete:	43.40 Tm ³
xiv) Total length.	
(a) Earthen dam on left flank.	1002 M.
(b) Masonry Dam.	468 M.
(c) Earthen dam on right flank.	5550 M.
xv) Spillway.	
(a) Type	Ogee, with 28 gates (12 M x 5 M)
(b) Designed flood	9600 Cumecs.

(xv)

- (c) Depth over crest from the design flood. 5 M.
- (d) Length of spillway. 417 M. (including 27 piers : 3 M. thick)

xvi) Outlets

- a) Location. Right Flank @ Ch:172
- b) Type Details not worked out.
- c) Full supply discharge. 100 M³/Sec.
- d) R.L.of outlet sill. + 424.70

* Note:- Paithan reservoir is included in Stage-I.

5. <u>Canals.</u>	<u>Paithan Right Bank Canal.</u>	<u>Majalgaon Right Bank Canal</u>
1) Full supply discharge at head in Cumecs.	63.71	82.63
2) Length in Kms.	132.56	165
3) Section at head.		
a) Bed width at head in metres	9.14	8.50
b) Side slopes	1½:1	2:1
c) Full supply depth in metres.	3.87	4.00
d) Free Board in metres.	0.90	0.90
4) Description	Both the canals are lined and perennial.	

6. Command area (Ha)

	<u>Paithan R.B. Canal.</u>	<u>Majalgaon R.B. Canal.</u>	<u>Total</u>
I) Gross command area.	59,892	1,31,520	1,91,412
II) Culturable command Area.	53,910	1,19,400	1,73,310
III) Net irrigable area.	41,682	93,885	1,35,567

7. Irrigable Command Area Talukawise (Ha)

<u>District.</u>	<u>Taluka.</u>	<u>Paithan R.B. Canal.</u>	<u>Majalgaon R.B. Canal.</u>	<u>Total</u>
Aurangabad.	Paithan	1732	-	1732
Ahmednagar.	Shevgaon	1690	-	1690
Bhir.	Gevrai	24060	-	24060
	Majalgaon	14200	28300	42500
Parbhani.	Gangakhed.	-	58385	58385
Nanded.	Kandhar.	-	7200	7200
Total		41682	93885	135567

8. Irrigation Crop Pattern (Ha)

<u>Sr. No.</u>	<u>Crops.</u>	<u>%</u>	<u>Paithan R.B. Canal.</u>	<u>Majalgaon R.B. Canal.</u>	<u>Total</u>
1.	Sugar cane.	3	1250	2718	4068
2.	Other perennials.	1½	625	1409	2034
3.	Paddy.	5	2085	4695	6780
4.	L.S.Cotton	37½	15635	35210	50845
5.	Rabi Seasonals	51	21225	47875	69130
6.	Hot Weather Seasonals.	2	832	1878	2710
Total			41682	93885	135567

Intensity of Irrigation - - - 77%
 (Ratio of cropped area to culturable area).

9. Normal Rain fall in the command.

<u>Months.</u>	<u>Rainfall (mms)</u>
June	139.70
July	165.10
August	139.70
September	190.70
October	45.72
November	22.86
December	7.62
January	5.08
February	5.08
March	5.08
April	12.70
May	15.24
	<hr/>
Total	754.58
	<hr/>

10. Soils in the command.

The percentages of the shallow soils, medium soils and deep soil area are as under :-

	<u>Paithan Right Bank Canal.</u>	<u>Majalgaon Right Bank Canal.</u>
Shallow soil area	18.88%	21.70%
Medium soil area	11.31%	23.40%
Deep soil area.	69.81%	54.90%

11. Existing Pattern of cultivation

	<u>Crop.</u>	<u>Percentage.</u>
1)	Rice.	0.74
2)	Wheat.	3.30
3)	Sugarcane.	0.21
4)	Kharif Jawar.	8.00
5)	Rabi Jawar.	24.80
6)	Bajra.	7.50
7)	Maize	0.44
8)	Gram.	3.32
9)	Other T.S. (Tobacco etc.)	0.01
10)	Ground Nut.	3.16
11)	Other oil seeds.	8.60
12)	Cotton.	21.45
13)	Pulses.	19.47

12. Details of duty and deltas at distributary head for the proposed irrigated crops.

Crop.	<u>Duty (Ha/Cumec)</u>			<u>Delta (mms)</u>			
	Kharrif	Rabi	Hot Weather	Kharrif	Rabi	Hot Weather	Total
1. Sugar cane.	1358	1000	714	77.72	106.68	145.80	330.20
2. Other peren- nials	2358	1500	1072	45.20	71.12	97.04	213.36
3. Paddy	1286	5716	-	82.04	18.79	-	100.83
4. L.S. cotton	5144	8574	2286	20.57	12.44	45.73	78.74
5. Rabi Seaso- nals	-	2858	-	-	38.10	-	38.10
6. Hot Weather Seaso- nals	-	-	1429	-	-	73.66	73.66

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13. Utilisation @ Canal head (Mm³)

	<u>Kharif</u>	<u>Rabi</u>	<u>Hot Weather</u>	<u>Total</u>
Paithan Right Bank Canal.	74.71 (2.64)	138.67 (4.90)	118.01 (4.17)	331.39 (11.71)
Majalgaon Right Bank Canal.	159.90 (5.65)	303.38 (10.72)	253.57 (9.96)	716.85 (25.33)
	-----	-----	-----	-----
Total:-	234.61 (8.29)	442.05 (15.62)	371.58 (13.13)	1048.24 (37.04)

14. Cost of the Scheme Rs. in lakhs

A) Direct charges.

1) Head Works	1825.00
2) Canals and distributaries.	5649.66
3) Other charges Establishment, ordinary T & P. etc.	710.20

Total:- 8184.86

Deduct receipts and recoveries: 371.15

7813.71

B) Indirect charges. 11.29

Total:- 7825.00

15. Cost per hectare of cropped area. .. Rs. 5772.

16. Benefit cost ratio .. K. 2.55

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(Chapters)

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CHAPTER - I

HISTORY AND GENERAL FEATURES OF JAYAKWADI PROJECT

1.0 RIVER GODAVARI

Godavari river is one of the important rivers in Southern India. The basin of this river extends over an area of 3,12,812 Square Kms. which is nearly 10% of total geographical area of India. The basin lies between East longitudes $73^{\circ} - 26'$ and $83^{\circ} - 7'$ and North latitudes $16^{\circ} - 16'$ and $22^{\circ} - 36'$. The Godavari rises in the Nasik District of Maharashtra about 80 Kms. from the Arabian Sea at an elevation of about 1067 Metres - above mean sea level and after flowing for about 1465 Kms. in a generally south east direction falls into the Bay of Bengal about 96 Kms. below Rajahmundry. The Pravara, Purna, the Manjra, the Pranhita, the Indravati and the Sabri are Godavari's principal tributaries. The distribution of the Godavari basin in various States is as under :-

Sr.No. :	Name of State	: Area in Sq.Kms.
1)	Maharashtra.	.. 1,52,199
2)	Andhra Pradesh.	.. 73,201
3)	Madhya Pradesh.	.. 65,255
4)	Orissa.	.. 17,752
5)	Mysore.	.. 4,405
Total:		<u>3,12,812</u>

Index plan for Godavari valley is given in Plate No. 1.

1.1 REGIONAL ECONOMY

On the basis of 1971 Census and the percentage of the area of each District within the basin to the District as a whole, the total population in the basin works out to about 35.46 Million. More than 50% of this population resides in Maharashtra.

The economy of the basin at the present largely depends on agriculture which in view of the uneven incidents of the rainfall provides a low level of subsistence except for small parts of the basin where irrigation has been provided. These areas are also the seat of industries based on agricultural produce.

For these reasons there is a keen demand in the basin for the development of water resources. Though the major drainage area as well as precipitation in Godavari basin is from Maharashtra the total use of Godavari water for irrigation happens to be very low. Percentage of net area irrigated to net area sown is only 7.4% . Out of this area only 1.17% area gets benefits from Tanks, Wells etc. This project viz : the Jayakwadi Project is conceived to extend irrigation benefits to chronically scarcity affected areas of Ahmednagar and Bhir Districts.

1.2 SCARCITY CONDITIONS

The central part of the Godavari basin from Aurangabad, Ahmednagar and Bhir Districts is very prone to be affected by scarcity conditions. Specially the Majalgaon and Gevrai Talukas in Bhir District have

been often affected by scarcity and revenue was required to be suspended in these areas. The continued drought conditions during the years 1970-71, 1971-72 and 1972-73 have highlighted the need for irrigation protection in this area. During 1972-73 this area has faced the worst drought and various scarcity relief works were required to be provided in this area. In Majalgaon Taluka and Gevrai Taluka more than 2,000 scarcity works were required to be taken up as a relief measure for employing about 1,00,000 famine stricken population. In order to utilise this scarcity labour for productive purposes the work of Paithan Right Bank Canal has also been taken up throughout the length. These scarcity conditions have focussed sharply the attention of the people in Marathwada Region on this Project, which is designed to play an important part in ameliorating their conditions to a great extent.

1.3 JAYAKWADI PROJECT

Jayakwadi Project has been planned for irrigation by harnessing the Godavari waters for irrigation. In addition to the main Godavari waters upto Paithan, the resources of Sindphana river are also proposed to be utilised. Sindphana is one of the tributaries of Godavari on the right bank. The Sindphana generally flows in a west - east direction for about 104 Kms. (65 Miles) before joining Godavari river near village Manjrath in Majalgaon Taluka of Bhir District. The Sindphana river has three main tributaries namely Bendsura, Tukur and Kundalika rivers. Whole of the catchment area lies between the rainfall zone of about 800 mms.

1.4 HISTORY:

The investigations of this scheme were in progress since a long time before the re-organisation of States, when this region was a part of the old Hyderabad State. During 1965 after studying various proposals the Project has been finalised as under :-

The Project consists of :

- 1) A reservoir on the Godavari river above Paithan Town with the live storage capacity of 1965.9 Mm³ (73.00 T.M.C.).
- 2) A reservoir on the Sindphana river, tributary of the Godavari near Majalgaon Town with the live storage capacity of 311.3 Mm³ (11.00 T.M.C.).
- 3) Left Bank Canal starting from the Paithan dam to command the gross and the net irrigable area of 2,03,958 Ha (5,04,000 acres) and 1,41,637 Ha (3,50,000 acres) respectively.
- 4) Right Bank Canal starting from the Paithan dam to command the gross and net irrigable area of 59,892 Ha (1,48,000 acres) and 41,682 Ha (1,03,000 acres) respectively.
- 5) Right Bank Canal starting from the Majalgaon dam to command the gross and net irrigable area of 1,31,520 Ha (3,25,000 acres) and 93,335 Ha (2,32,000 acres) respectively.

1.5 STAGING OF THE PROJECT

The construction of the Project has been proposed in two stages based on construction facilities and financial resources as under :-

STAGE - I

- 1) The reservoir on Godavari river near Paithan Town.
- 2) Paithan Left Bank Canal starting from Paithan Dam to irrigate 1,41,637 Ha (3,50,000 acres).

STAGE - II

- 1) The reservoir on Sindphana river near Majalgaon Town.
- 2) Right Bank Canal starting from the Paithan dam to irrigate 41,682 Ha (1,03,000 acres).
- 3) Right Bank Canal from Majalgaon dam to irrigate 93,885 Ha (2,32,000 acres).

The reservoir near Paithan for the storage requirement of Stage-I and Stage-II has been taken up and nearing completion. Since the proposed staging was based merely on construction facility and financial resources; the Hydrology and water planning for the whole Project was incorporated in the report for Stage-I only. The details of estimates, financial planning etc. were, however, given for the components in the Stage-I. The Project accordingly was accepted by Planning Commission under Government of India letter No. III-2(23)/64, I&P: dated the 3rd Feb.1965.

Investigations and survey of the components proposed in Stage-II were, however, further carried out. As the Hydrology, water planning of the comprehensive Project were already finalised at the time of approval of the Stage-I, the present project report pertaining to

Stage-II includes the details regarding the structural designs, estimates, financial planning, benefit cost ratio etc. pertaining to the components of Stage-II.

1.6 FINANCIAL ASPECTS

The cost of the Stage-II has been estimated as under :-

<u>A) Works portion</u>	<u>Rs. in lakhs.</u>
i) Majalgaon reservoir.	1825.00
ii) Paithan Right Bank Canal.	2087.54
iii) Majalgaon Right Bank Canal.	2892.18
iv) Distribution system:	
a) Paithan Right Bank Canal.	209.62
b) Majalgaon Right Bank Canal.	460.32
Total	7474.66
<u>B) Other charges</u>	
Establishment, ordinary T. and P. etc.	710.20
Grand Total Rs.	8184.86
Deduct -	
Receipts and recoveries.	371.15
Net Total Rs.	7813.71
<u>C) Abatement of Land Revenue</u>	11.29
Total Rs.	7825.00

The Project pays an interest of 2.06% after 10 years from construction. The benefit cost ratio for

(7)

Stage-II works out to 2.55 .

The Jayakwadi Project has the pride of being the biggest among the irrigation schemes in the Maharashtra State and it benefits a comparatively large area with the available water resources.

The construction of Stage-I works is in an advanced stage. Earth work of Paithan dam is completed while masonry dam work (about 70% already completed) is expected to be over by 1976 as scheduled. Thus the Paithan storage will be available by this time.

It is thus necessary to take up Stage-II works of the Project immediately as a natural follow up action. The continued drought conditions, as highlighted in para No. 1.2 further justify the importance of this action.

If Stage-II works are taken up immediately, benefits would start flowing in immediately as Paithan Right Bank Canal works get completed bit by bit. The gestation period of this stage would thus prove to be shortest one.

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CHAPTER - II

HYDROLOGY, WATER PLANNING, COMMAND AREA AND CROP PATTERN

1.0 SOURCES OF SUPPLIES

For the irrigation requirement under Jayakwadi Project Stage-II, water resources proposed to be harnessed are as under :-

- (1) Godavari river at Paithan Dam.
- (2) Sindphana river near Majalgaon Dam.

1.1 GODAVARI RIVER

Godavari river upto Paithan Dam site gets replenishment in addition to its own from main tributaries namely Darna, Kadwa, Pravara with Mula and Shivna. The total catchment area of Godavari at Paithan is 21,404 Sq. Kms. (8400 Sq. miles).

The run-off available at Paithan Dam site has been worked out and full details are given in the Report of Stage-I of the Project.

1.2 SINDPHANA RIVER

The total catchment area of this river upto Majalgaon site is 3840 Sq. Kms. (1500 Sq. miles). The details of run-off series etc. are also given in the Report of Stage-I.

2.0 THE COMBINATION OF PAITHAN & MAJALGAON SERIES.

In the planning of the Jayakwadi Project dealt with in Stage-I report combined series of utilisable run-off of Godavari at Paithan and Sindphana at Majalgaon

are worked out. As per this planning 75% dependable flow for this Project has been worked out to 2332.83 Mm³ - (100.1 T.M.C.).

3.0 ALLOCATION OF WATER

The allocation of water for irrigation of the whole scheme given in the Report for Jayakwadi Project Stage-I is as under :-

Utilisation at Canal Head

a) Paithan Left Bank Canal.	1043.14 Mm ³ (36.86 T.M.C.)
b) Paithan Right Bank Canal.	331.39 Mm ³ (11.71 T.M.C.)
c) Majalgaon Right Bank Canal.	716.85 Mm ³ (25.33 T.M.C.)

Thus the utilisation proposed in Stage-II is as under :-

a) Paithan Right Bank Canal.	331.39 Mm ³ (11.71 T.M.C.)
b) Majalgaon Right Bank Canal.	716.85 Mm ³ (25.33 T.M.C.)

Total	1048.24 Mm ³ (37.04 T.M.C.)
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4.0 COMMAND AND CROP PATTERN

The canal system proposed in the Stage-II of this Project is already out-lined in the para No. 1.4 of Chapter I .

The details of the command area in respect of the two canals i.e. Paithan Right Bank Canal and Majalgaon Right Bank Canal are worked out separately. The gross command area of these two canals is computed from the contour maps after excluding the high spots compared to the canal bed levels.

The cultivable area is 90% of the gross command. It has been observed from the village Statistics collected for the planning of the distribution system of Paithan Left Bank Canal that this percentage of cultivable area to gross command area varies from 90% to 95%. It is also confirmed from the village Statistics collected for the command area (vide Appendix No. 2.1) . The cultivable command area is the area excluding the uncultivable part of the command such as village Gaothans, Roads, Nallas etc. and is worked out on the basis of Revenue Records available.

As the tracts adjoining the Godavari river are flat, it is possible to realise 75% to 80% intensity for irrigation. For the planning it is assumed as 77%. The net irrigable area will be that part of the cultivable area, which will get the irrigation benefits after the complete distribution system is complete. It excludes that part of cultivable area worked out as above which may be utilised for construction of channels higher patches of ground near the take-off of field channels, area under field tracks, contour bunds, farm houses etc. The index plan to the scale of 1 Cm. = 20 Kms. showing the alignment of the canal and the command area is given in plate No. II . According to the comprehensive planning.

already approved, the gross, the cultivable and net irrigable area in respect of Stage-II proposal under the various canals are given in the following table. :-

Sr. No.	Canal	Gross command area (Ha) (acres)	Cultivable command area (Ha) (acres)	Net Irrigation (Ha) (acres)
1)	Paithan Right Bank Canal.	59,892 (1,48,000)	53,910 (1,33,200)	41,682 (1,03,000)
2)	Majalgaon Right Bank Canal.	1,31,520 (3,25,000)	1,19,400 (2,95,100)	93,385 (2,32,000)
Total		1,91,412 (4,73,000)	1,73,310 (4,28,300)	1,35,567 (3,35,000)

5.0 CHARACTERISTICS OF COMMAND AREA

In case of Paithan Right Bank Canal the entire command area is bounded by Godavari river on one side and the ridge between Godavari river and Sindphana river on the other side while in case of Majalgaon Right Bank Canal it has Godavari river on one side and ridge between Godavari river and Manjra river on the other side. The whole command area lies between Longitude $75^{\circ} - 20'$ to $77^{\circ} - 10'$ (E) and Latitude $18^{\circ} - 55'$ to $19^{\circ} - 30'$ (N). The irrigable area lying within various talukas and Districts is as under :-

Sr. No.	Name of District/ Taluka	Paithan Right Bank Canal Ha	Majal- gaon Right Bank Canal Ha	Total Ha
I)	<u>Aurangabad District</u>			
	Paithan Taluka	1732	-	1732
II)	<u>Ahmednagar District</u>			
	Shevgaon Taluka.	1690	-	1690
III)	<u>Bhir District.</u>			
	Georai Taluka.	24060	-	24060
	Majalgaon Taluka.	14200	28300	42500
IV)	<u>Parbhani District</u>			
	Gangakhed Taluka.	-	53385	53385
V)	<u>Nanded District</u>			
	Kandhar Taluka.	-	7200	7200
		41682	93885	135567

6.0 TOPOGRAPHY

The general features of topography for the command area are the same as for the whole Godavari Valley.

It consists mainly of rolling and undulating country with the series of ridges and valleys interspersed with low hills. Its elevation varies from 457 M. (1500 ft.) to 325 M. (1100 ft.) above the mean sea level from west to east.

7.0 SOILS

The area in question consists of undulating lands having alternate ridges and valleys subjected to serious erosion by rain. Hence the soils are generally shallow where they have been formed in situ near the ridges. Deep soils are, however, met with in the vicinity of river bank as a result of deposition of the eroded material brought by river in floods. The soils consist of shallow, medium, deep black varieties. The shallow soils generally found near the hills, ridges and slopes, are light in colour having murum as sub-soil. Deeper soils are developed as alluvial material along the banks of the river. They are darker, deep and richer.

The soil survey of the whole command is completed. From the soil survey carried out for the entire command area the soil classification of the area for the two canals is as under :-

	<u>Paithan Right Bank Canal</u>	<u>Majalgaon Right Bank Canal.</u>
Shallow soil area.	18.88%	21.7%
Medium soil area.	11.31%	23.4%
Deep soil area	69.81%	54.9%

It is also found that the infiltration rate of the soil is considerably high. Internal drainage is much influenced by the character of under-lying murum. This appears to be relatively pervious although its permeability is variable at places. Where the murum layer has free discharge to a nearby Nala or a river it functions effectively as a drain. In areas of very flat surface slopes, lateral drainage via murum layer by ditches will

be necessary. Alternatively effective vertical drainage may occur through the underlying Basalt. Substantial surface gradient from the irrigation area to the river, the occurrence of murum layer and the planned low intensity of irrigation are favourable factors which would minimise the extent of drainage problems. However, the observations regarding ground water level the salinity and alkalinity would be continuously taken through-out the area after the irrigation commences so that timely measures can be taken if and where adverse drainage conditions become apparent.

8.0 RAINFALL

The annual average rainfall from the command area varies from 648 mms. (25.5 inches) at Paithan Dam site to 1003 mms. (32.5 inches) near Nanded, the end of Majalgaon Right Bank Canal. However, the actual monthly as well as annual rainfall is subjected to wide range of variation, many times resulting in dry and wet droughts.

9.0 CROP PATTERN

The crop pattern proposed for the Jayakwadi Project is as under :-

Sr.No. :	C r o p	:	Percentage
1)	Sugarcane.	..	3
2)	Other perennials.	..	1½
3)	Paddy.	..	5

Sr.No. :	C r o p	:	Percentage.
4)	L.S. Cotton.	..	37½
5)	Rabi Seasonals.	..	51
6)	Hot Weather seasonals.	..	2
Total			100

The State Agriculture Department has already concurred to the crop pattern. The considerations regarding the crop pattern proposed for the Project are discussed in details in comprehensive planning of the Project incorporated in the Report for Stage-I.

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CHAPTER - III

SEASONAL WATER REQUIREMENT AND RESERVOIR PLANNING

1.0 WATER REQUIREMENT

The details regarding the water requirement and reservoir planning for the comprehensive Project are discussed in details in the report of Jayakwadi Project Stage-I. Accordingly the proposed irrigation in the Stage-II of the project under different crops would be as under :-

Sr. No.	Crop	Percentage.	Area Ha/ (Acres)		
			Paithan Right Bank Canal.	Majalgaon Right Bank Canal.	Total
1)	Sugarcane	3	1,250 (3090)	2,818 (6960)	4,068 (10050)
2)	Other Perennials	1½	625 (1545)	1,409 (3480)	2,034 (5025)
3)	Paddy	5	2,085 (5150)	4,695 (11600)	6,780 (16750)
4)	L.S.Cotton	37½	15,635 (38625)	35,210 (87000)	50,845 (125625)
5)	Rabi Seasonals	51	21,255 (52530)	47,875 (118320)	69,130 (170850)
6)	Hot weather Seasonals.	2	832 (2060)	1,878 (4640)	2,710 (13700)
Total:			41,682 (103000)	93,885 (232000)	1,35,567 (335000)

In order to determine the water requirement of these crops the duties for different seasons for each crop are decided by Agriculture Department on the basis of their experience. The seasonal duties of the crops proposed for the irrigation suggested by State Agriculture Department are reproduced below:-

Sr. No.	Crop	Duties in Ha./Cumec (Acres/Sec) at distributary head			Total Delta in Cms. (inches)
		Kharif	Rabi	Hot Weather	
1.	2.	3.	4.	5.	6.
1.	Sugarcane	1358 (98)	1000 (70)	714 (50)	330.20 (130)
2.	Other perennials.	2358 (165)	1500 (105)	1072 (75)	213.36 (84)
3.	Paddy.	1286 (90)	5716 (400)	--	100.83 (39.7)
4.	L.S.Cotton	5144 (360)	8574 (600)	2286 (150)	78.74 (31)
5.	Rabi Seasonals	-	2858 (200)	--	38.10 (15)
6.	Hot weather Seasonals	-	-	1429 (100)	73.66 (29)

The total requirement on the above basis worked out for the command area included in Stage-II is reproduced below:-

Sr. No.	Canal	Total water requirement at canal head in Mm ³ (T.M.C.).			
		Kharif	Rabi	Hot Weather	Total
1.	Paithan Right Bank Canal.	74.71 (2.64)	138.67 (4.90)	118.01 (4.17)	331.39 (11.71)
2.	Majalgaon Right Bank Canal.	159.90 (5.65)	303.38 (10.72)	253.57 (8.96)	716.85 (25.33)
		231.61 (8.29)	442.05 (15.62)	371.58 (13.13) (13.13)	1048.24 (37.04)

The details from the report of Stage-I may please be seen in Appendix No. 3.1.

2.0 SILT STORAGE

The provision of silt storage was discussed with C.W. & P.C. at the time of finalisation of Stage-I report. Accordingly it was decided that the provision for silt storage upto head regulator sill must be atleast at the rate of 0.1579 Hectares M/Sq.Km. (0.5 acre ft. per Sq.Mile) of catchment area. The silt storage upto head regulator sill and upto M.D.B.L in case of Majalgaon dam workedout is given below:-

1. Silt storage upto head regulator - 80.09 Mm³
sill (2830 Mcft.)

2.	Head Regulator sill.	-	R.L.	424.70 M.	
					(1393.00)
3.	Minimum Draw Down Level	-	R.L.	426.11 M.	
					(1398.00)
4.	Silt storage at Minimum Draw Down Level.			133.15 Mm ³	(4700 Mcft.)

3.0 EVAPORATION LOSSES

On the basis of data collected by I.M.D., Central Water & Power Commission had advised to adopt total evaporation losses as 243.79 Cms. (96") per year while scrutinising the comprehensive planning. The monthwise break up is given below:-

	<u>cms.</u>	(<u>Inches</u>)
January	12.70	(5")
February	15.24	(6")
March	27.94	(11")
April	35.56	(14")
May	33.02	(13")
June	25.40	(10")
July	20.32	(8")
August	17.73	(7")
September	17.78	(7")
October	15.24	(6")
November	12.70	(5")
December	10.16	(4")
	<hr/>	<hr/>
Total:-	243.79	96"
	<hr/>	<hr/>

4.0 LIVE STORAGE

The main component of the live storage is the fair weather requirements of the crops. The contribution from rainfall in fair weather being negligible, all the crops are required to be grown on the stored water. In the case of Jayakwadi Project Stage - II the fair weather requirement of the command under Paithan Right Bank Canal is completely met with by the storage in Paithan Reservoir while the requirement of Majalgaon Right Bank Canal is met with from the supplies from Paithan Reservoir and from the live storage of Majalgaon Reservoir. The working of the storage at Paithan and Majalgaon on the above basis is already dealt with in detail in the storage planning of the comprehensive scheme. The salient details of Majalgaon Reservoir are reproduced for reference.

	<u>Storage.</u>	<u>R.L.</u>
H.R. Sill	80.09 Mm ³ (2830 Mcft)	424.70 M. (1393 ft.)
M.D.D. Level	133.15 Mm ³ (4700 Mcft)	426.11 M. (1398 ft.)
Live Storage	311.30 Mm ³	-
Gross Storage	444.45 Mm ³	431.44 M.

The working table and storage computation for Majalgaon Dam worked out accordingly are reproduced in Appendix 3.2 and 3.3 of this report.

5.0 CAPACITY TABLE

The capacity table and capacity curve in respect of Majalgaon Reservoir is given in Appendix 3.4.

CHAPTER - IV

HEAD WORKS

1.0 SELECTION OF DAM SITE

In the 1964 project report, a dam site just upstream of Majalgaon town was proposed and explored. During the last decade, Majalgaon town, which is a Taluka town has grown considerably. The old site near the town would pose considerable difficulties in construction, land acquisition and rehabilitation.

To utilise the water potential to the maximum extent the dam site is proposed to cover the maximum catchment area of the river. One of the major tributaries namely Kundalika joins Sindphana river at a distance of about 7 Kms. upstream of Majalgaon Town. Thus the selection of the dam site has to be in between the confluence of Kundalika and Sindphana rivers and Majalgaon Town. Any proposal down-stream of Majalgaon town would not be economical and hence infeasible. Thus the selection of the dam site is restricted within this reach of the river i.e. between confluence with Kundalika river and Majalgaon Town.

Under these circumstances the alternative dam site about 2 Kms. upstream of Majalgaon Town (Lat. $19^{\circ}-10'$, Long. $75^{\circ}-10'$) has been investigated. This site is found to be feasible both technically and economically.

2.0 GEOLOGY

The original site near Majalgaon Town was inspected by the Officers of Geological Survey of India and they had approved the proposal for the construction. (A copy of their report is enclosed vide Appendix 4.1). The

Geological Survey of the present site is being carried out by them. However, as the present proposed site is within a distance of 2000 Metres from the old proposed site no major difference in Geological formation is expected at the present proposed site.

The formation at this site is Deccan Trap through which the river has cut a valley and created flood banks on either side. Results of bores and trial pits taken at site indicate that the Right Bank has deep alluvium deposits maximum depth being about 25 Metres. The left flank is firm; the hard rock being met with at a higher level.

Thus the Geological formation of both the banks appears to be of different characteristics. The top layer of the formation of Right Flank consists of black soil 1.5 m. to 3 m. thick. Soil below this strata is yellowish mixed with sand layers and lime kankar etc. Below this layer, massive rock appears to be available at the same level continuously for a length of 1500 Metres which indicates the erosion of the ground to the hard stratum by the river. Alluvial deposits are met with on the left flank for a short portion. The river bed level is 404.550 Metres and hard rock is available in river portion at a depth of 4 Metres dipping downwards towards the Right Flank. The intermediate layers consist of amygdaloidal rock. Hard rock, however is comparatively at higher level on Left Flank.

The general formation of the left flank is hard murum having a thin layer of black cotton soil, on the top. Below hard murum layers hard rock is available at a depth of about 11 Metres. The boulder formation is being met within the intermediate portion.

3.0 LAY-OUT OF HEAD WORKS

After studying the nature of the valley and the details available from the foundation exploration it is now proposed to provide the spillway in the river gorge extending on the left flank of the river. This will facilitate the construction of the dam and will avoid the problems of tail channel retrogression. The layout proposed has earthen embankment on the left and right flank with a central spillway. Divide wall type junction on left bank and partial envelope cum divide wall junction on the right bank are proposed. The out-let is proposed to be located at Ch:172 on the right bank through earth dam. The details of head works are as follows.

- (1) 1002 metres Earthen dam on left bank.
- (2) 468 metres masonry dam including spillway
- (3) 5550 metres earthen dam on right bank.

The L-Section and plan of the Majalgaon dam are given in Plate No.3 (i) while the bore results are shown in Plate No. 3(ii).

3.1 EARTHEN DAM

On the Right Flank the earthen dam will be 5550 Metres in length from Ch:49.00 to 234.00. The maximum height of the embankment on Right Flank is 22 Metres. The embankment on the left bank between Ch: 0 to Ch:33.4 is 1002 Metres long having maximum height of 15 Metres.

Though the top layers on Right Flank consist of blank cotton soil and yellowish soil which are comparatively impervious, the underlying sandy layer is expected to pose

some problems. It is proposed to provide a positive cut off trench upto hard rock level as done in case of Paithan dam. The maximum depth of cutoff trench is thus expected to be 30 Metres. The conditions met with at this site are more or less similar to the conditions of Paithan Dam site on Godavari River.

In view of the fact that characteristics of the soils at this site appear to be similar to those at Paithan Dam the section of earthen embankment decided on the basis of the detailed studies for Paithan Dam is proposed in this case also for Right Flank. Similarly, left flank section of Paithan Dam is also proposed here for the left flank embankment. Typical cross section of Earthen Dam are given in the Plate No. 4.

Total quantity of earth work is estimated to be as under.

1. Stripping	8,24,000 m ³
2. C.O.T.Excavation	15,80,855 m ³
3. C.O.T.Filling	15,80,855 m ³
4. Hearting	9,62,500 m ³
5. Casing	16,69,000 m ³
6. Sand Mat and Sand Filters.	1,56,100 m ³
7. Pitching & Rock toe	1,40,600 m ³

	69,13,710 m ³

8. Drains	7,450 m.
9. Black topping	7 Kms.
10. G.I.Pipe railing	1,485 m.
11. Turfing	2,87,500 m ²

3.2 MASONRY DAM

The spillway would be in the river gorge extending on the left flank of the river for a length of 468 Metres between Ch. 33.40 to Ch. 49.00. The spillway 417 Metres long includes 28 Gates of 12 x 5 Metres size. The width of the piers is 3 Metres. On left flank due to shallow depth of earthen embankment, the junction is proposed to be of a retaining wall type while on the right flank an envelope type junction is proposed.

In view of availability of suitable foundation, spillway portion is proposed to be located between Ch.33.4 to Ch.49.00. As good rock is available at higher elevation on the left flank, the masonry dam is proposed to be founded at two different levels. The dam between Ch.33.40 to Ch.42.00 is proposed to be founded at R.L. 408.425 while that between Ch. 42.00 to Ch. 49.00 at R.L. 399.196. The two bays are proposed to be separated by providing a divide wall. For the spillway, 28 Nos. of gates (12 m x 5m) are proposed to be provided. Out of these 28 Gates, 11 will be located in the river gorge and remaining 17 gates on the left flank. The layout of the masonry dam is given in Plate No.5, This arrangement is also advantageous in the flood routing. The maximum observed flood at the dam site is 3600 Cumecs only. The floods occurring more frequently upto this limit can be negotiated through 11 gates on the right side. When the flood exceeds this limit, the gates on the left bay can be operated. The right side gates will thus be operated first. Slotted buckets are proposed in this bay. In the left bay, however sloping apron is proposed for energy dissipation. The details about the

surplussing arrangements are given in Appendix No.4.2. The profiles of spillway in the above two bays are given in plate No.6 and 7. The profile of spillway and other details, energy dissipation arrangements, operation of spillway gates will however be finalised on the basis of model studies.

The total work involved in the work of masonry dam is given below.

i) <u>Excavation</u>	
a) Soft Strata	1,72,900 m ³
b) Hard Strata	2,61,300 m ³

	4,34,200 m ³

ii) <u>Masonry</u>	2,09,800 m ³
iii) <u>Concrete</u>	
(Excluding Bridge)	42,400 m ³
iv) <u>Concrete</u>	
(Over head Bridge)	1,000 m ³

	43,400 m ³

3.3 FREE BOARD

The maximum length of the uninterrupted fetch of the lake is about 15.9 Kms. (11.8 m.). Assuming the maximum velocity of wind at 80 Km.p.h. (50 m.p.h.) the wave height as per different formulae are tabulated below:-

Sr. No.	Formula	Wave height.
1)	Molitor's formula $H = 0.17 \sqrt{VD}$	4.83 ft.
2)	Creager's formula 6.37 0.48 $h = \frac{D}{C} V$	4.65 ft.
	('C' is constant usually taken to be 3.417)	
3)	Wolf's formula $h = (0.03357 - 0.25) \times \sqrt{Dh} =$	4.70 ft.

$$\begin{aligned} \text{Hence free board} &= 1.5 \times \text{Wave height} \\ &= 7.25 \text{ ft.} = 2.20 \text{ m.} \end{aligned}$$

However free board of 3.40 m. has been provided.

4.0 SURPLUSSING ARRANGEMENT

The river gauging station for Sindphana river at Majalgaon has been established by CW & PC since 1964. The data regarding maximum floods occurred is studied from the details available from the above records. It is found that the maximum flood discharge at the site is 3600 Cumecs on 26.8.1971. However as the data available is only for 9 years, it is inadequate to determine the maximum expected floods at the site for designing the surplussing arrangements. As a safe measure the maximum flood inflow for the surplussing arrangements is taken to be 1.25 times of Inglis flood

which works out to 9480 Cumecs. It is proposed to dispose off this flood by 25 gates of 12 m. x 5 m. Three additional gates are provided as standby. At F.R.L. the maximum outgoing discharge would equal to 6625 Cumecs. The designed flood inflow of 1.25 times Inglis flood can be accommodated at M.W.L. i.e. R.L. 431.70 M.

5.0 HEAD REGULATOR

The head regulator for the proposed Majalgaon Right Bank Canal is proposed at Ch. 172.00 on Right Flank.

6.0 APPROACH AND TAIL CHANNEL

As the spillway portion is just on the left flank, approach channel is not required for the spillway operation. However, for the proper junction with the river course from the spillway a tail channel would be required at the downstream of the dam.

An approach channel has also been proposed for the Head Regulator on Right Flank.

7.0 MATERIAL FOR CONSTRUCTION

7.1 Earthen Dam

7.1.1 Residual Soil

Residual soil is obtained over the murum on the right bank with the maximum thickness of 1.22 M. (4ft.). The colour of the soil is black. On the left Bank, reddish residual soil is obtained over the murum, but its thickness is very insignificant. The soil on the right bank is comparatively more clayey. As compared to the total requirements of the embankment, this soil, though suitable

for impervious hearting or cut-off trench filling, will form a small portion.

7.12 Jet Black Alluvial Soil (CH - Type)

This is obtained on the right bank and is different from the black soil obtained over murum. This soil varies in thickness from 1.52 M. (5 ft.) to 3.05 M. (10 ft.). It is expected to be useful especially for C.O.T. filling. Its presence on the up-stream side will have a blanketing effect, which is advantageous.

7.13 Dark Brown Alluvial Soil (CH - MH Type)

This soil forms the major bulk of the alluvial deposits on the right bank. It will be suitable for impervious zone of the embankment.

7.14 Yellow Alluvial Soil (SM - SC Type)

The yellow soil on the Right Flank though broadly grouped in one , will have to be further divided into sub-groups, depending upon the predominance of silt, fine sand, lime nodules, etc. All these varieties will be useful for hearting and semi-pervious zone of the embankment and will have better strength characteristics as compared to the dark brown soil.

7.15 Brownish Silt (MH - Type)

The brownish silt on the left bank is of recent origin. In view of its very limited extent no use is being planned for this material.

7.16 Murum (GP - GW Type)

The usual variation from soft to hard varieties is obtained but in general the murum on the left bank is of a harder variety and the particles are bigger and more cubical in shape. It has the usual yellowish or reddish colour. The murum on the right bank is greenish and brownish in colour. The particles are smaller and flaky in shape. Both varieties will, however, be suitable as a casing material.

Thus in short the material required for cut-off trench filling, hearting and semi-pervious zone is available on the Right Flank on the river while the casing material is to be used from the left side of the river.

7.2 MASONRY DAM

The entire masonry dam is proposed to be constructed in cement surkhi mortar. Stone and sand are available in sufficient quantity. Stone is available at the quarries within a lead of 20 Kms. from the work site while good sand is available in the Sindphana river down stream of the dam site at a lead of 4 Km. The cement required for the construction is available from the cement factories in Maharashtra as well as in nearby states namely Andhra Pradesh, Mysore and Madhya Pradesh. The nearest stations for cement transportation are Jalna and Marwat on Marwad Kacheguda line and Parli Vaijnath on Central Railway. The lead for cement is expected to be 150 Km. by roads from these stations.

8.00 COMMUNICATIONS

The dam site is approachable on left flank from Jalna Bhir Road which is a portion of state Highway. This road takes off at a distance of 25 Kms. from Bhir. Majalgaon Dam site is 51 Kms. away from this bifurcation point. At present this branch road is metalled one and is expected to be black-topped very soon. On right bank the dam site is approachable from Bhir-Parli road.

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CHAPTER - V

C A N A L S

1.0 As already stated in the earlier Chapters, Jayakwadi Project Stage-II includes the construction of two main canals:-

- a) Paithan Right Bank Canal from Paithan Reservoir.
- b) Majalgaon Right Bank Canal from Majalgaon Reservoir.

1.1 PAITHAN RIGHT BANK CANAL:

In addition to irrigating the command area from Paithan reservoir to Majalgaon reservoir on the right bank of Godavari river, Paithan right bank canal serves the purpose of carrying additional quantum of water for feeding Majalgaon right bank canal.

1.2 MAJALGAON RIGHT BANK CANAL:

Majalgaon right bank canal is designed to irrigate command area from Majalgaon Dam on the right bank of Godavari.

2.0 DISCHARGE CAPACITY

2.1 The maximum-discharging capacity of Paithan right bank canal has been worked out by AI/DC method for the direct command under it. In addition to this capacity, additional capacity of $26.88 \text{ m}^3/\text{sec.}$ for feeding the Majalgaon right bank canal is provided therein. The canal losses are taken to be $0.6082 \text{ Cumec/Msm.}$ (2 Cusecs per Msft.) for arriving at maximum discharging capacity of the canal.

As regards Majalgaon right bank canal the maximum discharging capacity has been worked out by AI/DC method for the area directly under its command.

2.2 ALIGNMENT

The alignment of Paithan right bank canal has been completely surveyed while that of Majalgaon right bank canal has been surveyed upto a length of 120 Kms. from Majalgaon dam. The actual surveyed length of Paithan right bank canal has been found to be 132.56 Kms. The length of Majalgaon right bank canal is 165 Kms. The maximum capacity at head, the length of canal and starting canal bed levels of the canals are given below:

Sr. No.	Name of Canal	Length in Kms.	Maximum discharging capacity in Cumecs.	Starting canal bed level.
1.	Paithan Right Bank Canal.	132.56	63.95	450.9516 M.
2.	Majalgaon Right Bank Canal.	165.00	82.76	422.5250 M.

Both the canals are aligned as falling contour canals. In order to minimise transit losses and achieve resultant economy, it is proposed to line both the canals. The nature of lining proposed is 50 mms. thick P.C.C. slabs (1:3:6) for the sides and 70 mms. thick (1:4:8) cement concrete in the bed. This type of

lining has been successfully done in the case of Paithan Left Bank Canal; hence the same is proposed to be adopted in these two canals also. The condensed L - Sections of these canals are given in the Plate Nos. 8 to 12 and 13 to 17 respectively.

2.3 REACHES OF CANAL AND DISCHARGING CAPACITY

As the length of the canal increases from the starting point, the command area decreases gradually. The canal sections can thus be suitably reduced commensurate with the discharging capacity. In order to effect this reduction in the canal section, the command area is divided into suitable reaches. While working out the section of the reach, the section of each reach has been designed to carry water to serve the area not only directly under its command but also the entire area of the succeeding reaches. The statement showing discharging capacities in the various reaches of canal, also the aggregate area to which they have to carry water is given in Appendix 5.1.

2.4 DESIGN OF CANAL SECTIONS

The dimensions for the section of various reaches are designed with the help of Manning's formulae. The detailed sections about various reaches are given in Appendix 5.2.

For determining the section the following formulae are adopted:-

$$i) V = \frac{1.486}{N} m^{2/3} \times i^{1/2} \quad (\text{Manning's formula})$$

ii) $m = L/P$

iii) $Q = A \times V$

Value of 'N' is taken to be 0.018 for lined canal.

The side slopes would vary according to soils, being $\frac{1}{2} : 1$ in hard rock, $1\frac{1}{2} : 1$ in murum and 2 to 1 in soil. However, the sections given in Appendix - 5.2 referred to above correspond to 2 : 1 side slopes. The typical cross sections of canal in cutting, banking as well as in partial banking are given in Plate No.18.

3.0 CROSS DRAINAGE WORKS

As both the canals are proposed as falling contour canals, various rivers, streams and nalas cross the proposed canal alignment. The types of cross drainage works to be provided along these natural drains mainly depend upon the catchment area of the nalla and position of C.B.L. in relation to nalla bed level at the crossing. The cross drainage works are divided into following types.

3.1 AQUEDUCTS

In case of the stream having catchment area more than 10 Sq.Kms., it has been found that the aqueducts with R.C.C. trough are economical. These troughs are continuous to earthen embankment section of the canal at banks of the nalla. Such type of structures, however, involve some loss of head due to reduction in waterway.

3.2 SLAB CULVERTS

In case of streams having catchment area less than 10 Sq.Kms., it becomes economical to continue the

earthen canal section over the nallas, with the help of R.C.C. slab at base. In such cases there would not be any loss of head.

3.3 HUME PIPE CULVERTS

For small local nallas, adequate waterway can be provided through the hume pipes below the canal bed level in the earthen canal section. In such cases of C.D.Works also, there is no loss of head.

3.4 SYPHONS AND SUPER-PASSAGES

In cases where the C.B.L. is lower than Nalla bed level, the canals are taken below the nallas by means of siphons while in cases where nalla levels are much higher and are above F.S.L. of canal, the super-passages are proposed.

3.5 DESIGN OF AQUEDUCTS

The maximum discharge to be allowed in the stream is obtained by the following formula and checked for flood according to Inglis' formula.

$$Q : \frac{4000 A}{\sqrt{A + 4}}$$

Where Q : Discharge in cusecs.

A : Catchment area in Sq.Miles.

Dividing the discharge by suitable velocity, the area of waterway for the stream is determined. Then assuming suitable depth consistent with the H.F.L., net length of waterway is calculated. Safe margin between the H.F.L. and the bottom of deck slab is generally allowed.

The section for the trough of the aqueduct is so designed that the canal discharge could pass through it with suitable velocity say 3.05 m/Sec. (10' per second).

Total loss of head in such structures is the sum of loss at entry, loss at exit and frictional losses.

3.6 DESIGN OF CULVERTS

In cases where the C.A. of the nalla is less than 10 Sq.Kms. culverts are economical. The waterway of the stream is obtained as in the case of aqueducts described in the preceding para. In case of culverts however, the whole canal earthen section is taken over the bottom slabs of the culverts.

3.7 DESIGN OF H.P.CULVERTS

In case of nalla where the drainage area is below 2.56 Sq.Kms. the following formulae by Marryat given in the Maharashtra P.W.D. Hand Book are adopted:-

If 'X' be catchment area in acres.

a) for area upto 100 acres the waterway

would be $\frac{X}{2.5}$ Sq.ft.

b) for area from 100 to 700 acres.

$$A = 0.225 X + 17.5$$

Designs of various aqueducts are finalised in details in case of Paithan Left Bank Canal now under construction. Losses of heads arrived at in these cases are adopted in present case also.

4.0 BRIDGES

The proposed canals cross the State Highways, M.D.Rs, O.D.Rs and village Cart Tracks at various places. To allow the traffic on these roads uninterrupted, bridges to the standards of the roads are proposed at the crossings. In addition to these crossings, crossings to allow the traffic of cattle, carts etc. from the villages on one side of the canal to be the other side are also provided. It is generally seen that atleast one bridge in every mile of canal length is proposed. In case of Majalgaon Right Bank Canal provision for Parli-Parbhani railway crossings is also made.

Loss of head in case of such bridges has been worked out to be 0.015 Cms. on the basis of designs for Paithan Left Bank Canal.

5.0 CROSS REGULATORS. ESCAPES AND S.W.F.

In order to control the flow in the main canal especially near zones of heavy embankment, cross regulators are provided on downstream of escapes in the main canal at following places :-

I) PAITHAN RIGHT BANK CANAL

1)	11 Km.	4)	65 Km.
2)	22 Km.	5)	86 Km.
3)	47 Km.	6)	113 Km.

II) MAJALGAON RIGHT BANK CANAL

- | | | | |
|----|--------|----|---------|
| 1) | 19 Km. | 4) | 86 Km. |
| 2) | 32 Km. | 5) | 106 Km. |
| 3) | 49 Km. | 6) | 128 Km. |
| | | 7) | 149 Km. |

The standing wave flumes are proposed for measuring the canal discharges and for controlling the water flow in the distributaries. One standing wave flume at head is proposed for each canal.

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CHAPTER - VI

MACHINERY AND LABOUR

1.0 MACHINERY

The main items of construction in this Project are (i) Earthen Dam (ii) Masonry Dam (iii) Paithan Right Bank Canal and (iv) Majalgaon Right Bank Canal. The quantities for various items for which machinery will be required are given below :-

Sr. No.	I t e m	Quantity	
1	2	3	
1.	Excavation in rock.	3,63,000	m ³
2.	Masonry.	2,09,800	m ³
3.	Rock toe and pitchings etc.	1,40,600	m ³
4.	Hearting and cut-off trench filling.	25,43,400	m ³
5.	Murum casing.	16,69,000	m ³
6.	Concrete.	43,400	m ³

Major component of earth work will be carried out by heavy earth-moving machinery. Quarrying equipment, transportation equipment will be required for masonry dam. Similarly ancilliary equipment for canal excavation and masonry works thereon will be necessary.

The entire construction is proposed to be done in a period of about 5 years. Based on the construction schedule and taking into consideration the outputs of various machineries, the requirement of the machineries are worked out as detailed in Appendix No. 6.1. This machinery will be available partly from Central Pool of machinery and balance purchased for this Project.

2.10 LABOUR

Labour of various classes will be required for construction of dam and canal works. Important classes are as under :-

- (1) Operators for Tractors, Scrapers, Shovels etc.
- (2) Mechanics and fitters for maintenance and repairs of various types of Machinery.
- (3) Skilled labour such as masons, Carpenters Blacksmiths etc.
- (4) Unskilled labour.

In view of the formation of central pool for heavy earth-moving machinery trained Operators, Fitters and Mechanics are available with that Organisation who have ample experience on similar works on other Projects.

Skilled labour such as Masons, Carpentars etc. are available from nearby cities and towns.

Unskilled labour required for dam, canal and distribution system is available from the surrounding area. During the scarcity relief works, it is observed

that the labour for such type of works is available in plenty.

Details of quantities of various items and labour units required for them have been given in Appendix No. 6.2 .

Sr. No.	Labour class	I-Head Works	II-Main Canal and Branches.
1	2	3	4
1.	Unskilled labour units in lakhs.	67,40,200	3,53,92,870
2.	Skilled labour Units in lakhs.	7,73,860	35,74,900
3.	Trained Operators Drivers etc. Units in lakhs.	12,480	4,320
	Total	75,26,540	3,89,72,090

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CHAPTER - VII

LAND ACQUISITION AND REHABILITATION

1.0 SUBMERGENCE OF LAND

F.R.L. of Majalgaon reservoir is estimated to be R.L. 431.44 M. (1415.5 ft.) . The submergence area is worked out to be 7982 Ha (19,620 Acres) (gross) at F.R.L. 431.44 M. (1,415.5 ft.). Out of this total area 7982 Ha (19,620 Acres), culturable area to the extent of 7184 Ha (17,658 Acres) owned by the cultivators would be submerged. The compensation towards the acquisition of this culturable area is proposed in the estimates. The land would be acquired well in time so as to allow the land owners to make arrangements for purchasing alternate land.

Fortunately neither important forests nor any big town is affected by the water spread of the reservoir . Regarding the acquisition of properties, the villages and structures which will be affected at M.W.L. + 1.2 M (4 Ft.) vertical or 60 M (200 ft.) horizontal whichever is less are proposed to be acquired. Accordingly 17 villages (2 Villages being deserted) will have to be rehabilitated. All these villages are from the Majalgaon Taluka of Bhir District. The details of the villages alongwith the number of houses and population to be rehabilitated is given in Appendix 7.1. No major road or Railway are affected by the water spread of the reservoir. The provision towards the compensation of structures from the above villages is also made in the project estimate. The expenditure towards the acquisition of alternate plots for residential houses of the

affected persons, public amenities such as providing water supply to new gaothans, Chawadis, Schools etc. would be provided at project cost. The provision towards those items is also made in the estimate.

2.0 REHABILITATION

In order to assure proper rehabilitation of project affected persons, Government of Maharashtra has appointed a separate Directorate for rehabilitation. The Collectors of the concerned Districts are appointed as Deputy Directors (Land) while the Chief Executive officers of the concerned Zilla Parishad are appointed as Deputy Directors Rehabilitation (Development). These two officers are assisted by Special Land Acquisition Officers and Rehabilitation Officers for proper rehabilitation of the project affected persons.

A Resettlement Advisory Committee consisting of non-official members from the affected area and concerned officers is also formed to advise Government for taking necessary steps in connection with the proper rehabilitation of the persons.

3.0 LAND FOR CONSTRUCTION

In addition to the submergence area under Majalgaon reservoir, land for the construction of the head works and canals will have to be acquired. It includes the land under seat of dam, borrow areas, quarries, colonies and area for construction of channles. This area is also included in the estimate. This acquisition will not likely to create any rehabilitation problem.

CHAPTER - VIII

ESTIMATES

1.0 GENERAL OUTLINE

The total cost of the whole project has been worked out on the basis of detailed estimates framed for various components. The cost of the project is worked out under two major heads:

- 1) Direct charges and
- 2) Indirect charges.

The direct charges are the total cost of various components which is required to be incurred for the construction of the project till its completion.

The indirect charges are worked out as capitalised amount for the land revenue to be lost due to the submergence of land.

2.0 DIRECT CHARGES

The total expenditure of direct charges for the project is again sub divided into four parts, I - Works, II - Establishment, III - Ordinary Tools and Plant and IV - Suspense. Further the minor head, I - Works indicated above is again divided into three main sub heads namely I - Head Works, II - Main Canal and Branches, III - Distributaries.

2.01 The total expenditure required to be incurred for the construction of head works i.e. Earthen Dam, Masonry Dam and Canal Head Regulator etc. is incorporated under the Sub-Head I - Head Works.

The Sub-head II - Main Canal and branches, includes the expenditure of those components required for constructing the main canal and the branches thereof.

The cost of distribution system is incorporated under the sub head of III - Distributaries.

For facility of maintaining accounts as well as overall control on the total expenditure, the above sub head, namely, I - Head works, II - Main Canal and Branches and III - Distributaries are again sub-divided into Departmental sub heads.

The details of various components under these Departmental sub heads of I - Head works and II - Main Canal and Branches are given below. The cost of distributaries is however estimated on the basis of cost per acre of G.C.A. arrived at for the distribution system for the Stage I works for which detail estimates have been sanctioned. (Vide statement No. 8.23).

The general abstract for the whole project including direct & indirect charges amounting to Rs. 7825.00 lakhs is given in statement No. 8.01.

The rates adopted for the estimates are based on the rates obtaining in the construction of Jayakwadi Project Stage-I during 1973-74 and are very realistic.

3.00 I - HEAD WORKS

The classified abstract amounting to Rs. 1825.00 in respect of Majalgaon Reservoir is given

in statement No. 8.02. The provision made under various sub heads is as under:

3.1 A - PRELIMINARY

The provision in this item includes the expenditure incurred for the survey and investigations for preparing the project. In addition to this, the amount required for further detailed surveys for preparing the designs, plans and estimates of various works is incorporated in this sub head. The provision is Rs. 16.50 lakhs roughly amounts 0.90 percent of the amount of works. The detailed estimate is incorporated in this report in statement 8.03.

3.02 B - LAND

This Departmental sub head includes the cost of lands to be acquired for the construction of dam, colonies as well as submergence area as far as I - Head works is concerned. It also includes the cost of structures, rehabilitation of villages including civic amenities to be provided in the alternate Gaothans and revenue establishment required for this particular purpose. The provision under this sub-head is Rs. 517.06 lakhs. The detailed estimate is incorporated in this report in statement No. 8.04

3.03 C - WORKS

Under this sub head the provision of following items has been made (1) Earthan Dam; (Rs. 554.25 lakhs) (2) Masonry Dam with spillway including the cost of gates and bridge (Rs. 497.58 lakhs)

(3) A low level causeway to facilitate the construction of dam (Rs. 3.25 lakhs). The total provision for these items as estimated work out to Rs. 1055.08. The abstracts are given in statement 8.05 (1) and 8.05 (ii)

3.04 D - REGULATOR

There will be only one Head Regulator for the Majalgaon Right Bank Canal. A lump sum provision of Rs. 35.00 lakhs has been made in this estimate on the basis of costs arrived at elsewhere.

3.5 K - BUILDING

For construction of the project residential and non residential buildings will have to be provided to house the supervisory staff during the construction period. Moreover after construction also there will be permanent staff for maintaining the irrigation system. The permanent buildings which will be required during the maintenance could be constructed and utilised for housing the supervisory staff during the construction. However as these permanent buildings will not be sufficient, additional temporary quarters and offices, are proposed to be constructed.

The total provision for these buildings is Rs. 63.50 lakhs. The details are given in statement no. 8.06 .

3.06 M - PLANTATION

Lump sum provision of Rs. 5 lakhs is made for this sub head.

3.07 Q - MISCELLANEOUS

The provision of Rs. 38.70 lakhs has been made for the Miscellaneous items. The details are given in statement no. 8.07 .

3.08 P - MAINTENANCE

A provision of Rs. 12.00 lakhs has been allowed for maintaining the structures during the period of construction being about 0.65 percent of amount of works. The details are incorporated in this report in statement no. 8.08 .

3.09 Q - SPECIAL TOOLS AND PLANTS

A provision of Rs. 72.16 lakhs has been made under this sub head for purchase of rated and non - rated equipment. This however does not include the earth moving machinery required for the project . A Central pool for heavy earthmoving machinery is created by Govt. of Maharashtra under the control of Mechanical Organization. The work carried out by this organisation is charged on the basis of no profit no loss. The hire charges for various machines are finalised every year by Govt. on the above basis. This Central Pool machinery will be used on the construction work of this project and pertinent hire charges will be debited to the work. The provision in this sub head includes the machinery which is required in addition to the heavy machinery in the central pool. The details of such machinery are incorporated under statement No. 8.09.

3.10 R - COMMUNICATION

The provision under this sub head has been made amounting to Rs. 10.00 lakhs. This cost includes the quarry roads as well as approach roads to dam site from the State Highways Bhir - Aurangabad, Bhir Parli and Bhir - Pimpalner Majalgaon road which at present are not in good condition for heavy traffic of the project.

4.00 II - MAIN CANAL AND BRANCHES

The estimates in respect of the two main canals, namely Paithan Right Bank Canal and Majalgaon Right Bank Canal are framed in details. The total costs of these canals are worked out to Rs. 2087.54 lakhs and Rs. 2892.18 lakhs respectively. The classified abstract is given at statement no. 8.10.

4.01 A - PRELIMINARY

Provision in this item includes the expenditure for the survey and investigations for preparing the project. Moreover, in addition to this the amount required for further detailed survey and estimates to prepare the designs and estimates of various works is incorporated in this sub head.

The provisions under this sub head for Paithan Right Bank Canal and Majalgaon Right Bank Canal are Rs. 15.70 lakhs and Rs. 18.70 lakhs respectively. It works out to about 0.7% of cost of works. The details are given in statement no. 3.11.

4.02 B - LANDS

This sub head includes the cost of land to be acquired for the Main Canal, borrow areas and colonies required along the main canal and special land acquisition establishment. The provisions for Paithan Right Bank Canal and Majalgaon Right Bank Canal are worked out to Rs. 114.10 lakhs and Rs. 148.00 lakhs respectively. The estimates are given in the statement no. 8.12 .

4.03 D - REGULATOR

Provision for Regulators at the heads of various distributaries taking off from main canal is made under this sub head. The standing wave flumes in the main canal are proposed to be provided for measuring the flow at various places. Similarly to control the canal flow, cross regulators are proposed at suitable places in the main canal. The total provisions under this sub head for Paithan Right Bank Canal and Majalgaon Right Bank Canal are Rs. 69.50 lakhs and Rs. 89.75 lakhs respectively. The estimates are given in statement no. 8.13

4.04 F - C.D.WORKS

The cost of cross drainage works namely aqueducts, culverts and hume pipe drains proposed on various rivers, nallas and streams coming across the main canal is incorporated in this sub head. The provision for various structures is based on the cost curves prepared for similar structures on Paithan Left Bank Canal which is at present under construction.

The cost curves for Aqueducts and culverts are appended in this report. The total estimated cost for these items for Paithan Right Bank Canal and Majalgaon Right Bank Canal are worked out to Rs. 373.50 lakhs and Rs. 452.15 lakhs respectively. The details of these provisions are given in statement No. 8.14, 8.14 (i), 8.14 (ii), 8.14 (iii) and 8.14 (iv).

4.05 G - BRIDGES

Various existing and proposed roads of different standards i.e. State Highway, M.D.R., O.D.R., and village roads cross the proposed Paithan Right Bank Canal and Majalgaon Right Bank Canal. In view of the facilities for easy transportation and communications systems, the provisions for bridges across the proposed canals on these roads are made in this sub head. Provisions for the Paithan Right Bank Canal and Majalgaon Right Bank Canal are worked out to Rs. 65.70 lakhs and Rs. 93.40 lakhs respectively. The details are given in the statement no. 8.15 .

4.06 H - ESCAPES

Escapes have been provided at suitable places along the main canals. The provisions of these escapes made under this sub head for Paithan Right Bank Canal and Majalgaon Right Bank Canal are Rs. 15.00 lakhs and Rs. 17.50 lakhs respectively. The details are furnished in statement no. 8.16

4.07 K - BUILDINGS

The buildings will have to be provided for the

supervisory staff on the main canal during the construction period. After completion of the project also, there will be permanent staff for maintaining the irrigation system. The permanent buildings which will be required during the maintenance would be constructed and utilised during the construction period also. However as these permanent buildings would not be sufficient, additional temporary quarters and offices would be required. The total provisions of buildings for Paithan Right Bank Canal and Majalgaon Right Bank Canal are worked out to Rs. 99.30 lakhs and Rs. 160.00 lakhs respectively. The details are given in the statement no. 8.17.

4.08 L - EARTHWORK

The alignment of Paithan Right Bank Canal as well as major portion of Majalgaon Right Bank Canal is surveyed in detail. The cost of earthwork as well as lining of the canals has been worked out and given in the statement No. 8.18. The provisions for Paithan Right Bank Canal and Majalgaon Right Bank Canal under this sub head have been worked out to Rs. 1061.23 lakhs and Rs. 1556.27 lakhs respectively. Typical estimate for a reach of canal is enclosed at statement no. 8.19.

4.09 M - PLANTATION

A provision of Rs. 10 lakhs has been made for the plantation proposed along the main canal and the colonies along the canal. This includes provision for both the main canals.

4.10 Q - MISCELLANEOUS

A provision of Rs. 108.10 and Rs.146.90 lakhs has been made for Paithan Right Bank Canal and Majalgaon Right Bank Canal respectively for miscellaneous items.

The details of this item are given in the statement no. 8.20 .

4.11 P - MAINTENANCE

A provision of Rs. 19.40 and 25.35 for Paithan Right Bank Canal and Majalgaon Right Bank Canal respectively has been allowed for maintaining the structures during the period of construction being about 0.8 percent of amount of works. The details are given in statement no. 8.21 .

4.12 Q - SPECIAL TOOLS AND PLANT

A provision of Rs. 133.30 and 164.30 for Paithan Right Bank Canal and Majalgaon Right Bank Canal respectively has been made towards the purchase of special tools and plants required for the construction of main canal. The details of equipment required for this purposes and the estimated cost are furnished in the statement no. 8.22 .

4.13 R - COMMUNICATIONS

As the communication system along the Paithan Right Bank Canal and Majalgaon Right Bank Canal is not developed, some approaches from the colonies to the work site will have to be constructed. Lumpsum provision of Rs. 10.0 lakhs each are kept for such approach roads as well as quarry roads for Paithan Right Bank Canal and Majalgaon Right Bank Canal.

5.00 ESTABLISHMENT

The charges towards establishment amounting to Rs.460.60 lakhs are workedout at 7.5% of the cost of works. This includes the establishment for construction works, audit charges, pensionary charges etc.

6.00 ORDINARY T&P

A provision of Rs. 112.20 lakhs is made towards ordinary tools and plants at 1.5% of the total cost of works as per experience on the other projects.

7.00 SUSPENSE - LOSSES ON STOCK

A provision of Rs. 37.40 lakhs has been made to meet the losses on stock. It is 0.5% of the total cost of the work.

8.00 RECEIPTS AND RECOVERIES

About 75% of the cost on special T&P in respect of rated items and the salvage value in respect of the ordinary T&P arrived at 25% of its original cost are expected to be returned back. Similarly salvage value of about 15% of the cost of temporary buildings is also expected to be received back after the construction is over. The details of such receipts and recoveries expected are workedout to Rs.371.15 lakhs and are given in statement no. 8.24.

9.00 INDIRECT CHARGES

The indirect charges would be due to loss of revenue from the land that would be submerged and acquired for construction purposes. The capitalised value on the basis of this annual revenue loss workedout to be Rs.11.29 lakhs is taken to be indirect charges and added into the cost of project. The details are given in statement no. 8.25.

CHAPTER - IX

CONSTRUCTION PROGRAMME AND ORGANISATION

1.0 While finalising the construction programme it is to be borne in mind that Stage-II consists of three main components : (i) Paithan Right Bank Canal (ii) Majalgaon Dam - (iii) Majalgaon Right Bank Canal which can be taken up and progressed simultaneously. Following objectives have to be achieved in scheduling these three components (a) By the time the work of Paithan Right Bank Canal is completed, Majalgaon Reservoir should be completed so as to receive the flows of Godavari through Paithan Right Bank Canal - (b) the work of Majalgaon Right Bank Canal alongwith the distribution system should be in readiness for utilising the flows available from Paithan storage and utilisable storage of ungated reservoir at Majalgaon and run of the Sindphana river (c) By the time crest gates are fixed at Majalgaon Dam, the remaining canal system should be ready. Regarding the Paithan Right Bank Canal the work of excavation in the deep cuts has already been taken up during the scarcity relief programme of 1971-72 and 1972-73. In view of the availability of storage by 1976 at Paithan reservoir the completion of Paithan Right Bank Canal with the distribution system has to be proposed on top priority so that the available storage at Paithan could be utilised immediately. On the basis of above consideration , the construction programme is finalised. Paithan Right Bank Canal would be taken up by January 1974 and completed by June 1978. The work of Majalgaon dam and Majalgaon Right Bank Canal would also be taken up by January 1974 and completed by June 1978 and June 1980 respectively.

1.1 PAITHAN RIGHT BANK CANAL.

The total length of the Paithan Right Bank Canal is 132.65 Kms. Under this canal the distribution system is to be provided for 41,682 Ha (1,03,000 acres) . Yearwise programme of expenditure for the canal is given in statement No. 9.1. Main canal including C.D.-Works etc. for the whole length is planned to be completed by June 1978 when Majalgaon dam would be ready for receiving the water from Paithan reservoir. It is planned to complete the distribution system for 20,000 Ha by June 1978 and additional balance 21,682 Ha by June 1980.

1.2 MAJALGAON DAM:

The total earthwork of Majalgaon dam is 71.30 lakhs Cu.m. The work will be taken up during June 1974 and is proposed to be completed by June 1978. The annual earth work programme will be 25.20 Lakhs Cu.m. , 24.40 lakhs Cu.m., 19.30 lakhs Cu.m. 20.20 lakhs Cu.m. respectively. The details are given in Appendix No. 9.2 .

The execution of the masonry dam as well as excavation of tail channel is interlinked with the construction of earth dam in the river gorge. During 1976-77 the gorge filling is expected to be over. Thus the masonry dam level will be maintained at R.L. 420.000 in this year. During 1977-78 the work upto crest of Ogee will be finished completion of piers, deck slabs and erection of gates is planned during 1978-79 and 1979-80. Thus it is proposed to complete the whole of the masonry dam in 6½ working seasons. The physical programme of the Earthen dam and masonry dam work is given in Statement No. 9.2.

The expenditure programme of all the items of Majalgaon dam is given in Appendix No. 9.3 .

1.3 MAJALGAON RIGHT BANK CANAL

The total length of the Majalgaon Right Bank Canal is 165 Kms. It covers the command area of 93,885 Ha (2,32,000 Acres). It is proposed to complete the main canal for a length of 90 Kms. including distribution - system thereunder by June 1978 covering irrigable area of 53,000 Ha, so as to utilise the available flows from Majalgaon reservoir without gates and Paithan diversion flow. The balance canal and distribution system for - irrigable area of 40,885 Ha will be completed by next two years i.e. by June 1980. The expenditure programme proposed for Majalgaon Right Bank Canal including the distribution system is given in Appendix No. 9.4 .

2.0 PHASING OF TOTAL OUTLAY

The total annual expenditure programme of the whole project is given in Appendix No. 8.5. The annual expenditure increases from Rs. 163.35 lakhs to Rs. 2005.94 lakhs the maximum being 83.54% above the average. The present construction programme has been proposed keeping in view the quick utilisation of Paithan storage(which will be available by 1976) as early as possible.

The summary of the programme on the basis of expenditure for the important items is given below to give brief idea of construction sequences at a glance.

Contd...

ITEM OF CONSTRUCTION

<u>Y e a r</u>	<u>: Head Works</u>	<u>: Per-centage</u>	<u>: Canal & Distri-butaries.</u>	<u>Per-centage.</u>
January '74	1) Buildings.	-	1) Preliminary.	5.81
To	2) Earthwork of Dam.	-	2) B-Lands.	-
March 1974	3) Cut-off-trench and seat of dam.	0.37	3) C.D.Works.	-
	4) Masonry spillway.	-		3.86
	5) Causeway.	30.30	4) Earthwork.	6.09
<hr/>				
1974-75	1) Buildings.	46.30	1) Preliminary	11.72
	2) Earthwork of dam.	7.30	2) Lands.	19.90
	3) Cut-off trench and seat of dam.	20.50	3) C.D.Works.	12.4
	4) Masonry spillway	17.50	4) Bridges.	3.14
	5) Causeway.	100.00	5) Buildings.	18.16
			6) Earthwork.	8.20
<hr/>				
1975-76	1) Buildings.	33.08	1) Preliminary	19.00
	2) Earthwork of dam.	14.00	2) Lands.	21.00
	3) Cut-off trench and seat of dam.	19.80	3) C.D.Works	20.45
	4) Spillway.	27.49	4) Regulator.	6.28
			5) Bridges.	15.70
			6) Buildings.	19.30
			7) Earthwork.	20.30

Year	Head Works	Per centage:	Canal and Distributaries:	Per-centage.
1976-77	1) Buildings.	18.90	1) Preliminary.	20.46
	2) Earthwork of dam.	29.75	2) L a n d s	22.30
	3) Cut-off trench and seat of dam.	19.14	3) Regulators.	25.20
	4) Spillway.	31.58	4) C.D.Works.	21.60
	5) D-Regulator.	31.60	5) Bridges.	18.90
			6) Buildings.	27.70
			7) Earthwork.	30.50
1977-78	1) Buildings.	1.72	1) Preliminary.	23.44
	2) Earthwork of dam.	5.41	2) Lands.	22.00
	3) Cut-off-trench and seat of dam.	1.00	3) Regulators.	34.60
	4) Masonry Spillway.	17.20	4) C.D.Works.	30.11
	5) D-Regulator.	34.2	5) Bridges.	28.30
	6) Bridges and gates.	1.00	6) Buildings.	19.30
			7) Earthwork.	23.65
1978-79	1) Earthwork of dam.	4.29	1) Preliminary.	9.4
	2) Spillway.	1.04	2) Lands.	6.00
	3) D-Regulator.	34.20	3) Regulator.	22.00
			4) C.D.Works.	6.02
			5) Bridges.	18.80
			6) Buildings.	9.60
			7) Earthwork.	5.30

(61)

Year	Head Works.	Per-centage:	Canal and Distributaries:	Per-centage.
1980	1)	6.5	1) Preliminary	6.5
	2)	6.00	2) Lands.	6.00
		8.00	3) Regulators.	8.00
		6.02	4) C.D.Works.	6.02
		8.50	5) Bridges.	8.50
		3.82	6) Earthwork.	3.82
		3.86	7) K-Buildings.	3.86
<hr/>				
		3.67	1) Preliminary.	3.67
		2.20	2) Lands.	2.20
		3.40	3) C.D.Works.	3.40
		3.92	4) Regulators.	3.92
		6.66	5) Bridges.	6.66
		2.08	6) Buildings.	2.08
		2.14	7) Earthwork.	2.14

3.00 ORGANISATION:

The work in Stage-I of this Project is already in progress. Two Circles with 11 Divisions are at present engaged in this activity; one Circle incharge of Head-works, while the other for canal works. The work of Head Works is now in advanced stage - Earthen dam being completed except few appurtenant items, while masonry dam also completed to the extent of about 70%; and is scheduled to be completed

by June 1976. Thus the Organisation already established and experienced for the work of Stage-I will be available for Stage-II works. As a matter of fact, balance can be maintained between the reduction in the work-load of Stage-I and increasing work-load of Stage-II. This will avoid the unpleasant retrenchment of construction staff and equipment. It is expected that this work will require the following establishment at its peak. :-

- | | |
|--|---------------------------------------|
| i) Head works
Majalgaon Dam. | 1 Division with
7 Sub-Divisions. |
| ii) Canals -
Paithan Right Bank
Canal. | 4 Division with
20 Sub-Divisions. |
| iii) Majalgaon Right
Bank Canal. | 3 Divisions with
23 Sub-Divisions. |

In addition to this Civil Engineering establishment, one Mechanical Division with 5 Sub-Divisions will be necessary for handling the machinery.

The provision for the residential and non-residential buildings required for this Organisation is already made in the estimate in the Project. After completion of the Project also there will be some permanent staff for maintaining the irrigation system. The permanent buildings which will be required during the maintenance would be constructed and utilised during the construction period also. The balance requirement will be met with by constructing temporary buildings. For maintaining irrigation system of 1,35,567 Ha it is estimated that three Divisions with eleven Sub-Divisions and thirty one Sections will be required.

CHAPTER - X

FINANCIAL FORECAST

1.0 DEVELOPMENT PROGRAMME

According to the construction programme given in Chapter 8, Paithan Right Bank Canal would be completed by end of June 1978. The distribution system of this canal would also be completed during year 1980. Since the storage of Paithan Dam would be built up by October 1976 actual Irrigation from Paithan Right Bank Canal would be started immediately as and when the distribution system is ready. The irrigation potential from Paithan Right Bank Canal according to construction programme would be built up as given below :-

Year	Irrigation potential in Hectares
1. June 1976	20,000 Ha
2. June 1978	21,682 Ha
Total	41,682 Ha

Regarding Majalgaon Right Bank Canal as per construction programme the water will be available for irrigation immediately after the dam work is completed to the level of crest of ogee. Though the full storage capacity of Majalgaon Reservoir will not be available at this stage, the water from Paithan Reservoir would be available through the Paithan Right Bank Canal. The balance water potential would be available when the gates of Majalgaon

Reservoir are erected. Thus the irrigation potential under Majalgaon Right Bank Canal would be built up as given below.

Year	Irrigation potential in Hectares.
1. 1978 - 1979	53,000 Ha
2. 1980 - 1981	40,885 Ha
Total	93,885 Ha

Though the irrigation potential would be created as indicated in the foregoing papers full development is assumed to be achieved within 10 years at the rate given below.

Year	Percentage development
1st Year	5
2nd Year	12
3rd Year	20
4th Year	30
5th Year	40
6th Year	52
7th Year	65
8th Year	77
9th Year	90
10th Year	100

The development programme for the whole scheme on the above basis with cropwise break up is given in Appendix No. 10.1.

3.0 GROSS AND NET REVENUE

3.1 GROSS REVENUE

On the basis of above water rates the revenue which would be available from the project is worked out in Appendix No. 10.2

3.2 NET REVENUE

The working expenses during the maintenance of the project are expected to be Rs. 12.5/Ha. The net revenue for each year after allowing the working expenses is given in the Appendix No. 10.3

4.0 BETTERMENT LEVY

Betterment levy is assessed at Rs. 500/- per acre and Rs. 150/- per acre for perennials and seasonals respectively. These charges are due for collection when in a particular year the area is ready for irrigation as a result of completion of distribution system. The cultivators are however allowed to pay these charges in 10 equal annual instalments. The instalments are worked out on the basis of compound interest at the rate of 5%. Ten equal annual deferred instalments for the compound interest at 5% are expected to be recovered as betterment levy. A statement showing the collection of betterment levy in conformity with the development programme is given in Appendix No. 10.4

The betterment levy that would be collected every year is adjusted by reducing the capital outlay of the project.

5.0 FINANCIAL FORECAST

On the basis of total expected expenditure of the project as per construction programme, and expected betterment levy and the revenue from the project, annual returns are worked out.

The details are given in Appendix No. 10.5 Accordingly the project pays interest of 2.06% after 10 years of completion.

The cost per hectare for the mixed crops is Rs. 5772.

6.0 BENEFIT COST RATIO

The benefit cost ratio for the Stage II of the project has been worked out as 2.55. The details are worked out with the help of Stage Agricultural Department and given in Appendix No. 10.6.

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Appendix - 2.1

Chapter - 2
Para - 4.0

STATEMENT SHOWING THE PERCENTAGE OF CULTIVABLE AREA TO GROSS COMMAND AREA

Sr.No.	Name of Taluka/District	No.of villages	Total G.C.A. (Ha)	Total C.C.A. (Ha)	Per-centage $\frac{C.C.A.}{G.C.A.}$	Remarks.
1.	Paithan/Aurangabad.	8	3,873	3,735	97	
2.	Shevgaon/Ahmednagar.	9	7,503	7,186	95	
3.	Gevrai/Bhir.	38	36,980	36,209	98	
4.	Majalgaon/Bhir.	44	46,321	44,229	95	
5.	Gangakhed/Parbhani.	35	26,303	24,238	92	
						Average - 95%

(67)

DEMAND TABLE SHOWING THE WATER REQUIREMENT AT DISTRIBUTARY HEAD FOR
2,77,204 Hectares (6,85,000 Acres)

Sr. No.	Crop	Percentage.	Area in Hectares.	Kharif Season			Rabi Season			H.W. Season			Total Mm ³
				Duty Ha/Cum	Water requirement Cumecs	Water requirement Mm ³	Duty Ha/Cum	Water requirements Cumecs	Water requirements Mm ³	Duty Ha/Cum	Water requirement Cumecs	Water requirement Mm ³	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Sugar Cane	3%	8316	1358	6.45	67.35	1000	8.32	88.01	714	11.63	124.52	279.88
	Over lap K	30%	-	-	1.924	20.09	-	3.339	34.81	-	1.163	12.45	67.35
	R	40%											
	H.W.	10%											
2.	Other Perennials.	1½%	4158	2357	1.755	18.11	1500	2.773	29.15	1072	3.877	40.47	87.73
3.	Paddy	5%	13860	1286	10.782	113.77	5716	2.434	25.75	-	-	-	139.52
4.	L.S.Cotton	37½%	103952	5144	20.178	208.29	8574	12.112	129.05	2286	45.421	471.20	808.54

1	2	3	4	5	6	7	8	9	10	11	12	13	14
5.	Rabi Seasonals	51%	141374	-	-	-	2858	49.440	521.00	-	-	-	521.00
6.	Hot Weather Seasonals	2%	5544	-	-	-	-	-	-	1429	3.877	40.47	40.47
Total			277204	41.089	427.61	-	78.418	827.77	-	65.968	689.11	1944.79	

Water requirement at canal head.

Water requirement in M³

Sr. No.	Canal	Net Area (Ha)	Kharif season			Rabi Season			Hot weather Season			Annual (6+9+12)=
			At dist-ributary head.	Transit losses	Total (4+5)=	At dis-tributary head	Transit losses	Total (7+8)=	At dis-tributary head.	Transit losses.	Total (10+11)	
1	2	3	4	5	6	7	8	9	10	11	12	13
I)	Paithan Right Bank Canal	41682	63.95	10.76	74.71	123.10	15.57	138.67	103.01	15.00	118.01	331.39

1	2	3	4	5	6	7	8	9	10	11	12	13
II)	Majalgaon Right Bank Canal.	93885	145.75	14.15	159.90	285.83	17.55	303.38	236.59	16.98	253.57	716.85
	Total	135567	209.70	24.91	234.61	408.93	33.12	442.05	339.60	31.98	371.58	1048.24
III)	Paithan Left Bank Canal.	141637	217.91	16.98	234.89	418.84	20.66	439.50	349.51	19.24	368.75	1043.14
	Total	277204	427.61	41.89	469.50	827.77	53.78	881.55	689.11	51.22	740.33	2091.38

TYPICAL WORKING TABLE FOR 2,77,204 Ha (6,85,000 Acres) IRRIGATION

I - Paithan Reservoir

Season	Open- ing R.L. M. (Ft.)	Open- ing capa- city Mm ³ (T.M.C.)	R e c e i p t s			Total Mm ³ (T.M.C.)	Withdrawals			Total Mm ³ (T.M.C.)	Lake losses Mm ³ (T.M.C.)	Total Mm ³ (T.M.C.)	Balance Mm ³ (T.M.C.)	Water Mm ³ (T.M.C.)	R.L. (Ft.)	S P I L O V E R Mm ³ (T.M.C.)
	Inflow (T.M.C.)	Rege- nera- tion. Mm ³ (T.M.C.)	Total Mm ³ (T.M.C.)	Irri- gation demand Paithan canals. Mm ³ (T.M.C.)	Majal- gaon feeding Mm ³ (T.M.C.)	Total Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)	Mm ³ (T.M.C.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Kha- rif	456.14 (1496.5)	787.58 (27830)	2023.45 (71500)	31.13 (1100)	2054.58 (72600)	2842.16 (100430)	309.60 (10940)	27.17 (930)	336.77 (11900)	195.27 (6900)	532.04 (18800)	2310.12 (81630)	2310.12 (81630)	462.22 (1516.5)	-	
Rabi	462.22 (1516.5)	2310.12 (81630)	141.50 (5000)	28.30 (1000)	169.80 (6000)	2479.92 (87630)	578.17 (20430)	39.34 (1390)	617.51 (21820)	164.14 (5800)	781.65 (27620)	1698.27 (60010)	1698.27 (60010)	460.40 (1510.5)	-	
Hot wea- ther	460.10 (1510.5)	1698.27 (60010)	33.96 (1200)	28.30 (1000)	62.26 (2200)	1760.53 (62210)	486.76 (17200)	232.91 (8230)	719.67 (25430)	253.28 (8950)	972.95 (34380)	787.58 (27830)	787.58 (27830)	456.14 (1496.5)	-	
Total			2198.91 (77700)	87.73 (3100)	2286.64 (80800)		1374.53 (48570)	299.42 (10580)	1673.95 (59150)	612.69 (21650)	2286.64 (80800)					

Contd....

(17)

II- Majalgaon Reservoir.

Season	Opening	Opening	Receipts			Total	Withdrawals			Bala-	Water	R.L.	Spill-
	R.L.	capacity	In	From	Total	Mm ³	Irrig-	Lake	Total	ance	stored	M.	over
	M	Mm ³	flow	Paithan	Mm ³		ation	losses	Mm ³	Mm ³	Mm ³		Mm ³
	(Ft.)	(T.M.C.)	(TMC)	Reser-	(TMC)	(TMC)	demand	Mm ³	(TMC)	(TMC)	(TMC)	(TMC)	(TMC)
			voir	Mm ³	(TMC)	(TMC)	Mm ³	(TMC)	(TMC)	(TMC)	(TMC)	(TMC)	(TMC)
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Kharif.	426.11 (1398.0)	133.00 (4700)	554.45 (19592)	27.17 (960)	581.62 (20552)	714.62 (25252)	159.90 (5650)	45.56 (1610)	205.46 (7260)	509.16 (17992)	444.30 (15700)	431.44 (1415.5)	-
Rabi.	431.44 (1415.5)	444.30 (15700)	42.45 (1500)	39.34 (1390)	81.79 (2890)	526.09 (18590)	303.38 (10720)	33.11 (1170)	336.49 (11890)	189.60 (6700)	189.60 (6700)	427.48 (1402.5)	-
Hot Weather.	427.48 (1402.5)	189.60 (6700)	14.15 (500)	232.91 (8230)	247.06 (8730)	436.66 (15430)	253.57 (8960)	50.09 (1770)	303.66 (10730)	133.00 (4700)	133.00 (4700)	426.11 (1398.00)	-
			611.05 (21592)	299.42 (10580)	910.47 (32172)		716.85 (25330)	128.76 (4550)	845.61 (29880)				

Computations of storage capacity to irrigate2,77,204 Ha (6,85,000 Acres).MAJALGAON RESERVOIRI - Fair weather utilisation
of Majalgaon R.B.Canal.

a) Rabi	303.38 Mm ³ (10.72 T.M.C.)	
b) Hot Weather	253.57 Mm ³ (8.96 T.M.C.)	

	556.95 Mm ³	556.95Mm ³
	(19.68T.M.C)	(19.68 T.M.C)

II - Fair Weather lake losses.

a) Rabi.	33.11 Mm ³ (1.17 T.M.C.)	
b) Hot Weather	50.09 Mm ³ (1.77 T.M.C.)	

	83.20 Mm ³	83.20 Mm ³
	(2.94T.M.C)	(2.94T.M.C)

	Total	640.15Mm ³
		(22.62T.M.C)

Deductions

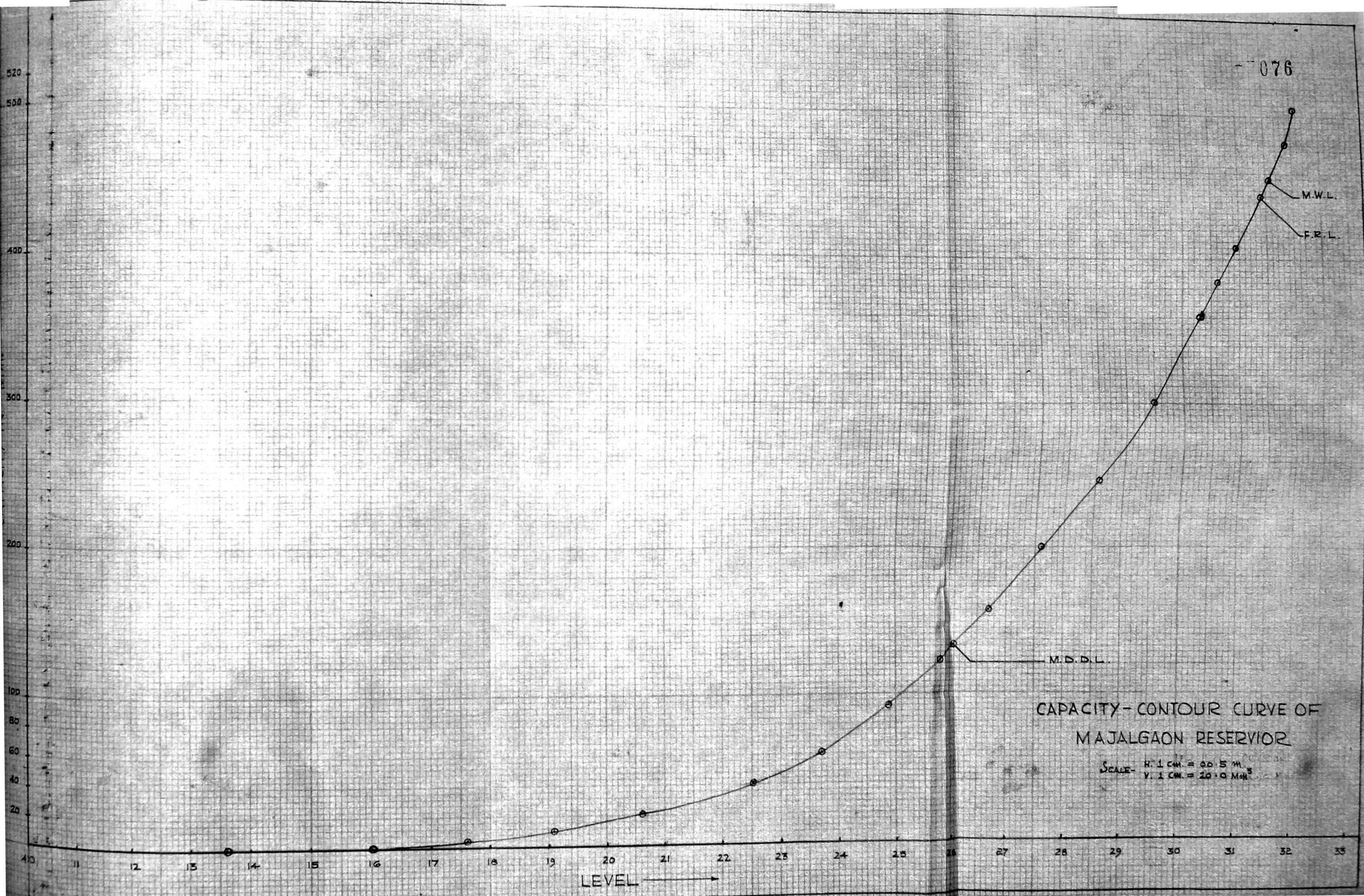
a) Feeding from Paithan in fair weather.	272.25 Mm ³ (9.62 T.M.C.)	
b) Post-monsoon flow.	56.60 Mm ³ (2.00 T.M.C.)	

	328.85 Mm ³	328.85 Mm ³
	(11.62 T.M.C.)	(11.62T.M.C)
•• Live storage	311.30 Mm ³ (11.00 T.M.C.)	
Add for dead storage.	133.00 Mm ³ (4.70 T.M.C.)	
Gross storage.	-----	
	444.30 Mm ³ (15.70 T.M.C.)	
F.R.L.	+ 431.44 M	

Appendix - 3.4Chapter - 3
Para - 5CAPACITY TABLE FOR MAJALGAON RESERVOIR

Sr.No.	R.L. in M.	Capacity in Mm ³	Remarks.
1	2	3	4
1.	413.613	-	
2.	416.052	1.33	
3.	417.576	5.322	
4.	419.100	11.63	
5.	520.624	21.206	
6.	422.148	36.94	
7.	422.453	41.02	
8.	422.757	45.44	
9.	423.062	50.28	
10.	423.367	55.66	
11.	423.672	61.608	
12.	423.977	68.148	
13.	424.281	75.340	
14.	424.586	83.182	
15.	424.891	91.704	
16.	425.196	100.934	
17.	425.501	110.928	
18.	425.805	121.687	

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CAPACITY-CONTOUR CURVE OF
MAJALGAON RESERVIOR

SCALE- H. 1 CM. = 10.5 M.
V. 1 CM. = 20.0 Mm³

1	2	3	4
19.	426.110 (1398 ft.)	133.153 (4703 Mcft.)	M.D.D.L.
20.	426.415	144.960	
21.	426.720	157.900	
22.	427.023	171.206	
23.	427.329	185.164	
24.	427.634	199.773	
25.	427.939	215.118	
26.	428.244	231.143	
27.	428.548	247.848	
28.	428.853	265.317	
29.	429.158	283.522	
30.	429.463	302.434	
31.	429.768	322.083	
32.	430.073	342.468	
33.	430.377	360.747	
34.	430.682	385.475	
35.	430.987	408.154	
36.	431.292	431.653	
37.	431.44 (1415.50 ft.)	444.507 (15,700 Mcft.)	F.R.L.
38.	431.70	462.857	M.W.L.
39.	431.902	481.143	
40.	432.054 (1417.50 ft.)	506.738 (17,898 Mcft.)	

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Appendix - 4.1

Chapter - 4
Para - 2.0

GEOLOGICAL NOTE ON JAYAKWADI PROJECT PHASE-I
DAM ACROSS SINDPHANA RIVER NEAR MAJALGAON -
BHIR DISTRICT : MAHARASHTRA

By

Hamzah Ali

&

C.V.L. Narasimham ,
Geological Survey of India.

A B S T R A C T

The geological investigations for Jayakwadi Project Phase-I , across Sindphana river near Majalgaon village, Bhir District, Maharashtra, have been reviewed in the following paragraphs. The 110 feet high (33.528 m.) earth dam with masonry spillway on the left bank is meant for irrigating parts of Bhir District. The country rock consists of mainly dark grey, massive to porphyritic fine-grained basalts, greyish green amygdaloidal basalts with red and green bole beds.

27 bore holes with a total footage of 930 feet - (283.46 m.) have been logged. From the study of the surface and sub-surface geology, the general suitability of the dam site is indicated. The foundation grade in the masonry waste weir section has been indicated. It is recommended that the cut-off can be had on an impervious layer in the over-burden. The depth of the cut-off should be decided after conducting analysis of the physical properties of the samples.

INTRODUCTION

1. At the request of the Maharashtra Government and at the special request of the Executive Engineer, the Geological investigation of the Jayakwadi Project was taken up by us between the 17th and 18th of May 1963.

2. It is proposed to construct a 110 feet high (33.528 m.) earthen dam across the river Sindphana, a tributary to Godavari near Majalgaon ($19^{\circ} - 9' : 76^{\circ} - 12' - 12'' - 30''$, 56 A/SW) Bhir District, Maharashtra, with a masonry spillway on the left bank. This forms phase-I of the proposed Jayakwadi Project across Godavari. This refers to item No. 5 on page 101 of the Field Season Programme of the Geological Survey of India for the year 1962-63.

ACKNOWLEDGEMENT

3. Our thanks are due to Sarvashri N.R. Cherekar, Executive Engineer and N.R. Joshi, Assistant Engineer for the help rendered to us in the furtherence of out-work.

ACCESSIBILITY:

4. The nearest railway Station is Jalna, which is about 98 miles (157.715 Kms.) from the dam site and is connected by a bitumen road upto Gevrai from where there is a metalled road to Majalgaon.

PHYSIOGRAPHY

5. The area presents a flat terrain. The general elevation of this place is about R.L. 1400 feet whereas the river bed elevation is R.L. 1315 feet. The area is covered by the low shrubs and thin vegetation. The major

drainage in this area is by the Sindphana river generally flows in a westerly direction but takes a northerly bend near Majalgaon and drains into the Godavari. The tributaries are flowing both from north and south.

SALIENT FEATURES

6. The salient features of the dam as supplied by the Project Engineers are as follows :-

Location	:	Near Majalgaon. (19° 0' ; 76° 12' 30" : 56 A/SW) Bhir District, Maharashtra.
Nearest Railway Station.	::	Jalna (98 miles (157.72 Kms.) from the site.
Catchment area	::	1500 Sq.miles (3884.98 Sq.Kms.)
Maximum flood discharge.	::	2,70,000 Cusecs.
T.B.L.	::	E.L. 1430.00
N.W.L.	::	E.L. 1422.00
F.R.L.	::	E.L. 1413.00
Crest of the weir.	::	E.L. 1413.00
Waterspread area at F.R.L.	::	16,200 acres (6555.87 Ha)
Capacity at F.R.L.	::	13800 Mcft. (390.77 Mm ³)
Length of the Bund.	::	17,800 feet (5425.44 m.)
Maximum height of the dam.	::	110 feet (33.528 m.)
Length of the waste-weir.	::	2800 feet (853.44 m.)
Length of the canal.	::	70 miles (112.654 Kms.)

(80)

Discharging
capacity of the canal. :: 1300 Cusecs.

- . NOTE :- Project levels are lower by 7 feet
(2.134 m.) from G.T.S.levels.

GEOLOGY OF THE AREA

7. The area near the dam site comprises Deccan trap formation consisting mostly dark grey, massive porphyritic, fine-grained basalt, greyish green to reddish brown amygdaloidal basalt with red and green clay or bole beds.

8. The alignment of the dam at the place where it crosses the river is $N 75^{\circ} 30' W S 75^{\circ} 30' E$. The left bank of the river is gentler in slope than the right bank and the latter is covered by black cotton soil.

9. The flow in the river is close to the right bank. The depth of the water in the channel is 8 feet (2.435 m.) in the non-monsoon period.

10. On the left bank , 900 feet (274.3 m.) down-stream of the dam, reddish brown amygdaloidal basalt is exposed. The thickness of this amygdaloidal basalt as measured is 37 feet (11.278 m.) and is overlain by 14 feet (4.267 m.) thick massive basalt.

11. The basalt is jointed and the major joint trends are as follows :-

	<u>Strike</u>	<u>Dip</u>	
N	$79^{\circ} E - S 79^{\circ} W$	69° due N	$11^{\circ} W$
N	$35^{\circ} E - S 35^{\circ} W$	82° due N	$55^{\circ} W$
N	$75^{\circ} W - S 75^{\circ} E$	Vertical	

and horizontal sheet joints.

(82)

12. On the left bank there is a thin soil cover of 1 to 2 feet (0.305 - 0.610 m.) underlain by massive basalt whereas on the right bank it is of the order of 10 to 15 feet (3.040 to 4.560 m.).

13. The waste weir is proposed on the left bank between Ch. 0.00 and 59.00. At this place dark grey massive basalt is exposed under a soil cover of 1 to 2 feet (0.305 to 0.610 m.). The rock is usually fine-grained but occasionally porphyritic. It is slightly weathered and jointed. The massive basalt is underlain by amygdaloidal basalt.

14. Along the proposed tail channel, amygdaloidal basalts have been exposed.

15. There is considerable variation among the individual massive and amygdaloidal flows which grade imperceptibly into ~~xxx~~ each other and as such it is difficult to trace the continuity of the flows.

SUBSURFACE EXPLORATIONS

16. 27 Bore holes of total running feet of 930 (283.46 m.), drilled at the dam site were logged. The rock types encountered in the bore-holes are massive and amygdaloidal basalts.

17. From the study of the bore-hole data along the waste weir section, it is inferred that foundation grade rock will be met with at a depth of 4 to 7 feet (2.134 - 6.096 from the G.L. or between R.Ls. 1385 - 1407).

18. The 7 trial pits excavated along the waste weir

jointed massive basalt under a soil cover of 1 to 2 feet (0.305 to 0.610 m.) . In addition, 2 more trial pits (wells) have been dug, one in the colony site and the other near the Idgah, the logs of which are given below :-

Well near Idgah : R.L. 1408.95

0-3'	(0 - 0.914m)	Soil and murum.
3-8'	(0.914 - 2.438 m.)	Massive, fine-grained to porphyritic and columnar jointed basalt.
8'	10.6" (2.438 - 3.2 m.)	Massive basalt with $\frac{1}{2}$ " (0.0125 m.) spaced sheet joints.
10'-6"	-19'(3.2 - 5.791 m.)	Massive basalt with columnar joints.
19'-22'-3"	(5.791-6.757 m.)	Massive basalt with sheet joints.
	water level.	

Well in the Colony site R.L. 1430 :

0'-7'	(0 - 2.134m)	Soil with Kankar and highly weathered basalt.
7'-18'6"	(2.134-5.638 m.)	Massive basalt with columnar joints.
18'-6"	- 21'(5.638-6.401m)	Massive basalt with sheet Joint
21'-25'6"	(6.401-7.772 m.)	Massive basalt with columnar joints.

CONCLUSIONS AND RECOMMENDATIONS

19. (a) It is proposed to construct a 110 feet high (32.53 m.) earth dam across Sindphana river, a tributary to Godavari, near Majalgaon, Bhir District, Maharashtra, as phase-I of the Jayakwadi Project.

(b) The rocks that are exposed at the dam-site are dark grey, massive, fine-grained, to porphyritic basalt, reddish brown to greyish green amygdaloidal basalts with infillings of secondary minerals.

(887)

(c) From the investigations conducted, the Project site is suitable for the proposed dam.

(d) Along the proposed waste weir section on the left bank under a soil cover of 1 to 2 feet (0.305 to 0.610 m.) weathered jointed, massive, fine-grained to porphyritic basalt is encountered in the trial pits. As the height of the structure over the ground level will range between 2 to 5 feet (0.610 m 1.5 m.). The foundation grade in this reach may be between 4 to 7 feet (2.134 - 7.026 m.) or between R.Ls. 1398 and 1408. As the rocks are weathered and soft, it would be necessary to provide a masonry or concrete blanket to prevent erosion in the rear of the weir.

(e) In the earth section excepting the river channel, the overburden consists of soil and alluvium. Depth to cut-off can only be determined after determining the permeability characteristics.

(f) In the river bed a positive cut-off is recommended, the depth of which may be about 3 feet (9.12 m.) below the bed level.

Engineering Geology Dvn.,
Southern Region, GSI:

Sd/-

(Hamzah Ali).

Sd/-

(C.V.Narasimham).

Computation of the Surplussing arrangement for the
Majalgaon Reservoir

R.L. of the crest of ogee	..	426.44 m.
R.L. of the top of gates i.e. F.R.L.	..	431.44 m.
Maximum water level.	..	431.70 m.
Capacity between M.W.L. and F.R.L. for flood absorption (By flood Routing)	..	18.35 mm ³
Total No. of gates proposed.	..	28
No. of stand by gates	..	3
No. of gates to be considered for flood discharge.	..	25
Width of each gate	..	12 m.
Gross length of spillway = 12 x 25	..	300 m.
Head of discharge @ M.W.L. =	..	5.24 m.
Head of discharge @ F.R.L. =	..	5 m.
Deduction due to end contractions for the head of 5.24 m. = 2 x 25 x 0.1 x 5.24 =	..	26.2 m.
Net effective length available for flood discharge at M.W.L. = (300 m. - 26.2 m.)	∴	273.8 m.
Coefficient of Discharge -	∴	3.9
Discharge over the spillway @ M.W.L.	..	7230 cumecs.
Deduction due to end contractions @ F.R.L. = 2 x 25 x 0.1 x 5	..	25 m.
Net effective length available for flood discharge at F.R.L. = (300 m. - 25 m.)	∴	275 m.
Discharge over spillway at F.R.L.	..	6625 Cumecs.
Maximum inflow expected - (1.25 x Inglis flood) = (1.25 x 7670) Computation of flood routing to cope up the maximum discharge of 9600 Cumecs (Hydrograph attached)	..	9600 Cumecs.

Sr. No.	Times in minutes.	Inflow in Mm^3	Out flow in Mm^3	Temporary storage in Mm^3	Cumulative storage in the Reservoir in Mm^3	Reservoir water level	Remarks
1	2	3	4	5	6	7	8
	0	-	17.90 (6625 Cumecs)	-	444.507	431.44	F.R.L.
1.	45	21.05 (7800 Cumecs)	12.14 (6744 Cumecs)	3.15	447.657	431.486	
2.	30	16.64 (9230 Cumecs)	12.32 (6844 Cumecs)	4.50	452.157	431.546	
3.	30	17.16 (9535 cumecs)	12.54 (6965 Cumecs)	4.84	456.997	431.611	
4.	30	16.86 (9360 Cumecs)	12.70 (7055 Cumecs)	4.32	461.317	431.669	
5.	30	14.24 (7910 Cumecs)	13.00 (7230 Cumecs)	1.54	462.857	431.689	M.W.L.

∴ The maximum water level = R.L. 431.70

REACHES OF CANALS AND DISCHARGING CAPACITIES

Sr. No.	Reach No.	Distance in Kms		Discharging Capacity (Cumecs)	G.C.A. (Ha)	C.C.A (Ha)	Net Irrigable Area (Ha)	Remarks
		From	To					
1	2	3	4	5	6	7	8	9
A) <u>PAITHAN RIGHT BANK CANAL</u>								
1.	I	0.00	29.42	63.71*	9413	8470	6486	
2.	II	29.42	46.26	57.90*	6137	5520	4216	
3.	III	46.26	57.90	54.19*	5645	5077	3846	
4.	IV	57.90	79.90	50.83*	13918	12530	9664	
5.	V	79.90	132.56	42.29*	24779	22313	17470	
				Total	59892	53910	41682	

(87)

(*Note - Discharging capacity includes the capacity of 26.88 Cumecs for feeding Majalgaon reservoir.

Contd..

1	2	3	4	5	6	7	8	9
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B) MAJALGAON RIGHT BANK CANAL

1.	I	0	19	82.63	26100	23760	18670	
2.	II	19	50	56.28	15300	13950	10960	
3.	III	50	82	56.62	27620	25100	19745	
4.	IV	82	114	39.22	18100	16460	12950	
5.	V	114	149	27.82	22800	20720	16300	
6.	VI	149	165	8.96	14200	12920	10160	
7.	VII	165	181	4.51	7400	6400	5100	Tail Branch.

Total	131520	119400	93835
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(53)

DETAILS OF CANAL SECTIONS IN VARIOUS REACHES

Sr. No.	Reach No.	Distance in Kms		Bed width (M.)	F.S.D. (M.)	Free Board (M.)	Side slopes	Bed fall	Required discharge (Cumecs)	Designated Discharge (Cumecs)	Velocity of Canal (m/Sec)	Remarks.
1.	2	3	4	5	6	7	8	9	10	11	12	13

A) PAITHAN RIGHT BANK CANAL

1.	I.A	0.00	4.26	9.14	3.87	0.90	1½:1	1 in 8570	63.71	63.95	1.1060	
2.	I.B	4.26	29.42	7.70	3.87	0.90	2:1	1 in 3570	63.71	64.12	1.0730	
3.	II	29.42	46.26	6.60	3.87	0.90	2:1	1 in 8570	57.90	58.39	1.0520	
4.	III	46.26	57.90	6.50	3.75	0.90	2:1	1 in 8570	54.19	54.20	1.0320	
5.	IV	57.90	79.90	6.20	3.70	0.90	2:1	1 in 8570	50.83	51.23	1.0190	
6.	V	79.90	132.56	6.20	3.45	0.90	2:1	1 in 8570	42.29	42.29	0.9271	

Contd..

1	2	3	4	5	6	7	8	9	10	11	12	13
B) MAJALGAON RIGHT BANK CANAL												
1.	I	0	19	8.50	4.00	0.90	2:1	1 in 6666	82.63	82.76	1.2540	
2.	II	19	50	8.20	3.65	0.90	2:1	1 in 6666	66.28	67.17	1.1880	
3.	III	50	82	7.50	3.45	0.90	2:1	1 in 6666	56.62	56.65	1.1390	
4.	IV	82	114	6.60	3.00	0.90	2:1	1 in 6666	39.22	39.31	1.0400	
5.	V	114	149	5.85	2.70	0.90	2:1	1 in 6666	27.82	28.85	0.9499	
6.	VI	149	165	3.90	1.75	0.90	2:1	1 in 6666	8.96	9.34	0.7213	
7.	VII	165	181	2.90	1.40	0.90	2:1	1 in 6666	4.51	4.95	0.6205	Tail Branch.

(06)

Statement showing requireemnt of Machinery.

Sr.No.	Items	Nos.
1	2	3

(A) EARTHEN DAM:I. Heavy Earthmoving Machinaries:

1)	Drawn scrapers	10
2)	D7 or D8 tractors	10
	OR	
	(Cat 619C motorised scrapers	(6)
	D8 Pusher)	(1)
3)	Motor Scraper	25
4)	D8 Pusher	4
5)	D8 Tractor Rollers	7
6)	Water tankers	9
7)	Diesel Road Rollers	10
8)	Tippers	12
9)	Conventional trucks	28
10)	Dumpers	10
11)	D-8 Dozer	1
12)	Tractor Shovel.	2

II. Ancillary Equipment :

1)	Air compressors	4
2)	Jack hammers	8
3)	40 H.P.Pumps Mechanical	5

1	2	3
4)	20 H.P.Pumps Mechanical	6
5)	10 H.P.Pumps Mechanical	7
6)	5 H.P.Pumps Mechanical	12
7)	40 H.P.Pumps Electrical	4
8)	20 H.P.Pumps Electrical	4
9)	10 H.P.Pumps Electrical	5
10)	5 H.P.Pumps Electrical	8
(B)	<u>MASONRY DAM:</u>	
1)	Trucks (7.5 Tons)	30
2)	Diesel Road Rollers	2
3)	Air Compressors	10
4)	Tankers	2
5)	Jack Hammers	4
6)	Pumps - 20 H.P.	2
	10 H.P.	5
	5 H.P.	5
	Grout Pump.	1
	Sludge Pump.	1
7)	Concrete Mixers (10x7)	15
8)	Vibrators	10
9)	Steel shuttering set	5
10)	Generators 100 KW.	1
	30 KW.	3
11)	Stone Crushers	2
12)	Granulators	3
13)	Diesel welding set.	1
14)	Boring Machines	2

1	2	3
	(C) <u>CANALS</u>	
1)	Trucks (7.5 Tons)	110
2)	Diesel road rollers	90
3)	Air Compressors	70
4)	Jack hammers	180
5)	Tankers	90
6)	Pumps	
	10 H.P.	45
	5 H.P.	70
7)	Earth rammers	45
8)	Concrete Mixers	55
9)	Vibrators	45
10)	Steel Shuttering sets (Aqueducts)	15
11)	Steel shuttering Sets (Bridges)	8
12)	Generators (30 KW)	22
13)	Stone Crushers	22
14)	Granulators	22
15)	Diesel Welding sets	8
16)	Boring Machines	9

Note:- In the Project estimate, provision for Items 1 to 12 under heavy Earthmoving machinery is not included as it will be available from central pool.

STATEMENT SHOWING THE REQUIREMENT OF LABOUR

Sr. No.	Item.	Quantity in m ³	Task work per day m ³	Skilled labour	Unskilled labour	Operators & Drivers.	Total	Remarks.
1	2	3	4	5	6	7	8	9

I - HEAD WORKS

1)	Excavation for seat of dam, cutoff trench, L-Drain & Cross drain divide wall, training walls, spillway portion, bucket, tail, approach & pilot channels Head Regulator and its approach in over burden.	24,30,000	1.416	1,75,200	17,52,000	-	19,27,200	
2)	Excavation in rock for all above items.	3,62,000	0.425	85,400	8,54,000	-	9,39,400	
3)	Excavation from Borrow area	40,56,000	1.133	3,06,800	30,68,000	-	33,74,800	

1	2	3	4	5	6	7	8	9
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II - MASONRY WORK

1) Laying of Masonry	2,09,800	0.333	61,800	6,18,000	-	6,79,800
2) Mixing and laying of concrete.	43,400	0.375	11,590	1,15,900	-	1,27,490

III Transporting and consolidation Machinery and Vehicles.

Total Nos. 104 labours for each 2 skilled and 2 unskilled Total working days 1200 day

-	-	1,24,800	2,49,600	12,480	3,86,880
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IV - Rock toe and pitching	1,40,000	1.699	8,270	82,700	-	90,970
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TOTAL:			7,73,860	67,40,200	12,480	75,26,540
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II - MAIN CANAL & BRANCHES

1) Excavation in all soils	1,18,59,000	1.416	8,47,100	84,70,720	-	93,17,820
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X 95)

1	2	3	4	5	6	7	8	9
2) Canal embankment.	1,62,00,000	1.133	14,73,700	1,47,27,000	-		1,62,00,700	
3) Excavation in Rock.	48,43,500	0.42	12,10,900	1,21,08,750	-		1,33,19,650	
4) Transport and cone solidation Machine & Vehicles 36 Nos. Labour for each 2 skilled & Unskilled total working days 1200 days.				43,200	86,400	4,320	1,33,920	
Total:			35,74,900	3,53,92,870	4,320	3,89,72,090		
Grand Total			43,48,760	4,21,33,070	16,800	4,64,98,630		
Say:			43,49,000	4,21,33,000	17,000	4,64,99,000		

(96) (97)

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DETAILS OF VILLAGES AFFECTED BY SUBMERGENCE OF
MAJALGAON RESERVOIR

Sr.No.	Name of village	Area in Ha	Population	No. of houses.
1	2	3	4	5
1.	Dhorgaon.	404	650	96
2.	Nandur.	191	110	18
3.	Chinchgavan.	405	396	74
4.	Shelapuri.	408	483	84
5.	Brahmgaon.	499	544	94
6.	Deogaon.	266	904	166
7.	Punandgaon.	140	400	57
8.	Brahmgaon (Devi)	211	Deserted.	-
9.	Renapuri.	344	349	39
10.	Mangrul.	1550	2413	489
11.	Kadiwadgaon.	540	1138	189
12.	Phul Pimpalgaon.	380	357	64
13.	Ekdara.	290	941	178
14.	Telgaon.	35	452	80
15.	Deokheda.	102	645	56
16.	Sawargaon.	390	1647	293
17.	Khanapur.	520	585	89
18.	Khalwat Nimgaon.	550	1493	274
19.	Kedarsangvi.	241	Deserted	-
20.	Kesapuri.	62	-	-
21.	Pulhe Pimpalgaon.	90	-	-
22.	Laul.	184	-	-
23.	Pardi.	70	-	-
24.	Kandgaon.	150	-	-
25.	Dewadi.	30	-	-
26.	Kherde (Kh.)	30	-	-
		7982	13,471	2,339
			Say	2,375

- Note:-
- 1) All the villages are from Majalgaon Tahsil District Bhir.
 - 2) Gaothans of villages from S.No. 1 to 19 only are affected.
 - 3) The information is based on 1971 Census.
 - 4) Submergence area is shown on the plan below.

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PAITHAN RIGHT BANK CANAL

STATEMENT SHOWING YEARWISE EXPENDITURE PROGRAMME

Amount Rs. in Lakhs

Sr. No.	Head of Expenditure	Estimated cost in Rs.lakhs.	January 74 to March 74.	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-1981
1	2	3	4	5	6	7	8	9	10	11.
1.	'A' Preliminary	15.70	1.00	2.00	4.00	4.00	2.00	1.00	1.00	0.70
2.	'B' Lands	114.10	-	30.00	30.00	30.00	24.10	-	-	-
3	'D' Regulators	69.50	-	-	5.00	20.00	20.00	20.00	3.00	1.50
4.	'F' <u>C.D.Works</u>	373.50	-	83.50	100.00	100.00	90.00	-	-	-
	a) Aqueduct & Syphons.	253.50								
	b) Slab culverts.	99.00								
	c) H.P.Culverts.	15.00								
	d) Nala diversions.	6.00								

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Contd..

1	2	3	4	5	6	7	8	9	10	11
5.	'G' Br-idges	65.70	=	5.00	20.00	15.00	10.00	10.00	3.50	2.20
6.	'H' Escapes	15.00	-	-	2.00	3.00	5.00	3.00	1.00	1.00
7.	'K' Buildings	99.30	-	27.00	30.00	42.30	-	-	-	-
8.	'L' Earth Work	1031.33	159.00	104.00	281.00	307.00	120.33	-	-	-
9.	'M' Plentation	5.00	-	-	-	1.00	1.50	1.50	0.50	0.50
10.	'O' Miscellaneous.	108.10	-	5.00	20.00	19.15	15.00	25.00	15.00	8.95
11.	'P' Maintcnance	17.01	-	1.00	5.00	5.00	4.00	0.51	1.00	0.50
12.	'Q' Special Tolls & Plants.	132.30	-	5.00	34.00	25.00	40.00	16.00	8.00	5.30
13.	'R' Communications.	10.00	-	-	2.00	3.00	4.00	1.00	-	-
14.III =	Distributaries.	209.62	-	10.00	40.00	50.00	50.00	29.72	19.90	10.00
Total		2297.16	160.00	272.50	573.00	714.45	325.93	107.73	52.90	30.65

(100)

STATEMENT SHOWING THE YEARWISE TOTAL IRRIGATION POTENTIAL AND CROPWISE DEVELOPMENT PROGRAMME

Area in Ha

Sr. No.	Year	Irrigation potential	Sugar Cane.	OVER LAP			Other perennials.	Paddy	L.S. Cotton	Rabi Seasonals	Hot Weather Seasonals	Total
				Kharif	Rabi	H.W.						
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	1976-77	20,000	30	-	-	-	15	50	375	510	20	1,000
2.	77-78	20,000	72	22	29	7	36	120	900	1224	48	2,400
3.	78-79	94,682	232	70	93	23	116	387	2900	3944	155	7,734
4.	79-80	94,682	449	134	180	45	225	748	5610	7631	299	14,962
5.	80-81	1,35,567	749	224	300	75	375	1249	9368	12740	499	24,980
6.	81-82	1,35,567	1131	339	452	113	566	1886	14141	19233	574	37,711
7.	82-83	1,35,567	1532	460	613	153	766	2553	191402	26035	1021	51,049

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Contd...

1	2	3	4	5	6	7	8	9	10	11	12	13
8.	1983-84	1,35,567	1995	599	798	200	998	3325	24937	33916	1330	66,501
9.	84-85	1,35,567	2487	746	995	249	1243	4145	31096	42278	1658	82,897
10.	85-86	1,35,567	2963	889	1185	290	1482	4938	37037	50370	1975	98,765
11.	86-87	1,35,567	3414	1023	1366	341	1706	5690	42672	58034	2276	1,13,792
12.	87-88	1,35,567	34724	1117	1490	372	1862	6206	96545	63300	2482	1,24,119
13.	88-89	1,35,567	3944	1183	1578	394	17972	6574	49305	67055	2629	1,31,479
14.	89-90	1,35,567	4068	1220	1627	407	2034	6780	50845	69130	2710	1,35,567

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Appendix - 10.2

Chapter - 10
Para - 3.0

Statement showing the cropwise yearly gross Revenue due to Water Charges

Area in Ha

Amount in Rs.lakhs.

Sr. No.	Crops	Fraction of the rate as per concession.	Rate per Hectare	1976-1977		1977-1978		1978-1979		1979-1980		1980-81 1981-	
				Area	Amount	Area	Amount	Area	Amount	Area	Amount	Area	Amount
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Sugarcane	Half	375	30	0.112	32	0.158	160	0.600	217	0.815	300	1.125
		Full	750	-	-	30	0.225	72	0.540	232	1.740	449	3.368
2.	Over lap	Half	75	-	-	22	0.016	48	0.036	64	0.048	90	0.068
	i) Kharif	Full	150	-	-	-	-	22	0.033	70	0.105	134	0.201
	ii) Rabi	Half	125	-	-	29	0.037	64	0.080	87	0.109	120	0.0150
	Full	250	-	-	-	-	-	29	0.073	93	0.232	180	0.450

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1	2	3	4	5	6	7	8	9	10	11	12	13	14
	iii) Hot Weather Season- als.	Half	175	-	-	7	0.012	16	0.028	22	0.038	30	0.053
		Full	350	-	-	-	-	7	0.025	23	0.081	45	0.158
3.	Other perenni- als.	Half	250	15	0.037	21	0.052	80	0.200	109	0.273	150	0.375
		Full	500	-	-	15	0.075	36	0.180	116	0.580	225	1.125
4.	Paddy	-	-	50	-	70	-	267	-	361	-	501	-
		1/3	16.33	-	-	50	0.008	70	0.011	267	0.044	361	0.059
		2/3	32.66	-	-	-	-	50	0.016	70	0.023	267	0.087
		Full	50	-	-	-	-	-	-	50	0.025	120	0.060
5.	L.S.Cotton	Half	125	375	0.468	525	0.656	2000	2.500	2710	3.388	3758	4.700
		Full	250	-	-	375	0.937	900	2.250	2900	7.250	5610	14.050
6.	Rabi Seasonals	-	-	510	-	714	-	2720	-	4687	-	4109	--
		1/3	25	-	-	510	0.125	714	0.178	2720	0.680	4687	1.170

1	2	3	4	5	6	7	8	9	10	11	12	13	14
		2/3	50	-	-	-	-	510	0.255	714	0.357	2720	1.360
		Full	75	-	-	-	-	-	-	510	0.382	1224	0.928
7. Hot weather Seasonals.		Half	125	20	0.025	28	0.035	107	0.134	144	0.180	200	0.250
		Full	250	-	-	20	0.050	48	0.120	155	0.387	299	0.746
					0.664		2.386		7.259		16.737		30.483

Sr. No.	Crops	Fraction of the rate as per concession.	Rate per Hectare	1981-1982		1982-1983		1983-1984		1984-1985		1985-1986	
				Area	Amount	Area	Amount	Area	Amount	Area	Amount	Area	Amount
1	2	3	4	15	16	17	18	19	20	21	22	23	24
1.	Sugarcane	Half	375	382	1.440	401	1,520	463	1.740	492	1.850	476	1.785
		Full	750	749	5.618	1131	8.483	1532	11.500	1995	14.950	2487	18.650
2.	Over lap.	Half	75	115	0.086	121	0.091	139	0.104	147	0.111	143	0.107
	i) Kharif	Full	150	224	0.336	339	0.509	460	0.690	599	0.899	745	1.120
	ii) Rabi	Half	125	152	0.190	161	0.201	185	0.231	197	0.246	190	0.238
		Full	250	300	0.750	452	1.130	613	1.530	798	2.000	995	2.490
	iii) Hot Weather Season-als.	Half	175	38	0.067	40	0.070	47	0.082	49	0.085	47	0.082
		Full	350	75	0.262	113	0.395	153	0.535	200	0.700	249	0.870

1	2	3	4	15	16	17	18	19	20	21	22	23	24
3.	Other perenni- als.	Half	250	191	0.476	200	0.500	232	0.585	245	0.612	239	0.597
		Full	500	375	1.875	566	2.830	766	3.830	998	4.990	1243	6.215
4.	Paddy	-	-	637	-	667	-	772	-	820	-	793	-
		1/3	16.33	501	0.082	637	0.104	667	0.109	772	0.126	820	0.134
		2/3	32.66	361	0.118	501	0.164	637	0.208	667	0.218	772	0.252
		Full	50	387	0.194	748	0.374	1249	0.623	1886	0.943	2553	1.277
5.	L.S. Cotton.	Half	125	4773	3.966	5001	6.250	5795	7.244	6149	7.686	5951	7.450
		Full	250	9368	23.420	14141	35.350	19142	47.855	24937	62.343	31085	77.700

1	2	3	4	15	16	17	18	19	20	21	22	23	24											
6. Rabi Seasonals	-	-	6493	-	6802	-	7881	-	8362	-	8092	-												
	1/3	25	4109	1.027	6493	1.620	6802	1.700	7881	1.970	8362	2.095												
	2/3	50	4687	2.344	4109	2.055	6493	3.247	6802	3.401	7881	3.941												
	Full	75	3944	2.960	8631	6.473	12740	9.555	19233	14.450	26035	19.526												
7. Hot Weather Seasonals	Half	125	255	0.328	267	0.334	309	0.386	328	0.410	317	0.396												
	Full	250	499	1.245	754	1.910	1021	2.560	1330	3.325	1658	4.140												
				48.786					70.363					94.314					121.315					148.065

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Sr. No.	Crops	Fraction of the rates as per concession.	Rate as per Ha.	1986-1987		1987-1988		1988-1989		1989-1990	
				Area	Amount	Area	Amount	Area	Amount	Area	Amount
1	2	3	4	25	26	27	28	29	30	31	32
1.	Sugar cane	Half	375	451	1.690	371	1.391	159	0.596	124	0.466
		Full	750	2693	22.250	3414	25.600	3785	28.388	3944	29.600
2.	Over lap.	Half	75	134	0.101	112	0.084	48	0.036	37	0.028
		1) Kharif	Full	150	889	1.330	1023	1.530	1135	1.703	1183
	ii) Rabi	Half	125	181	0.225	148	0.185	64	0.080	49	0.061
		Full	250	1185	2.960	1366	3.420	1514	3.790	1578	3.924
	iii) Hct weather seasonal.	Half	175	45	0.079	38	0.067	15	0.026	18	0.023
		Full	350	296	1.035	341	1.195	379	1.327	394	1.380

1	2	3	4	25	26	27	28	29	30	31	32
3. Other perennials	Half	250	224	0.560	187	0.468	79	0.198	62	0.155	
	Full	500	1482	7.410	1706	8.530	1893	9.465	1972	9.860	
4. Paddy	-	-	752	-	618	-	266	-	206	-	
	1/3	16.33	793	0.129	752	0.123	618	0.101	266	0.043	
	2/3	32.66	820	0.268	793	0.259	752	0.246	618	0.202	
	Full	50	3325	1.662	4145	2.073	4038	2.409	5690	2.845	
5. L.S.Cotton	Half	125	5635	7.044	4639	5.779	1994	2.493	1540	1.925	
	Full	250	37037	92.593	42672	106.680	47311	118.278	49305	123.263	

1	2	3	4	25	26	27	28	29	30	31	32
6. Rabi Seasonals.	-	-		7664	-	6309	-	2712	-	2075	-
	1/3	²⁵ 25		8092	2.023	7664	1.920	6309	1.577	2712	0.670
	2/3	50		8362	4.176	8092	4.046	7664	3.832	6309	3.155
	Full	75		33916	25.400	42278	31.709	50370	37.778	58034	43.600
7. Hot Weather Seasonals.	Half	125		301	0.376	247	0.309	106	0.133	81	0.101
	Full	250		1975	4.940	2276	5.690	2523	6.308	2629	6.573
				176.294		201.078		218.824		229.649	

STATEMENT SHOWING NET INCOME DUE TO WATER CHARGES

Amount Rs. in Lakhs

Sr. No.	Year	Gross income	Total area (Ha)	Working expenses Rs.12.50/Ha	Net income (3-5)
1	2	3	4	5	6
1.	1976-77	0.644	1000	0.1240	0.520
2.	1977-78	2.386	2400	0.296	2.090
3.	1978-79	7.259	7734	0.897	6.362
4.	1979-80	16.737	14962	1.847	14.890
5.	1980-81	30.483	24980	3.085	27.398
6.	1981-82	48.786	37711	4.560	44.226
7.	1982-83	70.363	51049	6.304	64.059
8.	1983-84	94.314	66501	8.220	86.094
9.	1984-85	121.315	82897	10.240	111.075
10.	1985-86	148.065	98765	12.200	135.865
11.	1986-87	176.294	113792	14.072	162.222
12.	1987-88	201.078	124119	15.325	185.753
13.	1988-89	218.824	131479	16.245	202.579
14.	1989-90	229.649	135567	16.791	212.858

Appendix - 10.4

Chapter - 10
Para - 4.0

DETAILS OF ANNUAL COLLECTION OF BETTERMENT LEVY

Amount Rs. in Lakhs.

Sr. No.	Year	Betterment levy for 20,000 Ha	Betterment levy for 74,682 Ha	Betterment levy for 40,885 Ha	Total	Cummulative Total.	Remarks.
1.	2	3	4	5	6	7	8
1.	1976-77	10.85	-	-	10.85	10.85	
2.	77-78	10.85	-	-	10.85	21.70	
3.	78-79	10.85	40.69	-	51.54	73.24	
4.	79-80	10.85	40.69	-	51.54	124.78	
5.	80-81	10.85	40.69	22.17	73.71	198.49	
6.	81-82	10.85	40.69	22.17	73.71	272.20	
7.	82-83	10.85	40.69	22.17	73.71	345.91	

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1	2	3	4	5	6	7	8
8.	1983-84	10.85	40.69	22.17	73.71	419.62	
9.	84-85	10.85	40.69	22.17	73.71	493.33	
10.	85-86	10.85	40.69	22.17	73.71	567.04	
11.	86-87	-	40.69	22.17	62.87	662.91	
12.	87-88	-	40.69	22.17	62.87	692.78	
13.	88-89	-	-	22.17	22.17	714.95	
14.	89-90	-	-	22.17	22.17	737.12	

Appendix - 10.5

Chapter - 10
Para - 5.0

FINANCIAL FORECAST

Amount Rs. in lakhs

Sr. No.	Year	Capital outlay during the year.	Cumulative capital outlay at the end of the year.	Cumulative Receipts from betterment levy.	Net cumulative capital outlay at the end of the year	Amount on which interest is charged.	Simple interest at 4½% on net capital outlay.	Cumulative interest at the end of the year.	Net Revenue at the end of the year.	Cumulative Revenue at the end of the year.	Net sum at charge at the end of the year.	% return on sum at charge
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	1973-74	163.35	163.35	-	163.35	81.67	3.67	3.67	-	-	167.200	
2.	1974-75	1051.15	1214.50	-	1214.50	688.92	31.00	34.67	-	-	1249.170	
3.	1975-76	1701.50	2916.00	-	2916.00	2065.25	92.94	100.81	-	-	3043.610	
4.	1976-77	2005.94	4921.94	10.85	4911.19	3074.00	176.11	303.72	0.520	0.520	5214.290	
5.	1977-78	1702.19	6624.13	10.70	6602.43	5756.76	259.05	562.77	2.090	2.610	7162.590	
6.	1978-79	643.48	7267.61	73.24	7194.37	6898.40	310.43	873.20	6.362	8.972	8058.598	

1	2	3	4	5	6	7	8	9	10	11	12	13
7.	1979-80	391.75	7659.36	124.78	7534.58	7364.42	331.40	1204.60	14.890	23.862	8715.318	
8.	1980-81	154.35	7813.71	194.49	7615.22	7574.90	340.87	1545.47	27.398	51.260	9109.430	
9.	1981.82	-	7813.71	272.20	7541.51	7578.36	341.02	1886.49	44.226	95.486	9332.514	
10.	1982-83	-	7813.71	345.91	7467.80	7504.65	337.71	2224.20	64.059	159.545	9532.455	
11.	1983-84	-	7813.71	419.62	7395.09	7430.91	334.39	2558.59	86.094	245.639	9707.041	
12.	1984.85	-	7813.71	493.33	7320.37	7357.23	331.07	2889.66	111.075	356.714	9853.316	
13.	1985-86	-	7813.71	567.04	7246.67	7283.52	327.75	3217.41	135.865	492.579	9971.501	
14.	1986-87	-	7813.71	629.90	7183.81	7215.24	324.68	3542.09	162.222	654.801	10071.009	
15.	1987-88	-	7813.71	692.76	7120.95	7152.38	321.85	3863.94	185.753	840.554	10144.333	
16.	1988-89	-	7813.71	714.93	7098.78	7109.86	319.94	4183.88	202.579	1043.133	10239.527	
17.	1989-90	-	7813.71	737.10	7076.61	7087.69	318.94	4502.82	212.858	1255.991	10323.439	2.06%

Appendix - 10.6

Chapter - 10
Para - 6.0

Letter

No. IRP/Jayakwadi Project/B.C./I
Poona-1.

Dated the 27th June 1973.

To

The Superintending Engineer,
Jayakwadi Project Circle,
Aurangabad.

Subject :- Jayakwadi Project Stage-II
Benefit Cost Ratio for the - -

Reference :- Your letter No. PB/JPS-II/146
dated the 14th June 1973.

...

With reference to above cited letter, the
B.C. Ratio for the Jayakwadi Project Stage-II is
hereby approved. The copy of the calculations of
B.C. Ratio duly approved is enclosed herewith.

OC: Approved by
A.D.A.

sd/-
for 'Addl. Director of Agriculture
(Eng.).

...

COMPUTATION OF BENEFIT COST RATIO

Irrigable Area	1,35,567 Hectares.
A) <u>Investment</u>	Rs. in lakhs
i) Cost of construction	7825.00
B) <u>Annual Cost.</u>	
i) Interest on Capital cost @ 10%	782.50
ii) Depreciation @ 1% on capital cost.	78.25
iii) Administrative charges @ Rs.25.00 per hectare.	32.89
	<hr/>
	894.64
C) <u>Annual Benefits</u>	
i) Net addition to agricultural produce.	2277.545
ii) Fish culture @ Rs.100 per acre limited to 3000 acres.	3.000
	<hr/>
	2280.545
	<hr/>
D) Benefit cost Ratio (C/B)	
= $\frac{2280.545}{894.64}$	
= 2.549	
Say = 2.55	
====	

NET BENEFIT STATEMENT

A) Net Benefit from command area after introducing Irrigation for 14200 hectare 2653.952 hence for 135567 hectares.

$$= \frac{2653.952}{142000} \times 1,35,567 \quad / \quad 2533.720$$

B) Loss of benefits.

From Command area.

i) Aurangabad District	..	2.236
ii) Bhir District.	..	111.040
iii) Parbhani District.	..	90.007
iv) Nanded District.	...	27.366
v) Ahmednagar District.	..	3.056

From Submergence area

vi) Bhir District.	..	13.472
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256.177

C) Net addition of agricultural produce.

$$= A - B = 2891$$

$$= 2533.720 - 256.177$$

$$= \underline{\text{Rs. 2277.543 lakhs}}$$

STATEMENT SHOWING BENEFITS IN COMMAND AREA AFTER IRRIGATION

Sr. Noo.	Name of crop	%	Total area in Hectare	Yield per Hect. in Quintals.	Total Yield in Quintals.	Rate per Quintal.	Amount in Rs. lakhs.	Deduct F.H.P. @ 10% of Col. 8 in Rs. lakhs.	Net Amount in Rs. lakhs (8-9)	Fodder Receipt %	Receipt of col. 10.	Dung Receipt @ 3% of Col. No.10.
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Sugar cane.	3%	4260	875	3727500	10	372.750	37.275	335.475	-	-	10.064
2.	Other perennials	1½%	2130	Rs. 4275	Per Hect: -	-	91.057	9.105	81.952	-	-	2.458
3.	Paddy	5%	7100	30	213000	69	146.970	14.697	132.273	15%	19.840	3.968
4.	L.S.Cotton	37½%	53250	20	1065000	300	3195.000	319.500	2875.500	-	-	86.265
5.	<u>Rabi Seasonals.</u>	51%	72350	-	-	-	-	-	-	-	-	-
	a) Jawar	30%	42600	17.50	745560	56	417.480	41.748	375.732	25%	93.933	11.272
	b) Maize	8%	11360	37.50	426000	60	255.600	25.500	230.040	-	-	6.901
	c) Wheat	8%	11360	20.00	22720	101	229.472	22.447	206.525	15%	30.978	6.195

1	2	3	4	5	6	7	8	9	10	11	12	13
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4.
5. Rabi Seasonals

d) Chillies.	5%	7100	16.25	115375	293	338.048	33.804	304.244	-	-	9.127
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6. Hot weather seasonals
Ground nut.

	2%	2840	18.75	53250	152	80.940	8.094	72.846	-	-	2.185
	<u>100%</u>	<u>142000</u>									

7. Kharif Crops before Rabi (Irrigation if required)

a) Kharif Ground nut.	15%	21300	7.00	149100	152	226.632	22.663	203.969	-	-	6.119
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b) Mug	15%	21300	2.40	51120	100	51.120	5.112	46.008	-	-	1.380
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c) Udid	8%	11360	2.40	27264	100	27.264	2.726	24.538	-	-	0.736
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d) Green Manure	8%	11360	Rs.187.50 Cr/Ha			21.300	2.130	19.170	-	-	0.575
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8. Gram after Paddy	5%	7100	12.50	88750	94	83.425	8.342	75.083	-	-	2.252
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(129)
(127)

Sr. No.	Name of crop	Total Benefits in Rs. lakhs (10+12+13)	Seed cost		Fertilizer & Manure cost		Total of col. 16+18.	Add for fodder @ 10% of Col.10.	Implement charges @ 3% of Col.10.
			Rate in Rs. per Hect.	Rs. in lakhs (4x15)	Rs. per Hectares.	Amount in Rs. lakhs			
1	2	14	15	16	17	18	19	20	21
1.	Sugar cane.	354.539	625	26.625	980	41.748	68.373	33.547	10.064
2.	Other perennials	84.140	@Rs.450 per hectare.	-	-	-	9.585	8.195	2.458
3.	Paddy	156.081	40	2.840	410	29.110	31.950	13.227	3.968
4.	L.S.Cotton	2961.765	20	10.650	535	279.562	290.212	287.550	86.265
5.	<u>Rabi Seasonals</u>								
	a) Jawar - 30%	480.937	10	4.260	226	95.850	100.110	37.573	11.272
	b) Maize -- 8%	236.941	37.5	4.260	300	34.080	38.340	23.004	6.901
	c) Wheat - 8%	243.698	100	11.363	475	53.960	65.320	20.652	6.195
	d) Chillies-5%	313.371	2.5	0.177	500	35.500	35.677	30.424	9.127

(130)

1	2	14	15	16	17	18	19	20	21	22
6. Hot weather Seasonals Ground nut.	75.031	200	5.680	125	3.550	9.230	7.282		2.185	
7. Kharif Crop before <u>Rabi</u> (Irrigation if required)										
a) Kharif Ground nut.	210.088	200	42.600	115	24.495	67.095	20.396		6.119	
b) Mug.	47.388	14	2.982	50	10.650	13.632	4.600		1.380	
c) Udid	25.274	14.52	1.591/1	50	-5.680	7.270	2.453		0.736	
d) Green Manure	19.745	Rs.62.50 per Ha	-	-	-	8.500	1.917		0.575	
8. Gram after Paddy	77.335	50	3.550	50	3.550	7.100	7.508		2.252	

(181)
(180)

Sr. No.	Name of Crops.	Labour charges 20% of Col.10.	Cost of pesticide		Total expenses col.19 to 24 (19+20 +21+22+23)	Net Benefits Col. (14-25)	Remarks
			Rate per Hectare in Rs.	Amount in Rs. lakhs.			
1.	2.	22.	23.	24.	25.	26.	27.
1.	Sugar Cane.	67.094	160	6.816	185.894	159.645	
2.	Other Perennials.	16.390	50	1.065	37.693	46.447	
3.	Paddy.	26.454	80.2	5.694	81.293	74.788	
4.	L.S.Cotton.	575.100	315	167.737	1406.864	1554.901	
5.	<u>Rabi Seasonals.</u>						
	a) Javar - 30%	75.146	48.5	20.721	244.822	236.115	
	b) Maize - 8%	46.008	48.50	5.509	119.762	117.179	
	d) Wheat - 8%	41.304	50.00	5.680	139.151	104.547	
	d) Chillies - 5%	60.848	63.25	4.490	140.565	172.805	

51%

1.	2.	22.	23.	24.	25.	26.	27.
6.	<u>Hot Weather Seasonals</u>						
	Ground nut.	14.569	36.50	1.036	34.304	40.727	
7.	<u>Kharif Crops before Rabi.</u> (Irrigation if required)						
	a) Kharif Ground nut	40.792	36.50	7.774	142.176	67.912	
	b) Mug	9.200	-	-	28.812	18.576	
	c) Udid	4.906	-	-	15.342	9.932	
	d) Green Manure	3.534	-	-	14.826	4.919	
8.	Gram after paddy.	15.016	-	-	31.876	45.459	
						<u>2653.952</u>	

(133)

Sr. No.	Name of Crop	%	Total area in Ha	Yield per in Ha Quintals.	Total yield in Quintals.	Rate per Quintal in Rs.	Amount in Rs. lakhs.	Deduct F.H.P. @ 10% of Col. 8 in Rs. lakhs.	Net amount in lakhs (8-9)	Fodder Receipt % of Col. 10.	Dung Receipt @ 3% of Col. 10.	Total benefit in Rs. lakhs 10+12+13.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Rice	0.10	1.70	5.00	8.5	69	0.005	Nil	0.005	15	0.001	-	0.006
2.	Wheat	4.10	71.00	3.16	224.4	101	0.226	0.022	0.204	15	0.030	0.006	0.240
3.	Jawar (Kh)	1.00	17.30	4.37	75.6	56	0.042	0.004	0.038	25	0.005	0.001	0.048
4.	Jawar (Rabi)	30.10	520.00	4.09	2126.8	56	1.191	0.119	1.072	25	0.268	0.032	1.372
5.	Bajra	16.40	288.40	3.45	994.9	75	0.756	0.075	0.681	-	-	0.020	0.701
6.	Gram	1.60	27.80	2.97	82.5	94	0.077	0.007	0.070	-	-	0.002	0.072
7.	Other Pulses	20.70	256.70	2.44	870.3	100	0.870	0.087	0.783	-	-	0.023	0.806
8.	Sugar Cane	0.30	5.20	4.00	2080	10	0.208	0.020	0.258	-	-	0.007	0.265

10
11
12

1	2	3	4	5	6	7	8	9	10	11	12	13	14
9.	Misc. food Crops.	1.10	19.00	3.41	64.7	60	0.038	0.003	0.035	-	-	0.001	0.036
10.	Cotton.	17.40	300.00	4.53	1359.0	200	2.712	0.271	2.447	-	-	0.073	2.520
11.	Ground nut.	5.20	90.00	3.91	351.9	152	0.534	0.053	0.481	-	-	0.014	0.495
12.	Other Oil Seeds.	1.90	32.20	1.90	63.0	65	0.040	0.004	0.036	-	-	0.001	0.037
13.	Tobacco.	0.10	1.70	5.00	8.5	250	0.021	0.002	0.019	-	-		0.019
		<u>100.00</u>	<u>1732.00</u>										

Sr. No.	Crops	Seed Cost		Fertilizer & manure cost		Total of col. 16+18.	Add for fodder @ 10% of col. 10.	Imple-ment charges @ 3% of col. 10.	Labour charges 20% of col. 10.	Cost of Pesticide		:Total expenses col. 19+20+21+22+24.	Net bene-fit col. 14-25	: Remarks
		Rate Rs./Ha	Cost Rs. in lakhs 4x15	Rate per Ha	Amount in Rs. lakhs					Rate/Ha	Amount in lakhs			

1	2	15	16	17	18	19	20	21	22	23	24	25	26	27
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1.	Rice.	50	0.001	115	0.002	0.003	-	-	0.001	32.45	0.001	0.005	0.001	
2.	Wheat.	62.5	0.004	100	0.007	0.011	0.020	0.006	0.040	-	0.003	0.080	0.160	
3.	Jawar (Kh)	12	0.002	60	0.010	0.012	0.003	0.001	0.007	16.50	0.002	0.025	0.023	
4.	Jawar (Rabi)	10	0.052	60	0.312	0.364	0.107	0.032	0.214	16.50	0.085	0.802	0.570	
5.	Bajra	15	0.043	50	0.244	0.287	0.068	0.020	0.136	16	0.043	0.554	0.147	
6.	Bram.	50	0.013	50	0.013	0.026	0.007	0.002	0.014	-	-	0.049	0.023	
7.	Other Pulses	19	0.067	50	0.0178	0.245	0.078	0.023	0.0156	-	-	0.602	0.204	

(136)

1	2	15	16	17	18	19	20	21	22	23	24	25	26	27
8.	Sugarcane.	625	0.032	500	0.026	0.058	0.025	0.007	0.050	160	0.008	0.138	0.127	
9.	Misc. food Crops.	10	0.501	40	0.007	0.008	0.003	0.001	0.007	-	-	0.019	0.017	
10.	Cotton.	1440	0.043	225	0.675	0.718	0.244	0.073	0.0489	36	0.108	1.632	0.833	
11.	Groundnut	200	0.180	115	0.103	0.283	0.048	0.014	0.096	36.50	0.041	0.482	0.053	
12.	Other Oil seeds.	20	0.006	20	0.006	0.012	0.003	0.001	0.007	10	0.003	0.026	0.011	
13.	Tabacco.	10	-	210	0.003	0.003	0.001	-	0.003	-	-	0.007	0.012	
													<u>2.236</u>	

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STATEMENT SHOWING EXISTING BENEFITS FROM COMMAND AREA BEFORE IRRIGATION FROM BHIR DISTRICT.

Sr. No.	Name of Crop	%	Total area in Ha	Yield per Ha in Quin-tals.	Total yield in Quin-tals.	Rate per Quin-tals	Amount in Rs. lakhs	Deduct FHP @ 10% of col. 8 Rs. in lakhs	Net amount in Rs. lakhs (8-9)	Fodder receipt: % of Col. 10.	Dung receipt @ 3% of col. 10.	Total benefits in Rs. lakhs (10+12+13)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Paddy	0.48	324.2	5.00	1621.0	69	1.118	0.111	1.007	15	0.151	0.030	1.188
2.	Wheat.	3.48	2315.0	4.15	9607.2	101	9.703	0.970	8.733	15	1.309	0.261	10.303
3.	Jawar(Kh)	1.68	1123.5	6.45	7246.5	56	4.058	0.405	3.653	25	0.193	0.109	4.675
4.	Jawar(Rabi)	29.23	19445.0	5.73	111419.8	56	62.395	6.239	56.156	25	14.039	1.680	71.875
5.	Bajri	13.80	9180.0	3.24	2974.3	276	22.604	2.260	20.344	-	-	0.610	20.954
6.	Gram	3.25	2172.0	3.36	7297.9	94	6.850	0.686	6.174	-	-	0.185	6.359
7.	Other Pulses	17.34	11547.0	2.42	27943.7	100	27.943	2.794	25.149	-	-	0.754	25.903

1	2	3	4	5	6	7	8	9	10	11	12	13	14
8. Sugarcane	0.10	66.0	370.00	24420	10	2.442	0.244	2.198	-	-	0.065	2.264	
9. Misc. Crops	0.58	370.7	4.44	1645.9	60	0.987	0.098	0.889	-	-	0.026	0.915	
10. Cotton	15.47 10295.5		5.34	54977.9	200	109.955	10.995	98.960	-	-	2.968	101.928	
11. Ground Nut.	4.30	2865.0	7.05	20198.2	152	30.701	3.070	27.631	-	-	0.828	28.459	
12. Other oil Seeds	10.30	6854.0	1.96	13433.8	65	8.731	0.873	7.858	-	-	0.235	8.093	
13. Tobacco	0.01	1.5	3.3	4.9	250	0.012	0.001	0.011	-	-	-	0.011	
	100	66560.0											

Sr. No.	Name of Crop	Seed Cost		Fertilizer & manure cost		Total of col. 16+18.	Add for: fodder @ 10% of col. 10.	Implement charge @ 3%	:Labour charges 20% of col.10	:Cost of pesticide		Total expenses (19+20 +22+24)	Net benefit (14-25)
		Rate/ Ha	Cost in lakhs (4x15)	Rate/ Ha	Amount					Rate	Amount		
1	2	15	16	17	18	19	20	21	22	23	24	25	26
1.	Paddy	50	0.162	145	0.470	0.632	0.100	0.030	0.201	32.45	0.105	1.068	0.120
2.	Wheat	62.5	0.144	160	2.315	2.459	0.873	0.261	1.746	5.0	0.115	5.454	4.849
3.	Jawar (Kh)	12	0.134	60	0.674	0.808	0.365	0.109	0.630	16.50	0.197	2.109	2.566
4.	Jawar (Rabi)	10	1.944	60	11.667	13.611	5.615	1.680	10.231	48.5	9.430	40.567	31.308
5.	Bajri	15	1.377	50	4.590	5.967	2.034	0.610	4.068	16.0	1.468	14.147	6.207
6.	Gram	50	1.086	50	1.086	2.172	0.617	0.185	1.224	-	-	4.198	2.161
7.	Other Pulses	19	2.193	50	5.773	7.966	2.514	0.754	5.029	-	-	16.263	9.640

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1	2	15	16	17	18	19	20	21	22	23	24	25	26
8. Sugar Cane.		625	0.378	500	0.330	0.708	0.219	0.066	0.438	160	0.096	1.527	0.737
9. Misc. Crops.		10	0.037	-	-	0.037	0.088	0.026	0.177	-	-	0.328	0.587
10. Cotton.		14.1	1.482	225	23.164	24.646	9.896	2.988	19.792	36.50	3.706	61.008	40.920
11. Ground nut.		200	5.740	115	3.294	9.034	2.763	0.828	5.526	36.50	1.045	19.196	9.263
12. Other oil seeds.		20	1.370	20	1.370	2.740	0.786	0.235	1.571	10	0.685	6.016	2.077
13. Tobacco.		1.0	-	210	0.003	0.003	0.001	-	0.002	-	-	0.006	0.005

111.040

(141)

Sr. No.	Name of Crops.	%	Total area in Ha	Yield per Ha in Quintals	Total yield in Quintals.	Rate per Quintal.	Amount in Rs. lakhs	Deduct FHP @ 10% of col. 8 in lakhs.	Net amount in lakhs (8-9)	Fodder receipt % of Col. 10.	Dung receipt @ 3% of col. 10	Total benefit in Rs. lakhs (10+12+13)	
1	2	3	4	5	6	7	8	9	10.	11	12	13.	14
1.	Rice	1.1	640	6.84	4377.6	69	3.020	0.302	2.718	15	0.405	0.081	3.204
2.	Wheat.	3.4	2000	4.63	9260.0	101	9.452	0.935	8.417	15	0.252	1.262	9.931
3.	Jawar (Kh)	16.3	9650	4.78	46127.0	56	25.831	2.583	23.248	25	5.812	0.697	29.757
4.	Jawar (Rabi)	18.2	10200	5.18	52836.0	56	29.588	2.958	26.630	25	6.657	0.798	34.025
5.	Bajra	0.8	470	3.33	1565.1	76	1.189	0.118	1.071	-	-	0.032	1.103
6.	Gram.	3.5	2200	2.61	5742.0	94	5.397	0.539	4.858	-	-	0.145	5.003
7.	Other Pulses	19.7	11767	3.51	41302.1	100	41.302	4.130	37.172	-	-	1.115	38.287

(122)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
8. Sugar Cane.	0.3	53	400	23200.0	10	2.320	0.232	2.088	-	-	0.062	2.150	
9. Misc. food Crop.	0.3	175	4.40	785.7	60	0.471	0.047	0.434	-	-	0.012	0.436	
10. Cotton.	27.0	15735	4.10	64513.5	200	129.902	12.902	116.136	-	-	3.483	119.608	
11. Ground Nut	1.8	1050	8.72	9156.0	162	13.917	1.391	12.526	-	-	0.375	12.901	
12. Other oil seeds	7.6		2.24	9945.5	65	6.464	0.646	5.818	-	-	0.174	5.992	
Total:		100	58385										

(143(1) 2-7)

Sr. No.	Name of Crops	Seed cost		Fertilizer & manure cost		Total of col. 16+ 18	Add for fodder @ 10% Col. 10	Imple- ment charges @ 3% of col. 10.	Labour charges 20% of col. 10	Cost of Pesticide		:Total expenses in lakhs (19+20+ 21+22+ 24)	:Net bene- fit of col. 14-25
		Rate in Rs./Ha.	Rs. in lakhs	Rate/ Ha	Amount in Rs. lakhs					Rate/ Ha	Amount in lakhs		
1	2	15	16	17	18	19	20	21	22	23	24	25	26
1.	Rice.	50	0.320	145	0.928	1.248	0.271	0.081	0.542	32.45	0.207	2.349	0.855
2.	Wheat.	62.5	1.250	100	2.000	3.250	0.841	1.262	1.682	5	0.100	7.135	2.796
3.	Jawar (Kh)	12	1.158	60	5.790	6.948	2.324	0.697	4.468	16.5	1.592	16.209	13.548
4.	Jawar (Rabi)	10	1.020	60	6.120	7.140	2.663	0.798	5.325	16.5	1.682	17.610	16.475
5.	Bajri	15	0.070	50	0.236	6.305	0.107	0.032	0.214	16	0.075	0.733	0.370
6.	Gram	50	1.100	50	1.100	2.200	0.485	0.145	0.970	-	-	3.800	1.203
7.	Other Pulses	19	2.235	50	5.883	8.118	3.717	1.115	7.434	-	-	20.384	17.903
8.	Sugarcane.	625	0.330	500	0.290	0.650	0.208	0.062	0.416	160	0.090	1.426	0.724

(144)

1.	2	15	16	17	18	19	20	21	22	23	24	25	26
9. Misc. food Crop.		10	0.017	40	0.070	0.087	0.042	0.012	0.084	-	-	00.225	0.211
10. Cotton.		14.40	2.265	225	35.403	37.668	11.612	3.483	23.224	36	5.664	81.651	37.957
11. Ground nut		200	2.100	115	1.207	3.307	1.252	0.375	2.504	36.5	0.383	7.821	5.080
12. Other oil Seeds.		20	0.888	20	0.388	1.776	0.581	0.174	1.162	10	0.444	04.137	1.885
													99.007

(145) (145)

Sr. No.	Name of Crops.	%	Total area in Ha	Yield per Ha in Quintals.	Total yield in Quintals.	Rate per Quintals.	Amount Rs. in lakhs.	Deduct F.H.P. @ 10% of col. 8 in Rs. lakhs.	Net amount in Rs. lakhs (8-9)	Fodder Receipt % of col. 10.	Dung receipt @ 3% of col. 10.	Total benefit in Rs. lakhs (10+12+13)+1.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Paddy	0.2	14	5.52	77.8	69	0.053	0.005	0.048	15	0.007	0.001	0.056
2.	Jawar (Rabi)	40.2	2937	7.53	21814.4	56	12.216	1.221	10.995	25	2.748	0.329	14.072
3.	Jawar	1.2	86	7.02	503.7	56	0.332	0.033	0.305	25	0.076	0.009	0.390
4.	Other Pulses	15.8	1122	3.85	15430.2	100	15.430	1.543	14.227	-	-	0.416	14.303
5.	Misc. Crops.	0.2	14	6.25	27.5	60	0.052	0.005	0.047	-	-	0.001	0.048
6.	Other Fibre Crops.	2.5	130	1.00	130.0	27	0.042	0.004	0.044	-	-	0.001	0.045
7.	Ground Nut	2.4	172	7.05	1212.6	152	1.843	0.244	1.659	-	-	0.049	1.702

1	2	3	4	5	6	7	8	9	10	11	12	13	14
8.	Other Oil Seeds.	4.3	324	2.24	725.7	65	0.471	0.047	0.424	-	-	0.012	0.436
9.	Wheat.	1.0	72	5.96	429.1	101	0.433	0.043	0.390	15	0.052	0.011	0.459
10.	Gram.	1.1	79	3.57	282.0	94	0.265	0.026	0.239	-	-	0.007	0.243
11.	Bajri.	0.1	7	3.21	22.4	76	0.170	0.017	0.153	-	-	0.003	0.156
12.	Sugarcane.	2.2	153	4.00	74000	10	7.400	0.740	6.660	-	-	0.199	6.859
13.	Cotton.	28.8	2075	5.72	11869.0	200	23.738	2.373	21.365	-	-	0.640	22.005

100% 7200

Sr. No.	Name of Crop	Seed Cost		Fertilizer & manure cost		:Total of col. 16+18	:Add for fodder @ 10% of col. 10.	:Imple- ment charges @ 3% of col. 10.	:Labour charges 20% of col. 10.	:Cost of Pesticide		:Total : Net	:Net benefit (14-25)
		Rate in Rs./Ha	:Rs. in lakhs (4x15)	Rate/ Ha	:Amount in Rs. lakhs.					Rate/ Ha	:Amount in Rs. lakhs (4x23)		
1	2	15	16	17	18	19	20	21	22	23	24	25	26
1.	Paddy.	50	0.007	145	0.020	0.027	0.004	0.001	0.009	32.45	0.004	0.045	0.011
2.	Jawar(Rabi)	12	0.347	60	1.738	2.085	1.099	0.329	0.199	16.50	0.470	6.182	7.890
3.	Other Pulses	19	0.215	50	0.566	0.781	1.388	0.416	2.777	-	-	5.362	8.941
4.	Misc. Crops.	10	0.001	40	0.005	0.006	0.004	0.001	0.009	-	-	0.020	0.028
5.	Other Fibre Crops.	5	0.009	-	-	0.009	0.004	0.001	0.008	-	-	0.022	0.023
6.	Ground Nut.	200	0.344	115	0.197	0.541	0.165	0.049	0.331	36.50	0.062	1.148	0.560
7.	Other Oil Seeds.	20	0.064	20	0.064	0.128	0.042	0.012	0.024	10	0.032	0.298	0.138
8.	Wheat	62.5	0.044	100	0.072	0.116	0.039	0.011	0.078	5.0	0.003	0.247	0.212

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1	2	15	16	17	18	19	20	21	22	23	24	25	26
9.	Jawar (Rabi)	10	0.008	60	0.051	0.059	0.030	0.009	0.061	48.5	0.041	0.200	0.190
10.	Gram.	50	0.009	50	0.079	0.078	0.023	0.007	0.047	-	-	0.155	0.091
11.	Bajari.	15	0.001	50	0.003	0.004	0.015	0.003	0.030	125	0.008	0.060	0.096
12.	Sugarcane.	625	0.987	500	0.740	1.777	0.666	0.199	1.372	160	0.252	4.226	2.633
13.	Cotton.	14.4	2.988	225	4.668	7.658	2.136	0.640	4.273	36	0.747	15.452	6.553

27.366

Statement showing existing benefits from command area from Ahmednagar District.

Sr. No.	Name of Crop	%	Total area in Ha	Yield per Ha in Quintals	Total yield in Quintals	Rate per quintal in Rs.	Amount in lakhs.	Deduct F.H.P. @ 10% of col. 12 in lakhs.	Net amount in lakhs (7-9)	Fodder % of col. 10.	Dung receipt @ 3% col. 10.	Total benefits (10+12+13)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Rice.	0.1	1.69	5.00	8.45	69	0.006	0.001	0.005	15	-	-	0.005
2.	Wheat.	4.1	69.29	3.16	218.95	101	0.221	0.002	0.199	15	0.029	0.006	0.234
3.	Jawar(Kh)	1	16.90	4.37	73.85	56	0.041	0.004	0.037	25	0.009	0.001	0.047
4.	Jawar (Rabi)	30.1	503.69	4.09	2080.54	56	1.185	0.116	1.049	25	0.167	0.031	1.247
5.	Bajra	16.4	277.16	3.45	956.20	76	0.726	0.072	0.654	-	-	0.019	0.673
6.	Gram	1.6	27.04	2.97	80.30	94	0.075	0.007	0.068	-	-	0.002	0.070
7.	Other Pulses	20.7	349.83	2.44	853.58	100	0.853	0.085	0.768	-	-	0.023	0.791

1	2	3	4	5	6	7	8	9	10	11	12	13	14
8. Sugarcane	0.3	5.07	600	3042.0	10	0.304	0.030	0.274	-	-	0.003	0.282	
9. Misc. food Crop	1.1	18.59	3.41	63.39	60	0.038	0.004	0.034	-	-	0.001	0.035	
10. Cotton.	17.4	294.06	4.53	2012.09	200	4.024	0.402	3.622	-	-	0.108	3.730	
11. Groundnut	5.2	87.83	3.91	343.61	152	0.522	0.052	0.470	-	-	0.014	0.484	
12. Other oil Seeds.	1.9	32.11	1.90	61.01	65	0.039	0.004	0.035	-	-	0.001	0.036	
13. Tobacco.	0.1	1.69	5.00	8.44	250	0.021	0.002	0.019	-	-	-	0.019	
			100	1690.00									

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Sr. No.	Name of Crop	Seed Cost		Fertilizer & manure cost		Total of col. (16+18)	Add for fodder @ 10% of col. 10.	Imple- ment charges @ 3% of col. 10.	Labour charges of 20% of col. 10.	Cost of pesticide		Total expenses col. (19+20+21+22+24)	Net benefit col. (14.24)
		Rate in Rs./Ha	Rs. in lakhs (4x15)	Rate	Amount in lakhs.					Rate per Ha	Amount in lakhs.		
1	2	15	16	17	18	19	20	21	22	23	24	25	26
1.	Rice	50	=	145	0.002	0.002	-	-	-	32.45	-	0.002	0.003
2.	Wheat.	62.5	0.043	100	0.069	0.112	0.002	0.006	0.004	5	-	0.124	0.110
3.	Jawar (Kh)	12	0.002	60	0.010	0.012	0.004	0.001	0.007	16.50	0.002	0.026	0.021
4.	Jawar (Rabi)	10	0.051	60	0.305	0.355	0.186	0.031	0.209	16.50	0.084	0.785	0.462
5.	Bajra	15	0.042	50	0.133	0.180	0.065	0.019	0.131	16.00	0.044	0.439	0.234
6.	Gram	50	0.013	50	0.013	0.026	0.007	0.002	0.013	-	-	0.048	0.022
7.	Other Pulses	19	0.066	50	0.175	0.241	0.077	0.023	0.153	-	-	0.494	0.297
8.	Sugarcane	625	0.032	500	0.025	0.057	0.027	0.008	0.054	160.00	0.008	0.154	0.128

1	2	13	16	17	18	19	20	21	22	23	24	25	26
9. Misc. Food Crop.	10	0.002	40	0.007	0.009	0.003	0.001	0.007	-	-	0.020	0.015	
10. Cotton.	14.4	0.042	225	0.662	0.704	0.362	0.102	0.724	36.00	0.106	2.004	1.726	
11. Ground Nut	200.0	0.176	115	0.101	0.277	0.047	0.014	0.094	36.50	0.033	0.464	0.020	
12. Other oil Seeds.	20	0.006	20	0.006	0.012	0.004	0.001	0.007	10.00	0.003	0.027	0.009	
13. Tobacco	10.00	-	210	0.004	0.004	0.002	-	0.004	-	-	0.010	0.009	
												Total:	<u>3.056</u>

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Statement showing existing benefits from submergence area from Bhir District.

Sr. No.	Name of Crop.	%	Total area in Ha	Yield per Ha in quin-tals.	Total yield in quin-tals.	Rate per Quintal.	Amount in Rs. lakhs.	Deduct F.H.P. @ 10% of col. 8 in lakhs.	Net amount in Rs. lakhs (2-9)	Fodder Receipt % of col. 10.	Dung receipt @ 3% of col. 10.	Total benefit in Rs. lakhs (10+12+13)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Rice	0.43	33.3	5.00	191.5	69	0.132	0.013	0.119	15	0.017	0.003	0.139
2.	Wheat	3.46	276.2	4.15	1146.2	101	1.157	0.115	1.042	15	0.156	0.031	1.229
3.	Jawar(Kh)	1.67	133.3	6.45	859.7	56	0.481	0.048	0.433	25	0.108	0.012	0.553
4.	Jawar (Rabi)	29.42	2348.3	5.73	13155.7	56	7.535	0.753	6.782	25	1.695	0.203	8.680
5.	Bajari	13.75	1097.5	3.24	3555.9	76	2.702	0.270	2.432	-	-	0.072	2.504
6.	Gram	3.25	258.4	3.36	871.5	94	0.819	0.081	0.738	-	-	0.022	0.760
7.	Other Pulses	17.29	1380.0	2.42	3339.6	100	3.339	0.334	3.005	-	-	0.090	3.095

1	2	3	4	5	6	7	8	9	10	11	12	13	14
8.	Sugarcane	8.10	3.0	370.00	2960	10	0.296	0.029	0.267	-	-	0.008	0.275
9.	Cotton	15.47	1234.8	5.34	6593.8	200	13.157	1.313	11.869	-	-	0.356	12.225
10.	Misc. Crops	0.55	44.0	4.44	195.3	60	0.117	0.011	0.106	-	-	0.003	0.109
11.	Groundnut	4.29	342.4	7.05	2413.5	152	3.669	0.366	3.303	-	-	0.098	3.402
12.	Other Oil Seeds	10.26	819.0	1.96	1605.2	65	1.043	0.104	0.939	-	-	0.023	0.967
3.	Tobacco	0.01	0.8	3.3	2.64	250	0.006	0.001	0.005	-	-	-	0.005
		<u>100%</u>		<u>7982.0</u>									

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Sr. No.	Name of Crop.	Seed Cost		Fertiliser and manure cost		Total of col. (16+18)	Add for fodder @ 10% of col. 10.	Implement charges @ 3% of col. 10.	Labour charges 20% of col. 10	Cost of pesticide		Total expenses in col. 19 to 24.	Net benefit (14-25)
		Rate in Rs. Ha	Rs. in lakhs (4x15)	Rate per Ha	Amount in Rs. lakhs.					Rate/ Ha	Amount in lakhs		
1	2	15	16	17	18	19	20	21	22	23	24	25	26
1.	Rice.	50	0.019	145	0.055	0.074	0.011	0.003	0.022	32.45	0.012	0.122	0.017
2.	Wheat.	62.5	0.172	100	0.276	0.448	0.104	0.031	0.208	5.00	0.013	0.804	0.425
3.	Jawar (Kh)	12.0	0.015	60	0.077	0.094	0.043	0.012	0.086	16.50	0.021	0.256	0.297
4.	Jawar (Rabi)	10	0.235	60	1.408	1.643	0.678	0.203	1.256	48.50	1.138	4.918	3.762
5.	Bajari	15	0.164	50	0.548	0.712	0.243	0.072	0.486	16.00	0.175	1.688	0.816
6.	Gram	50	0.129	50	0.129	0.252	0.073	0.022	0.146	-	-	0.493	0.267
7.	Other Pulses	19	0.232	50	0.690	0.952	0.300	0.090	0.301	-	-	1.643	1.452
8.	Sugarcane	625	0.050	500	0.040	0.090	0.026	0.008	0.052	160	0.012	0.188	0.087

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1	2	15	16	17	18	19	20	21	22	23	24	25	26
9. Misc. Crops.		10	0.004	-	-	0.004	0.010	0.003	0.021	-	-	0.038	0.071
10. Cotton		14.4	0.177	255	2.778	2.955	1.186	0.356	2.373	36	0.444	7.314	4.911
11. Ground Nut		200	0.634	115	0.393	1.077	0.330	0.099	0.660	36.50	0.124	3.290	1.112
12. Other Oil Seeds.		20	0.163	20	0.163	0.326	0.093	0.028	0.187	10	0.081	0.715	0.252
13. Tobacco		10	-	210	0.001	0.001	-	-	0.001	-	-	0.002	0.003
													13.472

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Statement - 8.01

Chapter - 8
Para - 2.00JAYAKWADI PROJECT STAGE-IIGeneral Abstract

<u>A) Direct Charges</u>	<u>Rs. in lakhs</u>
<u>I - Works</u>	
I - Head Works	1,825.00
Majalgaon Reservoir	
II - Main Canal and Branches.	
a) Paithan Right Bank Canal.	2,087.54
b) Majalgaon Right Bank Canal.	2,892.18
	<hr/>
	4,979.72
	<hr/>
	4,979.72
 <u>III-Distributaries.</u>	
a) Paithan Right Bank canal (59892 Ha x Rs.350/Ha)	209.62
b) Majalgaon Right Bank Canal. (131520 Ha x Rs.350/Ha)	460.32
	<hr/>
Total	7,474.66
	<hr/>
II -Establishment 7.5%	560.60
III-Ordinary Tools and Plant 1.5%	112.20
IV -Losses on stock 0.5%	37.40
	<hr/>
Total	8,184.86

(159)

Deduct Receipts and Recoveries.

371.15

Net Total (A)

7,813.71

B) Indirect charges

Abatement on Land Revenue.

(i) Head Works. 7.89

(ii) Canal and Branches. 3.40

11.29

11.29

Grand Total

7,825.00

...

(160)

Statement - 8:02

Chapter - 8
Para - 3.00

JAYAKWADI PROJECT STAGE - II

I. WORKS

I - HEAD WORKS

CLASSIFIED ABSTRACT

<u>Sub - Head</u>	<u>Cost Rs. in lakhs</u>
A - Preliminary	16.50
B - Lands	517.06
C - Works	
a) Earthen Dam	554.25
b) Masonry Dam	497.58
c) Cause-way	3.25
	1055.08
D - Regulators	35.00
K - Buildings	63.50
M - Plantation	5.00
O - Miscellaneous	38.70
P - Maintenance	12.00
Q - Special Tools & Plant	72.16
R - Communications	10.00
	<hr/>
Total	1825.00

Statement - 8.05

Chapter - 8
Para - 3.01I - HEAD WORKSA - PRELIMINARY

Sr. No.	Descriptionn	Amount Rs. in lakhs
1	2	3
1.	Survey and investigation of dam and reservoir to prepare the project report (sanctioned under Govt. Ir. No.HPD PIM 4996/44413 IP (I) D/- 29.1.60)	2.60
2.	Detailed surveys, exploration of foundation, block contouring, etc. for detailed design of head work.	5.00
3.	Establishing soil testing and material testing laboratory.	2.50
4.	Investigations of quarries for earthen dam and masonry dam.	0.50
5.	Provision for annual running and maintenance of laboratory (5 years)	3.00
6.	F.R.L., & M.W.L, survey for Majalgaon Reservoir.	0.50
7.	Establishing and maintenance of rain guage stations	0.50
8.	Aerial survey of Majalgaon Reservoir (8000 Hectares x Rs. 5/--)	0.40
9.	Miscellaneous unforeseen items.	1.50
Total		16.50

I - HEAD WORKSB - Lands

Acquisition of lands and structures likely to be submerged under Majalgaon Reservoir.

Quantity	Item	Rate	Per	Amount Rs. in Lakhs.
1.	2.	3.	4.	5.
	1) Acquisition of culturable land likely to be submerged upto F.R.L. for dam seat, colony buildings, and land for alternate goathans.			
540 Ha	a) Wet Land	7500	Ha	40.50
		(As per analysis)		
6874 Ha	b) Dry Land	4000	Ha	274.90
		(As per analysis)		
	2) Solatium charges at 15% of item No.1.			47.25
19 Village	3) Compensation for Mango and other fruit bearing trees, wells, bunds, etc.	30000	Village	5.70
2375 Structures.	4) Acquisition of structures from villages likely to be submerged.	4000	Each	95.00
		(As per analysis)		
	5) Solatium charges at 15% of item 4 above.			14.31

Quantity	I t e m s	Rate	Per	Amount Rs. in Lakhs.
1	2	3	4	5

17 Village	6) Providing civic amenities at new gaothans and other facilities to displaced persons.	120000—Village	20.40	(As per analysis)
	7) Revenue establishment.		15.00	
	8) Joint measurement survey, demarcation of land, fixing F.R.L. stones, M.W.L. stones etc.	L.S.	4.00	
			TOTAL:	517.06

Item No.1: Actual compensation paid for lands under submergence of Paithan reservoir:

Sr. No.	Name of village/ Taluka/District	Typical survey Nos.	Total area (Acres)	Amount for wet lands Rs.	Amount for Dry land Rs.	Rate/Acre Dry lands Rs.	Rate/Acre Wet lands Rs.	Rs.	Remarks
1	2	3	4	5	6	7	8	9	
1.	A) District Ahmednagar (Tal: Galnimb.) (Tal: Newasa)	2/1	2.17	-	3,152.50	1300	-	-	
		5/1	1.20	4500.00	-	-	3000		
		5/2	1.00	-	1,375.00	1375	-		
2.	Kalegaon (Tal: Newasa)	1	1.17	-	2,208.75	1550	-		
		22	29.06	-	45,182.00	1550	-		
		23/1	7.20	-	11,625.00	1550	-		
		136/1	1.36	5700.00	-	-	3000		
3.	Gevri (Tal: Shevgaon)	59/2c	0.30	2250.00	-	-	3000		
		13	4.35	-	7,556.25	1550	-		
		28/1	4.36	-	6,370.00	1300	-		
4.	Goglogaon (Tal: Shevgaon)	11	9.25	-	12,512.50	1300	-		
		15/1	9.11	-	3,602.50	1100	-		

1	2	3	4	5	6	7	8	9
5.	B) <u>District Aurangabad</u>	1	3.35	-	5,800.00	1500	-	
	(Lambaven (Taluka Paithan)	2	8.08	-	12,300.00	1500	-	
6.	<u>Lingatpuri</u>	8	22.07	-	28,800.00	1300	-	
	(Taluka Paithan)	9	21.30	-	30,500.00	1400	-	
7.	<u>Agarwadgaon</u>	5	3.16	-	4,420.00	1300	-	
	(Taluka Gangapur)	3	1.22	-	2,404.00	1550	-	
Average rate:-						1410	3000	

- (I) Average Rate for Dry lands = Rs.1410/- per acre or Rs.3500/- per Ha
 (II) Average Rate for Wet lands = Rs.3000/- per acre or Rs.7500/- per Ha

Item No.4: Actual compensation for structures under submergence of Paithan reservoir.

Sr. No.	Name of village:	Taluka	No. of structures:	Total valuation (Rs. in lakhs)	Remarks.
1	2	3	4	5	6
1.	Kalegaon	Nawasa	283	9.31	
2.	Warkhed	"	181	7.48	

1	2	3	4	5	6
3.	Malewadi	Newasa	53	2.20	
4.	Narala	Paithan	95	3.53	
5.	Dawarwadi	Paithan	30	1.46	
6.	Ganglewadi	Paithan	54	2.20	
7.	Sonewadi (Kd.)	Paithan	19	0.81	
8.	Saokheda	Gangapur	387	15.63	
9.	Sultanpur	Gangapur	9	0.81	
10.	Khirdi	Shevgaon	226	8.55	
Total:-			1337	51.98	

Cost per structure is about Rs. 4,000/-

Item No.6 : Details of civic amenities

Sr.No.	Particulars	Rate	Amount
1	2	3	4
1.	Gaothan site including demarcation and stone fixing etc. @ Rs.4000/- acre for 4 acres.	4000/- per acre	16,000/-

Sr. No.	Particulars	Rate	Amount
1	2	3	4
2.	Well 1 No.4M dia.	12,000/- each.	12,000/-
3.	Bore well 1 No.16 Cms.	2,000/- each.	2,000/-
4.	Internal Roads.	Lump	15,000
5.	Approach Roads including cost of land 2 Km.	Lump	20,000/-
6.	Construction of Chawadi	Lump	6,000/-
7.	School Building 3 Rooms (7 M x 6 M)	each	20,000/-
8.	Panchayat office		8,000/-
9.	Community hall		7,000/-
10.	Land for Khalwadi & burial grounds etc.	Lump	4,000/-
			<u>1,10,000/-</u>
	Add for enhanced rates		10,000/-
		Total:-	<u>1,20,000/-</u>

Statement - 8.05 (1)

Chapter - 8
Para - 3.03

Name of work :- Constructing Earthen Dam on Sindphans
River near Majalgaon.

Quantity	Unit	Items	Rate	Per	Amount
1.	2.	3.	4.	5.	6.
8,24,000	M ³	1) Excavation for stripping the dam seat for removing the over burden and disposal of material soil to a lead of 150 M. including stacking the same as and where directed etc. complete.	3.05	M ³	25,13,200
		2) Excavation for C.O.T. below the seat of embankment and utilising the excavated material in embankment or wherever directed upto a lead of 150 M.			
14,17,600	M ³	a) In all soils and soft murum.	4.25	M ³	60,24,800
10,400	M ³	b) In hard murum, compact sand conglomerate etc.	6.00	M ³	62,400
51,370	M ³	c) In hard murum and boulders.	6.70	M ³	3,44,179
1,01,370	M ³	d) In all types of rock with or without blasting	20.83	M ³	21,11,537

1.	2.	3.	4.	5.	6.
15,80,850	M ³	3) Filling C.O.T. with selected impervious material from borrow area in layers of specified thickness upto a lead of 2 Kms. including levelling watering and rolling to optimum density at O.M.C. etc. complete.	7.80	M ³	1,23,30,630
		4) Providing hearting of selected impervious material and spreading the same in layers of specified thickness including watering, levelling and rolling to optimum density at O.M.C. etc. complete.			
4,00,000	M ³	a) From available stuff of C.O.T. excavation:	3.40	M ³	13,60,000
5,62,500	M ³	b) From borrow area with a lead of 2 Kms.	8.70	M ³	48,93,750
		5) Providing and laying casing zone with selected material in layers of specified thickness including levelling, watering and rolling to optimum density at O.M.C. dressing of slopes etc. complete.			
20,000	M ³	a) From available stuff of C.O.T. excavation:	3.40	M ³	68,000
16,49,000	M ³	b) From borrow area with a lead of 5 Km.	10.00	M ³	1,64,90,000

1.	2.	3.	4.	5.	6.
1,56,100	M ³	6) Providing and laying sand mat of specified thickness with a lead of 4 Kms. for horizontal sand mats.	7.40	M ³	11,55,140
		7) Providing drainage arrangements including excavation of drains and filling with drainage material etc. complete.			
360	RM	a) Cross drains with filter material	8.00	RM	2,880
6,550	RM	b) Longitudinal collecting toe drain.	12.00	RM	78,600
540	RM	c) Longitudinal filter drain at heaving toe.	8.00	RM	4,320
		R) Providing up-stream slope protection arrangements with dry stone base and pitching including laying, packing etc. complete as directed.			
36,300	M ³	a) Base for pitching of 0.25 m. thick quarry spauls, gravel including laying, packing.	15.00	M ³	5,44,500
1,04,000	M ³	b) 0.75 m. thick pitching of big size stone of durable quality laid in specified manner.	30.00	M ³	31,20,000

1.	2.	3.	4.	5.	6.
400	M ³	9) Providing and constructing rock toe with 15 Cms. to 20Cms rubble of hard trap stone.	20.00	M ³	8,000
7.00	Km.	10) Providing black topping to the road surface on dam top with 5Cms thick semi-grout with base of 10Cms metal including compaction etc. complete.	40,000	Km.	2,80,000
1,485	Rmt.	11) Providing and fixing G.I. Pipe railing at 0.3M G/C with angle of 80 x 50 x 5 mm. 1M high at 7M C/C including fixing and painting with two coats of approved paint etc. complete as directed.	35.00	Rmt.	52,000
2,87,500	M ²	12) Providing turfing to the D/S slope of earth dam including 7Cms thick soil and watering for 3 months with a lead of 3 Kms etc. complete.	1.00	M ²	2,87,500
Lump-Sum		13) Providing and constructing 2M wide steps on U/s and D/s slope with 1:3:6 cement concrete including excavation in hard compact murum and plastering with cement mortar 1:3 proportion curing etc. complete.	Lump-Sum		20,000

1.	2.	3.	4.	5.	6.
Lump-Sum		14) Providing and constructing parapet wall on in U.C.R. Masonry 1 mt.height and $\frac{1}{2}$ M. wide.			Lump-Sum. 1,50,000
Lump-Sum		15) Provision for preparation of quarry and operation roads including its day to day maintenance temporary electrification for second shift and quality control charges during execution (about 8%).			Lump-Sum. 4,00,000
		16) Diversion channels and coffer dams during construction of dam in river.			Lump-Sum. 5,00,000
		17) Add for dewatering			Lump-Sum. 10,00,000
					<hr/>
				Total:-	5,38,01,436
		Add for Contingencies ...			5,38,014
					<hr/>
					5,43,39,450
		Add for W.C.Establishment ...			10,85,550
					<hr/>
					5,54,25,000
					<hr/>
				Say: 554.25 Lakhs.	<hr/>

Statement - 8.05 (ii)

Chapter - 8.
Para - 3.03

Name of work :- Constructing masonry portion of the
dam on Sindphana river near Majalgaon

Quantity	Unit	I T E M S	Rate	Per	Amount
1.	2.	3.	4.	5.	6.
1,23,510	M ³	1) Excavation for foundation in all kinds of soils, murum D.I.R. including disposal of excavated material as and where directed with the lead of 60 M. and 3 M. lift etc. complete.	2.70	M ³	3,33,480
49,366	M ³	2) Excavation for foundation in hard murum and boulders including disposal of excavated material as and where directed with lead of 90 m. and 8 m. lift etc. complete.	4.15	M ³	2,04,870
1,86,860	M ³	3) Excavation for foundation in soft rock with or without blasting including dressing the sides and bottom of trenches and disposal of excavated material as and where directed with lead of 90 m. and 12 m. lift etc. complete.	10.70	M ³	19,99,400

1.	2.	3.	4.	5.	6.
74,425	M ³	3)) Excavation for foundation in hard rock with or without blasting including dressing the sides and bottom of trenches and disposal of excavated material as and where directed with lead of 90 m. and 12 m. lift etc.complete.	17.25	M ³	12,83,830
22,170	M ²	4) Preparation of foundation for laying masonry including clearing with air and water jets crow barring, wedging and removal of all loose material etc.complete.	11.00	M ²	43,870
1,76,600	M ³	5) Providing and constructing uncoursed rubble masonry in cement surkhi sand mortar (0.8 : 0.2 : 5) for hearting curing watering, scaffolding etc.complete.	88.00	M ³	1,55,40,800
23,300	M ³	6) Providing and constructing uncoursed rubble stone masonry in cement surkhi sand mortar (0.8:0.2:3) for u/s face work of impervious septum including, curing, watering, scaffolding etc. complete.	111.00	M ³	25,86,300

1.	2.	3.	4.	5.	6.
9,792	M ²	7) Extra over item No.5 and 6 above for course rubble stone masonry for face work including cement pointing (1:3) watering, curing, scaffolding and finishing to required shape and batter with all lead and lift etc. complete.	25.00	M ²	2,44,800
49,280	M ³	8) Providing filling and laying plain cement concrete M-150 for all the work including pier, divide wall, apron etc. including placing, formwork, ramming, vibrating, curing, finishing etc. complete.	190.00	M³	93,63,200
2,643	Tonne	9) Providing and laying steel reinforcement for R.C.C. works in ogee bucket, apron, piers etc. including bending, binding, fixing M.S. bars in position, hooking with annealed steel wire etc. complete.	1600	M.T.	42,68,800
14,904	M ²	10) Providing and fixing in position the form work for concrete surface straight or curved.	22	M ²	3,27,890
1,510	Kg.	11) Providing and fixing copper plate joints wherever required with all leads and lifts.	50	Kg.	75,500

1.	2.	3.	4.	5.	6.
730	M.	12) Providing and fixing in position 20 cm. ϕ porous pipes for drainage.	100	M.	73,000
414	M.	13) Providing and constructing overhead bridge on the spillway portion.	2800	M.	11,59,200
18	M ³	14) Providing C.C. Road surface and Cantilever R.C.C. parapet for non-overflow portion.	210	M ³	3,780
2	Nos.	15) Providing construction sluices.		Lump-	3,00,000
-	-	16) Providing river sluice, raw water outlets etc.		Lump-	3,00,000
28	Nos.	17) Providing and fixing in position taintor gates of size 12 x 5 m. including hoisting, leads and lifts, painting, greasing, oiling etc. complete as per design and as and where directed.	300000	No.	84,00,000
Job	-	18) Diversion of river and dewatering during construction.		Lumpsum.	8,00,000
Job	-	19) Providing instrumentation in the masonry dam.			2,00,000

1.	2.	3.	4.	5.	6.
Job.	-	20) Carrying out permeability tests in the masonry.			50,000
Job.	-	21) Down stream protection work.			1,50,000
Job.	-	22) Tail channel obstruction removal.			4,00,000
				TOTAL :	4,83,08,720
				Add for Contingencies ...	9,66,170
				Add for W.C-Establishment...	4,83,110
					4,97,58,000

Note :- The obstruction removal includes Tail channel excavation from the lowest level of apron to R.L. +412.00 at a gradient of 1:4.

Statement - 8.06

Chapter - 8
Para - 3.05

I - Head Works

K - Buildings

I - Total requirement of accommodation and
abstract of cost

	<u>Permanent</u>	<u>Temporary</u>
1) Bhir	-	1 Division 1 Sub-Division
2) Majalgaon	2 Sub-Divisions	6 Sub-Divisions

Note :- It is expected that one division with 9 Sub-divisions will be required for supervision of Head works. Nine Sub-Divisions will lookafter as under:

- 1 Sub-Division for Masonry dam.
- 3 Sub-Divisions for Earthen Dam.
- 1 Sub-Division for Land Acquisition.
- 1 Sub-Division for stores.
- 1 Sub-Division for colony buildings and maintenance.
- 2 Sub-Divisions - Mechanical.

Total: 9 Sub-Divisions.

Place	No. of Dns. & Sub-Dns.		Cost of buildings						Grand Total Rs. in lakhs
	Permanent	Temporary	Permanent			Temporary			
			Resid- ential	Non Resid- ential	Total	Resi- den- tial	Non Resi- den- tial	Total	
1	2	3	4	5	6	7	8	9	10
1) Bhir	-	1 Division	-	-	-	5.70	1.20	6.90	6.90
		1 Sub-Divn.	-	-	-	4.90	3.70	8.60	8.60
2) Majalgaon	2 Sub-Divns.	6 Sub-Divns.	9.50	1.10	10.60	16.00	12.00	28.00	38.60
3) Misc-buildings for Quality & Control and other purpose									9.40
Total:			9.50	1.10	10.60	26.60	16.90	43.50	63.50

(180)

II - Estimated cost of buildings proposed @ Bhir

(A) (I) Temporary (Residential)

(One Division)

Description	Total No. of tenements proposed.	No. of tenements per unit.	Total No. of units.	Plinth area of one unit in Sq.m.	Cost/ Sqm. in Rs.	Total cost Rs. in lakhs.
Class I	1	1	1.0	180	300	0.55
Class II	1	2	0.5	210	280	0.30
Class III-A	12	4	3.0	250	210	1.60
Class III-B	16	4	4.0	170	210	1.40
Class IV	8	4	2.0	150	210	0.65

Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.

1.20

Total 5.70

ii) Temporary (Non - Residential)

Class I	1	1	1	380	260	1.00
---------	---	---	---	-----	-----	------

Add 20% for internal water supply, internal sanitary arrangements, Fencing, internal colony roads.

0.20

Total 1.20

iii) Temporary (Residential)

(One Sub-Division)

	Total No. of tenem- ents propo- sed.	No. of tenem- ents per unit.	Total No. of units.	Plinth area of one Unit in Sq. m.	Cost/ Sq.m. in Rs.	Total Cost Rs. in lakhs.
Class II	1	2	0.5	210	320	0.35
Class III-A	4	4	1.0	250	250	0.65
Class III-B	4	4	1.0	170	250	0.50
Class IV	4	4	1.0	150	250	0.40
Inspection Bungalow	1	1	1	500	400	2.00
Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.						1.00
					Total	4.90
iv) <u>Temporary (Non - Residential)</u>						
Office of Deputy - Engineer	1	1	1	300	300	0.90
Stores	-	-	1	-	-	0.10
Recreation hall	-	-	1	-	-	0.80
Cement Godown.	-	-	1	-	-	1.30
Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.						0.60
					Total	3.70
					Grand Total	15.50
					II	

III - Estimated cost of Buildings proposed @ Majalgaon(A) - (i) Parmanent (Residential)

(2 Sub-Divisions)

Description	Total No. of tenements proposed.	No. of tenements per unit.	Total No. of units.	Plinth area of one unit in Sq.m.	Cost/ Sq.m. in Rs.	Total Cost Rs. in lakhs.
Class II	2	2	1.0	210	320	0.70
Class III -A	8	4	2.0	250	250	1.30
Class III -B	6	4	1.5	170	250	0.70
Class IV	8	4	2.0	150	250	0.80
Inspection Bunglow	1	1	1	1000	400	4.00
Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.						2.00
Total						9.50
 (ii) <u>Permanent (Non Residential)</u>						
Office of Deputy Engineer	2	1	2	300	300	0.90
Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.						0.20
Total						1.10
Total III (A)						10.60

(B) (i) Temporary (Residential)

Description	Total No. of tenements proposed.	No. of tenements per unit.	Total No. of units.	Plinth area of one unit in Sq. m.	Cost per Sq. m. in Rs.	Total cost Rs. in lakhs
Class II	6	2	3.0	210	280	1.80
Class III - A	24	4	6.0	250	210	3.20
Class III - B	20	4	5.0	170	210	1.75
Class IV	24	4	6.0	150	210	1.90
Mechanical operators Qtrs.						5.00
Add for internal water supply, internal sanitary arrangements, fencing, internal colony roads.						2.35
					Total	16.00

(ii) Temporary (Non - Residential)

Office of Deputy Engineer.	6	1	6	100	250	1.50
Stores	-	-	1	L.S.	-	0.70
Recreation Hall	-	-	2	L.S.	-	0.80
Cement Godowns	-	-	2	L.S.	-	2.60
Sheds for Electric & Mechanic goods	-	-	1	L.S.	-	0.10
Core sheds) Heavy Earth-) moving mach-) inary sheds) Transport) equipments) sheds) Hard ware) store.)				L.S.	-	2.20

Description	Total No. of tenements proposed.	No. of tenements per units.	Total No. of Units.	Plinth area of one unit in Sq. m.	Cost per Sq. m in Rs.	Total cost Rs. in lakhs.
Magazine Building	-	-	L.S.	-	-	0.35
Heavy repairs work shop.	-	-	L.S.	-	-	0.25
Sheds for T&P.	-	-	L.S.	-	-	0.10
Dispensary	-	-	L.S.-	-	-	0.18
School Building	-	-	L.S.	-	-	0.48
Garages	-	-	L.S-	-	-	0.35
Post Office.	-	-	L.S	-	-	0.15
Police out post	-	-	L.S	-	-	0.15
Bus stand	-	-	L.S	-	-	0.05
Add 20% for internal water supply, internal sanitary arrangements, Fencing, internal colony roads.						2.00
Total						<u>12.00</u>
Total III (B)						28.00
Total III (A) + (B)						38.60
IV) Estimated cost of buildings for Quality control and other purposes.						9.40
Grand Total -						<u>63.50</u>

Statement - 8.07

Chapter - 8
Para - 3.07I - HEAD WORKS'O' Miscellaneous

Sr. No.	Description	Amount Rs. in lakhs
1	2	3
I)	Water supply and external drainage Schemes and running and maintenance charges.	16.30
II)	Power supply including installation, repairs, running and maintenance charges.	7.00
III)	Medical aid.	7.80
IV)	Photographs and Models	1.50
V)	Experiments.	1.50
VI)	Telephone and Telegraph system.	1.50
VII)	Wireless transmission.	1.00
VIII)	Miscellaneous.	2.10
Total:		38.70

Statement showing the details of provisionsUnder - I-Head Works - 'O' Miscellaneous.

	<u>Amount</u> Rs. in <u>lakhs</u>
I - <u>Water supply and external drainage schemes and running and maintenance charges.</u>	
1) Water supply arrangements at dam site Sub-Divisional Colony.	7.00
2) Water supply arrangement at Divisional colony.	4.00
3) External drainage arrangement at dam site Divisional colony.	0.50
4) External drainage arrangement at dam site Sub-Divisional Colony.	1.00
5) Running and maintenance charges of water supply and sanitation to dam site colony at Rs. 0.40 lakh/year for five years.	2.00
6) Running and maintenance charges of water supply and sanitation to Divisional colony at Rs. 0.20 lakh/year for five years.	1.00
7) Water supply by tankers prior to permanent scheme and during emergency at dam site colony.	0.50
8) Water supply by tankers prior to permanent scheme and during emergency at Divisional colony.	0.30
	<hr/> 16.30 <hr/>
II - <u>Power supply including installation repairs, running and maintenance charges.</u>	
1) Providing electric supply to dam site colony.	1.50

	Amount Rs. in <u>lakhs</u>
	B.F. 1.50
2) Providing electric supply to Divisional Colony.	1.00
3) Running, maintenance and consumption charges of electric supply at dam - site colony at Rs. 0.40 lakh/year for five years.	2.00
4) Running, maintenance and consumption charges of electric supply at Divisional colony at Rs. 0.20 lakh/year for five years.	1.00
5) Providing lighting arrangement in colony streets, store-yards, public garden etc. at dam site colony.	1.00
6) Providing lighting arrangement in colony streets, store yards, public garden etc. at Divisional colony.	0.50
	<hr/> 7.00 <hr/>

III - Medical Aid.

1) Establishing dispensary (equipment) at dam site colony .	1.25
2) Running and maintenance charges of dispensary at dam site colony.	0.50
3) Establishing dispensary (equipment) at Divisional colony.	0.75
4) Running and maintenance charges at Divisional Colony.	0.30
5) Establishment for malarial eradication on Project.	5.00
	<hr/> 7.80 <hr/>

	<u>Amount</u> Rs. in <u>lakhs</u>
IV - <u>Photographs and Models.</u>	
1) Photographs	1.00
2) Models.	0.50
	<hr/> 1.50 <hr/>
V - <u>Experiments.</u>	
1) Model studies of spillway outlets etc.	1.50
VI - <u>Telephone and telegraph System.</u>	
Facility of telephone and telegraph system at dam site colony and Divisional colony.	1.50
VII - <u>Wireless transmission</u>	
Wireless transmission between Divisions, Sub- Divisions and work site.	1.00
VIII - <u>Miscellaneous</u>	
1) Bhumipujan ceremony visit of V.I.Ps.	1.00
2) Printing charges of Project Report, Brochures,, Pamphlets etc.	0.10
3) Providing equipment for social Welfare and cultural activities at Divisional and Sub-Divisional colonies.	1.00
	<hr/> 2.10 <hr/>

Statement - 8.08

Chapter - 8
Para - 3.08

I - HEAD WORKS

P - MAINTENANCE

Sr. No.	I t e m s .	Amount Rs. in lakhs.
1	2.	3
1)	C - Works.	10.50
2)	D - Regulators.	0.35
3)	K - Buildings	0.60
4)	M - Plantation.	0.25
5)	R - Communications	0.30
Total		<u>12.00</u> =====

Note: - Maintenance charges are taken
@ 0.2% of cost of each item
for 5 years.

Statement - 8.09

Chapter - 8
Para - 3.09I - HEAD WORKSQ - SPECIAL TOOLS AND PLANT

Sr. No.	Items.	Nos.	Cost/No. Rs. in lakhs	Total amount Rs. in lakhs.
I)	<u>Masonry Dam</u>			
	1) Trucks (7.5 tons)	30	0.60	18.00
	2) Diesel Road Rollers (8 Tons)	2	0.60	1.20
	3) Air Compressors	10	0.45	4.50
	4) Tankers	2	0.60	1.20
	5) Jack Hammers	4	0.02	0.08
	6) Pumps - 20 H.P.	2	0.125	0.25
	10 H. P.	5	0.04	0.20
	5 H.P.	5	0.03	0.15
	Grout pump	1	0.10	0.10
	Sludge pump	1	0.03	0.03
	7) Concrete Mixers (10 x 7)	15	0.13	1.95
	8) Vibrators	10	0.03	0.30
	9) Steel shuttering set	5	L.S.	5.00
	10) Generators 100 KW	1	1.00	1.00
	30 KW	3	0.30	0.90
	11) Stone crushers	2	0.40	0.80
	12) Granulators	3	0.35	1.05
	13) Diesel Welding Set.	1	0.05	0.05
	14) Boring Machines	2	1.50	3.00
	15) Workshop equipment	L.S.		1.00
			Total	40.76

Sr. No.	Items	Nos.	Cost/No. Rs. in lakhs.	Total amount Rs. in lakhs.
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II) Earthen Dam

1) Pumps

40 H.P. (Mechanical)	5)	0.25	2.25
(Electrical)	4			
20 H.P. (Mechanical)	6)	0.125	1.25
(Electrical)	4			
10 H.P. (Mechanical)	7)	0.04	0.48
(Electrical)	5			
5 H.P. (Mechanical)	12)	0.03	0.60
(Electrical)	8			
Sludge pumps	4		0.025	0.10
2) Air compressors	4		0.45	1.80
3) Jack Hammers	8		0.02	0.16
4) Earth Hammers	5		0.50	2.50
5) Other necessary equipments such as generators, convention trucks etc.	L.S.			22.26

Total	31.40
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Grand Total (I+II)	72.16
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Statement - 8.10

Chapter - 8
Para - 4.00JAYAKWADI PROJECT STAGE -III - WORKSII-MAIN CANAL AND BRANCHES

Classified abstract of canals.

Sr. No.	Sub-Head.	Paithan R.B.Canal Cost Rs. in lakhs.	Majalgaon R.B.Canal Cost Rs. in lakhs.	Total amount Rs. in lakhs.
1	2	3	4	5
	A-Preliminary	15.70	18.70	34.40
	B-Lands	114.10	148.00	262.10
	D-Regulators	69.50	89.75	159.25
	F-C.D.Works	373.50	458.15	831.65
	G-Bridges	65.70	93.40	159.10
	H-Escapes	15.00	17.50	32.50
	K-Buildings	99.30	160.40	259.70
	L-Earthwork	1061.33	1556.27	2617.60
	M-Plantation	5.00	5.00	10.00
	O-Miscellaneous	109.10	146.90	255.00
	P-Maintenance	17.01	23.81	40.82
	Q-Special T&P.	133.30	164.30	297.60
	R-Communications	10.00	10.00	20.00
	Total	2087.54	2892.18	4979.72

Statement - 8.11

Chapter - 8
Para - 4.01II - Main Canal and BranchesA - PreliminaryRs. in lakhs

Sr. No.	Description	Paithan Right Bank Canal	Majalgaon Right Bank Canal.	Total
1)	Survey and investigations of canal for preparing the project report (sanctioned under Govt. I&P, Deptt: letter No. PIM.4996/44413/IP(I) dt: 29.1.1960.	4.45	5.45	9.90
2)	Topographical survey of command area	4.50	5.50	10.00
3)	Alignment survey of canal including trial pits, cross sections, alternatives etc.	4.30	4.70	9.00
4)	Demarcation stones, fixing B.Ms. etc.	0.10	0.10	0.20
5)	Soil Survey, taking test bore holes, trial pits etc.	0.70	0.80	1.50
6)	Collection of design data for Major C.D. works	1.50	2.00	3.50
7)	Survey establishment like technical Astt. attendants etc.	0.10	0.10	0.20
8)	Miscellaneous items like preparing plans and estimates, tracing etc.	0.05	0.05	0.10
Total		15.70	18.70	34.40

Statement - 8.12Chapter - 8
Para - 4.02II - MAIN CANAL AND BRANCHESB - LANDS

Quantity in Ha	Item	Rate per	Amount Rs. in lakhs.
A) PAITHAN RIGHT BANK CANAL			
1500	1) Acquiring private land for main canal, borrow area, camp sites and branch canal etc.	6000 Ha	90.00
	2) Solatium charges at 15% of item No.1		13.50
	3) Provision for establishment required for acquisition proceedings including joint measurements, materials for demarcation etc. at 6 $\frac{1}{4}$ % of Item No.1		5.60
	4) Provision for compensation of wells, crops, fruit bearing trees, structures etc.	L.S.	5.00
		Total	114.10
B) MAJALGAON RIGHT BANK CANAL			
1950	1) Acquiring private land for main canal borrow area, camp, sites and branch canal etc.	6000 Ha	117.00
	2) Solatium charges at 15% of Item No.1.		17.60
	3) Provision of establishment required for acquisition proceedings, including joint measurements, materials for demarcation etc. at 6 $\frac{1}{4}$ % of item No.1		7.30
	4) Provision for compensation of wells, crops, fruit bearing trees, structures etc.	L.S.	6.10
		Total	148.00
Grand Total (A+B)			262.10

Statement - 8.13

Chapter + 8
Para + 4.09II - MAIN CANAL AND BRANCHESD - REGULATORS

Sr. No.	Items.	No.	Cost Rs. in lakhs/No.	Total cost Rs. in lakhs
A) <u>PAITHAN RIGHT BANK CANAL</u>				
	1) Cross Regulators	6	6.00	36.00
	2) Head Regulators for distributaries (74 Nos.)	74	-	31.50
	3) Standing wave flume.	1	2.00	2.00

			Total	69.50
B) <u>MAJALGAON RIGHT BANK CANAL</u>				
	1) Cross Regulators	7	6.00	42.00
	2) Head Regulators for distributaries (100 Nos.)	100	-	45.75
	3) Standing wave flume	1	2.00	2.00

			Total	89.75

			Grand Total (A+B)	159.25

Statement - 8.14

Chapter - 8
Para - 4.04II - MAIN CANAL AND BRANCHESF - C.D. Works

Sr. No.	Items	Paithan Right Bank Canal		Majalgaon Right Bank Canal		Total amount Rs. in lakhs.
		No.	Cost Rs. in lakhs.	No.	Cost Rs. in lakhs.	
1	2	3	4	5	6	7
1.	Syphon	-	-	1	4.00	4.00
2.	Aqueducts	14	253.50	29	376.65	630.15
3.	Slab Culverts.	32	99.00	19	40.00	139.00
4.	H.P. Culverts.	21	15.00	50	35.50	50.50
5.	Nala Diversions.	24	6.00	8	2.00	8.00
Total			373.50		458.15	831.65

Statement - 8.14 (i)

Chapter - 8
Para - 4.04

STATEMENT SHOWING COST OF SYPHON

Sr.No.	Chainage in Km.	Catchment area in Sq.Km.	Maximum discharge in Cumecs.	Total Cost Rs. in lakhs.	Remarks.
1	2	3	4	5	6

MAJALGAON RIGHT BANK CANAL

1	3.070	6.04	117.60	4.00	
				Total Rs	4.00 lakhs

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Statement - 8.14 (ii)

Chapter - 8
Para - 4.04

Statement showing the cost of Aqueducts.

Sr. No.	Name of Nala	Chainage (Kms.)	Catchment area (Sq.Kms.)	Maximum discharge (Cumecs)	Length of vent way (M)	Depth of foundation (M)	Cost of amount wing walls etc. Rs. in lakhs.	Cost of trough piers etc. Rs. in lakhs.	Total cost Rs. in lakhs.	Remarks.
1	2	3	4	5	6	7	8	9	10	11

A) FAITHAN RIGHT BANK CANAL

1.	Nandini	6.000	73.40	535.50	25	23	17.300	1.250	18.55	
2.	Khatkali	11.070	135.20	775.00	96	17	12.900	4.800	17.70	
3.	Kasichi	14.370	102.50	675.30	92	21	15.800	4.600	20.40	
4.	Khari	22.960	42.60	410.00	85	21	15.800	4.250	20.05	
5.	Lendi	29.440	82.60	656.20	110	20	15.150	5.500	20.65	
6.	Dherkhari	34.685	19.55	257.50	41	16	12.200	2.050	14.25	

(18)

1	2	3	4	5	6	7	8	9	10	11
7.	Amrut	49.000	218.60	1010.00	52	24	18.100	2.60	20.70	
8.	Bagpimpalgaon	59.840	28.80	317.00	28	20	15.30	3.900	19.20	
9.	Vidrupa	61.390	46.00	428.00	67	16	12.200	3.350	15.55	
10.	Takadgaon	63.020	29.80	320.00	25	19	14.400	10.750	25.10	
11.	Lukhamasla	67.390	14.50	205.00	50	17	12.900	2.500	15.40	
12.	Kapsi	82.260	38.200	382.00	52	17	12.900	2.600	15.50	
13.	Lendi (Rohital)	83.510	15.100	208.00	35	15	11.500	1.750	13.25	
14.	Kolthewali	87.556	20.700	259.00	56	19	14.400	2.800	17.20	
									Total	253.50

1	2	3	4	5	6	7	8	9	10	11
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B) MAJALGAON RIGHT BANK CANAL

1.	Pathrod	5.420	68.530	904.30	90.00	9.00	4.500	9.250	13.750
2.	Longaon	17.044	28.260	270.40	51.00	12.00	2.550	10.750	13.300
3.	Saraswati	19.280	167.500	1524.00	68.80	12.00	3.44	11.500	14.940
4.	Simri Pargaon	24.860	8.179	155.70	11.32	10.00	0.566	10.400	10.966
5.	Jaigaon	27.15	28.57	472.40	20.90	8.00	1.04	10.100	11.140
6.	Hiwara	30.13	7.923	149.50	11.90	12.00	0.595	11.750	12.345
7.	Gunwati	33.188	130.30	134.00	19.40	7.00	2.02	10.78	12.800
8.	Pimpri Buzrug	37.247	5.269	100.8	2.93	5.00	0.1465	9.575	9.721
9.	Takli Achaya	41.180	5.591	106.7	4.95	5.00	0.249	7.80	8.049
10.	Khandi	43.198	38.920	614.6	20.60	7.00	1.03	10.400	11.430
11.	Wap.	46.066	116.60	1269.00	35.00	7.00	1.754	11.35	13.104

(200)

1	2	3	4	5	6	7	8	9	10	11.
12	Wan.	50.042	180.1	1591.00	55.50	8.00	2.78	10.85	13.630	
13.	Injegaon	51.108	15.22	266.10	13.90	5.00	0.695	7.65	8.345	
14.	Injegaon	51.80	164.30	1515.00	54.20	8.00	2.71	11.51	14.220	
15.	Dhamoni	64.57	12.69	226.2	18.70	5.00	0.935	5.65	6.585	
16.	Bondargaon.	66.772	12.81	228.2	18.30	10.00	0.918	10.30	11.218	
17.	Karmar.	75.063	7.92	149.60	9.80	10.00	0.490	10.80	11.29	
18.	Ukkadgaon	75.844	5.493	105.3	6.38	7.5	0.320	0.20	8.529	
19.	Ukkadgaon	76.625	8.522	126.00	5.25	6.00	2.263	7.85	8.113	
20.	Borna	82.175	141.00	1394.00	54.40	6.00	2.72	8.80	11.520	
21.	Banwadi	82.653	20.45	348.8	9.65	5.00	0.482	10.10	10.582	
22.	Margalwadi	104.12	12.29	219.3	7.02	7.00	0.351	10.60	10.951	
23.	Masoli	114.48	316.30	2142.00	51.65	12.00	8.29	11.50	19.790	

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1	2	3	4	5	6	7	8	9	10	11
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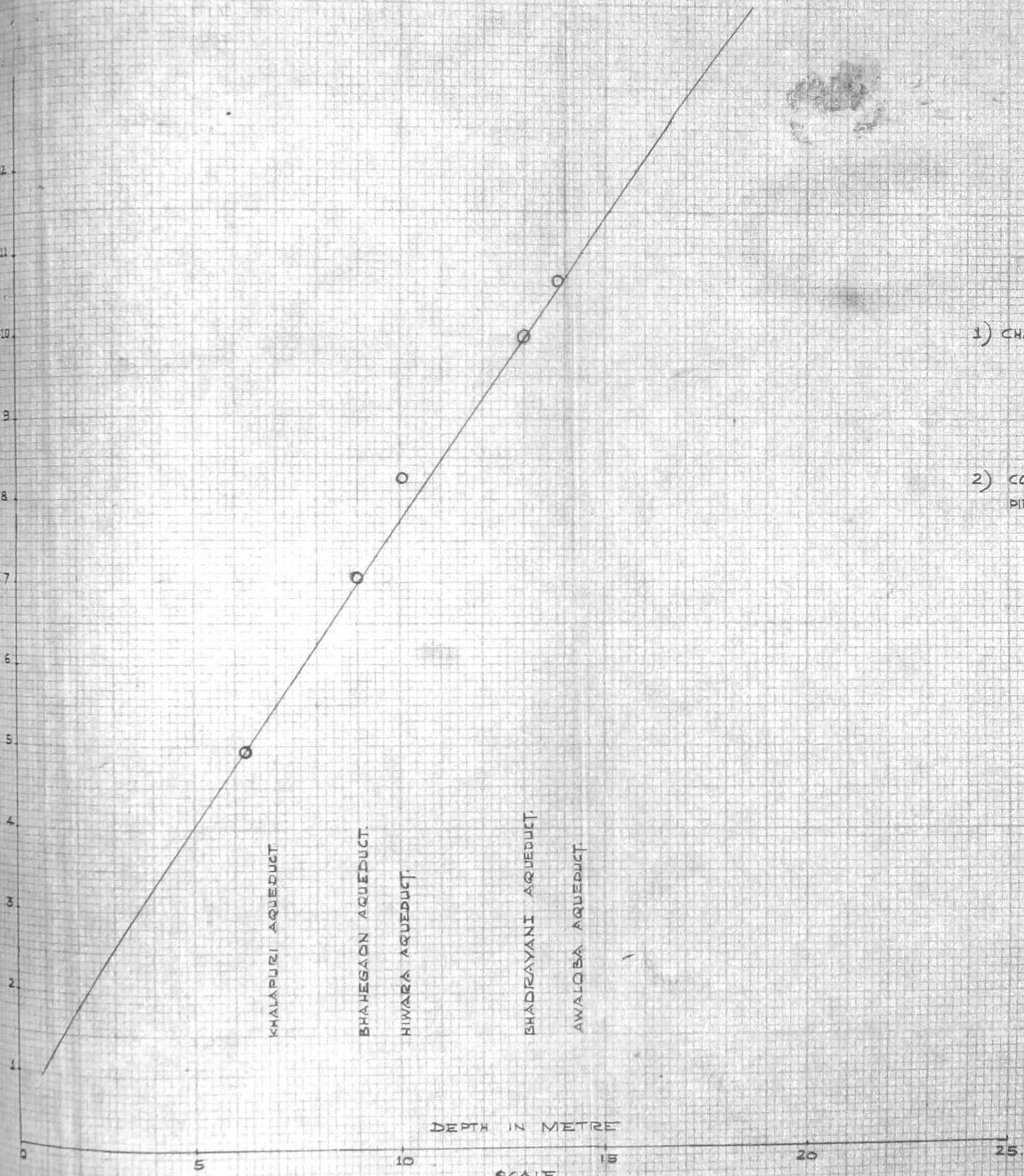
24.	Borgaon	134.00	663.90	-	-	-	-	-	25.000	
25.	Galati (Konarwadi)	135.30	534.20	-	-	-	-	-	25.000	
26.	Tambulgaon	149.00	165.70	-	-	-	-	-	14.832	
27.	Argaon.	165.50	7.506	-	-	-	-	-	11.000	
28.	Khambegaon	168.20	298.20	-	-	-	-	-	20.000	
29.	Jhod Nadi (Bhha. ira)	174.10	169.70	-	-	-	-	-	15.000	

Total 376.650

(Note:- Cost of Abutments, Wing walls, training walls, trough and piers, are based on the cost curves prepared on the basis of details of Paithan Left Bank Canal.) Grand Total 630.150

COST CURVE AQUEDUCTS

- 1) CHART SHOWING COST V/S CONSTANT ITEMS
 - 1. ABUTMENTS.
 - 2. WING WALLS.
 - 3. TRAINING WALLS.
- 2) COST OF VARIABLE ITEMS i.e TROUGH AND PIER TO BE ADDED AS Rs. 5,000/METRE.



DEPTH IN METRE

SCALE
 V - 1 CM = 50,000 Rs.
 H - 1 CM = 1 M.

Statement - 8.14 (iii)

Chapter - 8
Para - 4.04

STATEMENT SHOWING THE TOTAL COST OF SLAB CULVERT

Sr. No.	Nala Chain-age in Kms.	Catchment Area (Sq.Km)	Maximum Discharge (Cumeecs)	Vent length (M)	Nala bed levels.	Canal bed levels	Depth of foundation in m.	Cost of abutment wing walls etc. (Rs. in lakhs.	Cost of piers, slab etc. (Rs. in lakhs)	Total Cost.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12

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II A) PAITHAN RIGHT BANK CANAL

1.	4.410	6.220	109.10	17.76	14.720	49.874	6.154	1.04	2.07	3.110	
2.	8.33	7.000	119.20	9.53	14.465	49.114	8.000	2.00	1.30	3.300	
3.	15.50	3.100	60.05	24.02	46.675	47.437	3.670	1.889	1.340	3.229	
4.	20.425	3.900	73.31	19.71	44.220	45.852	5.63	1.111	2.250	3.361	

1	2	3	4	5	6	7	8	9	10	11	12
5.	37.150	2.600	51.18	10.72	41.310	43.925	6.61	1.595	1.378	2.973	
6.	38.580	9.00	119.00	18.08	37.745	43.730	9.00	2.00	2.14	4.14	
7.	39.365	2.10	42.40	5.65	39.960	43.652	6.69	1.1595	0.720	2.315	
8.	45.765	3.900	73.30	20.90	44.165	43.160	4.00	0.8890	2.10	2.989	
9.	72.500	4.300	79.50	25.20	35.975	37.836	5.00	0.940	2.65	3.59	
10.	75.00	5.18	93.44	20.70	41.100	37.552	8.00	2.00	2.73	4.73	
11.	76.00	5.18	93.44	20.13	36.810	37.232	5.00	0.940	2.41	3.25	
12.	78.00	7.77	131.80	37.00	35.870	37.093	4.00	0.889	3.70	4.589	
13.	79.00	1.60	33.75	13.50	36.275	36.899	4.00	0.8890	1.40	2.89	
14.	80.875	4.95	91.96	20.00	36.135	36.869	5.0	0.94	2.40	3.34	
15.	91.116	6.75	97.30	21.60	32.34	34.770	3.50	1.111	2.695	3.806	

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1	2	3	4	5	6	7	8	9	10	11	12
16.	92.525	5.30	95.00	5.50	26.635	34.470	10.00	2.50	0.852	3.352	
17.	96.296	4.15	79.50	15.60	31.380	34.132	6.00	1.04	1.81	2.82	
18.	98.555	2.78	55.62	4.40	28.210	33.807	8.60	2.00	0.66	2.66	
19.	100.460	4.95	91.96	9.17	29.005	33.675	7.60	2.00	1.125	3.125	
20.	101.956	2.00	42.40	18.80	33.470	33.495	4.55	0.84	1.915	2.755	
21.	102.636	1.38	121.00	10.29	28.020	33.332	8.00	2.00	1.27	3.270	
22.	108.266	1.95	42.40	8.50	30.76	33.357	8.60	1.595	1.008	2.603	
23.	111.051	4.95	91.90	10.48	26.890	33.005	9.00	2.000	1.355	3.355	
24.	112.011	3.24	55.00	3.10	29.590	33.761	7.00	1.889	0.260	2.149	
25.	113.171	1.66	33.75	5.11	28.795	32.091	6.50	1.595	0.585	2.180	
26.	116.361	5.70	95.00	17.40	28.630	31.415	7.00	1.889	2.040	3.929	
27.	118.231	5.7	96.00	13.70	27.700	31.10	6.50	1.595	0.1680	1.763	

1	2	3	4	5	6	7	8	9	10	11	12
29.	119.021	2.40	44.00	3.75	25.545	30.982	8.40	2.00	0.420	2.420	
29.	122.090	8.30	131.80	24.00	27.800	30.668	4.50	1.995	2.520	4.516	
30	125.340	3.62	72.00	12.70	27.800	30.668	6.00	1.040	1.495	2.535	
31.	125.572	1.45	32.00	8.53	29.135	30.242	4.00	0.8890	0.900	1.789	
32.	125.972	1.80	41.40	5.51	26.460	30.165	7.00	1.889	0.720	2.609	
									Total	99.00	

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B) MAJALGAON RIGHT BANK CANAL

1.	4.847	3.833	75.61	21	431.165	420.785	4	2.26	0.908	3.160
2.	13.825	3.106	59.50	6.3	416.390	419.005	3	0.705	1.100	1.805
3.	14.945	4.012	77.00	34.8	418.255	418.836	3	3.320	0.518	3.838

1	2	3	4	5	6	7	8	9	10	11	12
4.	20.706	2.588	50.13	6.65	415.755	417.433	2	0.650	0.528	1.178	
5.	21.720	7.96	50.69	6.38	415.590	417.347	3	0.670	0.97	1.640	
6.	25.995	4.558	87.52	7.8	413.245	416.360	3	0.90	1.20	2.100	
7.	71.640	2.975	50.49	2.55	401.320	406.574	-	0.273	0.98	1.253	
8.	72.711	2.898	57.41	2.48	400.990	406.357	2	0.335	2.10	2.435	
9.	74.426	2.796	51.81	3.74	406.097	402.970	3	0.452	1.70	2.152	
10.	86.718	2.847	56.01	1.50	400.015	403.472	1	0.21	2.55	3.760	
11.	92.120	2.040	50.41	20.00	405.875	402.432	1	1.55	0.75	2.300	
12.	122.00	3.50	-	-	-	-	-	-	-	2.500	
13.	127.50	1.25	-	-	-	-	-	-	-	1.250	
14.	146.50	2.50	-	-	-	-	-	-	-	2.129	
15.	151.150	1.25	-	-	-	-	-	-	-	1.250	

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1	2	3	4	5	6	7	8	9	10	11	12
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16.	159.30	2.00	-	-	-	-	-	-	-	2.000	
17.	160.00	1.25	-	-	-	-	-	-	-	1.250	
18.	161.50	2.50	-	-	-	-	-	-	-	2.000	
19.	177.50	4.00	-	-	-	-	-	-	-	3.000	

Total 40.00

Grand Total 139.00

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COST CURVE SLAB CULVERT (VARIABLE ITEMS)

CHART SHOWING COST OF VARIABLE ITEMS.

V/S DEPTH

VARIABLE ITEMS :- 1. ABUTMENTS

2. WING WALLS.

3. STAUNCH WALLS.

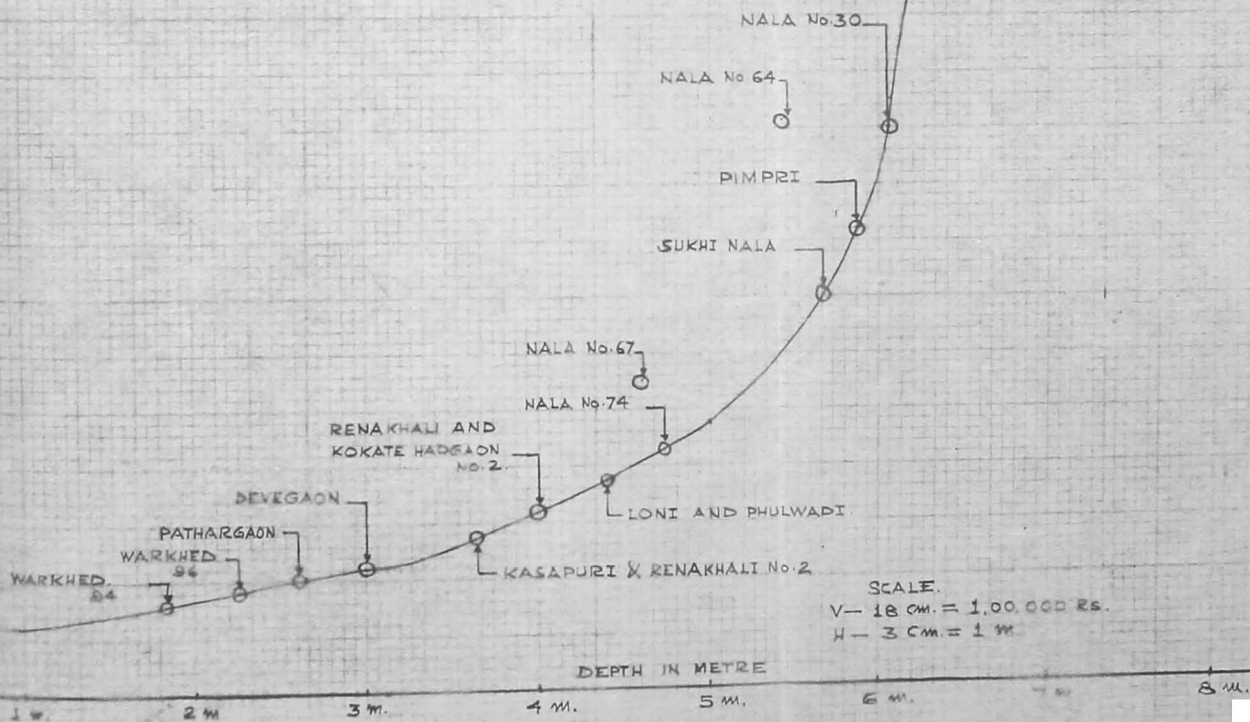
20,000

RS. IN LAKHS.

10,000

5,000

2,500

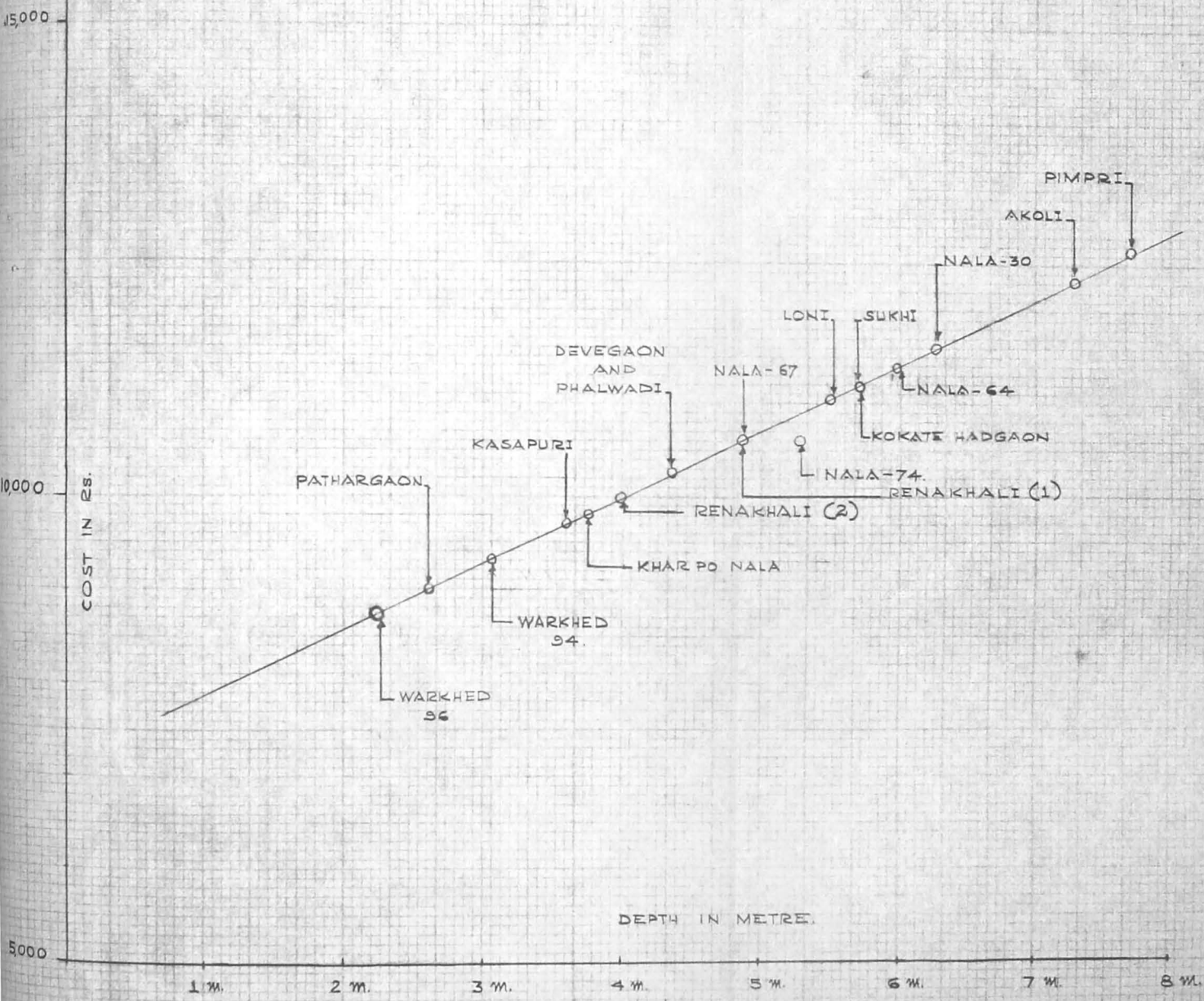


SCALE.
V - 18 CM. = 1,00,000 RS.
H - 3 CM. = 1 M.

COST CURVE SLAB CULVERT (VARIABLE ITEMS)

CHART SHOWING COST OF VARIABLE ITEMS
V/S DEPTH.

- VARIABLE ITEMS:—
1. PIERS.
 2. CURTAIN WALLS.
 3. DROP WALLS.
 4. SLAB.
 5. HEAD WALLS.



SCALE
 V— 1 CM. = 5,000 RS.
 H— 3 CM. = 1 M.

Statement showing the cost of Hume Pipe Culvert and diversions

A) Paithan Right Bank Canal:

a) Hume Pipe Culverts

Sr. No.	No. of vents of size 1.2 Ø per H.P.Culvert.	No. of H.P. culverts.	Cost per H.P.Culvert Rs. in lakhs	Total Cost Rs. in lakhs	Remarks
1	2	3	4	5	6
1.	5 Vents	12 Nos.	0.50	6.00	
2.	10 Vents.	9 Nos.	1.00	9.00	
				<u>15.00</u>	

b) Nala Diversions

Sr.No.	Nala diversion	Nos.	Cost/No.Rs.in lakhs	Total cost Rs.in lakhs	Remarks
1	Nala diversion	24	0.25	<u>6.00</u> 21.00	

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B) Majalgaon Right Bank Canal

a) Hume Pipe Culverts

Sr. No.	Nala Diversion	No.	Cost/No. Rs. in lakhs	Total cost Rs. in lakhs	Remarks
1	2	3	4	5	6
1.	5 Vents	29	0.5	14.50	
2.	10 Vents.	21	1.0	21.00	
				<u>35.50</u>	

b) Nala Diversion

1	2	3	4	5	6
1.	Nala Diversion	8	0.25	2.00	
				<u>2.00</u>	

Statement - 8.15

Chapter - 8
Para - 4.05

II - MAIN CANAL AND BRANCHES

G - BRIDGES

Sr. No.	Particulars	No.	Cost/No. Rs. in lakhs	Amount Rs. in lakhs
1	2	3	4	5

A) PATTHAN RIGHT BANK CANAL

1.	State Highway bridge.	2	1.50	3.00
2.	M.D.R. bridges	3	1.00	3.00
3.	O.D.R. bridges.	15	0.65	11.40
4.	V.R. Bridges.	64	0.40	25.60
5.	Foot bridges.	91	0.25	22.70
			Total	65.70

B) MAJALGAON RIGHT BANK CANAL

1.	State Highway bridges.	2	1.50	3.00
2.	Railway bridge	1	2.00	2.00
3.	M.D.R. bridges.	2	1.00	2.00
4.	O.D.R. bridges.	8	0.65	5.20
5.	V.R. bridges.	103	0.40	41.20
6.	Foot bridges.	160	0.25	40.00
			Total	93.40

Grand Total (A+B) 159.10

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Details of Road Bridges

Sr. No.	Chainage.	Description	Standard
1	2	3	4

A) PAITHAN RIGHT BANK CANAL

1.	0/115	Paithan to Shevgaon	State Highway.
2.	57/647	Aurangabad to Bhir	State Highway.
3.	47/315	Shevgaon to Georai	M.D.R.
4.	52/350	Georai to Shevgaon	M.D.R.
5.	131/380	Georai to Majalgaon	M.D.R.
6.	6/42	Shevgaon to Mungi	O.D.R.
7.	26/580	Kanbi to Rakshasabhuvan.	O.D.R.
8.	26/860	Kanbi to Malegaon	O.D.R.
9.	39/525	Rakshasabhuvan to Umapur	O.D.R.
10.	40/780	Kanegaon to Gulaj.	O.D.R.
11.	42/360	Gulaj to Kanegaon	O.D.R.
12.	60/680	Talwada to Georai	O.D.R.
13.	63/490	Georai to Talwada	O.D.R.
14.	67/230	Georai to Dahithan	O.D.R.
15.	75/775	Georai to Majalgaon	O.D.R.
16.	76/870	Talwada to Shirasdevi	O.D.R.
17.	107/656	Majalgaon to	O.D.R.
18	123/100	Kithi Adgaon to Rajegaon	O.D.R.
19	124/532	Rajegaon to Kithi Adgaon	O.D.R.

1	2	3	4
20.	127/517	Purushottampuri to Georai	O.D.R.
21.	2/250	Cahangatpuri to Telwadi	V.R.B.
22.	3/550	Changatpuri to Rategaon	V.R.B.
23.	6/000	Changatpuri to Dauegaon	V.R.B.
24.	8/85	Dadegaon to Mungi	V.R.B.
25.	9/60	Mungi to Khampimpri	V.R.B.
26.	11/68	Mungi to Pingewadi	V.R.B.
27.	13/000	Village Road.	V.R.B.
28.	14/000	Mungi to Hadgaon	V.R.B.
29.	17/000	Village Road.	V.R.B.
30.	19/180	Borgaon to Hadgaon	V.R.B.
31.	21/040	Kambi to Borgaon	V.R.B.
32.	22/50	Kambi to Hadgaon	V.R.B.
33.	24/50	Kambi to Malegaon.	V.R.B.
34.	27/445	Malegaon to Balamtakali	V.R.B.
35.	29/300	Jalgaon to Kambi, Mungi	V.R.B.
36.	30/02	Jalgaon to Malegaon	V.R.B.
37.	31/70	Malegaon to Umapur	V.R.B.
38.	33/685	Gulaj to Jalgaon	V.R.B.
39.	35/420	Umapur to Surlegaon	V.R.B.
40.	36/220	Gulaji to Umapur	V.R.B.
41.	37/850	Umapur to Panchaleshwar.	V.R.B.

1	2.	3.	4.
42.	38/280	Village Road.	V.R.B.
43.	38/750	Village Road.	V.R.B.
44.	44/843	Talnewadi to Shahgad.	V.R.B.
45.	46/000	Talnewadi to Dhondarai	V.R.B.
46.	48/90	Village Road.	V.R.B.
47.	49/980	Village Road.	V.R.B.
48.	51/210	Dhondrai to Ganelegaon	V.R.B.
49.	53/053	Dhondrai to Georai	V.R.B.
50.	55/680	Belgaon to Umapur	V.R.B.
51.	56/198	Belgaon to Georai	V.R.B.
52.	58/773	Bagpimpalgaon to Mandur	V.R.B.
53.	61/105	Georai to Kolher	V.R.B.
54.	61/120	Georai to Reorai to Deoki	V.R.B.
55.	65/490	Kingaon to Deoki	V.R.B.
56.	68/470	Kingaon to Daithan	V.R.B.
57.	69/570	Daithan to Wadili	V.R.B.
58.	70/730	Talwadi to Anterwadi	V.R.B.
59.	72/535	Village Road.	V.R.B.
60.	79/570	Dhoparwadi to Ronala	V.R.B.
61.	81/480	Jategaon to Georai	V.R.B.
62.	82/840	Rohital to Georai	V.R.B.
63.	84/766	Talwada to Shirasdevi	V.R.B.
64.	86/476	Jalgaon to Rohital.	V.R.B.

1	2	3	4
65.	87/100	Shirasdevi to Kulthewadi	V.R.B.
66.	88/662	Bhend to Adgaon	V.R.B.
67.	91/876	Gologaoon to Jalegaon	V.R.B.
68.	94/756	Rampuri to Jalgaon	V.R.B.
69.	95/800	Village Road.	V.R.B.
70.	97/00	Rampuri to Sailu	V.R.B.
71.	97/396	Rampuri to Takarwan	V.R.B.
72.	99/876	Takargaon to Sailu	V.R.B.
73.	102/000	Village Road.	V.R.B.
74.	104/421	Takarwan to Marphala.	V.R.B.
75.	110/351	Warula to +Shelgaon	V.R.B.
76.	113/101	Warula to Shelgaon	V.R.B.
77.	115/156	Warula to Surala	V.R.B.
78.	116/011	Raigegaon to Warula.	V.R.B.
79.	117/161	Rajegaon to Talkhed.	V.R.B.
80.	118/901	Rajegaon to Limgaon.	V.R.B.
81.	120/191	Rajegaon to Pargaon.	V.R.B.
82.	121/781	Rajegaon to Hadgaon	V.R.B.
83.	125/138	Pargaon to Kithi Adgaon	V.R.B.
84.	127/280	Pargaon to Paitalwadi	V.R.B.

B) MAJALGAON RIGHT BANK CANAL

1.	3/643	Majalgaon to Dharur Road	S.H.
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1	2	3	4
2.	78/295	Parli to Gangakhed.	S.H.
3.	79/670	S.C.Rly.from Palri to Gangakhed.	Rly.Crossing.
4.	15/855	Parli to Wajalgaon	M.D.R.
5.	108/440	Gangakhed to Ranis- awargaon	M.D.R.
6.	41/801	Sirsala to Sonpeth	O.D.R.
7.	56/701	Parli to Sonpeth Road.	O.D.R.
8.	101/660	Gangakhed to Akoli Road.	O.D.R.
9.	148/000	Astur to Tambulgaon	O.D.R.
10.	163/200	Subhashnagar to Kazichiwari	O.D.R.
11.	167/000	Subhashnagar to Adgaon	O.D.R.
12.	169/700	Subhashnagar to Sanmajri	O.D.R.
13.	172/100	Sunegaon to Pangra	O.D.R.
14.	1/470	Dhorgaon to Hinganwadi	V.R.B.
15.	2/724	Laul to Adgaon	V.R.B.
16.	4/093	Pathrud to Anandgaon	V.R.B.
17.	4/603	Pathrud to Anandgaon.	V.R.B.
18.	5/567	Pathrud to Ghalatwadi	V.R.B.
19.	7/029	Pathrud to Adgaon	V.R.B.
20.	8/900	Village Road.	V.R.B.
21.	9/820	Anandgaon to Majalgaon.	V.R.B.
22.	10/145	Anandgaon to Majalgaon.	V.R.B.

1	2	3	4
23.	12/240	Chambar Takli to Pathrud	V.R.B.
24.	13/317	Partur to Anandgaon	V.R.B.
25.	16/385	Nakhalgaon to Longaon.	V.R.B.
26.	16/949	Anandgaon to Majalgaon	V.R.B.
27.	17/249	Longaon to Majalgaon.	V.R.B.
28.	17/585	Longaon to Belur	V.R.B.
29.	17/627	Pathrud to Longaon	V.R.B.
30.	18/698	Mogra to Alapur	V.R.B.
31.	19/767	Belur to Devla(Khurd)	V.R.B.
32.	20/500	Belur to Umri	V.R.B.
33.	22/360	Umri to Dhindrud	V.R.B.
34.	23/693	Umri to Jagaon	V.R.B.
35.	24/486	Pargaon to Dhindrud	V.R.B.
36.	25/966	Umri to Naigaon	V.R.B.
37.	26/643	Pargaon to Jalgaon	V.R.B.
38.	27/375	Digras to Wangi	V.R.B.
39.	27/735	Hivra to Jalgaon	V.R.B.
40.	28/505	Pargaon to Gawargaon	V.R.B.
41.	28/670	Wangi Buzurg to Hivra	V.R.B.
42.	29/426	Majalgaon to Govardhan	V.R.B.
43.	31/915	Gowardhan to Majalgaon	V.R.B.
44.	32/450	Gowardhan to Jalgaon	V.R.B.
45.	32/831	Gowardhan to Hasnabad	V.R.B.

1.	2	3	4
46.	33/219	Gowardhan to Sirsala	V.R.B.
47.	33/515	Padoli to Gowardhan	V.R.B.
48.	34/395	Gowardhan to Tukli	V.R.B.
49.	34/455	Gowardhan to Pimpli Buzrug.	V.R.B.
50.	35/460	Sirsala to Dhonarwada	V.R.B.
51.	35/650	Pimprito Gowardhan	V.R.B.
52.	36/875	Sirsala to Pimpri Buzurug	V.R.B.
53.	38/390	Pimpri to Sirsala	V.R.B.
54.	38/776	Kowdgaon to Sirsala	V.R.B.
55.	39/508	Takli to Gowardhan	V.R.B.
56.	40/447	Takli to Sirsala	V.R.B.
57.	41/916	Takli to Kandai	V.R.B.
58.	42/256	Kowdgaon to Sirsala	V.R.B.
59.	43/360	Sonpeth to Kanadi	V.R.B.
60.	45/469	Pimpalgaon to Kowdgaon	V.R.B.
61.	46/246	Kowdgaon to Pimpalgaon	V.R.B.
62.	46/570	Dighul to Pimpalgaon	V.R.B.
63.	47/210	Dighul to Pimpalgaon	V.R.B.
64.	47/780	Nathra to Pimpalgaon	V.R.B.
65.	49/600	Sonpeth to Sakarabad	V.R.B.
66.	51/300	Nathra to Ingegaon	V.R.B.
67.	53/570	Digul to Dhamuni	V.R.B.

1	2	3	4
68.	56/150	Digul to Dhamuni	V.R.B.
69.	58/725	Limgaon to Narwadi	V.R.B.
70.	60/515	Narwadi to Digul	V.R.B.
71.	61/270	Kothala to Digul	V.R.B.
72.	64/910	Dhamoni to Sonapeth	V.R.B.
73.	65/180	Shelgaon to Dhamni	V.R.B.
74.	66/500	Digul to Bondergaon	V.R.B.
75.	67/230	Kothala to Bondergaon	V.R.B.
76.	67/990	Bondergaon to Naikot	V.R.B.
77.	69/560	Selu to Naikot	V.R.B.
78.	70/310	Kothala to Parli	V.R.B.
79.	71/026	Loni to Parli	V.R.B.
80.	75/505	Loni to Wadgaon	V.R.B.
81.	75/505	Loni to Wadgaon	V.R.B.
82.	84/120	Karam to Harangul	V.R.B.
83.	86/095	Nila to Shengge	V.R.B.
84.	87/380	Wadgaon to Harangul	V.R.B.
85.	90/078	Harangul to Margalwadi	V.R.B.
86.	90/775	Wadgaon to Margalwadi	V.R.B.
87.	91/785	Dagdwdi to Margwalwadi	V.R.B.
88.	94/193	Padegaon to Harangul	V.R.B.
89.	96/186	Harangul to Padegaon	V.R.B.
90.	96/790	Padegaon to Mahatpuri	V.R.B.

1	2	3	4
91.	98/035	Chikalwadi to Suralwadi	V.R.B.
92.	98/840	Suralwadi to Gangakhed	V.R.B.
93.	100/668	Chikalwadi to Gangakhed	V.R.B.
94.	102/000	Gangakhed to Margalwadi	V.R.B.
95.	103/555	Margalwadi to Gangakhed	V.R.B.
96.	104/360	Margalwadi to Gangakhed	V.R.B.
97.	105/665	Isad to Gangakhed	V.R.B.
98.	108/300	Gangakhed to Isad	V.R.B.
99.	109/445	Gangakhed to Dholakwadi	V.R.B.
100.	109/710	Dholakwadi to Anandwadi	V.R.B.
101.	110/720	Isad to Dholakwadi	V.R.B.
102.	113/180	Isad to Malewadi	V.R.B.
103.	118/000	Khandali to Dharamnagri	V.R.B.
104.	121/700	Ahlegaon to Kodgaon	V.R.B.
105.	122/500	Ahlegaon to Mardasgaon	V.R.B.
106.	126/500	Dhangarwadi to Mardasgaon	V.R.B.
107.	128/300	Anandwadi to Gopa	V.R.B.
108.	129/800	Anandwadi to Ghatori	V.R.B.
109.	131/200	Ahlegaon to Ghatori	V.R.B.
110.	142/200	Banjarwadi to Khadki	V.R.B.
111.	143/000	Chorwari to Khadki	V.R.B.
112.	144/000	Lowhrai to Khadki	V.R.B.
113.	146/000	Warkher to Umbra	V.R.B.
114.	153/500	Sadlapuri to Pethpimp- algaon	V.R.B.
115.	179/600	Walkiwadi to Khadakmanjri	V.R.B.
116.	180/500	Harsul to Khadakmanjri	V.R.B.

Statement - 8.16

Chapter - 8
 Para - 4.06

II - MAIN CANAL AND BRANCHESH - ESCAPES

Sr. No.	Particulars.	No.	Cost Rs. in lakhs	Amount Rs. in lakhs
1	2	3	4	5
1.	Providing Escapes on Paithan Right Bank Canal.	6	2.50	15.00
2.	Providing Escapes on Majalgaon Right Bank Canal.	7	2.50	17.50
			Total	32.50

Statement showing the particulars of Escapes

Sr. No.	Items.	Chainage.
1	2	3

I- PAITHAN RIGHT BANK CANAL

1.	Escape No.1	10/500
2.	Escape No.2	22/600
3.	Escape No.3	48/400
4.	Escape No.4	66/800
5.	Escape No.5	87/00
6.	Escape No.6	113/00

II - MAJALGAON RIGHT BANK CANAL

1.	Escape No.1	19/150
2.	Escape No.2	33/450
3.	Escape No.3	49/500
4.	Escape No.4	66/430
5.	Escape No.5	104/600
6.	Escape No.6	133/500
7.	Escape No.7	146/500

Statement - 3.17

Chapter - 8
Para - 4.07

II - MAIN CANAL AND BRANCHES

K - Buildings

Total requirement of accommodation and abstract of cost

Amount Rs. in lakhs

P l a c e	No. of Divisions and Sub-Divisions		Cost of buildings			Cost of buildings			Grand Total
	Permanent	Temporary	Parmanent			Temporary			
			Residential:	Non-residential.	Total	Residential	Non-residential	Total	
1	2	3	4	5	6	7	8	9	10

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4) Paithan Right Bank Canal.

1) Paithan	1 Sub-Dvn.	1 Division							
		3 Sub-Dvns.	-	-	-	-	-	-	6.20*
2) Bhir	1 Division	1 Civil Dvn.	6.90	3.80	10.70	11.10	2.40	13.50	24.20
		1 Mech.Dvn.							

1	2	3	4	5	6	7	8	9	10
3. Georai	1 Sub-Dvn.	3 Sub-Dvns.	2.40	1.10	3.50	6.25	0.90	7.15	10.65
4. Majalgaon	1 Sub-Dvn.	1 Sub-Dvn.	2.40	1.10	3.50	1.95	0.30	2.25	5.75
Section - 10 Nos.									
Changatpuri	}	-	10.45	2.50	12.95	19.75	2.90	22.65	35.60
Kambi									
Dholdrai									
Kohler.									
Talwada									
Kokot Pangri									
Jategaon									
Takarwan.									
Mali Pargaon.									
Majalgaon.									
I.B.1 at Georai	}	-	-	-	-	-	-	-	15.10
1 at Paithan									
and 10 I.Bs each at perm- anent secti- ons.	15.10	-	-	-	-	-	-	-	-
Operational Sectional Officers two Nos. at each colony.	1.80	-	-	-	-	-	-	-	1.80
								Total	<u>99.30</u>

(227)

1	2	3	4	5	6	7	8	9	10
B) Majalgaon Right Bank Canal									
Parli	2 Divisions 3 Sub-Dvn.	1 Sub-Dn. (Store)	16.25	8.70	24.95	1.95	0.30	2.25	27.20
Nanded	-	1 Divn. 1 Mech. Sub-Dvn.	-	-	-	7.40	1.50	8.90	8.90
Majalgaon	1 Sub-Divn. 1 Section	3 Sub-Dn.s (1 Store 1 Mech. 1 Civil)	3.50	1.30	4.80	6.25	0.90	7.15	11.95
Gangakhed	2 Sub-Dns 1 Section.	2 Sub-Dns 1 Mech. 1 Civil.	5.85	2.40	8.25	3.30	0.60	4.40	12.65
Palam.	1 Sub-Dn.	-	2.4	1.1	3.50	-	-	-	3.50
Loha.	1 Sub-Dn. 1 Section.	-	3.5	1.3	4.80	-	-	-	4.80

1	2	3	4	5	6	7	8	9	10
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Sections

Patrud									
Lonngaon									
Umpri (Bk)									
Gowardhan									
Takli.									
Pimpalgaon									
Nathra	-	-	22.00	5.05	27.05	19.75	2.90	22.65	49.70
Digal									
Dhamni									
Shelgaon									
Loni									
Ukadgaon									
Padegaon									
Isad									
Borgaon									
Ramtirth									
Badlapur									
Petshivani									
Shekh Rajuri									
Salegaon									
Dhanura									

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1	2	3	4	5	6	7	8	9	10
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Inspection Bungalow.									
Class - I I.B.@ Parli									
Two suites I.B. @ Majalgaon.									
Parli. Ganakhed. Palam. and Loha.	-	-	41.70	-	-	-	-	-	41.70
One suite at each sectional places 24 Nos.									

(.230)

Total 160.40

Grand Total 259.70

*Note:- (1) It is expected that 4 Divisions with 20 Sub-Divisions will be required for supervision of Paithan Right Bank Canal. Existing buildings available at Paithan will be useful for accommodating the supervisory staff of Stage-II work also. Hence provision for additions and alterations only is made for Paithan buildings.

(2) It is expected that 3 Divisions with 23 Sub-Divisions will be required for supervision of Majalgaon Right Bank Canal.

A) Paithan Right Bank CanalI - Estimated cost of buildings proposed at Paithan

Additions and alternations to existing
buildings and depreciated cost 6.20 lakhs

Total 6.20 lakhs

II - Estimated cost of buildings proposed at BhirA) (i) Permanent (Residential)

Sr. No.	Items	Plinth area in Sq.m.	Rate Rs./Sq.m.	Amount Rs. in lakhs
1)	Class I	230	350	0.80
2)	Class II	180	320	0.55
3)	Class III A (10 x 65)	650	250	1.65
4)	Class III B (16 x 45)	720	250	1.80
5)	Class IV (7 x 40)	280	250	0.70
6)	Sanitary block	20	100	0.02
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			1.38
			Total	6.90

(ii) Permanent (Non-residential)

1)	Division office	1000	320	3.20
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.60
			Total	3.80

Total (A) - 10.70

Sr. No.	Items.	Plinth area in Sq.m.	Rate Rs. / Sq.m.	Amount Rs. in lakhs
1	2	3	4	5

B) (i) Temporary (Residential)

1)	Class I (2 x 230)	460	300	1.40
2)	Class II (2 x 180)	360	280	0.90
3)	Class III A (20 x 65)	1300	210	2.70
4)	Class III B (32 x 40)	1280	210	2.70
5)	Class IV (14 x 30)	420	210	0.90
6)	Sanitary Block (2 x 10)	20	100	0.20

Add 26% for internal water supply,
internal sanitary arrangements,
fencing internal colony roads.

2.30

Total 11.10

(ii) Temporary (Non - residential)

1)	Division office -2Nos. (2x380= 760)	760	260	2.00
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Add 20% for internal water supply,
internal sanitary arrangements,
fencing, internal colony roads.

0.40

Total 2.40

Total (B) 13.50

Grand Total-(A)+(B) 24.20

1	2	3	4	5
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III - Estimated cost of buildings proposed at Georai

A) (i) Permanent (residential)

1)	Class II	180	320	0.55
2)	Class III A (4 x 65)	270	260	0.60
3)	Class III B (3 x 45)	135	250	0.35
4)	Class IV (4 x 40)	160	250	0.40
5)	Sanitary block	20	100	0.02

Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony road.

0.48

Total 2.40

(ii) Permanent (Non - residential)

1)	Office of Sub-Divn.	300	300	0.90
----	------------------------	-----	-----	------

Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.

0.20

Total 1.10

Total (A) 3.50

Sr. No.	Items.	Plinth area in Sq.m.	Rate Rs./Sq.m.	Amount Rs. in lakhs
1	2	3	4	5
1)	Class II (3 x 180)	540	280	1.50
2)	Class III A (12 x 65)	780	210	1.65
3)	Class III B (9 x 40)	360	210	0.75
4)	Class IV (12 x 30)	360	210	0.75
5)	Sanitary block (3 x 10)	30	100	0.30
	Add 26% for internal water supply, internal sanitary arrangements, fencing.			1.30
			Total	6.25
	<u>(ii) Temporary (Non-residential)</u>			
1)	Office of Sub- Divisions (3 Nos.) (3 x 95)	285	250	0.75
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.15
			Total	0.90
			Total (B)	7.15
			Total (A + B)	10.65

IV - Estimated cost of Buildings proposed at MajalgaonA) (i) Permanent (Residential)

Sr. No.	Items.	Plinth area in Sq.m.	Rate Rs. / Sq.m.	Amount Rs. in lakhs
1	2	3	4	5
1)	Class II	180	320	0.55
2)	Class III A (4 x 65)	270	250	0.60
3)	Class III B (3 x 45)	135	250	0.35
4)	Class IV (4 x 40)	160	250	0.40
5)	Sanitary block	20	100	0.02
	Add 26% for internal water supply, internal sanitary arrangements, fencing internal colony roads.			0.48
				<u>2.40</u>
	ii) <u>Permanent (Non-residential)</u>			
1)	Office of Sub-Division	300	300	0.90
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.20
			Total	<u>1.10</u>
			Total (A)	<u>3.50</u>

B - (i) Temporary (Residential)

1)	Class II	180	280	0.50
2)	Class III A (4 x 65)	260	210	0.55

1	2	3	4	5
3)	Class III B (4 x 40)	120	210	0.25
4)	Class IV (4 x 30)	120	210	0.25
5)	Sanitary block (1 x 10)	10	100	0.01
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.40
			Total	1.95
<u>(ii) Temporary (Non residential)</u>				
1)	Office of Sub-Division.	95	250	0.25
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.05
			Total	0.30
			Total (B)	2.25
			Total (A + B)	5.75

Estimated cost of buildings proposed at

i) Changatpuri, Kambi, Dhondrai, Kohler, Talawada,
Kekat Pangri, Jategaon, Takarwan, Malipargaon,
Majalgaon.

A)	(i) <u>Permanent (Residential) (10 Sections)</u>			
1)	Class III A (10x65)	650	250	1.60
2)	Class III B (40x45)	1800	250	4.50
3)	Class IV (20x40)	800	250	2.00
4)	Sanitary block (10x20)	200	100	0.20
				<u>8.30</u>

1	2	3	4	5
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			2.15
			Total	10.45
	<u>ii) Permanent (Non residential)</u>			
1)	Sectional offices at above places (10 Nos.)	800	250	2.00
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.50
			Total	2.50
			Total (A)	12.95

B)	<u>(i) Temporary (Residential)</u>			
1)	Class II (10 x 180)	1800	280	5.05
2)	Class III A (40x65)	2600	210	5.50
3)	Class III B (30x40)	1200	210	2.50
4)	Class IV (40x30)	1200	210	2.50
5)	Sanitary block(10x10)	100	100	0.10
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			4.10
			Total	19.75

	<u>(ii) Temporary (Non residential)</u>			
1)	Office of Sub- Divisions at above places (10 Nos) (10 x 90)	950	250	2.40

1	2	3	4	5
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.50
			Total	2.90
	Total for buildings at Changatpuri Kambi, Dhondrai ... Majalgaon.			35.60

vi) Estimated cost of Inspection Bungalows

(Each at Permanent Sub-Divisions 2 Suites- 2 Nos.)

(Each at Permanent Sections 1 Suite 10 Nos.)

1)	Inspection Bungalow at each permanent Sub-Divisions at Georai and Majalgaon.	-	-	4.00
2)	Inspection Bungalow at each permanent sections. (10 Nos.)	-	-	8.00
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.	-	-	3.10
			Total	15.10 lakhs

VII-) Add for operational sectional
officer 2 Nos. at each colony
(26 Nos) at 0.07 lakhs/No. 1.80

Grand Total: I + II + III + IV + V + VI + VII 99.30
lakhs

I - ESTIMATED COST OF BUILDINGS PROPOSED AT PARLI

(A) (i) Permanent (Residential)

Sr. No.	Items.	Plinth area in Sq.m.	Rate Rs./Sq.m.	Amount Rs. in lakhs
1	2	3	4	5
1)	Class I (2 x 230)	460	350	1.60
2)	Class II (2 x 180)	540	320	1.65
3)	Class III A (24x65)	1560	250	3.90
4)	Class III B (35x45)	1575	250	3.95
5)	Class IV (18 x 40)	720	250	1.80
6)	Sanitary Block (2x20)	60	100	0.05
	Add 26% internal water supply, internal sanitary arrangements, fencing, internal colony roads.			3.30
			Total	15.25
 (ii) <u>Permanent (Non residential)</u>				
1)	Divisional Offices at Parli - 2 Nos (2 x 1000 = 2000)	2000	320	6.40
2)	Offices of Sub-Dn. - 3 Nos (3 x 100 = 300)	300	300	0.90
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			1.40
			Total	8.70
			Total(A)	24.95

1	2	3	4	5
<u>B - (i) Temporary (Residential)</u>				
1)	Class II (1 x 180)	180	280	0.50
2)	Class III A (4 x 65)	260	210	0.55
3)	Class III B (3x40)	120	210	0.25
4)	Class IV (4x30)	120	210	0.25
5)	Sanitary Block(1x10)	10	100	0.01
Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.				0.40
Total				<u>1.95</u>
 <u>(ii) Temporary (Non residential)</u>				
i)	Office of Sub- Division.	95	250	0.25
Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.				0.05
Total				<u>0.30</u>
Total (B)				<u>2.25</u>
Total (A + B)				<u>27.20</u>

II)	<u>Estimated cost of buildings proposed at Nanded</u>			
A)	<u>Permanent</u>	- Nil -		
B)	i) Temporary (Residential)			
1)	Class I	230	300	0.70
2)	Class II (2 x180)	360	280	0.90

1	2	3	4	5
3)	Class III A (14x65)	910	210	1.90
4)	Class III B (19x40)	760	210	1.50
5)	Class IV (11x30)	330	210	0.70
6)	Sanitary Block(2x10)	20	100	0.20
				5.90
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			1.50
			Total	7.40
	<u>ii) Temporary (Non residential)</u>			
1)	Division office	380	260	1.00
2)	Sub-Division office	95	250	0.25
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.25
			Total	1.50
	Total for buildings at Nanded (A+B)			8.90 lakhs

III) Estimated cost of Buildings proposed at Majalgaon

A) (i) Permanent (Residential)

1)	Class II (1 x 180)	180	320	0.55
2)	Class III A (5x65)	325	250	0.80
3)	Class III B (7x45)	315	250	0.80
4)	Class IV (6x40)	240	250	0.60
5)	Sanitary Block(2x20)	40	100	0.05

1	2	3	4	5
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.70
			Total	3.50
	<u>(ii) Permanent (Non residential)</u>			
1)	Office of Sub- Division	300	300	0.90
2)	Sectional Office	80	250	0.20
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.20
			Total	1.30
			Total (A)	4.80
B)	<u>(i) Temporary (Residential)</u>			
1)	Class II (3x180)	540	280	1.50
2)	Class III A (12x65)	780	210	1.65
3)	Class III B (9x40)	360	210	0.75
4)	Class IV (12x30)	360	210	0.75
5)	Sanitary Block (3x10)	30	100	0.30
	Add 26% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			1.30
			Total	6.25
	<u>(ii) Temporary (Non Residential)</u>			
	Office of Sub- Divn. (3 Nos.)(3x95)	285	25	0.75
	Add 20% for internal water supply, internal sanitary arrangements, fencing, internal colony roads.			0.15
			Total	0.90
			Total (B)	7.15
			Total (A+B)	11.95

1	2	3	4	5
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IV) Estimated Cost of Buildings proposed @ Gengakhed

A) (i) Permanent (Residential)

1.	Class II	(2x180)	360	320	1.10
2.	Class III A	(9x65)	585	250	1.35
3.	Class III B	(10x45)	450	250	1.15
4.	Class IV	(10x40)	400	250	1.00
5.	Sanitary Block	(3x20)	60	100	0.05

Add 26% for internal water supply,
internal sanitary arrangements,
Fencing, internal colony roads.

1.20

Total 5.85

(ii) Permanent (Non - residential)

1)	Office of Sub-Division	(2x300)	600	300	1.80
2)	Office of Section.		80	250	0.20

Add 20% for internal water supply,
internal Sanitary arrangements,
Fencing, internal Colony roads.

0.40

Total 2.40

Total(A) 8.25

B) (i) Temporary (Residential)

1.	Class II	(2x100)	360	280	0.90
2.	Class III A	(8x 65)	520	210	1.10
3.	Class III B	(6 x 40)	240	210	0.50
4.	Class IV	(8 x 30)	240	210	0.50

1	2	3	4	5
5.	Sanitary Block (2 x 10)	20	100	0.02
	Add 26% for internal water supply, internal Sanitary arrangements, Fencing, internal colony roads.			0.80
				<u>3.80</u>
	<u>ii) Temporary (Non residential)</u>			
	1) Office of Sub-Divisions (2 Nos.) (2x 95)	190	250	0.50
	Add 20% for internal water supply, internal sanitary arrangements, Fencing, internal Colony roads.			0.10
				<u>0.60</u>
				Total (B) = 4.40
				Total (A+B) = 12.65 <u>lakhs</u>

IV) Estimated cost of buildings proposed @ PalamA) (i) Permanent (Residential)

Sr. No.	Items.	Plinth area in Sq.m.	Rate Rs. Sq.m.	Amount Rs. in Lakhs
1	2	3	4	5

(1)	Class II	150	320	0.55
(2)	Class III A (4x65)	270	250	0.60
(3)	Class III B (3x45)	135	250	0.35
(4)	Class IV (4x40)	160	250	0.40
(5)	Sanitary Block	20	100	0.02

Add 26% for internal water supply,
internal Sanitary arrangements,
Fencing, internal colony roads.

0.50

Total 2.40

(ii) Permanent (Non Residential)

1) Office of Sub-Division 300 300 0.90

Add 20% for internal water supply,
internal Sanitary arrangements,
fencing, internal colony roads.

0.20

Total 1.10

B) Temporary --- Nil ---

Total for buildings @ Palam (A+B) 3.50 Lakhs

(VI) Estimated cost of buildings proposed @ LohaA) (i) Permanent (Residential)

1)	Class II	(1x180)	180	320	0.55
2)	Class III A	(5x35)	325	250	0.80
3)	Class III B	(7x45)	315	250	0.80
4)	Class IV	(6x40)	240	250	0.60
5)	Sanitary Block	(2x20)	40	100	0.05

Add 26% for internal water supply,
internal sanitary arrangements,
Fencing, internal colony roads.

0.70

Total 3.50

(ii) Permanent (Non residential)

i)	Office of Sub - Division.		300	300	0.90
ii)	Sectional Office.		80	250	0.20

Add 20% for internal water supply,
internal sanitary arrangements,
fencing, internal colony roads.

0.20

Total 1.30

B) Temporary

- Nil -

Total for buildings @ Loha (A+B)

4.80

Lakhs

VII - Estimated Cost of buildings proposed @ Patrud.

Lo ngaon, Umari (B.K.) GowardhamTaki,
Pimpalgaon, Nathra, Digul, Dhamni, Shelgaon,
Loni, Ukadgaon, Padegaon, Isad, Borgaon,
Ramtirth, Sadlapur, Pethshivani, Shekh Rajuri,
Salegaon & Dhanura.

(A) (i) Permanent (Residential)(21 Sections)

1)	Class III - A	(21x65)	1365	250	3.40
2)	Class III - B	(84x45)	3780	250	9.45
3)	Class IV	(42x40)	1680	250	4.20
4)	Sanitary Block	(21x20)	420	100	0.40

Add 26% for internal water supply,
 internal sanitary arrangements,
 Fencing, internal colony roads.

4.55

Total 22.00

(ii) Permanent (Non residential)

i) Sectional Office
 @ above places
 (21 Nos.)

1680 250 4.20

Add 20% for internal water supply,
 internal sanitary arrangements,
 Fencing, internal colony roads.

0.85

Total 5.05

Total 27.05

(B) (i) Temporary (Residential) @ Lo ngaon, Gorelhan,
Pimpalgaon, Digul, Selgaon Ukadgaon, Borgaon,
Sadlapur, Shekh Rajuri and Dhanura.

(248)

1)	Class II	(10x180)	1800	280	5.05
2)	Class III - A	(40x65)	2600	210	5.50
3)	Class III - B	(30x40)	1200	210	2.50
4)	Class IV	(40x30)	1200	210	2.80
5)	Sanitary Block	(10x10)	100	210	0.10

Add 26% for internal water supply,
internal sanitary arrangements,
Fencing, internal colony roads.

4.10

Total 19.75

(ii) Temporary (Non residential)

i) Office of Sub - Divisions @ above places (10 Nos.)(10x95)	950	250	2.40
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Add 20% for internal water supply,
internal sanitary arrangements,
Fencing, internal colony roads.

0.50

2.90

Total (B) = 22.65

Total (A+B) 49.70
lakhs

VIII) Estimated cost of inspection Bungalows

(Class I Inspection Bungalow at Parli	1 No.
Two suites Inspection Bungalow @ Majalgaon, Parli, Gangakhed, Palam, & Loha	5 Nos.
One suite Inspection Bungalow @ each sectional place	24 Nos.)
Class I Inspector Bungalow @ Parli	4.00
Two suites Inspection Bungalow @ above places (5 Nos.)	10.00
One Suit @ each sectional places (24 Nos.)	19.20
Add 26% for internal water supply, Internal sanitary arrangements, Fencing, internal colony roads	8.50
Total	41.70

Grand Total I + II + III = 160.40
lakhs

Total cost of buildings for main canal

i) Paithan Right Bank Canal.	..	99.30
ii) Majalgaon Right Bank Canal.	..	160.40
Grand Total		259.70

Rs.259.70 lakhs

Statement - 8.18

Chapter - 8
Para - 4.08II - Main Canal and BranchesL - Earth workA) Paithan Right Bank Canal:

Kms.	Cost Rs. in lakhs	Kms.	Cost Rs. in lakhs
0.00 to 1.50	14.33	24	7.92
1.50 to 3.00	17.50	25	4.86
3.00 to 4.26	8.50	26	5.18
4.26 to 5.00	6.31	27	4.65
5.00 to 5.52	6.21	28	4.26
5.52 to 6.00	8.58	29	4.18
7	7.59	30	4.26
8	7.31	31	4.49
9	7.21	32	3.85
10	5.82	33	4.02
11	7.42	34	5.64
12	7.06	35	3.19
13	6.41	36	5.38
14	7.62	37	6.00
15	7.46	38	6.41
16	8.27	39	7.35
17	7.19	40	5.17
18	11.39	41	5.94
19	15.14	42	4.24
20	6.29	43	4.45
21	5.37	44	4.14
22	5.20	45	7.23
23	6.92	46	5.82

Kms.	Cost Rs. in lakhs	Kms.	Cost Rs. in lakhs
47	5.31	73	1 14.56
48	5.22	74	8.13
49	13.35	75	5.31
50	4.72	76	4.20
51	4.91	77	5.51
52	5.03	78	4.05
53	10.39	79	4.87
54	16.12	80	6.01
55	5.67	81	4.75
56	4.66	82	5.17
57	12.25	83	7.41
58	7.70	84	7.46
59	4.35	85	6.34
60	6.01	86	10.46
61	4.17	87	6.02
62	4.82	88	6.56
63	4.23	89	11.62
64	4.38	90	5.18
65	4.04	91	4.77
66	6.21	92	14.91
67	4.80	93	22.09
68	4.46	94	7.77
69	10.66	95	6.24
70	15.67	96	5.01
71	1.85	97	7.45
72	4.41	98	11.17

Kms.	Cost Rs. in lakhs	Kms.	Cost Rs. in lakhs
99	8.58	126	29.47
100	6.87	127	5.00
101	8.67	128	12.98
102	11.02	129	11.32
103	11.24	130	12.36
104	5.31	131	7.02
105	8.63	132	15.14
106	8.03	132.00	2.95
107	6.65	to	
108	7.90	132.650	
109	5.62	Total:	<u>1061.33</u>
110	5.94		
111	17.94		
112	7.56		
113	8.74		
114	8.07		
115	8.47		
116	32.02		
117	6.50		
118	4.68		
119	6.15		
120	13.65		
121	18.29		
122	25.30		
123	5.64		
124	7.63		
125	11.84		

B) Majalgaon Right Bank Canal

Kms.	Cost Rs. in lakhs.	Kms.	Cost Rs. in lakhs.
1	4.79	28	13.24
2	6.78	29	6.99
3	6.01	30	7.02
4	5.24	31	8.63
5	9.96	32	8.24
6	12.02	33	14.12
7	6.88	34	15.74
8	4.73	35	6.59
9	6.16	36	7.21
10	7.97	37	15.04
11	8.29	38	18.43
12	9.63	39	8.76
13	6.96	40	8.81
14	12.65	41	10.41
15	7.53	42	11.21
16	7.39	43	8.45
17	8.56	44	14.85
18	6.76	45	10.31
19	8.17	46	21.89
20	13.18	47	10.16
21	9.21	48	6.91
22	6.57	49	4.72
23	4.12	50	4.48
24	4.09	51	4.44
25	9.11	52	9.58
26	7.49	53	13.76
27	10.71	54	4.71

Contd...

Kms.	Cost Rs. in lakhs.	Kms.	Cost Rs.in lakhs.
55	14.62	82	5.09
56	5.15	83	17.17
57	5.73	84	7.49
58	4.50	85	9.75
59	5.03	86	7.80
60	4.74	87	5.95
61	8.59	88	5.98
62	5.30	89	10.09
63	4.77	90	5.48
64	6.43	91	7.60
65	7.52	92	19.08
66	6.11	93	11.12
67	7.80	94	6.80
68	5.34	95	10.84
69	8.47	96	3.88
70	12.81	97	16.78
71	16.39	98	21.44
72	8.21	99	13.78
73	9.93	100	9.42
74	8.49	101	5.82
75	8.89	102	20.49
76	7.98	103	8.53
77	9.25	104	5.76
78	6.51	105	9.69
79	5.94	106	7.90
80	7.19	107	7.90
81	6.02	108	9.80

Contd...

Kms.	Cost Rs. in lakhs.	Kms.	Cost Rs. in lakhs.
109	10.08	137	5.16
110	9.11	138	12.37
111	11.83	139	5.16
112	13.09	140	5.16
113	18.32	141	5.16
114	21.44	142	5.16
115	20.76	143	12.37
116	21.61	144	12.37
117	11.48	145	12.37
118	5.80	146	12.37
119	10.31	147	5.16
120	5.16	148	5.16
121	5.16	149	5.16
122	5.16	150	5.16
123	10.31	151	5.16
124	5.16	152	10.31
125	5.16	153	10.31
126	5.16	154	10.31
127	5.16	155	5.16
128	10.31	156	10.31
129	12.37	157	5.16
130	5.16	158	5.16
131	5.16	159	10.30
132	5.16	160	5.16
133	5.16	161	5.16
134	10.31	162	5.16
135	10.31	163	12.37
136	10.31	164	12.37

Contd...

Kms.	Cost Rs. in lakhs
165	5.16 Main Canal ends.
166	4.13 Tail branch.
167	4.13
168	8.25
169	8.25
170	8.25
171	4.13
172	4.13
173	4.13
174	8.25
175	8.25
176	8.25
177	4.13
178	8.25
179	4.13
180	4.13
181	10.31

Total 1556.27

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Statement - 8.19Chapter - 8
Para - 4.08

Typical estimate of Earth work and lining Majalgaon

Right Bank Canal Km. 2.

Quantity	Unit	Details	Rate	Unit	Amount
<u>Item No.1</u>					
30621	m ³	Excavation in soft soil including dressing the sides and stacking the material neatly with 30 m. lead and lifts of 1.5 m. etc. complete as directed.	2.47	m ³	75634
<u>Item No.2</u>					
8908	m ³	Excavation in hard murum including dressing the sides and stacking the material neatly with 30 m.lead and > 1.5 m. lifts etc. complete as directed.	2.92	m ³	26011
<u>Item No.3</u>					
16145	m ³	Excavation in soft rock including blasting if required dressing the sides and stacking the excavated material neatly with 30 m. lead and lift of 1.5 m.etc. complete as directed.	9.73	m ³	157090

Quantity	Unit	Details	Rate	Unit	Amount
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Item No.4

27559	m ³	Providing earthwork for embankment by utilising available excavated stuff for hearting within the lead of 30 m. lift of 1.5 m. including spreading in layers of 0.15 m. to 0.23m. etc. complete as directed.	2.95	m ³	81300
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Item No.5

22548	m ³	Providing earthwork for embankment by utilising available excavated stuff for casing comprising of any stuff including rock within the lead of 30 m. and lift of 1.5 m. including spreading in layers of 0.15 m. to 0.23 m. thick etc. complete as directed.	2.95	m ³	66515
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Item No.6:

3534	m ³	Providing earthwork for embankment with impervious soil of approved quality for hearting from borrow pits including spreading in layers of 0.15 m. to 0.23 m. thick with 30 m. lead and 1.5 m. lifts etc. complete as directed.	4.20	m ³	14843
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Item No.7:

152	m ³	Providing earthwork for embankment with pervious soils including hard murum of			
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Quantity	Unit	Details	Rate	Unit	Amount
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Item No.7 Contd.:

approved quality for casing from borrow pits including spreading in layers of 0.15 m. to 0.23 m. thick with 30 m.lead and 1.5 m. lifts etc. complete as directed.

4.45 m³ 676

Item No.8

8500 m² Providing and laying cement concrete lining 1:4:8 proportion 3" thick on bed with 20% addition of finally ground surkhi including placing, ramming & curing etc. complete.

5.30 m² 44960

Item No.9

22400 m² Providing and laying 2" thick P.C.C.1:3:6 slab lining for canals with cement pointing 1:3 proportion including providing 2" dia. A.C.Pipes for relief works etc. complete.

8.50 m² 190400

Item No.10

5 Nos. Providing and fixing Km.Stones in cement concrete 1:4:8 Proportion including white washing etc. complete.

7.25 Each. 37

657470

Add for Contingencies.

13150

Add for W.C.Establishment.

7380

Total 6,78,000

Statement - 8.20

Chapter - 8
Para - 4.10II - Main Canal and Branches'O' Miscellaneous

Sr. No.	Description	Amount Rs. in lakhs for P. R.B.C.	Amount Rs. in lakhs for M. R.B.C.	Total amount Rs. in lakhs
I)	Water supply and external drainage schemes and running and maintenance charges.	47.00	63.90	110.90
II)	Power supply including installation, repairs, running and maintenance charges.	25.30	35.80	61.10
III)	Medical Aid	11.00	16.40	27.40
IV)	Photographs & Models	4.50	6.50	11.00
V)	Telephone and Telegraph system	10.00	12.00	22.00
VI)	Wireless transmission	5.00	6.00	11.00
VII)	Miscellaneous	5.30	6.30	11.60
		108.10	146.90	255.00

Statement showing the details of Sub- Head
'0' Miscellaneous under II - Main Canal and
Branches.

A) Paithan Right Bank Canal. Amount Rs. in lakhs

I - Water supply and external drainage schemes and running and maintenance charges.

I/1 Water supply arrangement @

i) Divisional Colonies (3 Nos. x 1.50 lakhs)	4.50
ii) Sub-Divisional Colonies (20 x 1 lakh)	20.00
iii) Sectional Colonies (10 x 0.50 lakhs)	5.00

I/2 External drainage arrangement @

i) Divisional Colonies (3 Nos. x 0.25 lakhs)	0.80
ii) Sub-Divisional colonies (20 Nos. x 0.20 lakhs)	4.00
iii) Sectional Colonies (10 x 0.15 lakhs)	1.50

I/3 Running and maintenance charges of water supply and sanitation for

i) Divisional colonies (3 Nos. x 5 years x 0.06 lakhs)	0.90
ii) ii) Sub-Divisional Colonies (20 Nos. x 5 years x 0.06 lakhs)	6.00
iii) Sectional Colonies (10 Nos. x 5 years x 0.05 lakhs)	2.50

I/4 Water supply by tankers prior to permanent scheme during emergency.

i) Divisional Colonies.	0.30
ii) Sub=Divisional Colonies.	1.00
iii) Sectional Colonies	0.50
	<hr/>
	47,00
	<hr/>

II - Power supply including installation, repairs, running and maintenance charges.

II/1 Providing Electric Supply @

i) Divisional Colonies (3 Nos. x 0.25 lakhs)	0.80
ii) Sub-Divisional Colonies (20 Nos. x 0.20 lakhs)	4.00
iii) Sectional Colonies (10 Nos. x 0.15 lakhs)	1.50

II/2 Running, maintenance and consumption charges of electric supply for

i) Divisional Colonies (3 Nos. x 5 years x 0.065)	1.00
ii) Sub-Divisional Colonies (20 Nos. x 5 years x 0.06 lakhs)	6.00
iii) Sectional Colonies (10 Nos. x 5 years x 0.05 lakhs)	2.50

II/3 Providing, lighting arrangement in colony streets, store years, public gardens etc. @

i) Divisional Colonies	1.00
ii) Sub-Divisional Colonies	6.00
iii) Sectional Colonies.	2.50
	<hr/>
	25.30 lakhs
	<hr/>

III -Medical Aid.

III/1	Establishing, Dispensary (equipments)@	
	i) Divisional Colonies	1.00
	ii) Sub-Divisional colonies	4.00
	iii) Sectional Colonies.	1.50
		<hr/>
		6.50
		<hr/>
III/2	Establishment for Malaria eradication on Project.	4.50
		<hr/>
		11.00 lakhs
		<hr/>
	Photographs and models.	
IV/1	Photographs	3.00
IV/2	Models	1.50
		<hr/>
		4.50 lakhs
		<hr/>

V - Telephone and Telegraph system.

V/1	Facility of telephone and telegraph system at Divisional Sub=Dvnl. Sectional colonies along the canal.	10.00 lakhs
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(264)

VI Wireless transmission

VI/1 Wireless transmission
between Divisions,
Sub=Divisions, Sections
and work sites etc. 5.00 lakhs

VII Miscellaneous

VII/1 Bhumi-pujan ceremony,
visit of V.I.Ps. 2.00

VII/2 Printing charges,
brochures, Pamphlets
etc. 0.30

VIII/3 Providing equipments
for social welfare
and cultural activities
at Divisional Sub -
Divisional and Sectional
colonies. 3.00

5.30 lakhs

B) Majalgaon Right Bank CanalAmount Rs. in lakhs

I	-	Water supply and external drainage schemes and running and maintenance charges.	
		I/1 Water supply arrangement @	
	i)	Divisional Colonies (4 Nos. x 1.50 lakhs)	6.00
	ii)	Sub-Divisional Colonies (21 x 1.00 lakh)	21.00
	iii)	Sectional Colonies (24 x 0.50 lakhs)	12.00
		I/2 External drainage arrangement @	
	i)	Divisional Colonies (4 Nos. x 0.25 lakhs)	1.00
	ii)	Sub-Divisional Colonies (21 Nos. x 0.20 lakhs)	4.20
	iii)	Sectional Colonies (24 Nos. x 0.15 lakhs)	3.60
		I/3 Running and maintenance charges of water supply and sanitation.	
	i)	Divisional Colonies (4 Nos. x 5 years x 0.06 lakhs)	1.20
	ii)	Sub-Divisional Colonies (21 Nos. x 5 years x 0.06 lakhs)	6.30
	iii)	Sectional Colonies (24 Nos. x 5 years x 0.05 lakhs)	6.00
		I/4 Water supply by tanker prior to permanent scheme, during emergency.	
	i)	Divisional colonies	9.40
	ii)	Sub-Divisional Colonies	1.10
	iii)	Sectional Colonies	<u>1.10</u>
			63.90

II - Power supply including installation, repairs, running and maintenance charges.

II/1 Providing electric supply @

i) Divisional Colonies (4 Nos x 0.25 lakhs)	1.00
ii) Sub-Divisional Colonies (21 Nos. x 0.20 lakhs)	4.20
iii) Sectional Colonies (24 Nos. x 0.15 lakhs)	3.60

II/2 Running maintenance and consumption charges of electric supply for

i) Divisional Colonies (4 Nos. x 5 years x 0.06 lakhs)	1.20
ii) Sub-Divisional Colonies (21 Nos. x 5 years x 0.06 lakhs)	6.30
iii) Sectional Colonies (24 Nos. x 5 years x 0.05 lakhs)	6.00

III/3 Providing lighting arrangement in Colony streets, store yards, public gardens etc. @

i) Divisional Colonies	1.20
ii) Sub-Divisional Colonies	6.30
iii) Sectional Colonies.	6.00

35.80

III - Medical Aid.

III/1 Establishing dispensary,
(equipments)@

(267)

1) Divisional Colonies	1.20
ii) Sub-Divisional Colonies	4.20
iii) Sectional Colonies	6.00
III/2 Establishment for malarial eradication on project.	5.00
	<hr/>
	16.40
IV - Photographs and models	
IV/1 Photographs	3.50
IV/2 Models	3.00
	<hr/>
	6.50
V - Telephone and telegraph	
V/1 Facility of telephone and telegraph system @ Divisional, Sub-Divisional and sectional colonies along the canal	12.00
VI - Wireless transmission	
VI/1 Wireless transmission between divisions, sub-divisions, sections and work sites etc.	6.00
VII - VII/1 Bhumi-pujan ceremony visit of V.I.Ps.	2.50
VII/2 Printing charges, Brochures Pamphlets etc.	0.30
VII/3 Providing equipments for social welfare and cultural activities and divisional, sub-divisional and sectional colonies.	3.50
	<hr/>
	6.30
	<hr/>

Statement - 8.21

Chapter - 8
Para - 4.11II - MAIN CANAL AND BRANCHESP - MAINTENANCE

Sr. No.	Items.	Cost Rs. in lakhs for P.R.B.C.	Cost Rs. in lakhs for M.R.B.C.	Total cost Rs. in lakhs
1)	D-Regulators	0.70	0.90	1.60
2)	F.C.D.Works	3.80	4.55	8.35
3)	G - Bridges	0.65	0.95	1.60
4)	H - Escapes.	0.15	0.15	0.30
5)	K=Buildings	0.95	1.65	2.60
6)	L-Earthwork	10.61	15.46	26.07
7)	M-Plantation	0.05	0.05	0.10
8)	R-Communications	0.10	0.10	0.20
Total		17.01	23.81	40.82

Note:- Maintenance charges are taken about 0.2% of cost of each item for 1 year. Maintenance charges are taken for 5 years.

Statement - 8.22

Chapter - 8
Para - 4.12II - MAIN CANAL AND BRANCHES"Q" - Special T.&P.

Sr. No.	I t e m s	Nos.	Cost/No. Rs. in lakhs.	Total amount Rs. in lakhs
1	2	3	4	5

A) Paithan Right Bank Canal

1)	Trucks (7.5 tons)	50	0.60	30.00
2)	Diesel Road Rollers (8 tons)	40	0.60	24.00
3)	Air Compressors	30	0.45	13.50
4)	Jack Hammers	80	0.02	1.60
5)	Tankers.	40	0.60	24.00
6)	Pumps -			
	10 H.P.	20	0.03	0.60
	5 H.P.	30	0.04	1.20
7)	Earth rammers.	20	0.50	10.00
8)	Concrete Mixers (10 x 7)	25	0.13	3.25
9)	Vibrators	20	0.03	0.60
10)	Steel shuttering 7 sets (Bridges)	-	L.S.	3.50

1	2	3	4	5
11)	Steel shuttering 4 sets (Aqueduct)	-	L.S.	4.00
12)	Generators (30 KW)	10	0.30	3.00
13)	Stone Crushers	10	0.40	4.00
14)	Granulators	10	0.35	3.50
15)	Diesel welding sets.	4	0.05	0.20
16)	Boring Machines	4	1.50	6.00
17)	Workshop equipment	-	L.S.	0.40
			Total	133.30
B) <u>MAJALGAON RIGHT BANK CANAL</u>				
1)	Trucks (= 7.5 tons)	60	0.60	36.00
2)	Diesel Road Rollers (8 tons)	50	0.60	30.00
3)	Air Compressors	40	0.45	18.00
4)	Jack Hammers	100	0.02	2.00
5)	Tankers	50	0.60	30.00
6)	Pumps -			
	10 H.P.	25	0.03	0.75
	5 H.P.	40	0.04	1.60
7)	Earth rammers	25	0.50	12.50
8)	Concrete mixers (10 x 7)	30	0.13	3.90
9)	Vibrators	25	0.03	0.75

(271)

1	2	3	4	5
10)	Steel shuttering 8 sets (Bridges)	v	L.S.	4.00
11)	Steel shuttering 4 sets (Aqueducts)	-	L.S.	4.00
12)	Generators (30KW)	12	0.30	3.60
13)	Stone Crushers	12	0.40	4.80
14)	Granulators	12	0.35	4.20
15)	Diesel Welding sets.	4	0.05	0.20
16)	Boring Machines	5	1.50	7.50
17)	Workshop equipment	-	L.S.	0.50
			Total	<u>164.30</u>
			Grand Total	<u>297.60</u>

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(272)

Statement - 8.23

Chapter - 8

Para - 2.01

JAYAKWADI PROJECT STAGE - II

III - DISTRIBUTARIES

Sr. No.	I t e m	Rate	Per	Amount Rs. in lakhs.
1.	2.	3.	4.	5.
1.	<u>Paithan Right Bank Canal</u>			
	59,892 Ha	350.00	Ha	209.62
2.	<u>Majalgaon Right Bank Canal</u>			
	1,31,520 Ha	350.00	Ha	460.32

		TOTAL:		669.94

...

Statement = 8.24

Chapter - 8
Para - 8.00RECEIPTS AND RECOVERIES

I - Special tools and plant	<u>Rs. in lakhs</u>
	<u>Rs. in lakhs</u>
i) Head works	72.16
ii) Main Canal and branches.	297.60
Total	<u>369.75</u>
A) Rated equipment @ 80% of the total cost i.e. Rs.295.80 lakhs	
i) Realisation due to debit to respective items @ 50%	147.90
ii) Realisation due to salvage value @ 50%	147.90
B) Non-rated equipment @ 20% of the total cost i.e. Rs.73.96 lakhs	
i) Realisation due to salvage value @ 50%	37.04
II - Ordinary Tools and Plant	
	111.00
i) Realisation due to salvage value at 25%	27.75
III - Salvage value of temporary buildings @ 15% of total cost i.e. 70.30	10.56
	<u>371.15</u>

Statement - 8.25

Chapter - 8
Para - 9

DETAILS OF INDIRECT CHARGES

Abatement of Land Revenue

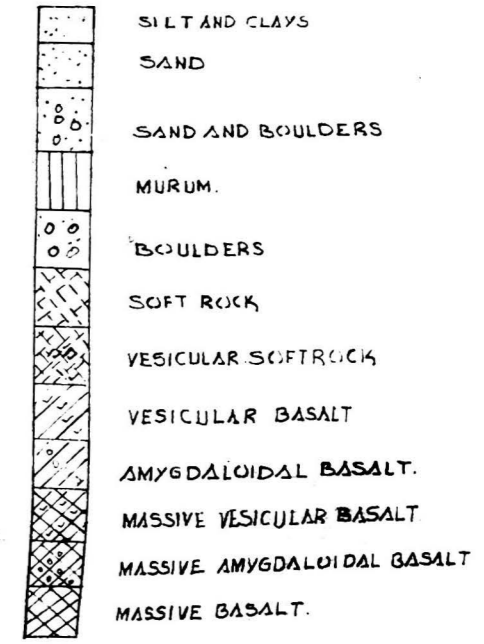
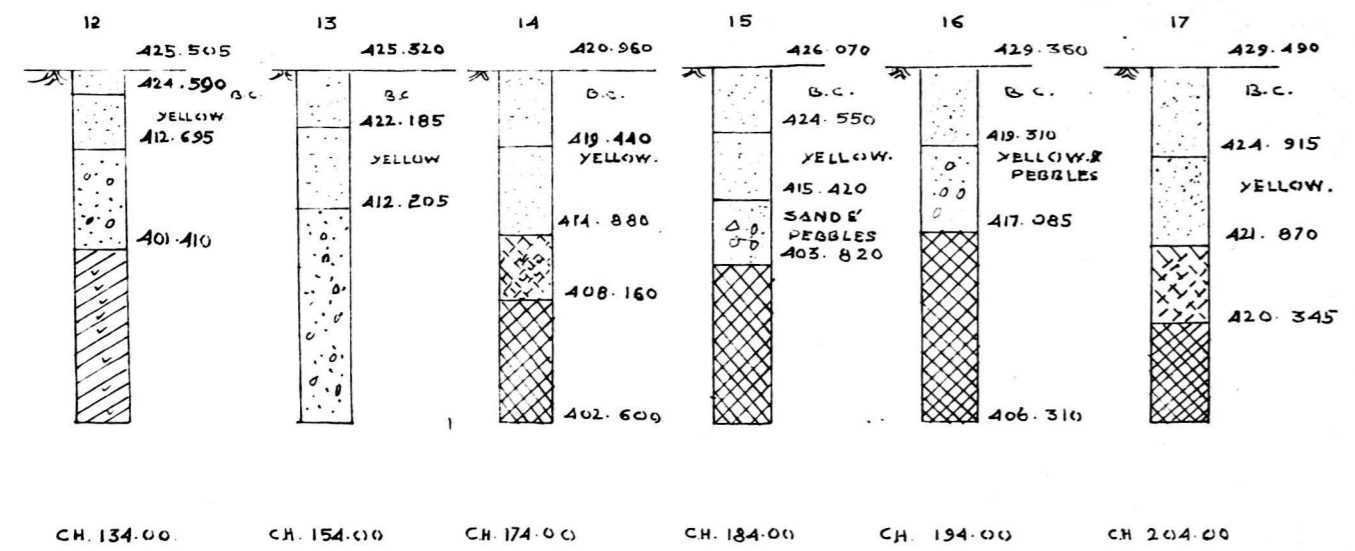
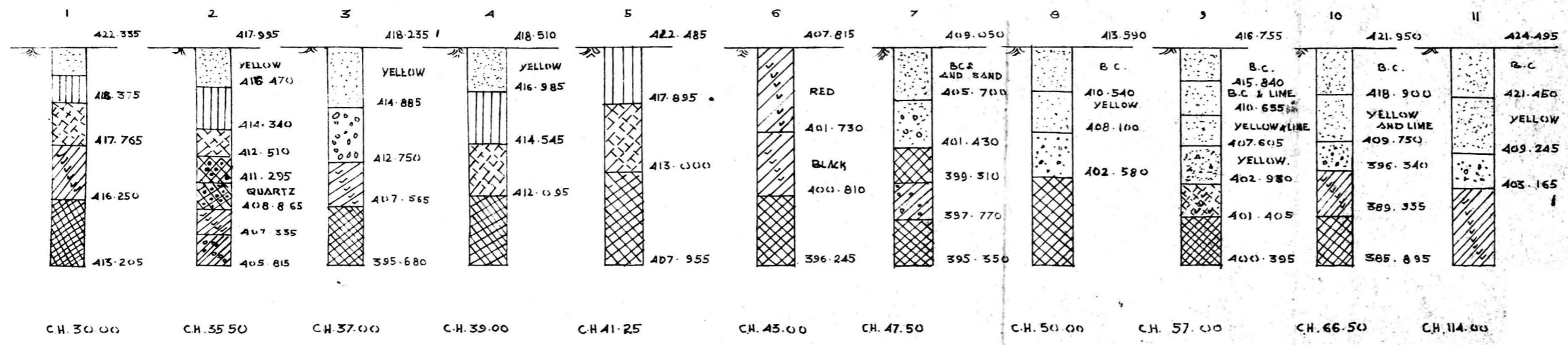
Rs. in lakhs

A) I - Head works	
Majalgaon Reservoir	
(20x2x19720)	7.89
	<hr/>
Total	7.89
	<hr/>
B) II - Main Canal and Branches	
Paithan Right Bank	
Canal.	
(20x2x3706)	1.48
Majalgaon Right Bank	
Canal.	
(20x2x4818)	1.92
	<hr/>
Total	3.40
	<hr/>
Grand Total	11.29
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NOT TO SCALE

GOVERNMENT OF MAHARASHTRA
 IRRIGATION AND POWER DEPARTMENT
 IRRIGATION PROJECTS INVESTIGATION CIRCLE A'SAR

JAYAWADI PROJECT STAGE-II
BORE RESULTS ON MAJALGAON DAM LINE

DRAWN BY M.S. SHINGARE, JE	CHECKED BY M.D. RANANE	SUP. ENGR [Signature]
COMPALED BY [Signature]	CHIEF ENGINEER	CHIEF ENGINEER