

Report of the Ad-hoc Committee in Connection with the Investigations of the River-Valley Projects

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GOVERNMENT OF INDIA MINISTRY OF WORKS, MINES AND POWER

REPORT OF THE AD-HOC COMMITTEE

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REPORT OF THE AD-HOC COMMITTEE, APPOINTED BY THE GOVERNMENT OF INDIA IN THE MINISTRY OF WORKS, MINES AND POWER, IN CONNECTION WITH THE INVESTIGATIONS OF THE RIVER-VALLEY PROJECTS, PREPARED BY THE CENTRAL WATERPOWER, IRRIGATION, AND NAVIGATION COMMISSION.

"We, the members of the Ad-hoc Committee met on 11th May 1948, and again on 18th May 1948, to examine the projects and estimates prepared by CWINC in connection with the Kosi, Narbada, Tapti, Sabarmati, C. P. and Berar rivers, Bastar State rivers, Assam Valley, and Coorg, in accordance with the terms of reference at Appendix I, page 9.

Messrs. Man Singh, Member, M. D. Mithal, Director, and G. N. Pandit and K. M. Bhatia, Project Officers, presented the proposals and explained the various features of the proposed developments.

They recast the relevant estimates in the light of some modification proposed, during the first day's meeting.

Item I of the Terms of Reference

I. What would you consider to be reasonable cost of investigations of a project in relation to the overall capital cost of that project?

As to the reasonable ratio which the cost of investigations of a project should bear to the overall cost of the project, in our opinion, no hard an first figure can be laid down. Generally speaking, the cost of prelimitary investigations will not be less than one per cent of the overall capital cost. It may go up as high as five per cent depending on the nature and features of the project.

1. KOSI PROJECT

(APPENDIX II)

Items II to VI of the Terms of Reference

II. Are the proposals in respect of each one of the above projects, as put forward by CWINC, in order?

III. Is the cost of investigations, provided in the above proposals, justified?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff, provided in the estimates for the purpose, adequate?

V. Is it possible, by a re-arrangement of programme, or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of the projects? The proposals in respect of investigations of the Kosi project, as put forward by CWINC, are in order.

The provision of Rs. 65 lakhs for investigations while adequate for the period in question appears to be on the low side for the completion of investigations. It will be more like one crore of rupees. The Kosi Dam, when constructed, will be the highest in the world—130' higher than the present highest dam, the Boulder Dam on the Colorado river in U. S. A. which is 726' above rock bottom. The dam site is situated in a highly seismic zone. The exploratory work and investigations at the site must therefore be very thoroughly done.

The proposed strength of engineering staff is adequate, for the present, but will have to be substantially increased if the recommendations under item VI are accepted.

The actual work of investigations at site was inspected by Dr. J. L. Savage and Mr. A. N. Khosla and is on sound lines. With more mechanisation in exploratory work and the operation of diamond Crills—now that the Drill Foreman has joined the work will be considerably accelerated.

Item VI. In respect of the Kosi Project in particular, what are your views as to :

- (a) the desirability of obtaining from Disposals construction machinery to the extent of nearly 40 lakhs in anticipation of the construction of barrage canals and dam; the expenditure to be treated as suspense in the first instance and charged to the project when the latter receives sanction; this course was followed in connection with the Hirakud Dam Project, and
- (b) the desirability of
 - (i) undertaking the construction of a meter-gauge railway line to the barrage and dam site (length nearly 40 miles), and
 - (ii) undertaking the construction of the barrage and canal systems in advance of the construction of the dam.

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In view of the recurring havoc caused by the vagaries and floods of the Kosi, and the need for growing more food for the country, the construction of this project is an urgent and vital necessity. This project with a potential development of 2 million k. W. of power and 3 to 4 million acres of annual irrigation, offers immense scope of development in the industrial and agricultural fields. Therefore, any measures that are calculated to accelerate the work of investigations and, later, construction of this project, deserve to have the full support of the Government.

We fully endorse the proposals under (a), and (b) (i) and (b) (ii).

The exploratory work on the dam will take some time as also the trial load analysis which, it is hoped, the U. S. Bureau of Reclamation will undertake to do. In the meantime machinery and staff can be assembled and trained on the construction of the Barrage and Canal systems and kept ready for the bigg r construction programme for the dam. In this way large areas of land will be brought under irrigation in advance of the completion of the dam and the country prepared to receive the full benefits from the dam 3 to 4 years in advance, thus bridging the gap between completion of the project and development of its potential.

2. NARBADA VALLEY PROJECTS

(APPENDIX IV)

Items II to V of the Terms of Reference

II. Are the proposals in respect of each one of the above projects, as put forward by CWINC, in order?

III. Is the cost of investigations, provided in the above proposals, justified?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff, provided in the estimates for the purpose adequate?

V. Is it possible, by a re-arrangement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects

The Narbada basin appears to hold great potential of development, and such development is likely to have far-reaching effect on the economic advancement of the country in general, and the basin in particular. It appears feasible to bring under irrigation 37,00,000 acres of cultivated and cultivable land in the basin, generate continuous power of over a million K. W., and extend navigation from the river's outfall in the sea right up to and beyond Hoshangabad i.e., almost to the heart of the country. The principal works involved would be construction of about eight storage reservoirs, a number of barrages and three systems of canals and some navigation locks. An overall estimate for investigation of the total plan has been prepared and amounts to Rs. 95,91,144. Estimates, prepared on the basis of expenditure from year to year, which were submitted to Government for sanction, were also placed before us. The amounts were Rs. 1,70,740 for 1947-48 and Rs. 25,91,000 for 1948-49. These have been examined by us in detail and appear to be in order.

In this connection Mr. Man Singh pointed out that the cost of topographical survey, provided in the estimates, could be brought down considerably if the contoursurvey of the commanded-areas by the Survey of India Department could be reduced to just what was essential to enable the CWINC staff to pick up the channel alignments roughly, and thereafter do the detailed work themselves. This, he said, would have the added advantages, first, of reducing the work of the Survey of India, who had already too heavy a programme for the staff they have, and secondly train up the CWINC staff for such work. He said, he had tried this in Bengal and the resulting work was quite accurate. Mr. Pandit said, he was working on this basis in the Tapti basin and calculated that the overall cost would be reduced to half. This, in our opinion, is a good suggestion and should be adopted wherever possible. Taking the resulting economy into acccount the total cost of investigations will come down to about Rs. 74 lakhs.

At this stage we were also apprised of the views of the Secretary, W. M. P., and the reactions of the Chairman, CWINC, regarding cutting short the programme of work on account of present day shortages of men and materials. The notes on the subject are appended to this report (Appendix III). We entirely agree with this view and suggest that it will be desirable to restrict the work in the first 2-3 years to only such projects as will give the maximum results in the shortest possible time. Judged from this criterion, we recommend that invsetigations be concentrated on the following :—

Bargi Project. The project envisages construction of 3 dams and a system of canals to command 18,000,000 acres. It is calculated that in addition it would be

possible to generate 80,000 k. W. of firm power. As most of the water will be used up for irrigation it might not be possible to make the navigational feature very attractive.

Tawa Project. This envisages construction of a dam on the tributary Tawa just above its outfall into the Nathada a few miles above Hoshangabad. A dam of 170 feet height will intercept the entire run-off from a catchment of 2,340 square miles. An area of 11,00,000 acres would be commanded from the reservoir itself for irrigation. The power potential is likely to be 12,700 k. W. continuous.

Punasa Project. A dam of 237 feet height will intercept almost the entire residual run-off of the main river at this site. It is proposed to reserve a portion of the capacity for controlling the floods which occur frequently in the Broach district of Gujrat in Bombay Province. Taking this into account, the power potential of this project would be in the neighbourhood of 2,33,000 k. W. continuous. The lake would be navigable right up to its upper end, very near Hosbangabad.

Barrage and canal system for the Broach District. With the regulated supplies available from the Punasa Project it would be possible to command the entire cultivated area of Broach district, measuring about 8,00,000 acres for perennial irrigation.

In addition to concentrated investigations on these projects we also recommend that the cost of collection of such essential data as discharge and silt observations at various important stations, meteorological, mineral, navigational and economic surveys and special tools and plant required should be provided for in the estimate for investigation of the projects on a basin-wide basis.

At our request fresh detailed estimates have been prepared to cover these investigations and these amount to Rs. 64,97,000. The cost will be spread over a period of three years, Rs. 26,97,000 in the first, Rs. 19,00,000 in the second and Rs. 19,00,000 in the third year.

The strength of engineering staff provided is adequate for the purpose in view.

While examining this project it was brought to our notice that there is a proposal to utilize the land to be commanded for irrigation by the Bargi and Tawa projects for resettling and rehabilitating refugees from Sind and Western Punjab. If, on this account, therefore, the investigations have to be speeded up, and construction has to be launched upon simultaneously, the staff for these two rojects will have to be considerably strengthened to suit the pace at which progress would be demanded.

3. TAPTI VALLEY PROJECTS

(APPENDIX V)

Items II to V of the Terms of Reference

II. Are proposals in respect of each one of the above projects, as put forward by CWINC, in order?

III. Is the cost of investigations provided in the above proposals justified?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff provided in the estimates for the purpose, adequate?

V. Is it possible, by a re-arrangement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects?

Examination of the proposals reveal that potential of development in this basin is also fairly great, although it is not likely to be as attractive as in the case of the Narbada basin. The plan envisages construction of six dams and three barrages together with their canal systems. Of these the developments on Girna river are being investigated and undertaken by the Government of Bombay. The estimated cost for investigations of the rest of the project amounts to Rs. 42,25,034. The yearly estimates for the years 1947-48 and 1948-49, amounting to Rs. 2,60,540 and Rs. 20,56,000 respectively, were also placed before us. The provisions are in order. But the cost of surveys should be reduced by the CWINC doing most of the work, leaving only the essential part to be done by the Survey of India.

In this case also, we suggest that attention for the present be concentrated on the lowermost dam at Ukai and the Kakrapara barrage and canal system and only silt observations, and meteorological, mineral, navigation and economic surveys be carried out for the rest of the basin, for the present. At our request an estimate to cover this limited objective has been prepared and amounts to Rs. 19,95,500. This cost will be spread over a period of two years, *i.e.*, Rs. 12,00,000 in the first year, and Rs. 7,95,500 in the second year. The provisions and the strength of the engineering staff for the purpose are adequate.

4. SABARMATI PROJECT

(APPENDIX VI)

Items II to V of the Terms of Reference

II. Are the proposals in respect of each one of the above project, as put forward by CWINC, in order?

III. Is the cost of investigations provided in the above proposals justified ?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff, provided in the estimates for the purpose, adequate?

V. Is it possible, by a re-arrangement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects?

This river passes by the industrial town of Ahmedabad where, we are informed the domestic water supply problem is acute. Authorities interested in the development of the basin are Bombay Prevince including Ahmedabad Municipality, Baroda State, Idar State and some States of Mahikantha, Sabar Kantha Agencies. Part of the catchment area lies in Udaipur State of the Rajputane Union. Projects for irrigation and improvement of domestic water supplies have been prepared by various agencies from time to time. But owing to disagreement regarding water-rights and other matters nothing has matured so far. Recently, we are informed, in a conference of representatives of various interests held at Bombay, it was decided to entrust the development of the basin on a unified basis to the CWINC in the hope that better progress will be made in finalising and then executing the projects. Some engineering staff was offered to be provided by governments of Bombay and Baroda for manning the organisation to be set up for the investigations. Accordingly, an estimate for preliminary investigations amounting to Rs. 15,10,000 was prepared. This and the year to year estimates of Rs. 28,000 for the year 1947-48 and Rs. 5,20,000 for the year 1948-49 have been examined by us. No contour-levels are available in this basin. Maps of hilly portion merely show the form lines. It has, therefore, not been possible to indicate precisely the development that might be possible. Some preliminary investigations were done, in connection with a dam project at Dharoi. The result of the survey indicates roughly that the project would ensure irrigation for 1,00,000 acres and put the water supply position of Ahmedabad town on a surer footing. We recommend that, in the first instance, activities might be restricted to this one project only in this basin. At our request the estimate has been recast to provide for the necessary investigations of this project. It amounts to Rs. 7,87,000 and expenditure will be spread over two years, in the first year being Rs. 4,34,000 and in the second year Rs. 3,53,000. The provisions are reasonable and the staff provided is adequate.

In this, as in the case of Narbada and Tapti, discharge and silt observations, meteorological observations etc., will be taken up on basin-wide scale and provision has been made in the recast estimate.

5. C. P. & 6. BASTAR PROJECTS

(APPENDIX VII)

Items II to V of the Terms of Reference

II. Are the proposals in respect of each one of the above projects, as put forward by CWINC, in order ?

III. Is the cost of investigations, provided in the above proposals justified ?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff, provided in the estimates for the purpose, adequate?

V. Is it possible, by a re-arrangement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects?

5. (C.P.)

Besides Narbada and Tapti basins, it is also proposed to undertake investigations for development in the mid-Godavari and upper Mahanadi basins. The projects in the mid-Godavari basin were principally on the Wainganga and Wardha tributaries of the Godavari. In view of the fact that a very big project is being undertaken by the C. P. engineers on the lower Wainganga we consider it desirable for the present for the CWINC to concentrate on the upper Mahanadi basin only. There are four projects, three on the tributaries and one on the main river which appear to be very promising and will result in assuring irrigation for 6,50,000 acres of land and enable 23,000 k.Ws. of continuous power being generated. The regulated supplies from these projects will also increase the power potential of the Hirakud and other lower projects on lower Mahanadi. The work of investigations could be taken up by one Division.

At our request the estimate for investigations has been recast and now amounts to Rs. 27,04,500 for the Mahanadi basin in place of Rs. 47,44,000 for the Mahanadi and Godavari basins. In the recast estimate costs of surveys by Survey of India have been reduced as in other cases. Other provisions are reasonable and the staff provided adequate. As in the case of other valley investigations, the silt mineral, meteorological and other general investigations will be carried out over the whole basin.

6. (BASTAR)

The area of what until recently was known as Bastar State is very sparsely populated. Cultivation is done on a very restricted scale and mineral resources, which are very great have not at all been explored or exploited. A good part of the state is on a plateau at an elevation of over 2,000 ft. above mean sea level. The rainfall is good and the elimate exhilarating.

On these accounts it is not unlikely that the territory might be utilized for resettling and rehabilitating refugees from Western Pakistan. This, we find, can be achieved without disturbing or encroaching upon the areas occupied by the tribal population.

The principal river of the state, Indravati, has great potential for Power development which is absolutely necessary for the rich iron ores aggregating to over 1,000 million tons, containing 63 per cent to 70 per cent pure iron to be utilised for manufacture of steel etc. Some good sites have been located where development will be very attractive. The power potential of these projects will be in the neighbourhood of 3,00,000 k.Ws. continuous.

On the Sabri river one project has been located which would enable bringing under irrigation 6,90,000 acres of land, and produce 14,000 k.Ws. of continuous power.

We agree that all these projects should be investigated on a priority basis and the proposal to set up one Division for the purpose has our approval. The estimate amounts to Rs. 27,04,000 and the expenditure would be spread over 3 years. The provisions made in the estimate are reasonable and the staff proposed adequate.

One Superintending Engineer would be necessary to control the two Divisions in this region, *i.e.*, one in the Upper Mahanadi and the other in Bastar State. The estimates provide for the entertainment of a Superintending Engineer and his office staff.

Total expenditure on investigations in C. P. and Bastar rivers will thus be Rs. 54,09,000 spread over three years. The yearly expenditure will be Rs. 16,00,000 in the first year, Rs. 20,00,000 in the second year and Rs. 18,09,000 in the third year. They are in order and compare favourably with the estimates for the years 1947-48 and 1948-49 amounting to Rs. 16:52 lakhs (Provision was for 13 months only).

7. ASSAM PROJECTS

(APPENDIX VIII)

Items II to V of the Terms of Reference

II. Are the proposals in respect of each one of the above projects, as put forward by CWINC, in order ?

III. Is the cost of investigations provided in the above proposals justified?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff, provided in the estimates for the purpose, adequate?

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V. Is it possible, by a re-arrangement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects?

The territory, with its magnificent rivers and the narrow gorges in the Himalayan ranges through which they flow, offers an almost unlimited scope for power development. CWINC, in consultation with the Government of Assam, have selected for the present four projects for preliminary investigations. An estimate amounting to Rs. 50,00,000 to cover the cost and programmes of expenditure for the years 1947-48 and 1948-49 amounting respectively to Rs. 2,67,000 and Rs. 20,41,000 have been examined by us and are, in our opinion, reasonable. But, for considerations similar to those which have led us to recommend curtailment of activities in other basins, we suggest that only two out of the four projects should be taken up for investigation at present. These, in our opinion, should be Manas and Dihang. The priorities allotted to the projects should be changed to give Manas the higher, as it is close to the rest of India and not too far from the industrial area of Assam. This project has a bigger irrigation potential as well. Besides, the channel below is likely to provide a link for the navigation canal which is being thought of from the Teesta barrage to the Brahmaputra. The Dihang will be No. 2 priority, but taken up simultaneously for investigation.

In addition to discharge and silt observations, meteorological, mineral and economic surveys, and surveys for navigation should be planned for the entire area. A recast estimate to cover our recommendation has been prepared and now amounts to Rs. 30,73,700 spread over two years. Expenditure will be Rs. 14,00,000 in the first and Rs. 16,73,700 in the second year. The provisions are reasonable and staff provided adequate, one of the three divisions previously provided having been curtailed.

8. COORG PROJECTS

(APPENDIX IX)

Items II to V of the Terms of Reference

11. Are the proposals in respect of each one of the above projects, as put forward by CWINC, in order ?

III. Is the cost of investigations provided in the above proposals justified ?

IV. Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff, provided in the estimates for the purpose, adequate ?

V. Is it possible, by a re-arrangement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects?

The estimate to investigate the projects in Coorg viz. Herangi Irrigation and Power Project, the Baropole Hydel Project, the Lakshamantirtha Irrigation Project and the projects for renovation of irrigation tanks, amounting to Rs. 6,64,740 and one for the year 1948-49 amounting to Rs. 2,24,000 have been examined. We suggest that work of investigations on renovation of tanks be omitted and the proposals should be amended to provide for only two S. D. Os. and the adequate number of subordinates and clerical staff instead of one Executive Engineer and three S. D. Os. The work of investigations could be completed in about two years. The estimate has accordingly been amended and now amounts to Rs. 4,52,000 and the expenditure for the year 1948-49 and 1949-50 will be respectively Rs. 2,20,000 and Rs. 2,32,000. The provisions are reasonable and the expenditure will be justified. The staff provided is adequate.

GENERAL

Before concluding we would like to bring to the notice of the Government that some special allowance should be given to officers and men on field duties in connection with investigation and construction of such projects as the localities where they have to work are generally unhealthy, communications are difficult and the work arduous. Unless an incentive in the shape of such allowance is given people would generally prefer to be on less arduous jobs elsewhere. This particular point was not amongst our terms of reference but we feel it would not be fair not to bring this aspect to the notice of Government, as it is only contented staff that could be relied upon to do the work efficiently and economically specially in these days of shortages.

The original estimates placed before us are appended as also the estimates now prepared which are approved by us."

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(Sd.) A. N. Khosla (Sd.) J. L. Savage (Sd.) M. Narasimhaiya

DATED NEW DELHI; the 18th May 1948.

APPENDIX 1

Terms of Reference of the Ad-hoc Committee, appointed by the Government of India in the Ministry of Works, Mines and Power in connection with the investigations of the River-valley projects, sponsored by the C. W. 1. N. C.

"The projects concerned are :---

- 1. Kosi,
- 2. Narbada,
- 3. Tapti,
- 4. Sabarmati,
- 5. Central Provinces and)
- 6. Bastar rivers,
- 7. Assam Valley, and
- 8. Coorg.

Item I.—What would you consider to be a reasonable cost of investigations of a project in relation to the overall capital cost of that project ?

Item II.—Are the proposals in respect of each one of the above projects, as put forward by C.W.I.N.C. in order ?

Item III.-Is the cost of investigations provided in the above proposals justified ?

Item IV.—Keeping in mind the proposed programme and priorities of investigations, is the proposed strength of engineering staff provided in the estimates for the purpose adequate?

Item V.—Is it possible, by a re-arragnement of programme or priorities, to reduce expenditure, or at least spread it over a longer period, in respect of one or more of these projects ?

Item VI.—In respect of the Kosi Project, in particular, what are your views ? as to

(a) the desirability of obtaining from Disposals construction machinery to the extent of nearly Rs. 40 lachs in anticipation of the construction of barrage, canals and dams; the expenditure to be treated as suspense in the first instance and charged to the project when the latter receives sanction : this course was followed in connection with the Hirakud Dam Project; and

(b) the desirability of

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- (i) undertaking the construction of a meter gauge railway line to the barrage and dam sites (length nearly 40 miles), and
- (ii) undertaking the construction of the barrage and canal systems in advance of the construction of the dam."

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IMPORTANT DATA IN RESPECT OF VARIOUS PROJECTS

APPENDIX II

KOSI PROJECT

Report

At their meeting held on the 29th July 1946, the Standing Finance Committee agreed to an expenditure of Rs. 31 44 lakhs on the preliminary surveys and investigations for the Kosi Project during the year 1946-47 and 1947-48. This sanction was communicated in W. M. P. letter No. D. W. 1201 (1), dated, the 27th May 1946.

2. The previous estimate had been framed with a view to ascertain the feasibility of the scheme. Investigations so far carried out have now shown that the scheme is definitely feasible and therefore investigations have now to be carried out in greater detail. Owing to difficult situation of the site and the enormity of the magnitude of the work, the detailed investigations will have to extend beyond 1950 but they shall have progressed sufficiently by March 1950 to enable construction to be taken in hand. This estimate amounting to Rs. 65,26,000 has therefore been prepared to cover the period ending March 1950 and includes the amount of Rs. 31,44,000 already sanctioned. For completing the investigations the cost will be of the order of rupces one crore.

3. The present estimate covers the cost of investigations for the dam (excluding the cost of trial load analysis to be carried out in America, the cost for which will be included in the supplementary estimate for overall invetstigations) and the investigations for the barrage site and surveys for a portion of the area to be irrigated to the east of the Kosi. The survey work, owing to its magnitude, will take a number of years to complete. The construction of the barrage can however be taken in hand without waiting for the completion of surveys for the irrigation area and the construction of irrigation system can propeed as surveys progress. For the present, it is proposed to concentrate on the surveys and investigations of the canal system to the east of the Kosi. The cost of the remaining surveys will be included in the supplementary estimate for the overall investigations.

4. Credit has been allowed in the estimate for the recovery value of T.& P. as also of buildings most of which have been provided in pre-fabricated structures.

(Index map showing dam site, etc. is enclosed)



BALWANT SINGH NAG, Project Officer (Kosi).

Kosi Project

Estimate for preliminary surveys and investigations for the Kosi Project for the period, ending March i950.

950.			Abstra	ct								Rs.
. a mor of India				•		•			•			22,70,000
1. Surveys by Survey of Indie		•							•			37,500
2. Surveys under C. W. I. X. C.							•					80,500
 Discharge Observations Silt Observations 	÷						•					18,000
5. Property Surveys												21,400
6. Ground Water Surveys			•••				•					Nil
7. Meteorological Surveys									•		•	2,93,900
8. Seismological Surveys											•	1,14,000
9. Geological Investigations .							•					12,03,750
10. Roads and Paths					•		•-					1,67,000
11. Aerial Ropeways										•		48,000
12. Soil conservation survey for c	ontro	lling	silting	of Da	m.							80,000
13. Agricultural and Soil surveys		÷	-			•						60,000
14. Survey of Fish Fauna							.•					5,000
15. Industrial and Load Surveys							•					5,000
16. Wooden Models												10,000
17. Temporary accommodation					CS187							2,70,000
18. Camp equipage			£	West S	163	0					·	96,000
19. Tools and Plants new supply			621	5.11	6-44	123	÷					2,33,900
20. Repairs and carriage to T. &	P		19	100	ant de	665				•		60,000
21. Laboratory at Barakeshtra	- · ·		6	81. I	8 .1	369						15,000
				24		9			Total	•	•	50,88,350
				LA.	138	8			Say		•	50,88,400
22. Contingencies on Rs. 50,88,40				-6-			•	·•	•	•	•	2,54,400
23. Establishment (Salary, T. A.	and c	ontin	gencies) - []	oe i		•	•	•	•	٠	11,83,000
			U.	1.3//					Grand 7 Say	fotal	•	65,25,800 65,26,000

BALWANT SINGH NAG, Project Officer (Kosi).

la: ial No.	Dist in	eost	Total
1	2	*	4
		Rs.	£9.
ı	Surveys to be carried out by Survey of India under guidance of the C. W. I. N.C		
	(a) For dam Site		
	Comprising agrial-photography of the gauge and the received area, survey and map publication of the dam site to scales add of (i) $1 = 1000$	y	
•	$\frac{(i)}{2} = \frac{1}{2} \text{ rule}$		
	Survey and map publication of the reservoir area and the Cantra gorge to a s \rightarrow of $4^{*}=1$ mile with 20' controvinterval and 1^{*} or scale survey of Dath Kosi reservoir site (in some)	2,50,000	
	(b) For irrigation and draining area to a cash of 4"-1 mits mut of Kosi	_,,	
	including the river (part area only) 23,03,000 acres, at Re. 1 per acres	29,40,909	
	(c) Cost of verices photomospies, and project maps for determine and publication of map plates and reportions for the " sequence of "	20,469	22 ,70,00
2	Surveys to be carried out by or mider the direction of the C W. to M. Counterstan		
	(a) Longitudinal section of the river and x-sections (105%' agart) 50 miles at Rs. 100 per mile	5,000	
	(b) Surveys for railway and road alignments for the daw and the barrage .	29,999	
	(c) Alignment of Eastern Kosi Canal and branches : 500 miles at Rs. 25		
	per milo	14,590	\$7,00
3	Discharge Observations.	······································	
	Number of sites		
	Expenditure per site (non-recurring)		
	Current Motors 14		
	Boat large 1		
	Boat small 1	•	
	Sounding rods, ote		
	Ropes		
		21,000	
	Recurring Expenditure for 2 years per site.		
	Hend bestman at Rz. 75 p. m		
	4 Rhalasis cum.boatmen at Rs. 50 p.m		
	7,960		
	(Say Rs. \$,000) Temporary gauge readors for flood souson 24 Nos. for 4	48,009	
	months por year for two years at Rs. 60 p.m	y 11,500	80,500
4	Silt Observations.		
	Number of sites (5) Rs.		
	Equipment (non-recurring) por site Rs. 1, 0 00 . 5,000		
	Recurring expenditure for 2 years: 2 khalasis por site at Re. 55 p.m. 13,200		
	2 khalasis por site at Rs. 55 p.m. 13,200 Say 13,000		
		18,000	18,000

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Estimate of preliminary surveys and investigations for the period, ending Ward, total

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	Fer 9 months.				
	4 Surveyors at Rs. 180 p.m. ".	6,480			
	10 Khalasis at Rs. 55 p.m.	4,950			
	Camp charges	5,000			
	Staff on deputation from Nepal	5,000			
		21,439		Say 21,400	21,40
				Rs.	Rs.
6 Hrown	d Water Surveys.				
T	ese will be done by staff.				Nil
7 Meise	rological Surveys.				
62	igures given by Meteorological Departmen Class I Observatories, 2 Nos.	t)			
	Class II Observatories, 2 Nes.				
	Cluss III Observatories, 6 Nes.				
	Class IV Observatories, 29 Nes.		_		
(-	Non nonuming expenditure	Rs.	Rs.		
(4) Non-recurring expenditure.	70 700			
	(i) Equipment	79,700			
	(ii) Installation charges including buildings	48,800	1,28,500		
()) Recurring charges for two years.	SET S			
	Pay of Officors	4,800			
	Pay of Staff :	1,00,000			
	Dearness allowance	50,000			
	6.05	CELMENT CONVERTING			0.00.0
(1	T. A. & contingencies	10,000	1,64,800	2,93,300	2,93 ₉ 3
(1	nelogical Surveys. Based on flugures given by Meteorological () Equipment (non-recurring) One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw korizental	NIT II	1,64,800 45,000	2,93,300	2,93,3
(1	nelogical Surveys. Based on flugures given by Meteorological) Equipment (non-recurring) One Cambridge Universal Vibrograph One Venner's 12" Accelorograph	Department)		2,93,300	2,93,3
(1 (•	nelogical Surveys. Sased on flugures given by Meteorological :) Equipment (non-recurring) One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizental Seismograph One Benioff vertical seismograph Six wood-Anderson seismographs	Department)	45,000 24,000 69,000	2,93,300	2,93,3
E) • 1	nelogical Surveys. Based on flugures given by Meteorological :) Equipment (non-recurring) One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph	Department)	45,000 24,000	2,93,300	2,93,3
E) • 1	 belogical Surveys. Based on flugures given by Meteorological : Done Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs 	Department)	45,000 24,000 69,000	2,93,300	2,93,3
E) • 1	 belogical Surveys. Based on flugures given by Meteorological (19) Cambridge Universal Vibrograph One Cambridge Universal Vibrograph Two units milneshaw horizental Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Recurring expenditure for two years. 	Department)	45,000 24,000 69,000 20,000		2,93,3
E) • 1 1 1 1 1	 belogical Surveys. Based on flugures given by Meteorological (19) Canutridge Universal Vibrograph One Cambridge Universal Vibrograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Recurring expenditure for two years. Pay of staff 	Department)	45,000 24,000 69,000 20,000	2,93,300	2,93,3
(] (* (*	 belogical Surveys. Based on flugures given by Meteorological . b) Equipment (non-recurring) One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs c) Buildings for observatories c) Beourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios 	Department) •omponent 13,000 6,000	45,000 24,000 69,000 20,000 		
(] { { { (4) } 9 C feolo	 helogical Surveys. Based on flugures given by Meteorological . b) Equipment (non-recurring) One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs b) Buildings for observatories c) Beourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios egical Investigations. 	Department) •omponent 13,000 6,000	45,000 24,000 69,000 20,000		
(] { { (4 9 G eola	 belogieal Surveys. Based on flugures given by Meteorological : Cone Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw korizental Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Bourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios Bequipment (non-recurring) 	Depertment)	45,000 24,000 69,000 20,000		
(] { { (4 9 G eola	 belogical Surveys. Based on flugures given by Meteorological : One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw korizental Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Beourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios Segical Investigations. Equipment (non-recurring) Diamond drills 6 Nos. 	Depertment)	45,000 24,000 69,000 20,000		
(] { { (4 9 G eola	 helogical Surveys. Based on flugures given by Meteorological : One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw korizental Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Beourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios Segical Investigations. a) Equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above 	Depertment)	45,000 24,000 69,000 20,000		
(] { { (4 9 G eola	 belogical Surveys. Based on flugures given by Meteorological : One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw horizental Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Beourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios egical Investigations. a) Equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above Calyx drill complete 	Depertment)	45,000 24,000 69,000 20,000		
(] { { (4 9 G eola	 helogical Surveys. Based on flugures given by Meteorological . Canbridge Universal Vibrograph One Cambridge Universal Vibrograph One Venner's 12" Acceloregraph Two units milneshaw horizontal Seismograph	Depertment)	45,000 24,000 69,000 20,000		
(] { { (4 9 G eola	 helogical Surveys. Based on flugures given by Meteorological . Cone Cambridge Universal Vibrograph One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories . Recurring expenditure for two years. Pay of staff . Allowances & Honoraria . Contingencios . Equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above . Spares for above . Special boats for drills 4 sets . 	Department)	45,000 24,000 69,000 20,000		
(] { { (4) 9 C feolu	 helogical Surveys. Based on flugures given by Meteorological . One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs Buildings for observatories Becurring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios Equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above Spares for above Special boats for drills 4 sets Derrick, steel cables etc. 	Department) eomponent 13,000 6,000 1,80,000 2,40,000 20,000 5,000 10,000 5,000	45,000 24,000 69,000 20,000		
(1 {= {= {= 9 G feold	 helogical Surveys. Based on flugures given by Meteorological . One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs b) Buildings for observatories c) Buildings for observatories c) Recurring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above Spares for above Special boats for drills 4 sets Derrick, steel cables etc. Compressors 4 Nos. at 5000 	Department)	45,000 24,000 69,000 20,000		
(] { { (4) 9 C feolu	 helogical Surveys. Based on flugures given by Meteorological : De Cambridge Universal Vibrograph One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs b) Buildings for observatories Bourring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios b) Equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above Calyx drill complete Spares for above Special boats for drills 4 sets Derrick, steol cables etc. Compressors 4 Nos. at 5000 Pumps 2 Nos. 	Department) 	45,000 24,000 69,000 20,000		
(1 {= {= {= 9 €feold	 helogical Surveys. Based on flugures given by Meteorological . One Cambridge Universal Vibrograph One Venner's 12" Accelorograph Two units milneshaw horizontal Seismograph One Benioff vertical seismograph Six wood-Anderson seismegraphs b) Buildings for observatories c) Buildings for observatories c) Recurring expenditure for two years. Pay of staff Allowances & Honoraria Contingencios equipment (non-recurring) Diamond drills 6 Nos. Diamonds & spares for above Spares for above Special boats for drills 4 sets Derrick, steel cables etc. Compressors 4 Nos. at 5000 	Department)	45,000 24,000 69,000 20,000		

(b) Labour and consumable stores for				
(i) 30,000' of diamond drilling at				
$\mathbf{R}_{\mathbf{S}}$. 12 por foot	3,6 0,00 0			
(ii) 2 Vertical shafts for under river				
tunnel 200' deep each 48" dia- meter at Rs. 100 a foot	40,000			•
(iii) Cross tunnel under the river 500'	*0,000			
at Rs. 100 per foot	50,000			
(iv) Drifts $7' \times 5'$ length 8000' at				
$\mathbf{R}_{\mathbf{S}}$. 50 per foot	4,00,000			
	8,50,000			
(c) Specialists.				
One drill foreman at Rs. 2000 p.m. for 2 years	48.000			
Subsistence allowance for above at	48,000			
Rs. 584 p.m. = $14,016$ say	14,000			
Passage both-ways	7,500			•
Consulting Geologist's fees	15,000			
Resident Geologists 2 Nos. for one				
year at Rs. 350 p.m.	8,400			
Dearness Allowance, T. A., etc.	3,600			
-	96,500		14,42,500	
	<u> </u>	. –		
Deduct cost of tools and plants detailed h	celow which	Rs.	Rs.	
will be available for use on other-v	vorke to be			
will be available for use on other v taken on stock suspense for furth				
	er use on		·	
taken on stock suspense for furth				
taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills	er use on			
taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of	er use on Rs. 1,35,000		·	
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill 	er use on Rs. 1,35,000 15,000			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares . 	er use on Rs. 1,35,000			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill 	er use on Rs. 1,35,000 15,000 50,000			
taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost	er use on Rs. 1,35,000 15,000			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 	er use on Rs. 1,35,000 15,000 50,000			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares . 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs 5,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of Derrick steel cables 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750			
taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares . 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs 5,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors	er use on Rs. 1,35,000 15,000 50,000 7,500			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares . 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs 5,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of Derrick steel cables 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750			
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003		2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs 5,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,009 4,500	·	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,009 4,500		2,38,750	12,03,750
taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares . 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 5,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors . 75 per cent of Rs. 6,000, the cost of pump . 80 per cent of Rs. 10,000, the cost of hoists . 81 parts . 82 per cent of Rs. 10,000, the cost of ads and Paths. (a) Construction	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000	·	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists 	er use on Rs. 1,35,000 15,000 7,500 3;750 15,003 4,500 8,000	20,000	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 20,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 	er use on Rs. 1,35,000 15,000 7,500 3;750 15,003 4,500 8,000		2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 20,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank	10,000	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank , left bank .	10,000 25,000	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares . 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors . 75 per cent of Rs. 6,000, the cost of pump . 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iii) Footpath from Barakeshtra to Tribeni, (iv) Footpath from Barakeshtra to Tribeni 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank left bank . i right bank	10,000	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 20,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iv) Footpath from Barakeshtra to Tribeni, (iv) Footpath s along both banks of the T 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank left bank . i right bank	10,000 25,000 17,000	2,38,750	12,03,75
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 20,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iv) Footpath from Barakeshtra to Tribeni (v) Footpaths along both banks of the T Tribeni to gauge site 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank i right bank i right bank amur, from	10,000 25,000	2,38,750	12,03,75
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 20,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iv) Footpath from Barakeshtra to Tribeni (v) Footpaths along both banks of the T Tribeni to gauge site 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank i right bank i right bank amur, from	10,000 25,000 17,000	2,38,750	12,03,75
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iv) Footpath from Barakeshtra to Tribeni (v) Footpath along both banks of the T Tribeni to gauge site (vii) Footpath along the Arun from Tribe 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank i right bank i right bank amur, from om Tribeni	10,000 25,000 17,000 4,000 2,000	2,38,750	12,03,75
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iv) Footpath from Barakeshtra to Tribeni, (iv) Footpath along the Sun Kosi from to gauge site (vi) Footpath along the Arun from Tribew waghat 3 miles 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank i right bank i right bank amur, from om Tribeni ni to Mach-	10,000 25,000 17,000 4,000	2,38,750	12,03,750
 taken on stock suspense for furth other works. 75 per cent of Rs. 1,80,000, the cost of drills 75 per cent of Rs. 20,000, the cost of calyx drill Spares 75 per cent of Rs. 10,000 the cost of special boats 75 per cent of Rs. 10,000, the cost of Derrick steel cables 75 per cent of Rs. 20,000, the cost of compressors 75 per cent of Rs. 6,000, the cost of pump 80 per cent of Rs. 10,000, the cost of hoists ads and Paths. (a) Construction (i) Widening and improving existing pa Barakeshtra and Chatra (ii) Tow Path from Chatra to Dam site 6 miles (iv) Footpath from Barakeshtra to Tribeni (v) Footpath along both banks of the T Tribeni to gauge site (vii) Footpath along the Arun from Tribe 	er use on Rs. 1,35,000 15,000 50,000 7,500 3;750 15,003 4,500 8,000 th between right bank i right bank i right bank amur, from om Tribeni ni to Mach- constructing	10,000 25,000 17,000 4,000 2,000	2,38,750	12,03,750

	(b) Maintenance of Roads & Paths.			
	 (i) Kutcha road from Jogbani to Ghatra 40 miles and Chatra to barrage site 16 miles (ii) All path michaeles 	40,000	85.000	
	(ii) All other feet-paths	25,000	65,000	1,67,000
11	Aerial ropeway across the Sapt Kosi, the Tamur, the Arun and	the Sun Kogi		
	4 Nos. at Rs. 12,000 each	· · · ·	48,000	48,000
12	Soil Conservation Surveys		80,000	80,000
13	Agricultural and soil survey for irrigation 4 million acres at 15,0 acres	00 per million	60,000	60,000
14	Survey of Fish Fauna	• • •	5,000	5,000
15	Industrial and Load Survey		5,000	5,000
16	Wooden models	• • •	10,000	10,000
17	Temporary Accommodation			
	(a) Dam Investigation			
	Non-Residential			
	Administrative Quarters at Barakeshtra	8,500		
	(i) Inspection Houses at Barakeshtra and Jogbani at 7,000 each .	1 4,000		
	(ii) M. B. Sheds for stores and workshops at Barakeshtra	11,000		
	(iii) Store Shed at Chatra	8,000		
	(iv) Laboratory and Store shed at Barakeshtra and	16.000		
	Tribeni 2 Nos.	16,000 10,000		
	(vi) Petrol godown	1,000		
	(vii) Magazine for explosives	4,000		
	(viii) Dispensary building	3000		
	(ix) Office building for Divisional and Sub-Divisional	10.000		
	offices . (x) Sheds for skilled and unskilled labour 200 Nos.	18,000 10,800		
	(xi) Sheds for cooking meals for the above labour .	4,200		
	(τ^{**}) Miscellaneous buildings	14,000	1,22,500	
		Rs,	Rs.	Rs.
	Residential	·		
	(i) Executive Engineer's Bungalow	6,000		
	 (ii) Residences for six gazetted officers (3 S. D. Os., 2 Geologists and 1 Meteorologist) 	18,000		
	(iii) Accommodation for clerks, drawing staff, store- keepers, compounders and laboratory assistants	25,000		
	25 Nos. (iv) Accommodation for Supervisors, Silt Analyst,	20,000		
	Research Assistant 25 Nos.	40,000		
	(v) Drill Foreman's quarter : 1 No	5,000		
	(vi) S. D. Os. visiting quarter at Tribeni	1,500		
	(vii) Time Keepere, Gauge Readers, Daffadars, Bar- kandazes, Peons, Chowkidars, Dak Runnere, Boatmen, Nepalese guards, Sweepers' quarters at	1		
	Rs. 350 each 80 Nos.	28,000		
	(viii) Servants quarters at camp sites : 3 Nos	J,500		
		1,25,000	1,25,000	

(b) Irrigation and Drainage investigations. Accommedation for efficers and stores sheds, etc. L. S.		
50,000 for each division 2 Nos	1,00,000	
	3,47,5●●	
Deduct the cost of materials from prefabricated apro- ture like M. B. Sheds, Lakore Sheds, Nissen theds which will be available for use on other Projects to be taken on stock suspense and credited to this work	77,000	
	2,70,0 00	2,70, 0 09
18 Camp Equipage.		
(i) For Dam Division.		
4 Tents $14' \times 14'$ @ 1,400 5,600 12 Tents $10' \times 10'$ @ 800 9,600 6 necessary tents 0 150 900 30 shoulderies 350 10,500 Camp furniture 7,500 Repairs and carriage of furniture 5,000	39,100	
(ii) For Irrigation Divisions.		
4 Tonts 14' × 14' @ 1,400 5,600 8 tents 12' × 12' @ 1,100 8,800 15 tents 10' × 10' @ 800 12,000 30 shouldaries @ 350 10,500 Camp furniture 10,000 Repairs and carriage of Camp equipage 10,000	56,9 0 0	96,0 0 A
19 Tools and Plant.		
(i) Special Tools		
For Kosi Dam Division,		
Jeeps with Trailers 2 Nos. @ 6,000 12,000* Weapon carrier trucks 6 Nos. @ 6,000 36,000* G. M. C. Trucks 4 Nos. @ 10,000 40,000* Country boats 18 Nos. @ 1,000 18,000 Inspection boats 4 Nos. @ 1,200 4,800* Motor boats 2 Nos. @ 3,000 16,000*		
For Irrigation Division.		
Jeeps and trucks 2 Nos. @ 6,000 12,000* Weapon carriers 8 Nos. @ 6,000 48,000* Boats 8 Nos. @ 1,000 8,000		
Instruments.		
For Kosi Dam Nivision.		
Levels 12 Nos. @ 1,000 12,000** Theodolites 3 Nos. @ 3,500 10,500** Binoculars 4 Nos. @ 200 800** Cameras 2 Nos. at 400 800** Miscellaneous Surveying and Drawing Instruments 5,000		

	20			
	For Kosi Irrigation Division.	Rs.	Rs.	Ps.
	Levels 24 Nos. at 1,000	24,000**		, -
	Theodolites 6 Nos. at 3,500	21,000**		
	Other suveying and drawing instruments	10,000 10,000		
	(iii) Office Furniture and other T. & P.			
	For Kosi Dam Division.			
	Office furniture for Executive Engineer and S. D. Os.	6,000		
	For Kosi Irrigation Divisions.	1		
	Miscellaneous T. P. at 10,000 Per Division Office furniture for Executive Engineer and Sub-	20,000		
	Division Officers	12,000	3,26,900	
	Deduct gost of storeg likely to be and 1-11 f		·,,	
	Deduct cost of stores likely to be available for use on other works and projects after completion of the investiga-	· · · •		
	tion to be taken on stock suspense and cost to be	-		
	credited to this work as under :	49.000		
	75% of the cost of items marked ** above .	42,000 51,000		
20	Repairs and Carriage of vehicles	······	93,000	2,33,900
21	Silt and chemical laboratory at Barakeshtra	60,000 15,000	60,000 15,000	
22	Contingencies at 5% on the amount of Rs. 50,38,400 .	2,54,400	2,54,400	
23	Establishment.			
	(i) Kosi Dam Investigation Division.			
	1 Executive Engineer for 3 years @ 1,150 p.m	41,400		
	3 Asstt. Engineers for 3 years @ 350 p.m.	37,800		
	15 Supervisors for 3 years @ 150/- p.m.	81,000		
	1 Accountant for 3 years @ 235/- p.m.	8,460		•
	1 Head Clerk for 3 years @ 170/- p.m.	6,120		
	3 Sub Divisional Clerks for 3 years @ 80/- p.m.	8,640		
	1 Accounts Clerk for 3 yours @ 100/- p.m	3,600		
	4 Clerks for 3 years @ 55/- p.m.	7,920		•
	6 Clorks for 2 years @ 55/- p.m.	7,920		
	1 Sr. Draftsman for 3 years @ 150/- p.m.	5,400		
	I Jr. Draftaman for 3 years @ 140/- p.m.	5,040		
	1 Tracer for 2 years @ 60/- p.m.	1,440		
	1 Ferro Printer for 2 years @ 60/- p.m.	J,440		
	1 Civil Asstt. Surgeon for 3 years @ 370/- p.m.	13,320		
	1 Compounder for 3 years (2) 60/- p.m.	2,160		
	I Research Asstt. for 3 years @ 160/- p.m.	5,760		
	3 Silt Analysts for 3 years @ 100/- p.m.	10,800		
	1 Silt Analyst for 2 years @ 100/- p.m.	2,400		
	1 Laboratory Asstt. for 2 years @ 60/- p.m.	1,440		
	I Laboratory Attendant for 2 years @ 40/- p.m. I Seismological Asstt. for 1 year @ 160/- p.m.	960		
	1 Senior Observor for 1 year @ 100/- p.m	1,920		
	1 Junior Observer for 1 year @ 60/- p.m	1,200		
	6 Guago Readers for 3 years @ 35/- p.m.	720		
	4 Daffadars for 3 years @ 30/- p.m	7,560 4,320		
	6 Barkandazes for 3 years @ 30/- p.m.	6,480		
	8 Peons for 3 years @ 30/- p.m.	8,640		
	7 Nepalese Police Guards for 3 years @ 35/- p.m.	8,820		
	1 Dispensary servant for 3 years @ 30/- p.m.	1,080		
	2 Storekeepers for 2 years @ 80/- p.m.	3,840		
	4 Special pays for handling cash for 3 years at			
	20/- p. m	2,880		
	Add provision for increments	10,000 -	-	
	-		3,10,480	

	rigation and Drainage Investigation Divis Exec. Engineers for 2 years @ 1,000/. p				48,000	
	Aust. Engineers for 2 years (350/- p.r.		•	•	50,400	
	Supervisors for 2 years @ 150/- p.m.		•	•	72,000	
	Accountants for 2 years @ 200/- p.m.	•	•	•	9,600	
	Head Clerks for 2 years @ 100/- p.m.	•	·	•	7,680	
	Accounts Clerks for 2 years @ 100/- p.m.	•	•	•	4,800	
	Sub-Divisional elerks for 2 years @ \$0/-			•	11,520	
	Asstt. Clerks for 2 years @ 55/- p.ma.	P		•	21,120	
	Storekeepers for 2 years @ 80/- p.m.	•	•		3,840	
	Sr. Draftsman for 2 years (d) 150/- p.m.			÷	3,600	
	Jr. Draftsmen for 2 years @ 100/- p.m.		÷		4,500	
	Tracers for 2 years (60/- p.m				2,880	
	Ferroprinters for 2 years @ 60/- p.m.				2,880	
	Guage Readers for 2 years (7) 35/- p.m.				5,040	
	Daffadars for 2 years () 30/- p.m.		Ì		5,760	
	Barkandazes for 2 years (i) 30/- p.m.				17,280	
	Peons for 2 years (3 30/- p.m.	•			11,520	
	Asstt. Soil Specialist for 1 year @ 350/-	р. н	L		4,200	
	Soil Analysts for 2 years @ 100/- p.m.	•		•	14,400	
1	Peon for I year @ 30/- p.m.	•	•		360	
	Special pays for handling cush for 2 year	rs a	t 20/- 1	9.m.	3,840	
	dd provision for incroments for 1 year	1	•	•	20,000	
	E S S S S S S S S S S S S S S S S S S S	R	5		**************************************	3,29,12
	Direction Office.	159				
iii) I		3				
	Stenographer for 2 years @ 170/- p.m.	9	•	•	4,080	
1	L2302005-332624	9	•	•	4,080 6,000	
1 1	Stenographer for 2 years @ 170/- p.m.		•	•	-	
1 1 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m.	ı.	• • • m.	•	6,000	
1 1 1 3	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m.	n. - p.		• • •	6,000 3,840	
1 1 1 3 4	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m Upper Division Clerks for 2 years @ 80/	n. - p. - p.		•	6,000 3,840 5,760	
1 1 3 4 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m Circle Clerk 2nd for 2 years @ 160/- p.m Upper Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/	n. - p. - p. •		• • • •	6,000 3,840 5,760 5,280	
1 1 3 4 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m Uppor Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m.	n. - p. - p. •		•	6,000 3,840 5,760 5,280 3,600	
1 1 3 4 1 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m Circle Clerk 2nd for 2 years @ 160/- p.m Upper Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m. Jr. Draftsman for 2 years @ 100/- p.m.	n. - p. - p. •		• • • • •	6,000 3,840 5,760 5,280 3,600 2,400	
1 1 3 4 1 1 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m Upper Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m. Jr. Draftsman for 2 years @ 100/- p.m. Tracer for 2 years @ 60/- p.m.	n. - p. - p. •		• • • • • •	6,000 3,840 5,760 5,280 3,600 2,400 1,440	
1 1 3 4 1 1 1 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m. Uppor Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m. Jr. Draftsman for 2 years @ 150/- p.m. Tracer for 2 years @ 60/- p.m. Ferroprinter for 2 years @ 60/- p.m.	n. - p. - p. •			6,000 3,840 5,760 5,280 3,600 2,400 1,440 1,440	
1 1 3 4 1 1 1 1 1 6	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m. Uppor Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m. Jr. Draftsman for 2 years @ 150/- p.m. Tracer for 2 years @ 60/- p.m. Ferroprinter for 2 years @ 56/- p.m. Daftri for 2 years @ 35/- p.m.	n. - p. - p. •		· · · · · · · · · · · · · · · · · · ·	6,000 3,840 5,760 5,280 3,600 2,400 1,440 1,440 840	
1 1 3 4 1 1 1 1 1 6 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m. Upper Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m. Jr. Draftsman for 2 years @ 150/- p.m. Tracer for 2 years @ 66/- p.m. Ferroprinter for 2 years @ 36/- p.m. Daftri for 2 years @ 35/- p.m. Peons for 2 years @ 30/- p.m. Barakandaz for 2 years @ 30/- p.m. Special Pay for handling cash for	n. - p. - p. •		• . • . • . • . • . • . • . • . • .	6,000 3,840 5,760 5,280 3,600 2,400 1,440 1,440 840 4,320 720	
1 1 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	Stenographer for 2 years @ 170/- p.m. Superintendent for 2 years @ 250/- p.m. Circle Clerk 2nd for 2 years @ 160/- p.m. Uppor Division Clerks for 2 years @ 80/ Lower Division Clerks for 2 years @ 55/ Sr. Draftsman for 2 years @ 150/- p.m. Jr. Draftsman for 2 years @ 150/- p.m. Facor for 2 years @ 66/- p.m. Ferroprinter for 2 years @ 36/- p.m. Daftri for 2 years @ 35/- p.m. Peons for 2 years @ 30/- p.m. Barakandaz for 2 years @ 30/- p.m.	a. - p.	m. • • • •	• • • • • • • • • • • • • • • • • • •	6,000 3,840 5,760 5,280 3,600 2,400 1,440 1,440 840 4,320	

(b) Dearness and Nepal Compensatory allowances.

Serial No.	Class of Estt.			No.	Period in Yrs.	D. A.	Nep: Allce.
						Rs.	Rs.
1	Executive Engineer .	,	•	1	3	4,140	5,400
	Executive Engineers .		•	2	2	4,800	-
2	Asatt. Engineers		•	3	3	7,560	. 8,100
				6	2	10,800	1,800
3	Supervisors 🚡 😱	3	•	15	3	24,300	21,600
				20	2	19,200	3,000

20

							-				
4	Accountants	•	•	•	•	1	8	1,800	1,089		
						. 2	2.	2,160	••		
5	Circle Supdt.	•	٠	• .	•	1	2	1,200	••	·.	
6	Circle 2nd Cler	rk	•			1	2	1,080	••		
7	Head Clerk			•	•	1	3	1,620	1,080		
8	Accounts elerk	κ.				1	3	1,260	900		
9	Head Clerks					2	2	2,160	••		
10	Accounts elerk	s			•	2	2	1,680	••		
11	Upper Div. Cle	erks	•			3	2	2,520	••		
12	Sub-Div. Clerk					3	3	3,780	2,160		
	•		-	•		6	2	5,040	480		
13	Steno for Proje	ect off	loor			1	3	1,620			
14	Clerks	,		•	•	4	3	5,040	 2,880		
••		•	•	•	•	26	2	21,840	3,360		
15	Storekeepers					4	2	3,360			
16	Sr. Draftsman	•	•	•	•	* 1	2	3,300 1,440	1,440		
10	Sr. Dratianan	•	·	•	•		3 2	960	1,080		
17	Draftsman					2			1.000		
17		•	•	•	•	1	3	1,440	1,080		
18	Tracers .	•	•	•	•	4	. 2	3,360	480		
19	Forroprinters	٠	•	٠	•	4	2	3,360	480		
20	Civil Asstt. Su	rgeen	•	•	•	1	\$	2,520	2,700		
21	Compounder	•	•	•	•	1	Constant 2	1,260	720		
22	Dispensary Ser		•	•	٠	153	3	900	360		
23	Research Asst	t .	•	•	•	4.5	- 3	1,620	1,440		
24	Silt Analysts	•	•	•	•	3 20	3	3,780	2,700		
					•	163	2	840	600		
25	Asstt. Soil Spe	eialist	•	•	•	- 1 🦋	2	1,680	••		
26	Soil Analysts	•	-	•	•	6	2	5,040	600		
27	Laboratory As		•	•	•	1	2	840	480		
28	Laboratory At	tenda	nt	•	•	1,65	2	600	240		
29	Soismological	Asstt.	-	•	•	103	1001	540	480		
30	Sr. Observer	•	•	•	•	1 (8)	1	420	300		
31	Jr. Observer	•		•	•	1	1	420	240		
32	Guage Readers	ι.	•		•	6 4	यमव3न	5,400	2,160		
33	Daffadars .			· ,	•	6	2	3,600	480		
						4	3	3,600	1,440		
						8	2	4,800	240		
34	Barkandazes			•		6	3	5,4 00	2,160		
						25	2	15,000	720		
35	Peons .					8	3	7,200	2,880		
						22	2	13,200	240		
36	Daftri .			•		1	2	600		•	
	Peon .					1	1	300	· · ·		
	• • • •	-	-	-	- ,		-				
								2,17,080	77,580	2,94,660	9,76,660
											y 9,77,000
	, mi	4 4 4				• •	•				
	(c) Travellir	-									
	(i) For K years	losi I	Dam	Divi	sion ; (2 11,000 pe	ər yearf	or 3	33,000		
·	(ii) For 2 In	rrigat	ion a	nd Di	rainaga	Investigati	ion Divisi	ions			
	@ 11,000		•						44,000		
	(iii) For S						. 4.000 1	oer			
	year fo	or 2 ye	ara	•	•	• •	• •	•	8,000	85,000	85,000

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(d) Contingencies

- (i) For Dam Investigation at 13,000 per year for 3 (ii) For 2 Investigation Divisions 13,000 each per year for 2 years
- (iii) For Direction Office 15,000 per year for 2 years Total Establishment charges Rs.

39,000		
52,000		
30,000	1,21,000	1,21,000
11,83,000	-	

BALWANT SINGH NAG, Project Officer (Kosi).



APPENDIX III

MINISTRY OF WORKS, MINES AND POWER

One of the factors governing the attitude of the S. F. C. to River Valley Projects is the high cost of preliminary investigations. Considering the difficulties of transport and the availability of steel and cement, I do not think that Government would be able to undertake a large number of river valley projects within a measurable period. Government are already committed to the Damodar Project as a whole, the Mirakud Dam Project, the Bhakra and Nangal Projects, Rihand, Tungabhadra and Ramapadasagara to mention only a few of the prominent projects which must go ahead in any case. The Kosi Project on which we have already spent a large amount on preliminary investigations must also go ahead. Similar considerations would seem to apply to some of the dams on the Chambal, the Narbada and the Tapti. These projects will tax all our resources and the capacity of CWINC to the utmost for the next 5 years, if not for a longer period. In the circumstances, I am of opinion that CWINC should try and reduce the cost of preliminary surveys on all other projects which are now under contemplation, e.g., projects in the Assam Valley, in the C.P., Coorg and so on. It is quite unnecessary at this stage to undertake aerial survey of all these projects, nor does it seem worthwhile taking up a large number of such projects even for preliminary investigations. We should pick and choose and only take up projects which appear most likely to be profitable and concentrate our energies on such projects. For instance, it will not be possible for many years to utilize all the electrical potential in Assam. The utmost we can aim at is to build one large dam at a suitable site in Assam which will provide power and irrigation. A very rough investigation of the various projects in view will suggest which of them should be taken up for preliminary investigations; similarly in the Central Provinces and other areas. Even on the Mahanadi, I am inclined to think that we should not spend any more money on the third site, viz., Naraj. It will be quite enough if Tikkarpara site is explored. The investigations on the third site may well be undertaken 10 years hence,- after Hirakud and Tikkarpara are nearing completion.

2. I have put down my tentative views as a basis for discussion with Mr. Khosla. If he agrees with me, will he kindly reduce his estimates for preliminary investigations of the Narbada-Tapti, Assam Valley, and other schemes before the next meeting of the S. F. C. I do not want the investigations on the Kosi to be curtailed nor on any other projects which are likely to be actually constructed during the next 5 years. But there is no point in spending large sums of money on other investigations which are not likely to be fruitful, at least for the next 5 or 7 years.



Sd. B. K. GOKHALE, 4-3-48. (Secretary).

Mr. Khosla

D. S. P.

I am in complete agreement with Secretary's views. Will Members and Directors note above and take immediate action as to " Λ " above in consultation with me so that I can discuss this with Secretary on Monday or Tuesday before I go on tour. This note should come back to me for return to Secy.

Sd. A. N. KHOSLA, 4-3-48. (Chairman, CWINC.)

APPENDIX IV

NARBADA VALLEY PROJECTS

REPORT

The Narbada river has hitherto been considered as useless for being exploited for either irrigation, power, or navigation, the latter beyond a certain small distance above its outfall into the Gulf of Cambay. In its course through the Broach district of the Bombay Presidency it frequently overflows its banks and floods the country-side on both banks. This fact as well as the projected development of other river basins in the country led the Governments of Bombay and C. P.-Berar to request the CWINC to take up the investigations for a basin-wide development of the river with flood control, irrigation, power generation and extension of navigation as the chief objectives in view. They offered to depute some of the engineering staff necessary for the work and also bear the cost of investigations in case no projects matured.

Accordingly the topography and hydrology of the basin were taken up for study in the CWINC at the beginning of the year 1947. The river drains an area of nearly 40,000 sq. miles. The total annual precipitation of rain in the basin is normally over 90 million acre feet of water. At present the entire amount is running to waste into the sea. The river has a deep channel almost throughout its course except in the plains of Broach after it emerges from the last narrow gorge near Rajpipla. The bed slopes vary from a maximum of about 40 feet a mile to about 3.75 ft. a mile through the last gorge. In the Broach plains it flattens out to about $2\frac{1}{2}$ to 3 inches per mile. Almost throughout its course it flows over basaltic formations.

A study of the topography has revealed that excellent storage sites exist both on the main river and on some of its tributaries where, by constructing dams of medium heights, reservoirs of varying capacities can be formed to hold back the excessive precipitation of rain during monsoon months and utilize the water for purposes of perennial irrigation, power generation, extension of navigation, fish culture and supplies for domestic uses all over the basin. Floods in the Broach area can be completely controlled by reserving the upper portion of their capacities for flood absorption in some of the lower reservoirs.

Most of these sites have been inspected both by Engineers and Geologists and the preliminary ground surveys have revealed that development of projects at the sites is feasible. It has been decided to take up, for the present, investigations of only 7 projects, a list of which is appended. The last two items of the list show the power and irrigation potential of the projects, which will aggregate to nearly one million K.W. of continuous power and a gross command of nearly 4 million acres respectively. The estimate amounting to Rs. 95,91,144 has been prepared to meet the cost of detailed investigations of these projects. Provisions have been made for collection of hydrological data including rainfall, temperature, and humidity and river gauging; surveys of dam sites, the reservoir areas and areas to be commanded for irrigation; soil surveys of the commanded area and geological surveys of the dam sites. Such other surveys as minerals of the entire basin, electrical load surveys, surveys for navigation, soil erosion and also economic surveys by Gokhale Economic Research Institute, Poona, have also been included in the programme of investigations and requisite provisions made in the estimate. Surveys of dam sites, reservoir areas and irrigation areas will be done through the agency of the Survey of India Department, while surveys of main canals and other channel alignments for distribution system for irrigation water will be done by CWINC staff. The hydrological surveys will be undertaken in close co-operation with the Indian Meteorological Department. Geological Survey of India. Similarly surveys for pisciculture will be undertaken under the direction of the Director, Zoological Survey of India.

Two divisions have been formed to do the work. Each Division will have four sub-divisions together with requisite subordinate and ministerial staff. Such other staff as Meteorological Assistants, Research Assistants for soil survey, Silt Observers, Geologists, Drill foreman, etc. has also been provided for, as detailed in the estimate.

The work will take nearly four years to complete. But the investigations will be so phased that construction can be launched upon in case of features which can be taken up independently before the investigations on all projects are completed so as to obtain quick and maximum results. As soon as such stages are reached, estimates for construction will be prepared for sanction. Adequate provision for acquiring necessary tools and plant and transport vehicles has been made at rates which prevail in the market at present.

A statement showing the rough data for the dam sites and the anticipated benefits from the projects is given below.

The following map and chart are enclosed—

- (1) An index map of the Narbada basin showing the proposed dam sites and projects.
- (2) A profile of Narbada river and its main tributaries.

G. N. PANDIT, Project Officer (Narbuda and Tapti).



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NARBADA BASIN-ROUGH DATA FOR THE DAM SITES

	Name of the river Name of the dam site .	· · ·	Narbada Bilghara	Burhner Ghugri	Narbada Bargi	Tawa Ranipur	Narbada Punasa	Narbada Barwani	Narbada Weir be- low gorge
3.	Longth along river (Miles)	- •	153	85	249	95	513	665	750 (approx.)
4.	Latitude and Longitudo of	dum site	80°29'20"E	80°42′0″E	79°55′30*E	77°59′0″E	76°28′0″E	74°41′0″E	
			22°49′40″N	22°44′45″N	V 23°1°0″N	22°35′30″N	22°17′0″N	22°2′0″N	
5.	Catchment area above o (Sq. miles)	dam site	1900	1290	6180	2340	23600	320 00	
6.	Average rainfall in catchme	ont (Inches) 60	60	55	59	45	42	
7.	Probable mean annual rune	off (m.a.ft.) 3.06	$2 \cdot 06$	4.8	$3 \cdot 12$	$15 \cdot 63$	22 · 23	
8.	R. L. of river bed		1520	1570	1240	1020	650	350	
9.	Proposed F. T. L.		1750	1745	1350	1190	887	590	
10.	Maximum height of the	o dam at		.					
	F. T. L. (feet)	• •	. 230	175	110	170	237	240	
	Length of the dam at F. T.		3960	5300	5120	. 2700	2400	2000	
12.	Gross capacity of reservoir (m.a.ft.)	at F. T. L.	1.90	1.57	$2 \cdot 59$	5.0	17.14	25·18	
13.	Dead storage (m.a.ft.) .	· ·	0.19	0.13	0 · 29	$1 \cdot 5$	1.52	2.85	
14.	Max. area of water spread	(acres) .	22900	32000	62200	89600	320000	390400	
15,	Losses due to evaporation	(m.a.ft.) .	0.08	0.10	$0 \cdot 25$	0.36	1.03	1 · 26	
16.	Reserve for flood control	•		aligo!	h	• •	••	••	
17.	Net storage available .	• •	E	1.34	2.05	$3 \cdot 14$	14.60	21.00	
18.	Continuous regulated	discharge							
- 0	(cusecs)	• •	3275	2380	9700	4140	20500	28980	
	R. L. of the top of dead st	orage .	1613	1638	1308		790	470	
	. R. L. of tail race	• •	1540	11.4.1011	2 11		670	375	
	Average head available (fe		141.5	106-5	50		168.5	155	
	Continuous power availabl		30800	17500	20.00		223000	300000	
23	Gross area commanded (ac	eros) .	•• (18,00,000	11,00,000	••	••	8,09,000
	1.—Total live storage	impoundu	d. 3	1 • 13 m.a.ft	. Total gro	oss area con	nmanded 37	,00,000 acr	98.
	11Continuous powo	0		सत्यमेव ज	지금				
	Bilghara	-							
	Ghugri	17,50(
	Bargi	32,500							
	Tawa	12,700),,						
	Punasa	223,000),,						
		· •			· · · · · · · · · · · · · · · · · · ·				

At the dam between Punasa and Harinphal 112,600 k.W.

Harinphal 250,000 ,,

At the two dams in the gorgo

. 320,000 ,, Total 9,98,500 ,,

G. N. PANDIT,

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Project Officer (Narbada and Tapti),

NARBADA PROJECTS ESTIMATES

Overall estimate for preliminary surveys and investigations in connection with projects for the multipurpose development of the Narbada Basin.

		Abstract								Rs.
I. WORKS										
1. Dams and Appurtenant works										
A. Preliminary expenses .	· •	•	• •	•	•	•	•	•	•	,74,000
K. Buildings .	• •	• • • •	•	•	•	•	•	•	•	1,00,000
2. Main canul and Branches .	• •	• •	•	•	•	•	•	•	•	45,46,500
3. Discharge and silt observations		•	•	•	•	•	•	•	•	2,00,000
4. Meteorological Observations .		•	•	•	•	•	•	•	•	25,800
5. Mineral surveys		•	•	•	•	•	•	•	•	10,000
6. Surveys for Pisciculture	• •		•	•	•	•	•	•	•	2,000
7. Malaria surveys		•	•	•	•	•	•	•	•	5,000
8. Electric Load surveys	•		•	•	•	•	•	•	•	10,000
9. Surveys for Navigation .	•		•	•	•	•	•	•	•	1,00,000
10. Economic and property surveys	•		•	•	•	•	•	•	•	60,000
11. Soil erosion surveys	•					•	•	•	•	7,500
12. Communications	•				•	•	•	•	•	3,00,000
13. Special Tools and Plant	•		•	•	•	•	• .	•	•	4,60,000
2 per cent Contingencies	· Es	NE.		3.	. •	•	•	•	•	67,00,800 1, 34 ,016
II. TOOLS AND PLANT	- Ch			Y.		Total	Works	•	٠	68,34,816
Tools and Plant for the Divisions	68	2.22	16	1.						4,38,000
2 per cent Contingencies .		1993	79		•	•	•	•	•	8,760
III. ESTABLISHMENT		1211	12		Total	Tools	and Pla	int	•	4,46,760
				<u>k</u>						23,09,568
Establishment for 4 years including	USLADI.	19ULUON .	contil	ugen	. 6910	•	•	•	•	40,00,000
	- CE	1001		1		Gran	d Total		•	95,91,144
I. WORKS		सन्यमेव	Deta	ils						
Dams and Appurtment Works		1	1.1.1					•		

Dams and Appurtenant Works

A. Preliminary Expenses

1. Survey of reservoir basins by air photography and ground survey and plotting contours at 10 ft.—5 ft. intervals on a scale of $4^{"}$ —1 mile.

1.	Ghugri Dam					•			•	٠	•	•	•	•	•	50 sq.	miles
2.	Bilghra .							•							•	25 • 8	**
3.	Bargi .										•	•	•			97	,,
	Tawa .			•			•						•			139	.,
5.	Hoshangaba	d.	•				•			•			•	• 1	•	25 (A)	pprox.)
	Punasa .		•					•								500	
	Harinphal				•	•		•	•		•	•		•	•	140	,,
8.	Dam site be	tween	Puns						•	•		•	•		•	25	**
	2 Dam sites					·· r ·		•	•	•	•					15	,,
			-7E - I 4	- 80		-	•	-	-						•	15	,,
																	·
																1031.8	Sq. miles

1031.8 Sq. miles at Rs. 375 per sq. mile

Rs. 3,87,000.

2. Survey of Dam sites and Weir sites by air photography and ground surveys and plotting on a scale of 32''=1 mile.

7500 acres at Rs. 4 per acre

Rs. 30,000

Bilghara																	f borcs.	
	• •	•		•	•	•	•	•	•	•	•	•	•	•	- '		Nos.	
Ghugsi.	• •	• •	•	•	•	•	•	•	•	•	•	•	•	٠	•	56		
Bargi .	• •	•		•	•	•	•	•	•	•	•	•	•	•	•	52	79	
Tawa .	• •	•		•	•	•	•	•	•	•	٠	•	•	•	•	30	,,	
Punasa	• •	•		•	•	٠	•.	•	•	•	•	•	•	•	•	100	"	
Harinphal	• •		,	•	•	•	•	•		•	•	•	•			20		
Hoshangab	ad .	•		•		•	٦	, í	•	•	•	•	•			32	.,	
Dam site be	twoon I	unas	a and	d He	rinph	al	•		•		•			•		27	,,	
2 Dam sitos	in Rajj	pipla	gorge	в	•		•					٠				50	,,	
Pick-up We	ir for B	rouch	proj	oct												25		
															400			
21,600	R. Ft. a	t Rs.	20 pc	or R	Ft.									\mathbf{Rs}	432 . 4,32		each 50'	in dep
4. Soil ana	lucia an	d hor			and for		than	duma	tra le co						ты		Rs.	
	•				•						sung	•	•		L.S.		10,000	
5, Model E	-		-			Jrwa	-	Build		լև .	•	•	•	•	L.S.		15,000)
Tempor	ary bui	ldings	i—10	site	ន	•	•	•	•	•	•	•	•	•	L.S.		1,00,000	
		•					•										9,74,000	-
II. Main	Canals	and i	Bran	chcs				~	11225									
(a) S	urvey ol				led ar	oas f	for ali	gnme	nts of	canal	s							
	Canals		•		•	•	82		6		•	•	•	•	•		8,00,000	
	Canals				•	•	ିତ୍ୟ			2854	•	•	•	•	•		1,00,000	
	Canals	ex-Bi	roach	ı.	•	•	-6		A 33	82 ·	٠	•	•	•	•	1	0,00,000	
							6			1					·	3),00,000 Ks.	acros.
39,00,00)0 acres	@ Rs	3. 1/2	001	acro			14	144	ξ.						4	3,87,500	
	Miscell					_	1	the second	1 69	60					L.S		20,000	
-	Explore			-		Is of	erose	drah	nam w	orka a	ավ.ազ	กษณะย	rv sur	veva			1,00,000	
• •	Soil su						- 10.2	 FUE 		1		000000	iy sui	voya		•	39,000	
(4)	Son su	lvoys	30,00	,00	Jacro	5 (00	1101 1	r por	100 at	-	•	•	•	•	•			
II. Dischar	an and	8:14 AI	60.000	-	(ma	and	1	मन्म	व जय	ति						4	5,46,500	
One Boa	-	nd fo	ur K	hala	sis at	eacl	ı dişe	hargo			st of 1	ropes	, discl	nrge	e roda	3,		
10 sites				-							. 5.00	0 ner	site n	er ve	ur.		2,00,000	
	•										•	•	-	•			2,00,000	
V. Meteoro	logical (vations	Dserv)	ution	8, K	ainga	uges,	, Tem	perati	ires, H	umidi	ety and	d Wi	rd Vel	ocity	00-			
Equipm		l insta	Illati	ons	of 15	now	rain	gaugo	s some	of th	ese to	bo c	of the	inte	grate	1		
	of Rs.			, ,					y appa						vi age	,	15,000	
Recurri 15 obser	ng Expe	mditu	re or	ւթո ո. քշ	t-tim	e ob	serve										10,800	
																	25.800	-
T Minaurl	Same	r. c.															25.800	
7. Mineral					•.	•,	•.	•.	•	•	•	•	•	•	•		-	
I. Survey				ы.	•	•	•	•	•	•	•	٠	٠	•	•		12,000	
II. Malaria	-			•	•	•	•	•	•	•	•	•	•	•	٠		5,000	
[[. Electric					•	•	•	•	•	•	•	•	•	•	. •		10,000	
C. Surveys					•	•	•	•	•	•	٠	٠	•	•	•		1,00,000	
X. Economi					L.S	••	•	•	•	•	•	•	•	•	•	•	60,000	
I. Surveys	for Soil	Erosi	on L	. <i>I</i> S.	•	•	•	•	•	•	•	•	•	•		•	7,500	
II. Commu	nication	.8																
Constru	ncting 1 mile			f ten	ipora:	ry ro	ads a	nd th	oir ma		ance f	or 2 y	cus at	Rs.	3,000		3,00,000	

3. Geological investigations for foundations of Dam sites and Weir sites and of the reservoir basins by boring, core drilling, making drifts and tunnelling, etc. including testing.

			÷.	2	17							
I. Special Tools and Plan	t											Rs.
6 Diamond drills complet		000880	ries a	t Rs. 6	80 ,0 00	oael.	ι.					3,6 0,000
Testing apparatus and la rocks and testing soi	boratory	and v	works	ibore ea	uinm	ont f	or com	press atent	sive s and	treng	th of lida.	- -
tion, etc. L. S.	• •	•	• •	•	•	•	•	•	•	•	• _	1,00,000
												4,60,000
												67,00,800
2% Contingencies .	• •	•	•	• •	• •	• •	•	•	•	٠	• _	1,34,016
II. TOOLS AND PLANT					Te	otal 1	Works	•	•	•	•	68,34,816
1. Motor vehicles for	survey p	artios							-		. .	u .4
14 vohicles at Rs. 7	• •									Ż	•	98,000
Working expenses i	-								-	•	•	1,40,000
2. Scientific Instrument	•					•	•	•	•	•	•	1,20,000
3. Ordinary Tools and		•	•	•	•	•	•	•	•	•	•	
4. Camp equipage	1 104110	•	•	•	•	•	•	•	•	•	•	10,000
	• •	•	•	•	•	•	•	·	•	•	•	30,000
5. Office furniture	• •	•	•	•	•	•	•	•	•	•	•	40,000
2% Contingencies .												4,38,000
2% outringuiolos	•••	•	•	•	•	•	•	•	•	•	•	8,760
I. ESTABLISHMENT.					Te	otal I	Cools a	nd Pl	lant	•	•	4,46,760
D 400				E	3	~					E,	cpondituro po
. Pay of Officers-			1 pra	Bue	3/15	20						Rs.
Executive Engineers 2 N	os. @ Re	s. 875 j	p. m .	100				•				21,000
Assistant Executive Engi	ineors 4 l	Nos. @) Rs.	600 p.r	n.	88		•				28,800
Assistant Engineers 4 No	s. @ Rs.	560 p	.m.	5	88.7	191				•		26,880
Geologist 1 No. @ Rs. 87				\$794Q	994	9			-			10,500
Assistant Goologists 2 No	-	. 500 n	.m.	VAT	141			_		•.		12,000
Officer to conduct econon				Rs 55	i0 n m		•	•		•	. •	6,600
Drill Foroman 1 No. @ F			o. 🕒		.o 1	90	•	•	•	•	•	
Dim i otomat i no. (g i	•3. 1,000	b	- 15	116	17	20	•	•	•	•	•	12,000
			- Vé	the state	Star.	21						1,17,780
Pay of Establishment-				and the second second		9°						Rs.
•	-4- O B	- 940		सन्यमह	ন সম	त						
3 Meteorological Assista		8. 240	p.m.	•	•	•	•	٠	•	•	•	8,640
2 Accountants @ Rs. 20	-	•	•	•	٠	•	•	•	•	•	•	4,800
2 Head clerks @ Rs. 18	-	•	•	•	•	•	•	•	•	•	•	4,320
6 Senior clerks @ Rs. 1	-	•	•	•	•	٠	•	•	•	•	•	10,800
2 Storokeepers @ Rs. 1	50 p.m.	•	•	•		•		•	•	•	•	3,600
14 Junior clerks @ Rs. 9	3 p.m.	•		•	•	•	•	•		•		15,624
2 Senior Draftsmen @ 1	Rs. 200 p	.m.	•		•							4,800
4 Junior Draftsmon @]	Rs. 143 r).m.	•	•				•				3,432
4 Tracers @ Rs. 104 p.r.	n											4,992
2 Sub Assistant Surgeon		170 n	m.				•		•	•	•	4,080
2 Compounders @ Rs. 5	•	•		•	•	•	•.	•	•	•	•	-
• •	-	•	•	•	٠	•	•	•	•	• .	•	1,200
32 Ovorseers @ Rs. 240 p	-	•	•	•	•	•	•	•	•	•	•	92,160
6 Rosearch Assistants @		-	•	•	•	•	•	•	•	•	•	17,280
2 Laboratory Assistants	-	230 p.r	n.	•	•	•	•	• `	•	•	•	5,520
2 Silt-Analysts @ Rs. 2	-	•	•	•	•	•	·	•	•	•	•	4,800
2 Assistant Silt Analyst	s @ Rs.	93 p.n	ı.	•	•	•	•	•	•			2,232
	70 p.m.		•	•		•	•		•		•	8,400
10 Gauge readers @ Rs.												•
10 Gauge readers @ Rs. 10 Senior Observers @ F	Rs. 90 p.n	n.			•	•	•			•		10.800
	-	n.	•	•	•	•	•	•	•	•	·	10,800 792

	14 Peons @ Rs. 33 p.m			•							•	•	Rs. 5,545
	6 Laboratory Khalasis @ Rs. 33 p.m.						•		•	•			2,376
	10 Chowkidars @ Rs. 33 p.m.	•		•	•	•	•	•	•	•	•	•	3,960
										Total	•	•	2,24,112
3.	Dearnoss allowances of Officers.			•						•			16,020
4.	Dearness allowances for establishmen	t	•								•		66,480
5.	Travelling allowances for Officers					•				•			40,000
6.	Travelling allowances for establishmen	ıt				•		•		•			60,000
7.	Cost of project Circle office debited to	Nar	bada			•		•					33,000
8.	Establishment contingencies .		•	•	•	•	•		•	•	•	•	20,000
					E	stabli	ishme	nt per	year				5,77,392
	Grand Total	-E	stablis	hmər	t for	4 yea	гз.	•				. –	23,09,568

G. N. PANDIT, Project Officer (Narbada & Tapti).



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v

II. Estimate for preliminary surveys and investigations in connection with projects for multipurpose development in the Basin of the Narbada River for the year 1947-48 submitted to Government for sanction.

I. WORKS

Dams and appurtenant works												
(i) Preliminary expenses												Rs.
(ii) Survey to be carried out by the) Sur	vey o	f Indi	a Dop	artme	\mathbf{nt}			•		L.S.	2,500
1. Survey to be carried out by	ori	under	the di	roctio	ns of	c.w.i	.N.C.				L.S.	14,000
2. Discharge and silt observat	ions	•	•	•	•	•		•	•		L.S.	1,990
3. Geological investigations ar	nd m	ineral	surve	уя			•	•	•		L.S.	1,000
4. Communications	•				•			•	•		L.S.	10,000
5. Contingencies at 2 per cent	•	•		•	•	•	•	•	•	•		650
						Tot	al Wo	rks	•			30,140

II. TOOLS AND PLANT

(Including transport, conveyance and its carriage and repair charges, survey and mathematical instruments, camp equipage, silt, observation apparatus, etc.)

(a) New Supplies	Rs.
9 Woapon carriers @ Rs. 7,000 each	63,000
3 Jeeps with trailers @ Rs. 7,000 each	21,000
2 Chronographs @ Rs. 100 each	200
2 current metors @ Rs. 1,000 each	2,000
2 largo boats @ Rs. 1,000 each	2,000
2 small boats @ Rs. 500 each	1,000
Discharge rods	200
Sounding rods	100
Ropes	500
One set of apparatus for silt observations @ Rs. 1,500 each and remaining laboratory equipment	2,200
(b) Repairs and Carriage	
Repairs to trucks etc	1,500
Grand Total of Tools and Plant	93,700
III. ESTABLISHMENT	
(a) Pay of Officers Reality and	
2 Executive Engineers for 3 months @ Rs. 900 p.m	5,400
4 Assistant Engineers for 3 months @ Rs. 350 p.m.	4,200
1 Geologist for 3 months @ Rs. 600 p.m	1,800
Total .	11,400
Pay of establishment	
11 Overseers for 3 months @ Rs. 180 p.m	5,940
2 Accountants for 3 months @ Rs. 200 p.m	1,200
2 Head clorks for 3 months @ Rs. 160 p.m	960
l Sub-Assistant Surgeon for 2 monthe @ Rs. 200 p.m	400
3 clerks for 3 months @ Rs. 80 p.m	720
4 Sub-Divisional clerks for 3 months @ Rs. 75 p.m	900
1 Head Draftsman for 3 months @ Rs. 250 p.m.	750
2 Junior Draftsmen for 3 months @ Rs. 100 p.m	600
4 Tracers for 3 months @ Rs. 80 p.m	960
1 Dispensor for 2 months @ Rs. 80 p.m	160
l Daffadar for 2 months @ Rs. 35 p.m	70
3 Barkandazes for 3 months @ Rs. 30 p.m	270
7 Peons for 3 months @ Rs. 30 p.m	630

4 Feons for 8-months @)Re. 20-1	хп	•		•			۰.			•		R 380
5 Chowkiders for 3 months @ R	s. 80 ;	р.т		•		•	•			•	•	450
4 Dak runners for 3 months @ F	св. 3 0	p.m.							•		•	360
11 Khalasis for overseers for 3 m	onthe	1 @ Re	. 3 0	р.т					•	•	•	990
7 Gauge readers for 3 months @	Rs. 3	10 p.m.	•			•	• •	•			•	630
Geologiat-staff-L.S	•	•	•	•	•	•	•	•	•	•	•	.1,000
											****	17,350
Dearness allowance and Special p	ay of	Officer	rs L.	S	•					•	•	1,150
Dearness allowance of establishm	ent L	. 8	•		•	•		•	•	•	•	7,000
Travelling allowance for officers												
1. Executive Engineers				•		•	•				•	1,400
2. Assistant Engineers		•				•			•	•		1,800
3. Geologists	•	•	•	• '	•	•	•	•	•	•	•	1,000
												4,200
Travelling Allowance of Detablishment												
Supervisors	•	•							•			2,000
Other staff (Executive Engineers)		•										2,000
Geologist-Other Staff	•	•	•		•	•	•	•	•			400
											_	4,400
(b) Establishment Contingencies		0	E	3	0							<u> </u>
Rent for Divisional and Sub-Divi	siona	1 Office	. 8		43		•					1,000
Rent for Geologists' Offices	•	- 28	•		8	•		•	•	•		400
		6			9							1,400
		1	Gr	and to	otal of	[ostal	blishm	ent	•		•	46,900
I. Works	•	•	1	3	0,140							
II. Tools and Plant	•	· #	•	8	3,700							
I. Establishment	•	 (2) 	-16	0-14	6,900							
	Ţ	otal		1.7	0.740	-						
	_		-		-	_						

G. N. PANDIT, Project Officer, (Narbada and Tapti).

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III. Estimate for the preliminary surveys and investigation in connection with the project for multipurpose developments in the Basin of the Narbada River for the year 1948-49, submitted to Government for sanction. I. WORKS

1. Dams and appurtenant works. (A-	-Prei	limiı	ary ex	pense	9 8) ·								Rs.
Survey to be carried out by the S	lurve	y of	India		•			•				L.S.	3,00,00
Survey to be carried out by or un	ıder	the c	lirectio	on of	c.w.	[.N.	c					. L.S.	20,00
K. Buildings	•	•	•	•			•	•	. •	•		D.8.	50,00
2. Main canal and branches													
Miscellaneous surveys such as can	al al	ignn	oents, s	pecia	l rese	rvoi	r surve	ys, et	c . .			L.S.	40,00
Soil surveys	•	•	•	•	•	•	•	•	•	•	•	L.S.	70,00
3. Meteorological surveys													
Rain gauges —It is proposed to in installation of gauges—70 new re wind velocity apparatus at 35 p average rate of Rs. 500 each	ain g	auge	s inclu	ding	tempe	ratu	re, hun	hidity	and			35,000	
(ii) Observation Expenditure per	year	•											
3 Meteorological Assistants @) R 8	. 200	p.m.		•		•	•	•			7,200	
3 Senior Observers @ Rs. 120	0 p.n	B.	•		•		•	•				4,320	
70 part time Observers @ Rs.	. 15 y	p.m.				•	•	•				12,600	
70 part time Retainers @ Rs.	. 12)	p.m.		12	123		•	•	•			10,080	
			A	62	5)	2	2					34,220	69,000
5 Geological investigations and						233	P .					L.S.	(88.y
6 Communications.	1 111	uera.	surve	ув	233	83	•	•	• '	•	•	L.S.	20,000
7 Special Tools and Plant (Dri	•		• • •	d. an	•		• • and la	hanat		•	•	L.S. L.S.	50,000
8 Economic surveys	пөд	աթո	10110 91	u ap	heren	18 10	r son is	oorat	oryj	•	•	L.S. L.S.	12,00,000 6,000
9 Hydro Electric Installations		•	iminor		•		Iestria I	•	•	•	•	L.S.	5,000
10 Contingencies @ 2%	A.	prei	TITTTTT	A OT	1011BOR		lectre i	LUBU	surve	y8.	•	T''??	61,000
To containgoine to the 270	•	•	100	36	6-11	7.0	L .	•	•	•	•	•	
			100		То	TAL-	-Work	8.	•	•	•	•	19,41,000
I: TOOLS AND PLANTS			7	úra	व जर	मि							
7 country boats @ Rs. 1,000 each					•								7,000
3 outboard motors @ Rs. 1,000 eac	ch	•	•	• '		•	•	•		•		•	3,000
16 chronographs at Rs. 100 each .			•								•	•	1,600
18 levelling instruments at Rs. 800	each	n			•	•			•	•			14,400
3 theodolites at Rs. 1,500 each .		•		•			•	•	•	•	•	•	4,500
3 Binoculars at Rs. 200 each		•	•.		•	•	•	•		• •		•	600
1		•	•	•	•			•	•	•		•	600
1 camera at Rs. 600				_	••				•	•		•	270
18 measuring chains @ Rs. 15 each	i	•	•										1,800
	i	•	•	•		•	•	•	•	•	•		*,000
18 measuring chains @ Rs. 15 each	'n	• • •	•	•	•	•	•	•	•	•		•	
18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each	n ,	• • •	•		•	• • •	•	• •	•	•	•	•	1,200
18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each	ĥ,	• • •	• • •		• • •	• • •	• • •	• • •	• • •	• • •	•		1,200 700
18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100	•		. 200 e				• • • •	• • • •	• • • •	• • •	•		1,200
18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100 7 drawing boards at Rs. 30 each	COB (@	-				• • • •	• • • •	• • • •	• • • •	• • • •	• • • •		1,200 700 210 1,400
 18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100 7 drawing boards at Rs. 30 each 7 2nd class drawing instrument box 2 first class drawing instrument box Scales with offsets, etc., french cur 	106 (() 106 (()) R e	s. 3 00 e	ach			ific inst			• • • •	• • • •		1,200 700 210 1,400 600
 18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100 7 drawing boards at Rs. 30 each 7 2nd class drawing instrument box 2 first class drawing instrument box Scales with offsets, etc., french cur and tools and plant 	KOS ((KOS ((TVOS) R e	s. 3 00 e	ach	• • • • •	ient	ific inst		• • • • • •	• • • •	• • • •		1,200 700 210 1,400 600 100
 18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100 7 drawing boards at Rs. 30 each 7 2nd class drawing instrument box 2 first class drawing instrument box Scales with offsets, etc., french cun and tools and plant 10 current meters @ Rs. 1,000 each 	KOS ((KOS ((TVOS) R e	s. 3 00 e	ach		ient	ific inst	trume	• • • • • • •		• • • • •		1,200 700 210 1,400 600 100 10,000
 18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100 7 drawing boards at Rs. 30 each 7 2nd class drawing instrument box 2 first class drawing instrument box Scales with offsets, etc., french cur and tools and plant 10 current meters @ Rs. 1,000 each 10 large boats at Rs. 1,000 each 	KOS ((KOS ((TVOS) R e	s. 3 00 e	ach		ient	ific inst			• • • • •	• • • • •		1,200 700 210 1,400 600 100 10;000 10;000
 18 measuring chains @ Rs. 15 each 60—100 ft. tapes at Rs. 30 each 60—50 ft. tapes at Rs. 20 each 7 steel tapes @ Rs. 100 7 drawing boards at Rs. 30 each 7 2nd class drawing instrument box 2 first class drawing instrument box 2 first class drawing instrument box 3 Scales with offsets, etc., french cur and tools and plant 10 current meters @ Rs. 1,000 each 	KOS ((KOS ((TVOS) R e	s. 3 00 e	ach		ient	ific inst			• • • • • •	• • • • • •		1,200 700 210 1,400 600 100 10,000

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	Sounding and															Rs.
	Sounding rods .	•	•	•	•	•	•	•	•	•	•	•	۰.	•	•	1,100
	Ropes	• 114 -	1	•	•	•	•	•	•	•	•	•	•	٠	•	2,500
	I set of apparatus for					•	•	•	•	•	•	•	٠	•	•	1,500
	Recurring laboratory	-		•		•	•	•	•	•	•	•	•	•	•	300
	15 Nos. 14' × 14' tent	~				•	•	•	•	٠	•	•	•	•	•	18,000
	40 Nos. $10' \times 10'$ tent	-			•	•	•	•	•	•	•	•	•	•	•	32,000
	40 Nos. shouldaries a				•	•	•	•	•	•	•	•	•	•	•	24,000
	40 servents' tents at		-		•	•	•	•	•	•	•	•	•	•	•	20,000
	Camp furniture . Office furniture for Di			5L	D:	:	•	•	•	•	•	•	•	•	•	58,000
									•	•	•	•	•	•	•	15,000
	Office furniture for so						atory	•	•	•	•	•	•	•	•	2,500
	Office furniture for ge				•	•	•	•	•	•	•	•	•	•	•	2,500
	Repairs and Carriage			airs t		K8	•	•	•	•	•	•	•	•	•	5,420
	Contingencies at 2%	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4,000
							Тот	AI.—']	Cools	and P	lant	•	•	•	•	2,00,000
	ESTABLISHMENT) Pay of officers															······
(4	2 Executive Engineer	n at D	. 000		for 1		nthe									21,600
	8 Assistant Engineer			-				•	•	•	•	•	•	•	•	33,600
	-			-		шоц	1113	•	•	•	•	•	•	•	•	53,000 7,200
	1 Geologist at Rs. 60 2 Assistant Geologist					•	•	•	•	•	•	•	•	•	•	•
	•			-			1011B	•	•	•	•	•	•	•	•	9,600 3,300
	1 Soil Physicist at R	8. 210	p.m. 10	or 12	mont	rus	50	3.	~ .	•	•	•	•	•	•	3,300
						A:	he:	9E	A.							75,800
(8) Pay of establishment		• •	•		QNS:		1.10	939							
	32 Overseers at Rs. I	-				183		•	28	•	•	•	•	•	•	69,120
	2 A ccountants at Rs.	-				10.00		• //	g.	•	•	•	•	•	•	4,800
	2 Lead clerks at Rs.	-					119		· • .	•	•	•	•	•	•	3,840
	2 Sub-Asstt. Surgeon			-			iths	14.4	•	٠	•	•	•	•	•	4,800
	10 Clerks at Rs. 80 p.			•	•	int.	63	23.3	5	•	•	•	٠	•	•	9,600
	16 Sub-Divisional Cle			-		200 V	1.465.69	15	25	•	•	•	•	•	•	14,400
	2 Head draftsmen for					- B.C. Pri		5.U	5.	·	•	·	•	•	•	6,000
	2 Junior draftemen fo) p.m	•••	•	8 C .	•	•	•	٠	•	•	2,400
	4 tracers for 12 mont			-		• 33	रामेव	। जेरावे	÷	. •	•	•	•	•	•	8,840
	2 dispensers for 12 m			-					· •	•.	•	•	•	•	•	1,920
	2 daffadars for 12 mo			-		•	•••	•	•	•	•	•	•	•	•	840
	10 barakandazes for 1					n .	•	•	·	•	•	•	•	•	•	3,600
. •	22 peons for 12 mont			-		•	•	•	•	•	•	•	•	•	•	7,920
	12 peons for 12 mont			-		•	·	•	•	•	•	٠	•	•	•	4,320
	10 chowkidars for 12				-		•	•	•	•	•	•	•	•	•	3,600
	12 Dak runners for 1				•		•	•	•	•	•	•	•	•	•	4,320
	32 khalasis for overse						р.т.	•	•	•	•	•	•	•	•	11,520
	20 gauge readers for		oths at	Rs.	30 p.1	n.	•	•	•	•	•	•	•	•	•	7,200
	Geologist's staff L.S.		•	•		•	•	•	•	•	•	•	•	•	•	4,000
				19 m	ionthe		•	•	•	•	•	•	٠	•	•	3,600
	6 sub-ovorseers at Rs	-														0 000
	3 Laboratory assistan	its at]	Rs. 100) p.m		12 mc	nthe	•	•	•	•	•	•	•	•	3,600
	3 Laboratory assistan 2 clerks at Rs. 40 p.n	nts at] n. for]	Rs. 100 12 mon) p.m ths		12 ma	nths.	•	•	•	•	•	•	•	•	960
	3 Laboratory assistan 2 clerks at Rs. 40 p.m 1 computor at Rs. 40	nts at] n. for] p.m. f	Rs. 100 12 mon for 12 p) p.m iths mont		12 mc	onths		• • •	• • •	• • •	•	• • •	• • •	• •	960 480
	3 Laboratory assistan 2 clerks at Rs. 40 p.m 1 computor at Rs. 40 1 tracer at Rs. 40 p.m	nts at] n. for] p.m. f n. for]	Rs. 100 12 mon for 12 p 12 mon) p.m aths mont aths	hs	• • •	onths • • •		• • •	• • •	• • •	•	• • •	• • •	• • •	960 480 - 480
	3 Laboratory assistan 2 clerks at Rs. 40 p.m 1 computor at Rs. 40 1 tracer at Rs. 40 p.m 3 laboratory pcons at	nts at] n. for] p.m. f n. for] Rs. 2/	Rs. 100 12 mon for 12 p 12 mon 13 p.m.) p.m iths mont iths for 1	hs 2 mor	• • •	onths	• • • •	•	• • •		• • •	• • • •	• • • •	• • • •	960 480 - 480 900
	3 Laboratory assistan 2 clerks at Rs. 40 p.m 1 computor at Rs. 40 1 tracer at Rs. 40 p.m 3 laboratory pcons at 2 peons at Rs. 25 p.m	nts at] n. for] p.m. f n. for] Rs. 2/ n. for]	Rs. 100 2 mon for 12 m 2 mon 5 p.m. 2 mon) p.m iths mont iths for 1 ths	hs 2 mor	• • •	onths		•	• • • •	• • • •	• • • •		• • • •	• • • •	960 480 - 480 900 600
	3 Laboratory assistan 2 clerks at Rs. 40 p.m 1 computor at Rs. 40 1 tracer at Rs. 40 p.m 3 laboratory pcons at	nts at] n. for] p.m. f n. for] Rs. 2/ n. for] n. for]	Rs. 100 12 mon for 12 mon 2 mon 5 p.m. 2 mon 12 mor) p.m aths mont ths for 1 ths aths	hs 2 mor	nths	onths		• • • •	• • • •	• • • •	• • • • •		• • • • •	• • • • •	960 480 - 480 900

.

1;80,880

D		• •											R s. 26,420
Dearness allowance and	_	_	-		918	•	•	•	•	•	•	• • •	20,420
Dearness allowance of e			ient I	4.8.	•	•	•	•	•	•	•	 Rs.	10,000
Travelling allowance of		ors										5,800	
Executive Enginee		•	٠	•	•	•	•	•	•	•	•	•	
Asstt. Engineers	•	•	•	•	•	•	•	•	•	•	•	14,400	
Geologists .	•	•	•	•	•	•	•	•	•	•	•	8,000	
Asstt. Geologists	•	•	•	•	•	•	•	•	•	•	•	9,000	40.00
Soil Physicist	•	•	•	•	•	•	•	•	•	•	• -	5,000	42,200
Travelling allowance of	este	blish	mont	i									
Supervisors .	•		•		•	•	•	•		•	•	28,000	
Other staff-XEN	'8								•	•		10,000	
Other staff (Geolog	;ist)		•		•	•		•	`•	•	•	1,600	
Soil survey staff-													
Sub-overseers			•							•		2,000	
Auger measures	•	•		•		•				•	•	2,000	
Other staff .	•	•		•	•		•				•	2,000	45,600
(c) Establishment conting	oncio	38									-		
Rent for Divisiona	l and	d Sul	b-Div	ision	al office	98.					•	4,600	
Rent for soil physic	cist's	s offic	e and	l lab.			•	•	•			1,000	
Rent for Geologist'											•	1,600	6,600
•						5	E ⁿ		1.12.1		-		4 70 00
					pre-	25a	'OTAL-	-Esta	ionan	ment	•		4,50,00
t r act					10		2.16	12					
I. Works	-				.73	198	大限	88				19,41,000	
II. Tools and Plant					16		8857	23				2,00,000	
III Establishment						2.44		1				4,50,000	
	•	•	·	•		Y IL L	144	0.		•	•		
						114	GI	RAND	TOTA	Ľ	•	25,91,000	
					6	56	0-1	ħ.				G. N. PAI	NDIT,
					100	1.3025		100		_		Officer (Narbada	1 -

IV. Estimate for preliminary surveys and investigations in connection with Projects for the multi-purpose development of the Narbada Basin prepared in accordance with the instructions of the ad hoc Committee.

														1 VD+
	•		•	٠	•	•	•	•	•	•	. •	•	•	27,39,114
										•	•	•	•	15,42,677
											. •	•	•	7,35,329
•		•			•					•	• .		•	11,02,255
•		•			•	•	•	•	•	•	•	•	•	37,770
													Rs.	64,97,081 64,97,000
		· · · · · · · · · · · · · · · · · · ·	· · · · · ·	· · · · ·	· · · · · ·	· · · · · · ·						тот. Тот.		

Estimate for the preliminary surveys and investigations for dam sites on the Narbada at Bilgarh and Bargi and on the Burhner River at Ghugri and a canal system taking off from Barg. ABSTRACT

I. WORKS

1. WORKS														
1. Dams and appurtenant work	:8						/							
A. Preliminary expenses		•	•	•	•	•	•	-	•	•	•	•	•	2,35,800
K. Buildings		•	•		•	•	•	•	•	•	•	•	•	30,000
2. Main Canals and Branches			•			•		•	•	•	•	•	•	10,98,500
3. Malaria Surveys						and a				•	•	•	•	1,000
4. Electric Load Surveys		•	2		15	31	<u>.</u>	•			•	•	•	2,000
5. Property Surveys	•	•		R	328	SIF.	63	•		•		•		7,500
6. Communications		•		108	S		R.			•	•	•	•	1,00,000
7. Special Tools and Plant	•		•	-68		322	<u>84</u>	•	•	•	•	•	•	1,60,000
-				9	深彩		1			2% Q	onting	zencies	•	16,34,800 32,696
				1	11	14	5	Ň						16,67,496
II. TOOLS AND PLANT .				10	1						•		•	2,05,530
III. ESTABLISHMENT	•	•		16	SIE		57	•	•	•	•	•	•	8,66,088
							10				Tor	TAT.		27,39,114

DETAILS

I. WORKS

Dams and appurtenant works

A. Preliminary Expenses

. Freiminiury Expenses	-	
1. Survey of Reservoir basins by air photography and ground survey and plotting	of	contours
at 10 ft,-5 ft, intervals on a scale of 4"=1 mile.		

	Ghugri dan Bilghara Bargi	n.	•	•	• •	• • •	•	25 • 8	q. mik sq. m q. mile	iles							
	81							172.	- 8 sq. 1	niles	-						
1	72·8 sq. mile	s at :	Rs. 3'	15 per	sq. n	nile.	•	•	•	•		-	•	•	•	•	65,000
2. Su 2	rvey of dam ; ,700 acres at	sites Rs.	by ai: 4 per	r phot acre	tograp			ound e	survey •	and pl	otting	g on a	i scale	of 32'	″lr	nile. •	10,800
3. Geo	logical inve	stigat	ions	for for	undati	ions											
Ν	io. of bores																
	Bilghara	•	•	•	•	•	•	4 0 .	Nos.			•					
	Ghugri		-	•	•	•	•	56	Nos.								
	Bargi .	• ·		•	٠	•	•	52	Nos.								

148 Nos.

148 bores each 50 r.ft. at R	s. 20) per r	.ft.		-				-	_				Rs. 1,48,0
4. Soil analysis and burrow		-			÷			ż					L.S.	7.0
5. Model experiments .					•	•	•	•			•	•	L.S.	5,00
-														0.950
K. Buildings														2,35,8
Temporary Buildings .	•	.*	•		•	•	•	•	•	•	•	•	L.S.	30,00
I. MAIN CANALS AND BRANCH (a) Survey of commanded a		18.00.	000 s	ICTOR 8	t (As.	9) m	r ac re							10,12,5
(b) Miscellaneous survoys		• 0,00,	000 .			0) 1/0					·	•	L.S.	8.0
(c) Exploration for founds of	• •fere	• 184-cir:	nineu			•	•	•	•	•	•	•	L ,	60,0
(d) Soil surveys 18,00,000 a						•		•				•	•	18,00
	0100		•1~			•	•	•	•	•	•	-	•	
														10,98,5
III. Malaria surveys .		•	•				•							1,0
IV. Electric load surveys		•			•						•			2,0
V. Property surveys 173 sq. n	ailes	at Rs	. 43	per sq	. mile			•						7,5
VI. Communications .									•		•			1,00,0
VII. Special Tools and Plant	•													
2 Diamond drills .	•			•	•			•			•			1,20,0
Testing apparatus	•		•	•			•		•	•				40,00
•														1,60,00
					62	C2.PR								1,00,00
. TOOLS AND PLANT	_			ß	2445	284	2							
Motor vohicles 7 vehicles at		7,000	•	623		$\simeq 1$	26.5	÷ -	•	٠	•	•	•	49,00
Working expenses for 3 year	rs	•	•	- 9		H	88	•	•	٠	•	•	•	52,5(
Scientific Instruments .	•	•	•	- 6	S	Q•	26	•	•	•	•	•	•	60,00
Ordinary Tools and Plant	·	•	•				9 -	•	•	•	•	•	•	5,0(
Camp equipage	•	•	•	•	Villi	n:#	U-	•	•	•	•	•	•	15,00
Office furniture	•	•	•	•	LLU	130	1.	•	•	•	•	•	•	20,00
				- 8		L ICLU TD XY	100							2,01,50
				- 10	196	031	23			2% c	onting	gencie	з.	4,03
•• ••				16	5(0e)//S	924	123							2,05,53
I. ESTABLISHMENTS Cost of 1 Division for 3 year		n . a	00.00		TIM	17 71	÷.							8,66,08

2. Estimate for the preliminary surveys and investigations for a dam site on the Tawa River, and a left bank canal taking off from the dam for purposes of irrigation. ABSTRACT

I. WORKS 1. Doms and appurtenant wor	ka		,								-			
A. Preliminary expons							•					•		87,125
K. Buildings .	•	•				•		•				•	•	25,000
2. Main canals and branches				•	•		•							6,59,750
3. Malaria surveys				•			•				•		•	1,000
4. Electric load surveys .				•	•			•		•			•	500
5. Property surveys	•	•								•				6,000
6. Communications .		•				•					•			80,000
7. Special Tools and Plant	•	•	•		•	•	•	•	•	•	•	•		1,35,000
										2% co	onting	oncies		9,94,375 19,888
										Тс	TAL-	-Work	s	10,14,263
II. TOOLS AND PLANT . III. ESTABLISHMENT	•	•	•	•	•	•	•	•	:	:	•	•		95,370 4,33,044
											To	LAL	•	15,42,677

DETAILS

. WORRS				
1. Dams and appurisnant works				
A. Preliminary Expenses				Rs.
1. Survey of reservoir basin by air photography and ground surv at 10 ft5 ft. intervals on a scale of 4"-1 mile 139 sq. miles at				52,125
2. Survey of dam site by air photography and ground survey an $32''=1$ mile 500 acres at Rs. 4 per acre.	d plotting	on a :	scale of	2,000
3. Geological investigations for foundations of dam and reservoir bas making drifts, tunnelling, etc. including testing 30 Nos. bores eac Rft.	sin by borir ch of 50 Rf	ig, core t. at Ra	drilling s. 20 per	30,000
4. Soil surveys and burrow surveys			. L.S.	1,000
5. Model experiments by Indian Waterways Station, Peona		•	• •	2,000
				87,128
K. Buildings				
Temporary buildings	•••	•	. L.S.	25,000
1. Survey of the commanded area for Canal alignment 11,00,000 acres at	t As. 9 per	aore	••	[6,18,750
2. Miscollaneous surveys	• •	•	. L.S.	5,000
3. Explorations for foundations of cross-drainage works and necessary s	surveys .	•	. L.S.	25,00
4. Soil surveys 11,00,000 acres at Ro. 1 por 100 acres	• •	•	••••	11,000
				6,69,75
3. Malaria Surveys	• •	•	. L.S.	1,00
4. Electric load survey		•	. L.S.	50
5. Property surveys 139 sq. miles at Rs. 43/- per sq. mile	• •	•	• •	6,00
6. Communications Constructing and maintaining for 3 years temporary roads		•	. L.S.	80,00
7. Special Toole and Plant				
1. 2 Diamond drills complete with accessories at Rs. 60,000 each	• •	•	•••	1,20,00
2. Testing apparatus and laboratory equipment for compressive st soils for shear strongth, optimum moisture content and consol			d testing . L.S.	15,00
· · · · ·				1,35,00
	2% cont	tingenci		9,94,37 19,88
	TOTAL	-Work	· ·	10,14,26
I. TOOLS AND PLANT				
1. Motor vehicles for survey parties 3 Nos. at Rs. 7,000 each	• •			21,00
2. Working expenses for above for 3 years	• •			22,50
3. Scientific Instruments		•	•••	30,00
4. Ordinary Tools and Plant		•	• •	2,50
5. Camp equipage	• •			t 7,50
6. Office furniture	• •	•	•••	10,00
	2% con	tingenci		93,50 1,81
				95,37
II. ESTABLISHMENT Cost of 1 Division for 3 years-8,66,088. 50% chargeable to Tawa .		•		4,33, 04

3. Istimate for the preliminary surveys and investigations for a dam site on the Narbada River near Punasa, for purposes of flood control and generating hydro-electric power.

ABSTR	ACT
-------	-----

1. Bame and Appurtena	int V	Vorks				1									Rs.
A. Preliminary E				•		•		•		•	-			٠	3,04,500
K. Buildings										•			•	•	30,000
2. Malaria surveys .		•						•			•	•	•	•	3,000
3. Electric lead surveys									•				•	•	7,500
4. Property surveys											•				21,500
5. Communications							•					•		•	1,00,000
6. Special Tools and Pla	int	•	•					•		•			•	•	1,45,000
										29	% con	tinger	cies		6,11,500 12,230
										1	OTAL	-Wo	rks		6,23,730
I. Tools and Plant											-			•	24,990
II. ESTABLISHMENT .				•	•	•	•	•			•	•		•	86,609
												То	TAL		7,35,329

DETAILS

I. WORKS

1. Dams and appurtenant works A. Preliminary Expenses

2. Survey of dam site by air photography and ground survey and plant 32"=1 mile, 2,000 acres at Rs. 4 por acre	•	•		• •	8,000
 Geological Investigations for foundations of dam site and reservoir drilling, making drifts, tunnelling, etc. including testing 100 Nos. 	basin bores	by b each	orin 50'	g, core deep==	
5,000 Rft. at Rs. 20 per Rft.	• 、	•	•	•	1,00,000
4. Soil analysis and burrow surveys for earthen dykes including testing	•	•	•	L.S.	2,000
5. Model Experiments by Indian Waterways Station, Poona	•	·	•	L.S.	7,000
सत्यमेव जयते					3,04,500
L. Buildings					
1. Temporary Buildings	•	٠	•	L.S.	30,000
2. Malaria Surveys	•	٠	•	L.S.	3,000
3. Electric load surveys	•	•	•	L.S.	7,500
4. Property surveys 500 sq. miles at Rs. 43 per sq. miles	•	•	٠	•	21,500
5. Communications					
Constructing temporary roads and their maintenance for 3 years .	•	•	•	L.S.	1,00,000
6. Special Tools and Plant					
1. 2 diamond drills complete with accessories at Rs. 60,000 each .	-	•	•	•	1,20,000
2. Testing apparatus for Laboratory and workshop equipment for c	ompres	sive : d cov	strer	ngth of detion	
rocks and testing soils for shear strongth, optimum moisture cont		•	•	L.8.	25,000
				-	1,45,000
					6,11,50(
	2% co	nting	enci	08	12,230
	Тота	- '11	To min.	-	6.23,730

15 M. of I. & P.

4Ú

TOOLS AND PLANT				*									•	•	Ŕs.
Motor vehicle for survey	y party	7 I No. (at Rs.	7,000	•	•	•		•	•	•	•	÷	÷	7,000
Working expenses for 3	years			•				•	•	•	•	•	•		7,500
Scientific instruments		•	•			•			•	•	•		•		6,060
Ordinary Tools and Pla	nt.						•	•		•		•			, 500
Camp equipage												•	•		1,500
Office furniture	• •			•	•	. •	•	•	•		•	•	•	•	2,000
· · ·	,									2% 00	onting	encies			2 4, 500 490
														9	24,990
I. ESTABLISHMENT															
Cost of 1 Division for 3	10070-	AA A	88 1	0% at	aro	eable t	o Pun	000							86,609

4. Estimate for preliminary surveys and investigations for the Broach Project consisting of a Pick-up Weir at the end of the Rajpipla Gorge, and left and right bank canals taking off from the weir for purposes of irrigation.

ABSTRACT

I. WORKS												
1. Dams and Appurt	endnt	works	9									
A. Preliminary	Ехреі	nses			NER			•				28,000
K. Buildings					合议院组织	•				•	•	15,000
2. Main Canals and	Brai	nches					•	•	•			5,94,500
3. Communications	•	•	•	•	CHER SHARE	•	•	•	•	•	•	20,000
							29	% con	tingen	cies		8,57,500 13,150
					TUTINT			Tota	1ĽW	orks	•	6,70,650
II. TOOLS AND PLANT					ANT CONTRACT							85,170
III. ESTABLISHMENT .	•	•	•	•	iter States	•	•	•	•	•	•	3,46,435
					सत्यमेव जयते				Tor	AL	•	11,02,255

DETAILS

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I. WORKS

1. Dams and appurtenant works

A. Preliminary Expenses

1. Survey of weir site by air photography and ground surveys and plotting on a scale of $32'=1$ mile, 500 acres at Rs. 4 per acre	2,000
 Geological Investigations for foundation of weir site by boring, core drilling, etc. including testing. 25 Nos. bores, each of depth 50'=1,250 Rft. at Rs. 20 per Rft. 	25,000
3. Model Experiments by Indian Waterways Station Poona L.S.	1,000
	28,000
. Buildings	
Temporary Buildings	15,000
2. Main Canals and Branches	•
1. Survey of commanded areas for alignments of canals, 10,00,000 acres at As. 9 per acre	5,62,500
2. Miscellaneous surveys	7,000
3. Explorations for foundations of cross-drainage works and necessary surveys L.S.	15,000
4. Soil surveys 10,00,000 acres at Re. 1 per 100 acres	10,000
	5,94,500

3. Communications Constructing temporary roads	and	l main	tainin	g the	m for	3 yea	rs.		•	•	L.S.	Rs 20,000
2% contingencies		٠		•				•	•		•	6,57,500 13,150
					Tota	al Wo	orke	•			•	6,70,650
I. TOOLS AND PLANT Motor vehicles for survey par	ties	3 Nos.	at Re	. 7,00)0 eacl	ı		•				21,000
Working expenses for 3 years				•					•		•	22,500
Scientific Instruments .									•		,	24,000
Ordinary Tools and Plant					•			•	· .	,	·.	2,000
Camp equipage												6,000
Office furniture	•	•	•	•	•	•	•	•	•	•	•	8,000
2% contingencies	•			•	•	•	•		•	•		83,500 1,670
II. ESTABLISHMENT												85,170
Cost of I Division for 3 years	s 8,6	6,088.	40%	, char	geable	to B	roach	Proje	et.			3,46,435

5. Estimate for the general investigations and surveys in the whole basin in connection with Projects for the multi-purpose development of the Narbada Basin. ABSTRACT

-	The Dese
Ι.	WORKS

					$\mu D D$.	1 16 16 (1					
RKS 1. Discharge and Silt Observe	ation	я.			123	•	•	•				Rs. 2,00,000
2. Meteorological Observation	ns		L.	343	Ritz	2		•	•	•	•	25,800
3. Mineral Surveys .			Gi	83 E		23		• '	•		•	10,000
4. Surveys for Pisciculture		•	1	Sec. 7	8.0					•	•	2,000
5. Surveys for Navigation			- 82		8)	19.					•	1,00,000
6. Economic Surveys .		•	. 9	979 C		<i>%</i> .		•	•		•	25,000
7. Surveys for soil erosion	•	•		Wi	UH I	ļ.	•	•	•	•	•	7,500
2% contingencies		•	Ŕ	44	19				•	•		3,70,300 7,406
			R	r	otal	57					•	3,77,706
			_	Contractory of the local division of the loc	1	10						

I. WORKS 1. Discharge and silt observations

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1

DETAILS

?. Meteorological Observation	· · / 12		•	•	•	.,				, ,	ear for 4	2,00,000
Raingauges, Temperatu				d wind	t velo	aita ok	GOTUG	tions				
(i) Equipment and install	ation	of 15	new	raing	auges	(some	of th	ese to l	be of	the in	ategrated	
self-recording type), h rate of Rs. 1,000	umid	ity ar	10 WU	nd vei	ocity	appara	itus e	it 5 sta	tions.	atan	n average	15,000
(ii) Recurring expenditur	e on p	part-ti	ime ol	bserve	ers. 1	5 obse	rvers	at Rs.	15 g	o.m. f	or 4 years	10,800
3. Mineral Surveys												2,25,800
v	•	•	•	•	•	•	•	•	•	•	. L.S.	10,000
4. Surveys for Pisciculture	•	•	•	•	•	•	·	•	•	•	. L.S.	2,000
5. Surveys for Navigation	•	•	•	•	•	•	•	•	•	•	. L.S.	1,00,000
				•	•	• .					. L.S.	25,000
6. Economic Surveys .	•											
6. Economic Surveys . 7. Surveys for soil erosion	•	•	•	•	•	•	•	•	٠	•	. L.S.	7,500
7. Surveys for soil erosion	•	•	٠	•	•	•	•	•	•	•	. L.S.	7,500 3,70,300
•	ncies	•	•	•	•	۰ •	•	•	•	•	. L.S. 	

Details of the establishment of the two Divisions provided for in the preceding five estimates.

1. Pay of Officers	Details of establishment of the two Divisions	Bo pend ita re per y se Re.
2 Executive Engineers @ Rs. 875 p.m	le e e	21,000
4 Assit. Executivo Engineers @ Rs. 6	00 p.m	28,800
4 Asstt. Engineers @ Rs. 560 p.m.	- • •	26,880
l Geologist @ Rs. 875 p.m	· ·	10,500
2 Asstt. Geologists @ Rs. 500 p.m.		12,000
1 Officer to conduct economic surveys 550 p.m.	@ Rs.	6;600
1 Drill Foreman @ Rs. 100 p.m.	1 No. at Rs. 1,000 p.m	12,000
2. Pay of Establishment		117,780
3 Meteorological Asstts. @ 240 p.m.		8 ,64 0
2 Accountants @ Rs. 200 p.m.		4,800
2 Head Clerks @ Rs. 180 p.m.		4,320
6 Senior Clerks @ Rs. 150 p.m.		10,800
2 Storekeepers @ Rs. 150 p.m.	• •	3,600
14 Junior Clerks @ Rs. 93 p.m.		15, 62 4
2 Senior Deraftsmon @ Rs. 200 pm.		4,800
2 Junior Draftsmen @ Rs. 143 p.m.	· ·	3,432
4 Tracers @ Rs. 104 p.m		4,992
2 Sub-Asstts. Surgcons @ Rs. 170 p.r	n	4,080
2 Compounders @ Rs. 50 p.m.	012210	1,200
32 Oversoers @ Rs. 240 p.m.	6-15-16-16-1-3	92,160
6 Research Asstts. @ Rs. 240 p.m.		17,280
2 Laboratory Asstts. @ Rs. 230 p.m.		5,520
2 Silt Analysts @ Rs. 200 p.m.	NOVERSEN AV	4,800
2 Asstt. Silt Analysts @ Rs. 93 p.m.	0 A 1711 J 17	2,232
10 Guuge Roaders @ Rs. 70 p.m.	I M X K N X	8,400
10 Senior Observers @ Rs. 90 p.m.	atten ten to	10,800
2 Daffadars @ Rs. 33 p.m		792
10 Barkandazes @ Rs. 33 p.m.	Strain Contractor	3,960
14 Poons @ Rs. 33 p.m	and the second se	5,044
6 Laboratory khalasis @ Rs. 33 p.m.	सत्यमव जयत	2,376
10 Chowkidars @ Rs. 33 p.m.	• •	3,960
		2,24,112
3. Dearness Allowance for officers	• •	16,020
4. Dearness Allowance for establishment	• •	66,480
5. T. A. for officers		40,600
6. T. A. for establishment		60,000
7. Cost of Project circle office debited to 1	Varbada	33,000
8. Establishment contingencies	• •	20,000
- ""		5,77,392

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$$\frac{2,77,392}{2}$$
 = 2,88,696

Cost of 1 Division for 3 years Rs. 8,66,088

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	G. N. 3	Pandit,		
Project	Officer,	(Narbada	and	Tapti).

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APPENDIX V

TAPTI VALLEY PROJECTS

As in the case of the Narbada, no work for utilising the waters of the Tapti river has so far been executed. This river drains a total area of about 30,000 square miles and approximately 45 million acre feet of water precipitate in the basin during the monsoon months. The entire quantity runs to waste to the sea. The Surat plain often gets flooded causing a lot of damage to life and property. During the last 60 years as many as 15 floods have been reported within this area. The maximum discharge has been calculated to have reached the figure of 900,000 cusecs. Towards the end of the last century a proposal for irrigating lands in the Surat plain was investigated but the scheme did not materialise.

Government of Bombay approached CWINC about a year and a half ago with a request to investigate and formulate schemes which would mitigate the evil of flood and enable the water resources of the basin being utilised for such other beneficial purposes as irrigation, extension of navigation and generation of hydel power. Studies of topographical and hydrological data of the basin were accordingly taken up by the CWINC early in 1947. These studies have revealed that quite a number of suitable sites for development exists in the basin whereby construction of dams of low to medium heights reservoirs can be greated for storage of water during monsoons, regulated discharges from which can be utilized for the multipurposes of irrigation and power generation. By allowing a reserve for flood absorption in the lowermost reservoir, floods in the Surat plain can be completely controlled.

For the present it has been decided to investigate only six projects of which four are on the main river and two on the tributaries. Another project on an important tributary Girna is being investigated by the Government of Bombay. Total storage at these sites will amount to about 4.5 million acre fect, slightly less than in the case of the Damodar Valley Projects. A gross area of 12,85,000 will be commanded for irrigation and 63,010 kW. of continuous power generated. Such other benefits as fish culture in the reservoirs, recreational amenities and assurance of adequate domestic water supplies will also aderue to the entire basin with the development of these projects. A list of the projects as well as their details is appended to this note.

The estimate amounting to Rs. 42,25,034 has been prepared to cover the cost of necessary surveys and investigations in order to prepare the projects in detail for execution. It is proposed to set up one division with four sub-divisions and requisite number of subordinate and ministerial staff to do the work. Details of the work to be done are shown in the estimate. Topographical surveys of the dam sites, reservoir areas, areas to be commanded for irrigation will be done through the agency of the Survey of India Department. Geological surveys of the dam sites and mineral surveys of the basin will be undertaken in collaboration of the Geological Survey of India. Hydrological surveys will similarly be done in close eo-operation with the Indian Meteorological Department. Provisions have also been made for soil surveys fish culture survey and economic and property survey. Necessary staff for geological and other surveys has been provided. It is anticipated that a period of two years will be required to complete all these surveys and investigations. Accordingly staff has been provided for that period. Necessary tools and plant such as survey instruments, core drills, camp requisites have also been provided for.

A statement showing the rough data for the dam sites and the anticipated benefits from the projects is given on page 44. The following maps and charts are enclosed.

(1) An index map of the Tapti basin showing the proposed dam sites and projects.

(2) A profile of the Tapti river and its main tributaries.

G. N. PANDIT, Project Officer (Narbada and Tapti).

Tapti Basin-Rough Data for the Dam Sites

1.	Name of the river	Tapti	Tapti	Tapti	Tapti	Waghur	Panjhra					
2.	Name of dam site	Atwadhana	Nawtha	Hatnur	Ukai	Bhagpur	Akalpada					
3.	Length along river (miles)	91	259	315	487	44	36					
4.	Latitude and Longitude at dam site		76° 27′ 0″ E 21° 26′ 0″ N		73° 35′ 30″ E 21° 15′ 30″ N 2	75° 42' 0" E 0° 56' 0" N						
5.	Catchment area above dam (sq. miles).	1,049	3, 100	11,750	23,365	789	510					
6.	Average rainfall in catchment (inches).	43	41.88	34 · 42	30.87	30	30					
7.	Probable mean annual run-off. (m. a. ft.)	0.92	1.4	2.5	8 • 43*	0.17	0.108					
8.	R.L. of river bed	1,190	800	625	175	730	1,170					
9.	Proposed F. T. L	1,340	900	690	400	Not work	ed out.					
10.	Maximum height of dam up to F. T. L. (ft.).	150	100	65	225	Not work	ed out.					
11.	Length of dam at F. T. L. (ft.) .	2,700	2,640	20,000	16,000	Not work	ed out.					
12.	Gross capacity of reservoir at F. T. L. (m. a. ft.).	0.82	0.53	••	6·19	Not work	ed out.					
13.	Dead storage (n. a. ft.)	0.11	0 · 20	••	1.71	Not work	ed out.					
14.	Maximum area of water spread (acres).	11,900	19,400	••	1,76,000	Not work	ed out.					
15.	Losses due to evaporation $(5 \cdot 5 \text{ ft.} \text{per year})$ (m. a. ft.)	0.042	0.075		0.49	Not worke	ed out:					
16.	Reserve for flood control (m. a. ft.)		Mask	2	1.05	Not work	ed out.					
17.	Net Storage available (m. a. ft.)	0.67	0.28	23	2.94	Not work	ed out.					
18.	Continuous regulated discharge (cusecs).	890	1,285	1,28	5 4,000	Not work	ed out.					
19,	R. L. of top of dead storage	1,252	875	9	360	Not work	ed out.					
20.	R. L. of Tail Race	1,160	810		195	Not work	ed out.					
21.	Average head available for power (ft.).	141	77.5		181	Not work	ed out.					
22.	. Continuous power available (kW.)	8,360	6,650	×	48,000	Not work	ed out.					
23	. Gross area commanded (acres)			5,00,000	7,00,000	50,000	35,000					
	*Excluding run-off intercepted above.											
	I. Total live storage impounded	• •	লগ্রমণ গ্রহ	1		4·497 m. a.	ft.					
	II. Total continuous power generate	əd.				63,010 kW						

Tapti Projects Estimates

OVSIALL ESTIMATE FOR PRELIMINARY SURVEYS AND INVESTIGATIONS IN CONNECTION WITH PROJECTS FOR THE MULTI-PURPOSE DEVELOPMENT OF THE TAPTI BASIN

Abstract

I. WORKS

1. Dams and Appurtenant works	
	Rs.
A. Preliminary expenses	5,80,000
K. Buildings	60,000
2. Main canals and Branches	14,78,800
3. Discharge and Slit Observations	1,40,000
4. Meteorological Observations	17,200
5. Mineral survey	5,000
6. Surveys for Pisciculture	1,000
7. Malaria surveys	2,500
8. Electric Load surveys	5,000
9. Surveys for Navigation	[40,000
10. Economic and property survey	20,000
11. Survey for soil erosion	5,000
12. Communications	1,50,000
13. Special Tools and Plant	2,30,000
2 per cent contingencies	27,34,500 54,690
Total Works	27,89,190
11. TOOLS AND PLANT	
Tools and plant for the Division	2,19,000
2 per cent contingencies	4,380
Total Tools and Plant	2,23,380
III. ESTABLISHMENT	
Establishment for 4 years including establishment contingencies	12,12,464
Grand Total	42,25,084

Details

1. WORKS

•

Dams and Appurtenant Works

A. preliminary Expenses

1. Survey of the reserv contours at 10ft.—5 f	oir b	asins	by a	ir pho	togra	phy s	nd g	cound	surve	y an	i plotting
(a) Tukai/Tokarwa d			•					•	•	٠	sq. miles 275
(b) Nawtha Dam	•	•	٠	•		٠	•	•	•	•	84
(c) Atawadhna dam	•	•	÷	•	٠	٠				٠	18.6
(d) Waghar and Panj	hra (dam	•		٠	•	٠	•	•	٠	15
								Tot	al j	•	342.6

				4	6						
342.6 Sq. Miles @	Rs. 375 p	er Sq.	Mile	•	•				•	• •	Rs. 1,28,000
2. Survey of the dam	-	•		v air	photo	ograph	y and	l gro	und	•	
surveys and piotting				-	•	0 1	•	Ŭ			
		-a								acres	
(a) Ukai/Tokarwa da	m site .									3,000	
(b) Kakarpar weir sit	ю.			• • •	. •					600	
(c) Hatnur weir site								•		600	
(d) Nawtha dam site										600	
(e) Atawadhna dam s	sito .									600	
(f) Panjhra dam site		-								800	
(g) Waghur dam sito		-	•	•						1,800	
(9) 11 agrint anni 2113		•	•	•	•		·	•	•.	8,000	
8,000 acres at Rs.	4 per acre				•		•	•		0,000	32,000
3. Geological investigat and of the reservoir tunnelling etc., include	r basins l	y bor	tions ing, d	of the core di	dam rilling	sitos mak	and ting, o	weir drifts	sites and		
(a) Kakarpar Weir		•.					•.	•	•	Nos. 22	
(b) Ukai/Tokarwa da	ımı .					•		•		160	
(c) Hatnur weir			•	, .		•			•	20	
(d) Nawtha dam						•	•	•	2	20	
(e) Atawadhna dam		,	•	`.			•			27	
(f) Waghur dam	• •	•	•	•	•	•	•	2		40	
(g) Panjhra dam	• •	•	•			•	•	•	·*		
(9) Fanjira dam	•••	•		ndie	101	<u> </u>	•	•	•	100	
		0 D	63		3.11	342				, 400	
400 nos. each of 50,2		-			CT 1 101/1	287	•	•	•		4,00,000
4. Soil analysis and bu		-	100	5. A 1973 M	A-24204	CPICS .	-	ing	· . •	L.S.	10,000
5. Model Experiments	by the In-	dian V	Vatorv	vays S	tatior	1, Pool	na	•	•	L.S.	10,000
K. Buildings Tomporary buildings				14	11	L			•	L.S.	5,80,000 60;000
II. Main canals and branches			- R		T.S.	A.					
(a) Surveys of the com	mandad a	noog fo	n olior	nmont	of on	mala					
(a) Burveys of the com	inganuou a	1043.10	n ang	11110110	or ca	mais.	1			acres	
Canals ex. Kakarpar	•••••		1.1	mi	-	÷Ē.			•	7,00,000	
Canals ex. Hatnur		•		인5네 M	N 19	451	•			5,00,000	
Canals ex. Waghur a	and Panjh	ra .	•				•	•		50,000	
						· ·			·		
·										12,50,000	
12,50,000 acros at	Rs. 1/2 pe	er aere					•				14,06,300
(b) Miscellaneous suvr	eys .	٠	. •	•	•	•	•	•		L.S.	10,000
(c) Exploration for the				lrainag	go woi	rks an	d noce	ossary	7		
•		•		•	•	٠	•	٠	•		50,000
(d) Soil surveys $12,50$,	000 acres :	at Re.	l per	100 a	cros	٠	٠	٠	٠		12,500
											14,78,800
III. Discharge and Slit Observat One boatman and four k rods, floats, gauges, silt s 7 sites (5 on Tapti and 2 or	halasis at samplers a	each nd lab	discha oratoi	y oqu	ipmer	ıt.			. 0		1,40,000
IV. Meteorological Observations observations											
Equipment and installatio tograted self recording stations, at an avorage r	type), Hu ate of Rs.	imidit 1,000	y and	wind	l velo	city a	ppara	tus a	at fiv	·Ə	10,000
Recurring expenditure on 4 years	part-timo · .·	obsorv •	vation •	s ,10 o •	bserv	ers at •	Rs, 1 •	5 p.r.	n. foi	•	7,200
										-	17,200
										-	

.

						41							
V. Mineral Surveys			•	•	•	•	•	•	•	L.S.			\$ 5,000
VI. Surveys for Piscicultu	ro .			•			•	•	•	L.S.			1,000
VII. Malaria survey .				•	•		•		•	L.8.			2,500
VIII. Electrical Load survey	· 8		•	• ,	•	•	•	•	•	L.8.			5,000
IX. Surveys for navigation	n.		•	•	•	•	-		•	L.S.			40,000
X. Economic and property	y surve	ув.	•	•	•		•	•	•	L.S.			20,000
XI. Surveys for soil erosion		•	•	•	•	•	•	•	•	L,8.			5,000
XII. Communications													
Constructing 50 miles 3,000 per mile	of tor	npora •	гу гоња • • •	ds and	d ma	intena •	unce f	or 4	yoara •	at R	8.		1,50,000
XIII. Special Tools and Plan	ıt												
3 Diamond drills comple	to with	1 8000	sories	at Rs.	. 60,0	100 ea	oh.	•		•			1,80,000
Tisting apparatus and of rocks and testing													
polidation, etc.	•	•	• •	•	-	•	•	•	•	. L.S	•		<u>50,000</u> <u>2,30,000</u>
		:	2 por o	ent co	ontin	gencie	е.						27,37,500 54,690
			•	~	F	3		Total	Wor	ka .			27,89,190
			2	23	9E		B			_ 0 +			
II. TOOLS AND PLANT				961			8						
				63		1	9						Rs.
1. Motor vehicles for	r surve	y part	i ce 7 ve	hicle	ı at P	ts. 7.0	00 eac	ch.		•			49,000
Working expense		-		.13	44	100		•	•	•	•	•	70,000
2. Scientific Instrum	nents	•	•	10		Section of	ŝ		· .	•	•	•	60,000
3. Ordinary Tools a	nd Plar	nt.		Con-		243	1.	•			•		5,000
4. Camp equipage	•									•	•		15,000
5. Office furniture .	•	•	•		니지의	পালং	•	•	•	•	•	•	20,000
													2,19,000
	2 per	cont	onting	oncies	3.	•	•	•	•	٠	•	•	4,380
	Total	Tools	and Pl	ant	•	•	•	•	•	•	•	•	2,23,380
III. ESTABLISHMENT													
													Expenditure per year
1. Pay of officers													
Executive Engineer	l No. a	t Rs.	875 р.п	n.	•	•	•	•	•	•	•	•	10,500
Asstt. Executive En	gineers	2 Noe	. at Re	600	р.т.	•	•	•	•	•	•		14,400
Asstt. Engineers 2 N	los. at]	Rs. 56	0 p.m.	•		•		•		•	•	•	13,440
Geologist 1 No. at R	s. 875 j	p.m.	•	•	•		•	•	•	•	•	•	10,500
Asstt. Geologists 2 N	los. at 1	Rs. 50	0 p.m.	•	•	•	•	•	•	•	•	•	12,000
Drill Foreman 1 No.	at Rs.	1,000	p.m.	•		•	•	•	•	٠	•	•	12,000
												-	72,840
												•	

2. Pay of establishment					
1 Moteorological Assistant at Rs. 240 p.m.					2,880
1 Accountant at Rs. 200 p.m.				-	2,400
1 Head Clork at Rs. 180 p.m.					2,160
8 Senior Clerks at Rs. 150 p.m.					5,400
1 Storekeeper at Rs. 150 p.m.					1,800
1 Senior Draftsman at Rs. 200 p.m.					2.400
7 Junior Clerks at Rs. 93 p.m.	•	•		•	7,812
1 Junior Draftsman at Rs. 143 p.m.		•		•	1,716
2 Tracers at Rs. 104 p.m.		•		•	2,496
1 Sub-Asett. Surgeon at Rs. 170 p.m.		•		•	2,040
1 Compounder at Rs. 50 p.m.		•			600
16 Overseers at Rs. 240 p.m.	•		•	•	46,080
3 Research Assistants at Rs. 240 p.m.	•			•	8,640
1 Laboratory Assistant at Rs. 230 p.m.			•	•	2,760
1 Silt Analyst at Rs. 200 p.m.	•		•	•	2,400
1 Asstt. Silt Analyst at Rs. 93 p.m.	•			•	1,116
5 Gauge Readers at Rs. 70 p.m.	•	•	•	•	4,200
5 Senior Observers at Rs. 90 p.m.	•	•	•	•	5,400
l Dafadar at Rs. 33 p.m.	•	•	•	•	396
5 Barkandazee at Rs. 33 p.m	•	•	•	•	1,980
7 Peons at Rs. 33 p.m	•	•	•	•	2 ,772
3 Laboratory khalasis at Rs. 33 p.m.	•	•	•	•	1,188
5 Chowkidars at Re. 33 p.m	•	•	•	•	1,980
					1,10,616
3. Dearness allowance for officers	•	•	•	•	9,720
4. Dearness allowance of establishment ,	•		•	•	32 ,94 0
5. Travelling allowance for officers				•	20,000
6. Travelling allowance for establishment	•		•	•	13,000
7. Cost of Project Cirlce office debited to Tapti	•	•		•	17,000
8. Establishment contingencies	•	•	•	•	10,000
Establishment per year	•	•		•	3,03,116
Total establishment for four years	•	•	•	•	12,12,464

G. N. PANDIT,

Project Officer, (Narbada and Tapti).

II. ESTIMATE FOR PRELIMINARY SURVEYS AND INVESTIGATIONS IN CONNECTION WITH PROJECTS FOR MULTI-PURPOSE DEVELOPMENT IN THE BASIN OF TAPTI RIVER FOR THE YEAR 1947-48 SUBMITTED TO GOVERNMENT FOR SANCTION.

			·	ABST		-									Rs.
	WORKS	•	• .	• •		•		•.	•	•	•	•	•	٠	61,960
	TOOLS AND PLANT ESTABLISHMENT	•	•	• •	•	•		•	•	•	•	•	٠	٠	1,56,684 41,895
		•••	•	•	• •	•		•	•	•	•	•	•	<u> </u>	
				DEI	"AIL	S				•	Grand I	otal	٠	•	2,66,540
I. WOF	KS		,	גשע		N									
	Dams and appurtenant												$\mathbf{R}_{\mathbf{S}}$		
	(i) Survey to be carrie (ii) Survey to be carrie								or i NI		L.S.			,500	
2.	Main canals and Branch				uneer	, IOLS U	, one		Y. I. IV.		L.S. L.S.			,000 ,640	,
	Discharge and silt Obs						•	•	•	•	•		4	570	
	Geological investigatio	ons and r	minera	l surve	ys	•	•	•	•	•	•			,000	
6. 8	Communications Special Tools and Plant	Drill ec	minme	nt and	annar	atus f	or so	il lal	orator	v).	L.S.			,000 ,000	
7. 0	Contingencies 2 per cent	· ·	•	•	•	•	•	•	•	•	•			250	
							Tota	l Wo	orka				61	,960	
1. TOC	DLS AND PLANT 6 weapon carriers at F	Sa. 7 000	Asch								•		49	,000	
	2 jeeps with trailers a			•	•	•	•	•	•	•	•			,000	
		-			•	•	•	•	•	•	•				
	2 country boats at Rs 3 outboard motors at	-		•		- Carlo	λ	•	•	•	•			,000 ,000	
		-	•		53	12.8	it C	2	•	•	•				
	6 chronographs at Rs.			9	61/3	• • • ·	192	60	•	•	•			600	
	8 levelling instruments		800 88	cn	783	2.天、	199	2	•	•	•			400	
	1 theodolite at Rs. 1,5		•	•	134	1033	3.0	? •	•	•	•		1	,500	
	1 Binocular at Rs. 200			• .	-997	1000	49	•	•	•	•			200	
	8 measuring chains at			•	• V //	hΠù	ΗU.	•	•	•	•			120	
	30-100 ft. tapes at R			•	· 14	U 3.	N.L.	•	•	•	•			900	
	30-50 ft. tapes at Rs		1.	•	16		1.0	<u>k</u> -	•	•	• •			600	
	3 steel tapes at Rs. 10		. '	•	0.44	12.6-	124	5	٠	•	•			300	
	5 Drawing boards at 1			. •	10000	100	110	(F)	•	•	•			150	
	5 second class drawin	•					-	•	•	•	•		I.	,000	
	2 First class drawing i Scales with offset, Free							e ine	trumer	1ts	and			600	
		• •	•	•	•	•	•	٠	•	•	•			800	
	8 current meters at R			٠	•	•	•	•	•	•	•		-	,000	
	6 large boats for disch	-	ervati	ons at 1	Rs. 1,0)00 ea	ch	•	•	٠	•			,000	
	6 small boats at Rs. 5	00 each	• `	•	•	•	•	٠	٠	٠	•		8,	,000	
	Discharge rods		•	•	•	•	•	•	•	٠	•			800	
	Ropes	• •	•	•	•	•	•	•	•	٠	•		4	,000	
	1 set of laboratory app	paratus f	for silt	observ	ations	at Rs	. 1,5	00		•	•		1,	500	
	Recurring laboratory e	oquipme	nt.	•	•	•	•	٠	•	٠	•				20
	14 by 14 tents 5 Nos.				•	•	•	•	•	٠	•		6	,000	
	10 by 10 tents 15 Nos. 15 shouldaries at Rs.			ch	•	•	•	•	•	•	•			,000 ,000	
	15 servant's tents at H			•	•	•	:	•	•	:	•			,000	
	Camp furniture L. S		: _	. <u>.</u>	•	•	•	•	•	•	•			,000	
	Office furniture for Div Office furniture for soi						•	•	•	•	-			,000 ,000	
	Office furniture for geo	logist's	office	100 and			•	:	:	:	:			996	
		0							m		-	·			
	(b) Repairs and Carria	RA-BA	naira +	o Truck	a			_	Total	•	•		1,52	,430	2(1,0(
	(c) Contingencies 2 per			•	•	•	•	:	•	:	•		8	,049	⊥ jU\
					18.4-1	Tools		-ים	.+		-		1.55	10*	1,20

III. ESTABLISHMENT

I. ESTABLISHMENT												
(a) Pay of officers					V							
1 Executive Engineer for 3 months at Rs.	900 p.	m.	•	•	•	•				2,700		
2 Assistant Engineers at Rs. 350 p.m	•	•	•	•	•	•		•		2,100		
1 Geologist for 3 months at Rs. 600 p.m.	•	•	•	•	٠	•		•		1,800		
1 Soil Physicist for 4 months at Rs. 275 p	.m.	• ;	•	•	•	•	•	•		1,100		
· · · · ·	•		•		Total	•	•			7,700		
Pay of establishment												
5 Overseers for 3 months @ 180 p.m.	•	•	•		•	•	•	•	•			2,700
1 Head clerk for 3 months @ 160 p.m.	• •	•			•	•		•	•	•		480
I Accountant for 3 months @ 200 p.m.					•		•			•		600
1 Sub-Assistant Surgeon for 1 month @ 2	00 p.m			1	•	•	•		•	•		200
2 Clerks for 3 months @ 80 p.m.	• •					•						480
4 Sub-Divl. clerks for 3 months @ 75 p.m												900
1 Junior Draftsman for 3 months @ 100 p	.m							•	•	•	•	300
2 Tracers for 3 months @ 80 p.m.							•		•	•	•	
1 Dispenser for 1 month @ 80 p.m.		•	•		•	•	•	•	•	•	•	480
1 Daffedar for 1 month @ 35 p.m.	•	•	•		•	•	•	•	•	•	•	80
2 Barkandazes for 1 month @ 30 p.m.	•		in		•	•	•	•	•	•	٠	35
	SE	121	il.	2	• •	•	•	•	•	•	•	60
4 Peons for 3 months @ 30 p.m.	68			\mathbf{F}	• . •	•	٠	•	, •	•	٠	360
2 Peons for 3 months for officers @ 30 p.m	1. AS			8	•	•	•	•	•	• -	•	180
2 Dak runners for 3 months @ 30 p.m.	68		8.74	9	•	•	•	•	•	•	•	180
5 Khalasis for 3 months for overseers @ 3	0 p.m.	1.11	111		•	•	•	٠	•	•	•	450
3 Gauge readers for 3 months @ 30 p.m	- 1	1.1	5 <u>8</u> i		• _•	•	•	•	•	•	• •	270
Geologists' staff L. S. ·	- 64			Æ		•	•	•	•	•	•	600
6 Sub-overseers for 4 months @ 50 p.m.	12.	સંદર્ભ		2	• •		٠	•	•	•	•	1,200
3 Laboratory Assistants for 4 months @ 1	00 p.m.	11.50	2010	Ρ.			•	•	•	•	•	1,200
2 Clerks for 4 months @ 40 p.m.	स	यमेव	জয়ন	Ŧ.		,	•	•				320
1 Computor for 4 months @ 40 p.m.												160
1 Tracer for 4 months @ 40 p.m.	•		•				•					160
3 Laboratory peons for 4 months @ 25 p.m) .									•	•	
2 Peons for 4 months @ 25 p.m.							•	•	•	•	•	300
1 Tapali for 4 months @ 25 p.m.	•	•	•		• •	•	•	•	•	•	•	200
4 Auger measurers for 4 months @ 40 p.m.	•				•••		•	. • •	. •	, •	•	100
· · · · · · · · · · · · · · · · · · ·			-				•	•	•	•	•	640
		•				I	'otal		•	•	•	12,630
Dearness allowances and Special Pay of Offi	cers L.	8.	•				• .		•	•		1,965
Dearness allowance of establishment L. S.	•	•	•		•		•		•	•		8,000
Travelling allowance of officers												••
1 Executive Engineer	•	•	•		•		•	•	•	•	•	800
												~ ~ ~

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2 Assistant Engineers

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1 Geologist

1 Soil Physicist

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1,800 1,750

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5,150

800

Supe visors	•	•	٠	٠	•	•	•	•	•	٠	•	•	•	•	•	1,200
Other staff (I	Execu	tive I	Engin	eer)	•	•	•	•	•	•	•	•	•	•	•	1,600
Geologist-Other	staff	•	•	•	•	•	•	•	•	•	•	•	•	•	•	200
Sub-oversoors	•	•	•	•	•	•	•	•	•	٠	•	•		•	•	600
Auger measures	•	•	·Ì	•	•.	•	•	÷	•	•	•	•		•	-	600
Other Staff	•	•	•	•,	•,	•.	•.	•.	•.	•.	•.	•	•	•	•	. 500
											•				-	4,700
) Establishment Conti	ngene	xics														
Rent for Division	n ang	l Sub-	Divis	ional	offices	•	•	•	•	•	•		•	•	•	1,000
Rent for Soil Phys	icist'	s offic	e a nd	l labo	ratory	•	•	•	•	•		•	•	•	•	500
Rent for Geologia	t'e off	loe	•	•	•	٠	•	•	•	•	•	•	•	•	•	250
						,									-	1,750
					1	Fotal	of est	ablish	ment	•	•	٠	•			41,894



111. ESTIMATE FOR THE PRELIMINARY SUBVEY AND INVESTIGATIONS WITH THE PROJECTS FOR MULTI-PURPOSE DEVELOPMENT IN THE BASIN OF THE TAPTI RIVER FOR THE YEAR 1948-49 SUBMITTED TO GOVERNMENT FOR SANCTION.

				ABS	TR.	1CT			_				
								•	•			Rs.	
I. WORKS			_				•	•	•	•		16,76,00	0
II. TOOLS AND PLANT	•	•	•	•	•	•.	•.	•			•	1,00,00	
	• •	•	•	•	•	•	•	•	•	•	•	2,80,00	
III. ESTABLISHMENT	• •	•	•	•	٠	•.	•	•	•`	• '	•	2,80,00	
Grand Total	•	•	•	•	•	•	•	•	•	•	•	20,56,00	0
				DETA	4 <i>IL</i>	S							•
I. WORKS													
1. Dams and Appurtenan	t Works-	-A. P	relin	ninary H	Expe	nses							
Survey to be carried ou				-	-								. 2,00,000
Surveys to be carried o	•		-		-		.C.	L.S.					. 20,000
K. Buildings L. S.	• •	•	•	•	•	•	•	•	•	•	•	•	. 25,000
2. Main canal and Branch Misc. surveys as canal a		s, spec	eial r	eservoir	' sur	veys e	to,	•	•	•	•	•	. 25,00
Soil surveys L. S.				•						•	•	•	45,000
3. Discharge and Silt Ob	ervation	a L. S								•			. 50,000
4. Meteorological surveys			•••	•	•	-	-	•	-	•	•	•	,
- •					11122		•		3 t	11	6		
(a) Rain gauges—It is pr gauges 30 new rain	oposed to	o insta neludi	1301 ng t	new gau	ges	() Equ	upm sidits	ent and	i insta wind	liatio velo	n or city		
apparatus at 15 plac	es and s	ome se	alf re	cording	gai	iges at	tan	averag	e rate	of 50	00/-	each	15,000
(ii) Observation expendit				CASE			9° -	-			•		-
1 Meteorological Ass			p.m .	SSIR	10	3222		•				2,40	0
1 Senior observer at				- YOGHA		369			-	ż		1,44	
30 Part-time observer			. *	1.1	191	TY.	•	•	•	•	•	5,40	
30 Part-time retainer		•		- Y 13	98	44	•	•	•	•	•	4,32	
	5 GU 105. 1	а р.ш	•	Alt	34	1917	· •	•	•	•	•	4,04	
				199	KOR.	2011-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	<u> </u>						28,560
(b) Seismological surveys	L. S.	•	•	12:20	-0	$\delta N E_{i}$	24	-	•	•	•	•	. 10,000
				0511-310		220-63	r						38,560
			Se	y .	Ì.	जयने		_		•			. 38,000
5. Geological Investigation	nne end r	ninera							•			•	. 10,000
6. Communications L. S.		<u>minor</u> u	i bui	109500		<i>.</i>	•	•	•	•	•	•	. 25,000
	•	•	•	•	•	• hua for	•	Iohono	• • • • • • • •	г а [.]	•	•	
7. Special Tools and Plan		equipi	dent	and app	para	CUB IOI	BOIT	labora	tory)	L.O.	•	•	. 12,00,000
8. Economic surveys L. 8			•	•	•	٠	٠	•	•	٠	٠	•	. 3,000
9. Hydro-Electric Installa		. Prh	emin	ary exp	ense	6							
Electric Load surveys		•	•	•	•	•	•	•	•	•	•	•	. 2,00
Conting	gencies a	t 2 pei	cen	t.	•	•	٠	•	•	•	•	•	• 33,000
		5	[otal	Works	•	•		•	•	•		•	. 16,76,000
II. TOOLS AND PLANT													
8 country boats at Rs. 1	000 eech				_	_	_					3,00	'n
6 Chronographs at Rs. 10		•	•	•	•	•	•	•	•	•	•	60	
		• 0	•	•	•	•	•	•	•	•	•		
4 Levelling instruments (o each	•	•	•	•	•	•	•	٠	٠	3,20	
2 Theodolites at Rs. 1,500		•	•	•	•	•	•	٠	•	•	•	3,00	
2 Binoculars at Rs. 200 e	acn .	•	•	•	•	•	•	•	•	٠	٠	40	
1 Camera at Rs. 600	• •	•	•	•	٠	•	•	•	•	•	•	60	
4 Measuring chains at Ra		L •	•	•	•	•	•	•	•	•	٠		0
10—100 ft. tapes at Rs. 3		•	•	•	•	•	•	•	•	•	٠	30	0
10-50 ft. tapes at Rs, 20) each	•	٠	•	•	•	•	•	•	•	•	20	0
2 Steel tapes at Rs. 100 e	ach .	•	٠	•	•	3	•	•	•	•	•	20	0
-						_							

Scales with offsets, french curves and Misc.	٠									
Scientific instruments, tools and plant .	•	•	•	•		•			200	
4 current meter at Rs. 1,000 each	•	•			•	•	,		4,000	
6 Large boats at Rs. 1,000 each	•	•				•			6,000	
6 Small boats at Rs. 500 each	•	•			•				3,000	
Discharge rods	•	•		•					200	
Recurring laboratory equipment	•	•				•			200	
Ropes	•							•	1,500	
7 Nos. 14' \times 14' tents at Rs. 1,200 each .			•	•		•			8,400	
20 Nos. $10' \times 10'$ tents at Rs. 800 each	•	•		•				•	16,000	
20 Shouldaries at Rs. 600 each		•							12,000	
20 Servants, tents at Rs. 600 each					•	•	•		12,000	
Camp furniture									3,000	
Office furniture for Divl. and Sub-Divl. offices	5.	•							12,000	
Office furniture for soil Physicist's office and I					-				2,000	
Office furniture for geologist's office						•		•	2,000	
(b) Repairs and Carriage-Yearly repairs to tru	Joka		•			•	•	•	3,500	
2 per cent contingencies .		•	•	•	•		•	•	2,000	
• •	•	•	•	•	•	•	•	• -		
Total To	ools ai	nd Pla	ant	•	•	•	٠	•	99,560	
									Say	1,00,00
		-	a							
I. ESTABLISHMENT	Si	\$25	also.	6						
Pay of Officers	200	1.0		53						
1 Executive Engineer for 12 months @ Rs. 9	00 p.1	n.		2	•		.•			10,80
4 Assistant Engineers for 12 months @ Rs. 3	50 p.r	n.		1.			• .			16,80
1 Contracted for 10 -conthe C D. 600	100.000									-
I Geologist for 12 months @ Rs. 600 p.m.	- 192	100	99.97				•	•	• •	7.20
	p.m.	19	11	•	•	•	•	•	•••	•
2 Asstt. Geologists for 12 months @ Rs. 600 p.m. 1 Soil Physicist at Rs. 275 p.m.	p.m.		N	•	•	•	•	•	•••	9,60
2 Asstt. Geologists for 12 months @ Rs. 400	di	Totel	I		• •	• • •	• • •	• •	•••	9,60 3,30
2 Asstt. Geologists for 12 months @ Rs. 400	di	Total		6	•	• •		•	•••	9,60 3,30
2 Asstt. Geologists for 12 months @ Rs. 400	di	Total		6	•	•	• •	•	• •	9,60 3,30
2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m Pay of establishment	di	Total	र्ग अपने जपने	0	•	•	•	•	•••	9,60 3,30 47,70
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 	di	Total	र्ग संस्थित जयने	5	•	•	•	•	• •	9,60 3,30 47,70 84,56
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 	di	Total	जयने	0	•	•		•	• •	9,60 3,30 47,70 84,56 1,92
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Poy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 	Hard H	थ <u>ए</u> श प्रमेव	जयते)	•	•		•	• • • • • •	9,60 3,30 47,70 84,56 1,92 2,40
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asett. Surgeon for 12 months @ Rs. 200 	Hard H	थ <u>ए</u> श प्रमेव	जयने			•		• • • •	• • • • • • • • •	9,60 3,30 47,70 84,56 1,92 2,40 2,40
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asett. Surgeon for 12 months @ Rs. 20 5 Clerks for 12 months at Rs. 80 p.m. 		थ <u>ए</u> श प्रमेव	जयते					• • • • •	• • • • • • • • • • •	9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Clerks for 12 months at Rs. 80 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 		थ <u>ए</u> श प्रमेव	जपने					•	• • • • • • • • • • • • • • •	9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 20 5 Clerks for 12 months at Rs. 80 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 		<u>प्रम</u> ेव 	जयने					•	• • • • • • • • • • • • • • • •	9,60 3,80 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 100 		<u>प्रम</u> ेव 	जयते					•	 . .<	9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Poy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 100 2 Tracers for 12 months @ Rs. 80 p.m. 		<u>प्रम</u> ेव 	जयते					• • • • • • • • • • • • • • •	 . .<	9,60 3,80 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 100 2 Tracors for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 	00 p.n. 	<u>प्रम</u> ेव 	जयते					• • • • • • •	 . .<	9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Poy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 100 2 Tracers for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 		<u>प्रम</u> ेव 	जयते					•	 . .<	9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asett. Surgeon for 12 months @ Rs. 200 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 260 2 Tracers for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 30 p.m. 3 Barkandazes for 12 months @ Rs. 30 p.m. 		<u>प्रम</u> ेव 	जयते					• • • • • • • • • • • • • • • •		9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Poy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asett. Surgeon for 12 months @ Rs. 200 p.m. 1 Sub-Asett. Surgeon for 12 months @ Rs. 200 p.m. 2 Clerks for 12 months at Rs. 80 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 100 2 Tracors for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 1 Daffadar for 12 months @ Rs. 35 p.m. 5 Barkandazes for 12 months @ Rs. 30 p.m. 11 Peons for 12 months @ Rs. 30 p.m. 	00 p.m. m. p.m. 0 p.m.	<u>प्रम</u> ेव 	जयते					• • • • • • • • • • • • • • • • • • •		9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80 3,96
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Poy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Clerks for 12 months at Rs. 80 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 100 2 Tracers for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 30 p.m. 3 Barkandazes for 12 months @ Rs. 30 p.m. 4 Peons for 12 months @ Rs. 30 p.m. 6 Peons for 12 months for officers @ Rs. 30 p. 	00 p.m. m. p.m. 0 p.m.	<u>प्रम</u> ेव 	जयते					• • • • • • • • • • • • • • • • • • •		9,60 3,80 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80 3,96 2,16
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 200 2 Tracors for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 30 p.m. 5 Barkandazes for 12 months @ Rs. 30 p.m. 6 Peons for 12 months for officers @ Rs. 30 p.m. 	00 p.m. m. p.m. 0 p.m.	<u>प्रम</u> ेव 	जयते		· • • • • • • • • • • • • • • • • • • •		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • • •		9,60 3,80 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80 3,96 2,16 1,80
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. Pay of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 8 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 200 2 Tracors for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 1 Daffadar for 12 months @ Rs. 35 p.m. 5 Barkandazes for 12 months @ Rs. 30 p.m. 6 Peons for 12 months @ Rs. 30 p.m. 6 Dak runners for 12 months @ Rs. 30 p.m. 	00 p.m. p.m. p.m.	<u>प्रम</u> ेव 	जयते		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • • •		9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80 3,96 2,16 1,80 2,16
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. 1 Soil Physicist at Rs. 275 p.m. 1 Soil Physicist at Rs. 275 p.m. 1 Boy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 200 2 Tracors for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 3 Barkandazes for 12 months @ Rs. 30 p.m. 6 Peons for 12 months @ Rs. 30 p.m. 6 Dak runners for 12 months @ Rs. 30 p.m. 16 Khalasis for overseers for 12 months @ Rs. 30 p.m. 	00 p.m. p.m. p.m.	<u>प्रम</u> ेव 	जयते		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • • •		9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80 3,96 2,16 1,80 2,16
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. 1 Soil Physicist at Rs. 275 p.m. 1 Soil Physicist at Rs. 275 p.m. 1 Book of the second state of the seco	00 p.m. p.m. p.m.	<u>प्रम</u> ेव 	जयते		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • •	· • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •		9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 96 42 1,80 3,96 2,16 1,80 2,16 5,76
 2 Asstt. Geologists for 12 months @ Rs. 400 1 Soil Physicist at Rs. 275 p.m. 1 Soil Physicist at Rs. 275 p.m. 1 Soil Physicist at Rs. 275 p.m. 1 Boy of establishment 16 Overseers for 12 months @ Rs. 180 p.m. 1 Head clerk for 12 months @ Rs. 160 p.m. 1 Accountant for 12 months @ Rs. 200 p.m. 1 Sub-Asstt. Surgeon for 12 months @ Rs. 200 p.m. 2 Sub-Divl. clerks for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 75 p. 1 Head Draftsman for 12 months @ Rs. 250 1 Junior Draftsman for 12 months @ Rs. 200 2 Tracors for 12 months @ Rs. 80 p.m. 1 Dispenser for 12 months @ Rs. 80 p.m. 3 Barkandazes for 12 months @ Rs. 30 p.m. 6 Peons for 12 months @ Rs. 30 p.m. 6 Dak runners for 12 months @ Rs. 30 p.m. 16 Khalasis for overseers for 12 months @ Rs. 30 p.m. 	00 p.m. p.m. p.m.	<u>प्रम</u> ेव 	जयते		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • •	· • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •		7,20 9,60 3,30 47,70 84,56 1,92 2,40 2,40 4,80 7,20 3,00 1,20 1,92 1,80 3,96 2,16 1,80 2,16 1,80 2,16 5,76 3,60 7,40

3 Laboratory Assits. for 12 months @ Rs. 10	0 p.m.	•	•	•	•	•	•	٠	• '	•	3,600
2 Clerks for 12 months @ Rs. 40 p.m.	•	•	•	•	•		•	•	•	٠	960
1 Computor for 12 months @ Rs. 40 p.m	•	•	• .	•	•	٠	•	•	•	•	480
1 Tracer for 12 months @ Rs. 40 p.m.	•	•	•	•	•		•	٠	•	•	480
3 Laboratory peons for 12 months @ Rs. 25	p.m.	•.	• .		• .	•	•	•	•	•	900
2 Peons for 12 months @ Rs. 25 p.m.	•	•	•	•			٠	•	•		600
1 Tapali for 12 months @ Rs. 25 p.m.	•	•	• .	•	•	•	•	•	•	•	300
4 Auger measurers for 12 months @ Rs. 40 p.	.m.	•	• .	• .	•	•	•,	• .	•	•	1,920
Total	•	•		•.				•	•	•	1,02,260
Dearness allowance and Special pay of Officer	s L. S.	•	•	•		•			•	•	12,235
Dearness allowance of establishment	•	•	•	• •	•	•	•	•	•	•	49,000
Travelling Allowance of officers			•								
Executive Engineers		•	•		•	•	•		3.	200	
Assistant Engineers						-		•		200	
Geologist				•	•					200	
Asstt. Geologists	•	•	•	•	•		•	•	9,	000	
Soil Physicist	•	• 、	• ,	•	•	•	•	•	5,	250	30,850
Travelling allowance of establishment									-	`	•
Supervisors	•	•	•		•	•	•	•	14,	800	
Other staff-XEN'S	•	•		•	•	•	•	٠	6,	400	
Geologist other staff	- 5	73	1 -		٠	•	• .		2,	300	
Soil survey staff	AR	ės i	Es	5							
Sub overseers	683.		1.21	2	•	•	•	•	1,	900	
Auger measurers	199	.3				•		•	1,	900	
Other staff	NS CON		13		•	•		•	2,	155	29,455
stablishment contingencies	1A	n.	11					_			
Rent for Divl. and Sub-Divl. offices .	12	11	11	• .	•		•	•	•		4,000
Rent for soil physicist's office and laboratory	(halling			i	•	•		•	•	•	1,50
Rent for geologist's office	Carl H	105	KC.		•	٠	•	•	•	•	3,000
	1411-370	24	21.42								8,500
	The second second	-									

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IV. ESTIMATE FOR PRELIMINARY SURVEYS AND INVESTIGATIONS IN CONNECTION WITH PROJECTS FOR THE MULTI-PURPOSE DEVELOPMENT OF THE TAPTI BASIN, PREPARED IN ACCORDANCE WITH THE INSTRUC-TIONS OF THE ad hoc COMMITTEE.

ABSTRACT

I. WORKS													
1. Dams and appurtenant Works	5												Rs.
A. Preliminary Expenses .		•	•	•	•	•		•	•		•	•	3,19,525
K. Buildings			•				•		•	•		•	40,000
2. Main Canals and Branches .		•	•	•	•		•	•	•		•		4,36,750
3 Discharge and Silt observation	ıs.	•					•		•	•	•	••	70,000
4. Meteorological observations			•		•	•	•	•	•				13,600
5. Mineral survoys		•	•		•	•	•	•	•	•	•	•	5,000
6. Surveys for Pisciculture	•	•	•		•	•	,	•	•	•	•	٠	1,000
7. Malaria survey		•	•		•	•	•	•	•	•	•	•	2,500
8. Electric Load Surveys.	•	•		•	•		•	•	•	•		•	4,000
9. Surveys for Navigation .		•			•	•	•	•	•	•		•	40,000
10. Economic and Property survey	ув .	•	•		• ·	•	•	•	•	•			15,000
11. Surveys for soil erosion .	•	•	•	•	•						•	-	4,000
12. Communications	•		•	•	•	•	•	•	•	•			90,000
13. Special Tools and Plant .			•	•			•	• .		•		.]	1,70,000
			-	6253								-	12,11,375
		L	343	Rite	2		2 p	oor cor	nt', cor	ntinge	ncies		24,227
		G	1315	246	23		-			-		-	10.95 609
II. TOOLS AND PLANT	_	2	180	R6 3	88		_						12,35,602
III. ESTABLISHMENT		184	SI 11	283	229								5,72,232
	•	. 4	87#Q	100	8	-	-	-		-	-	-	
			VAi	1.11	1				Grane	l Tota	al 🛛	•	19,95,514
			1913	211	5			•	(Dr Say	,		19,95,500
		ý.		202	20					•		-	
I. WORKS		- 8	DETA	ILS	23								
		16	TE TAX	222									
1. Dams and appurtenant works			Statistics.										

1. Dams and appurtenant works A. Preliminary Expenses

Rs.

1.03,125

Survey of the Reservoir Basin by Air photography and ground survey and plotting contours at 10 ft.—5ft. intervals on a scale of 4"=1 mile 275 sq. miles of Ukai/Tokarwa Dam at Rs. 375 per sq. mile

0.0700

2. Survey of dam and weir site by air photography and ground survey and plotting on a scale of 32'=1 mile

									a	cres					
Ukai/Tokarwa da	m site	•	•		•	•	•	•	3,	000					
Kakarpar weir site	e		•		•	•	•	•		600					
	-							-	3,	600					
3,600 acres at Rs.	4 per acı	re .		•						•					14,400
3. Geological investiga boring, core drillin									g testi	ng—	105			- ~y	
									No						
Kakarpar weir			•						No	os. 22					
Kakarpar weir Ukai/Tokarwa dau	 m		•	•	•		•	•							
-		-9,10() R :	ft. at	Rs. 2	20 per	, R ft.	•		22	•	•	•	•	1,82,00
Ukai/Tokarwa dan 182 Nos. each of 5	60 R. ft.—					-		• • •		22	•	•	. I	s.	
Ukai/Tokarwa da	i0 R. ft.— urrow sur	rveys	incl	uding	g testi	ng.	•	• • • •	•	22	• •	•		s.	1,82,000 10,000 10,000

15 M of J& P

सन्यमेव जयते

(a) Surveys of the comman	ided ar	ea fo	r cane	al align	nment	7,00,0	00 ac	res at	t 0-9-1) per	acre.			3,93,7
(b) Miscellaneous surveys	•	•				•	•	•	•				L.S.	6,0
(c) Exploration for the four	ndatio	ns of	cross-	drains	sge wo	rks an	d nec	ossar	y sur	veys	•	•	L.S.	30
(d) Soil surveys 7,00,000 ac	res at	Re. 1	l per :	100 ac	r08 ·	•	•	•	•	•	•	. •	-	7,0
,								·						4,36,750
III. Discharge and Silt observati (Period 2 years)	ions													
One boatman and four khale										ods,	floats,	gaug	(08, 8 1	
 samplers and laborator IV. Meteorological observations 		pmen	U 7 81	tes at .	Ks. 0,	000 per	8110	per 3	/ear	•	•	•	•	70,0
Rain gauges, temperature, h		+++ ~~		d vole	aite c	heartra	liona							
Equipment and installation type) and humidity and	often	new 1	rain g	auges	(some	of these	e to t	be of f	the in	tegrat	ted sel	lf-rece	ording	g 10,0
Recurring expenditure on pa														3,6
								-						13,6
														Rs.
V. Mineral surveys		•						•	•		•		L.S.	5,0
VI. Surveys for Pisciculture .	•					.*							L.S.	1,0
VII. Malaria survey								÷					L.S.	2,50
III. Electric load survey				. E	627	-				•	•		L.S.	4,0
IX. Survey for Navigation .			6	252	Ser.	22							L.S.	40.00
X. Economic and Property surve	e tra		6	1811	- 17	100							L.S.	15,00
								•	-	-	•	•		
			2		大服	88							L.S.	4.00
XI. Surveys for soil erosion .		•	-0			ġ.	•	•	•	•	•	•	L.S.	4,00
XI. Surveys for soil erosion .	•	road	is and	their	main	ænance	• for 2	2 yea	rs at i	Rs. 3,	,000 p			
XI. Surveys for soil erosion . XII. Communications	•	road	is and	l their	maint	œnance	for 2	• 2 yea	rs at :	Rs. 3,	,000 p			
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1. Pay of officers pi 1 Executive Engineers at Rs. 675 p.m. 2 Aestt. Engineers at Rs. 560 p.m. 2 Aestt. Engineers at Rs. 560 p.m. 2 Aestt. Engineers at Rs. 575 p.m. 2 Aestt. Geologista at Rs. 600 p.m. 1 Geologista at Rs. 70 p.m. 2 Aestt. Geologista at Rs. 200 p.m. 1 Drill Foreman at Rs. 100 p.m. 1 Metoorological Aestt. at Rs. 240 p.m. 1 Metoorological Aestt. at Rs. 240 p.m. 1 Metoorological Aestt. at Rs. 240 p.m. 1 Metoorological Aestt. at Rs. 240 p.m. 1 Metoorological Aestt. at Rs. 200 p.m. 1 Metoorological Aestt. Stop p.m. 1 Metoorological Aestt. Stop p.m. 2 Senior Clerks at Rs. 150 p.m. 1 Storokeeper at Rs. 150 p.m. 1 Monor Draftsman at Rs. 200 p.m. 1 Junior Draftsman at Rs. 200 p.m. 1 Junior Draftsman at Rs. 200 p.m. 1 Storokeeper at Rs. 160 p.m. 1 Sub-Asstt. Surgeon at Rs. 170 p.m. 1 Storokeeper at Rs. 160 p.m. 1 Storokeeper at Rs. 160 p.m. 1 Sub-Asstt. Surgeon Rs. R. 70 p.m. 1 Storokeeper at Rs. 160 p.m. 1 Storokeeper at Rs. 160 p.m. 1 Sub-Asstt. Surgeon Rs. R. 70 p.m. 1 Asstt. Sit Analyst at Rs. 230 1 Matt. Sit Analyst at Rs. 30 1 Asstt. Sit Analyst at Rs. 33 1 Daboratory Asstt. at Rs. 33 1 Daboratory Knalasis at Rs. 33 2 Dearnoes allowance for officors 1 Asstt. Sit Analyst at Rs. 33 1 Asstt. Sit Analyst a																
 1 Fry to Universe Engineer at Rs. 875 p.m. 2 Aestt. Executive Engineers at Rs. 600 p.m. 2 Aestt. Executive Engineers at Rs. 600 p.m. 2 Aestt. Executive Engineers at Rs. 600 p.m. 1 Geologist at Rs. 575 p.m. 2 Asstt. Geologist at Rs. 500 p.m. 1 Drill Foreman at Rs. 1,000 2 Fay of Establishment 1 Metoorological Aestt. at Rs. 240 p.m. 1 Accountant at Rs. 100 p.m. 1 Accountant at Rs. 100 p.m. 1 Storekeeper at Rs. 150 p.m. 2 Fay of Establishment 1 Storekeeper at Rs. 160 p.m. 2 Tracers at Rs. 104 p.m. 3 Research Asstts. at Rs. 200 1 Asstt. Stilt Analyst at Rs. 200 1 Asstt. Stilt Analyst at Rs. 200 1 Asstt. Stilt Analyst at Rs. 33 5 Gauge Readers at Rs. 33 5 Chowkidars at Rs. 33 5 Chowkidars at Rs. 33 6 Chowkidars at Rs. 33 7 Peous at Rs. 33 8 Laboratory Khalasis at Rs. 33 6 Chowkidars at Rs. 33 7 Peous at Rs. 34 7 Tavelling allowance for officors 4. Dearnoss allowance for officors 4. Travelling allowance for officors 6 Travelling allowance for officors 7 Tavelling allowance for officors 8 Establishment contingencies Furth Nathikateurs (5 0) 	Expenditure														MENT	III. ESTABLISHMEN
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G. N. PANDIT, Project Officer. (Narbada & Tapti). •

APPENDIX VI.

SABARMATI PROJECT REPORT

(I) The Sabarmati River

The Sabarmati river drains a catchment area of 1,723 square miles before entering the Dharoi Gorge. The catchment area above Ahmedabad is about 5,000 square miles. The maximum discharge of the river at Dharoi is about 3,00,000 cusecs, while at Ahmedabad it may be taken to be about 5,00,000 cusecs.

Two important tributaries, the Hathmati (hill catchment about 237 square miles) and the Khari (hill catchment about 100 square miles) meet the Sabarmati between Dharoi and Ahmedabad. Below Ahmedabad, the main stream of the Meshwa System consisting of Meshwa (hill catchment about 316 square miles), Migham (hill catchment about 157 square miles) and Vatrak (hill catchment about 450 square miles) joins the river.

The river is a source of considerable danger to the industrial town of Ahmedabad and villages lower down. Monsoon floods in the past have caused devastation, destroyed crops, carried away cattle, changed course of delta channels and filled up harbours with silt.

(II) Works and Proposals in the Past

In the past some very small dams and anicuts for storage and irrigation have been constructed on the tributaries of the river. No large works have been undertaken although proposals to harness the main channel of the Sabarmati river have been under contemplation as far back as the second half of the nineteenth century. A scheme was drawn up in 1904 by Bombay Engineers to construct a dam at Dharoi and three pick-up weirs at different places down the river up to Ahmedabad. The scheme was, however, dropped as it was not considered at the time sufficiently remunerative. Nothing tangible was done till 1935, when the Baroda Engineers started investigations and by 1942 produced a scheme, the details of which are available in two volumes. As the project could not proceed without the agreement of the several States having riparian rights and other interests in the waters of Sabarmati, the Baroda State referred it to the Bombay Government, who in turn sought the opinion of the Government of India. In addition, the Baroda Government wanted their project to be 'vetted' by the Central Waterways, Irrigation and Navigation Commission, and for that purpose a party of Engineers of the CWINC, headed by the Member for Irrigation, visited the area by air and land routes, and discussed the scheme with various interests informally and in conferences. All interests showed keenness to participate in a unified multipurpose development of the Sabarmati basin and not in piecemeal schemes and also wanted that the preparation of such a project be undertaken by the CWINC and that a special Division be opened under it for this purpose.

(III) Proposals

To implement the decisions arrived at in the conferences referred to in paragraph Π , available data has been studied and proposals are drawn up for opening a Division to complete investigations for drawing up a scheme for unified multipurpose development of the entire Sabarmati basin.

A statement showing the rough details of the dam sites and possible irrigation areas is enclosed. The main work lies on the Sabarmati river itself, as there are possibilities for a dam at Dharoi, where the main stream debouches in the plains. The storage capacity of the reservoir formed by a dam of about 150 feet height at this site may be as much as 30,000 m.c. ft., which is expected in normal years to equal almost all the run-off from the catchment up to this point. The regulated discharge will be of the order of 500 cusees yielding about 3,000 to 4,000 kW. of firm power, ensuring about 100 cusecs of constant flow for Ahmedabad water supply and making possible irrigation to the extent of about 1,00,000 acres with or without the help of pick-up weirs between Dharoi and Ahmedabad. Detailed investigations are necessary to find the exact location of the sites for pick-up weirs, the alignments for canals and location of the areas to be irrigated.

From a study of the form line sheets, possible sites for a dam on the Hathmati, a dam on Ghuvai, a pick-up weir on the Hathmati for the above two dams, a dam and pick-up weir on Meshwa, a dam on Vatrak and a dam on Majham (the main tributaries of the Sabarmati system) have been located very approximately and marked on the index map. The discharge available due to storage at these dams is likely to irrigate another 1,00,000 acres making a total of 2,00,000 acres irrigation over the entire basin. Taking an intensity of 40% the culturable commanded area should be about 5,00,000 acres. Possible location of the areas making up this figure are shown on the enclosed index map.

(IV) Estimate

An estimate is enclosed. Worked out in great detail, it provides for manning a Division with three Sub-Divisions for two years to complete the necessary investigations and to draw up a complete project for the unified multipurpose development of the entire Sabarmati basin.

The estimate amounts to Rs. 15,10,000. surveys of the reservoir and irrigation areas costing about Rs. 5,86,000 are proposed to be carried out through the Survey of India. All other investigations like the surveys for dam sites, canal alignment, soil surveys, discharge and silt observations and property surveys are proposed to be carried out independently by the CWINC. Geological surveys including core drilling are proposed to be carried out with the help of resident geologists and under the general advice of the Geological Survey of India. Meteorological surveys including fixing of new rain gauges and observatories for recording temperatures, humidity, wind velocity, etc. will be planned and carried out by the CWINC, under the guidance of the Meteorological Department.

Necessary provision has been made in the estimate for temporary buildings to accommodate the staff, for communications, for electric load surveys and for laboratory apparatus, etc. Necessary provision has also been made for the purchase of office equipment, scientific and ordinary tools and plant, and motor vehicles for transport in the difficult area.

M. D. MITHAL,

Director, Irrigation and Waterways,

C. W. I. N. C.



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STATEMENT SHOWING PROPOSED DAM SITES AND POSSIBLE IRRIGATION AREA ON SABABMATI AND ITS TARIBUTARIES

Name of river or tributary	Site and Location	Dam, or pick-up weir	Catchment area in sq. miles	Possible average annual runoff in million cu. ft.	Possible annual irrigation in acres	Area to be surveyed in acres for irrigation	Remarks
Sabarmati	Dharoi 72° 51' E., 24° N.	Dam	1,723	15,000	••	••	
	Valasna 72° 47' E., 23° 50' W.	Pick-up weir .		••	60,000	150,000	
	Waghpur . 72° 47′ E., 23° 28′ N.	Do		••	4 0,000	100,000	
	Ahmedabad . 72° 36′ E., 23° 2′ N.	Do	••	••			100 cusecs w be reserve for Ahmed bad wat supply.
Meshwa	Near Lachhai 73° 10′ E., 23° 30′ N.	Dam .		3			
Meshwa	Near Warwara. 73° 5' E., 23° 30' N.	Pick-up weir .	316	2,800	2 8,000	70,000	
Hathmati	Near Fatepur . 73° 10' E., 23° 40' N.	Dam	237	2,000	20,000	50,000	
Ghu vai	Near Khandial. 73° 5' E., 23° 40' N.	Dam .	ग्रीव जयते				
Hathmati	Near Himmat . Nagar. 72° 58′ E., 23° 36′ N.	Pick-up weir •	-192	1,600	16,000	40,000	
Vatrak	Near Bhanipura 73° 22' E., 23° 20' N.	Dam • •	450	3,900	39,000	97,000	
Majham	Near Munsi- ware. 73° 22' E., 23° 17' N.	Dam	157	1,300	13,000	34,000	
		Total .	3,075	26,600	216,000	541,000 acres say 850 sq. milés.	

N. B.—Above the Dharoi dam site, there appear to be some sites for dams as indicated on the plan. These will need to be verified for the sake of negotiations amongst the various interests. The ultimate aim is, however, to concentrate on the Dharoi dam site.

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Serial No.						Ite	m		<u>.</u>	<u> </u>				~	Estimated amount
															Rs.
1.	Survey through the Survey										I. N.	C. 🔓	•	•	5,86,50
2.	Other river and land surve	ys to l	се сал	rried	l out	by th	10 C. J	N. I. 1	N. C. 1	Staff	•	•			48,50
8.	Soil Surveys	•	•	•	٠	•	•	•	•	•	•	•	•	•	17,00
≼ .	Temporary Buildings	•	•	•	•	•	· .	•		•		•			10,00
5.	Discharge and Silt Observa	tions		•	•	•	•			•					69,31
6.	Meteorological surveys			-		•	•		•					•	2,00
7.	Geological investigations an	d min	oral s	urve	eys				•	-					1,87,96
8.	Communications	•			•	•		•	•					•	15,00
9.	Special T. & P. for laborato	ry app	aratu	us fo	or Soi	il Sur	vey		•		•		•		11,00
10.	Electric load and property	survey	s.								•			•	15,00
11.	Working of motor vehicles			•		•		•	•						30,00
12,	Establishment	•				•	•	•			•		•		2,84,88
13.	Tools and plant				•	•	•		•	•				•	1,63,08
14.	Contingencies and Sundries			,	•	•	•	•	•	•	•		•		69,76
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OVERALL ESTIMATE FOR PERLIMINARY SUBVEYS AND INVESTIGATIONS FOR POSSIBLE MULTIPUEPOSE DEVELOPMENT OF SABARMATI BASIN •.

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(SD.) M. D. MITHAL, Director, Irrigation and Waterways.

Serial No.	Itom	Estimated cost	Total
		Rs.	Rs.
1.	Survey through the Survey of India staff (a) Survey of reservoir areas scale 4"= 1 mile 100 sq. miles @ 320/- per sq. mile.	32,000)
	 (b) Contoured survey of Irrigation area scale 4" = 1 mile. 850 sq. miles @ Rs. 650/- per sq. mile. 	5,52,500)
	(c) Rapid 2" scale map of Dharoi Dam site	2,000	5,86,50
2.	Other river and land surveys to be carried out by C.W.I.N.C. staff.		
	(a) Survey of dam site areas (scale 1/1000) contour interval 5' to 10', 10 sq. miles @ Rs. 2,600 per sq. mile.	26,000	
	(b) Longitudinal section of the river and its tributarios with cross-sections (500 miles @ Rs. 25 per mile).	12,500	•••
	(c) Mapping shoals, sand bars, deep channels and install- ing guages.	5,000) .,
	 (d) Miscellaneous surveys such as canal alignment, special reservoir surveys, etc. 	5,000	48,50
3.	Soil surveys		
	Work Charged establishment for one year. 4 Auger Mukadams @ Rs. 55 p.m. for one year = 2,640 16 Khalasies @ Rs. 45 p.m. for one year = 8,640		
	T. A. for work charged establishment \cdot = 720		
	12,000	12,000	
	Testing Water and soil samples, for one year	5,000	17,00
4.	Temporary Buildings	10,000	10,000
5.	Discharge and silt observations.		
	(a) There will be four discharge sites on Sabarmati and 6 discharge sites on its tributaries.		
	Non-recurring expenditure per site on Sabarmati.	***	
	Current meter per site	. 500	
	Boat large	800 100	
	Discharge rods	300	
		100	
	Sounding rods		
		1,800	
	For 4 sites non-recurring expenditure	7,200	
	Recurring expenditure (for 2 years) per site on Sabarmati.		
	dobserver @ Rs. 150/- p.m. including dearness allow-		
	ance and special pay for $1\frac{1}{2}$ years	1,800	
	One boatman @ Rs. 60 p.m. for 14 years .	1,080	
	4 khalasies @ Rs. 55 p.m. for 14 years	3,960	
		6,840	
	Recurring expenditure for 4 sites = 4×6840	27,360	
	Non-recurring expenditure per site on a tributary of Sabar- mati	070	
	t current meter	250	
	Boat small	400	
	Discharge rods and sounding rods	. 100	
	Ropes	100	
		850	

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D	etails-	-Co	ntd.

orial No,	Item		Estimated cost	Total
			Rs.	Rs.
	Non-resurring expenditure for 6 sites $= 6 \times 850$.	5,100		
	Recurring expenditure (for 2 years) per site on a tributary of Sabarmati.			
	desrver @ Rs. 150 p.m. including dearness allow-			
	ance and special pay for 2 years	1,800		
	One boatman @ Rs. 55 p.m. for 1 year	660		
	2 khalasies also suitable as boatsmen @ Rs. 50 p.m. for 1 year	1,200		
		3,660		
	Recurring expenditure for 6 sites on tributaries of Sabarmati = 6×3.660	21,960	61,620	
	(b) Silt observations			
	Equipment Work charged establishment for 1 years.	4,000		
	Laboratory Assistant @ Rs. 150 p.m. for 11 years	2,700		
	1 Khalasi @ Rs. 55 p.m. for 1 ¹ / ₂ years	990		
6.	Meteorological Surveys-	7,690	7,690	69,3
	Rain guages, temperatures, humidity & wind veloc y observa-		2,000	2,0
7.	tions Geological investigations and mineral Surveys—		2,000	-10
••	(a) Equipment (non-recurring)			
	2 diamond drills with equipment @ Rs. 30,000 each .	60,000		
	2 diamonds and spares for the above @ Rs. 20,000 each .	40,000		
	1 Calyx drill with equipment	20,000		
	Spares for the above	10,000		
	2 large boats for drills @ Rs. 1,000 each	2,000		
	2 compressors @ Rs. 5,000 each	10,000		
	(h) Dunning supersons for one man	1,42,000	1,42,000	
	(b) Running expenses for one year One Drill foreman @ Rs. 1,500 p.m. for one year	18,000		
	One Resident Asstt. Geologist @ Rs. 350 p.m. for one year	4,200		
	2 Operators @ Rs. 120 p.m.	2,880		
	4 helpers @ Rs. 60 p.m.	2,880		
	Dearness allowance & T. A. of staff	10,000		
	Running expenses for engines for drills, etc	8,000		
		45,960	45,960	187,9
8.	Communications—	•	-	-
	Constructing and maintaining temporary roads to various dam sites and gauging stations.	•	15,000	15,0
9.	Special Tools and Plant for laboratory, apparatus for soil surveys		11,000	11,0
10.	Electric load and property Surveys		15,000	15,0
11.	Working of motor vehicles (for 2 years @ Rs. 15,000 per year) .		30,000	30,0
12. A	Istablishment			
	(a) Pay of Officers	10.010		
	1 Executive Engineer @ Rs. 760 p.m. for 2 years	18,240		
	3 Asstt. Engineers @ Rs. 350 p.m. for 2 years	25,200	10 B 10	
	1 Soil Physicist @ Rs. 275 p.m. for one year	3,300	46,740	
	(b) Pay of Establishment—	10 000		
	12 Supervisors @ Rs. 140 p.m. for 2 years	40,320		

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Details-Contd.

Serial No.	Ite	m					Estimate	d cost	Total
	l Accountant @ Rs, 200),m. for 2	years	•		•	4,800		
	1 Head Clerk @ Rs. 160		•				3,840		
	1 Sub-Assistant Surgeon (•	for 2	voars		4,800		
	5 Clerks @ Rs. 80 p.m. fo	-	• •		· .	•	9,600		
	8 Sub-Divisional Clerks @	•	.m. fo	r 2 ve	878		5,400		
	Accounts Clerk @ Rs. 1						2,400		•
	l Head Draftsman @ Rs.	-	-				7,200		
	1 Junior Draftsman @ Re	•					2,400		
	2 Tracers @ Rs. 60 p.m. f	-		yours	•••	•	2,880		
	l Computor @ Rs, 60 p.m.			•	•	•	1,440		
		•		•	•	•	1,440		
	1 Ferro Printer @ Rs. 60	-		•••	•	•			
	1 Dispenser @ Rs. 80 p.m	. •		•	•	•	1,920		
	1 Storekeeper @ Rs. 80 p.	-		•	•	•	1,920		
	4 Daffadars @ Rs. 35 p.m			•	٠	•	3,360		
	5 Barkandazes @ Rs. 30		-		٠	•	3,600		
-	2 Sub-overseers @ Rs. 60		-		• • •	•	2,880		
	9 Peons (3 for Division, years @ Rs. 30 p.m.	• •		THE R	a	•	6,480		
	2 Peons (1 for Ass. Geologi @ Rs. 30 p.m.		AS.	255	184	3	r 720		
	4 Peons for Officers (one S.D.O's) for 2 years @ F			and 1	eaon	IOL	2,880		
	6 Chowkidars @ Rs. 30 p.	-	122/04		11		4,320		
	1 Daftri @ Rs. 35 p.m. for	-	Cars	90.0	R81	•	840		
	6 Dak Runners @ Rs. 30 p		1700110	1.11	11	•	4,320		
	12 Khallasies @ Rs. 30 p.m.			A.Y.S	2.0	•	8,640		
	11 Gauge-readers @ Rs. 30		- CT - 3		144.00	£ .	7,920		
	I Laboratory Attendant @	•	100 C	TRACE	10.00	2	720		
	2 Clerks for Asstt. Geologis year @ Rs. 40 p.m.	-	1016111	100.000	20.000	one	960		
	S Clerks special pay for	hendlin	r oaah	for 2	vear				
	@ Rs. 20 p.m.		e otwari		• •	•	1,440		
	Geologist staff for one year		•	•	•		2,000		
						-	1,41;440	1,41,440	
	(c) Dearness allowance for off	cers .	•	•	•	•		8,000	
	(d) Dearness allowance for est	ablishme	at .	•	•	•		24,000	
	(e) Travelling allowance for o	ficers —							
	Executive Engineer (2 ye	ars) .	•	•	•		7,200		
	Asstt. Engineers (2 years)	•				•	8,600		
	Asstt. Geologist (1 year)			•	•	•	1,800		
	Soil Physicist (1 year)			•			1,800		
					•	-	19,400	19,400	
	(f) Travelling allowance for es	tablishme	ont—			-			
	Overseers (2 years) .	• •	•	٠	•	•	21,600		
	Other Staff (2 years).		•	•	•	•	10,000		
	Geologists, Staff (1 year)		•	•	•	•	1,400		
							33,000	33,000	

Details- Contd.

8. No.	Item								Estimated cost	Total
(g)) Establishment Contingencies									
	Rent for divisional and Sub-Divisio	nal off	ices :	fo r 2	years			7,000		
	Rent for Soil Physicist's office for 1	year			-	•		1,500		
	Rent for Asstt. Geologist's office for	1 yea	r, .		•	•		1,500		
	Rent for Laboratory for 11 years .	•	~ •	•		•		2,300		
							1	12,300	12,300	2,84,8
13. Too	LS AND PLANT-									
(a)	Scientific instruments and drawing mat	erials-	-							
	5 No. Levelling instruments with sta	nd @)	Rs. '	700 өг	ch.	•		•	3,500	
	1 No. Theodolite with stand @ Rs. 1	,000 ee	ich		. •			•	1,000	
	5 No. Prismatic compasses with stand	1 @ R	s. 16	io eac	h.			•	800	
	5 No. Planetables with stand @ Rs. 1	l00 eac	eh						500	
	14 No. L'velling staves @ Rs. 40 each							•	560	
	4 No. Scale boxes complete with scal	es and	offs	ets @	Rs.	15 eac	h.		60	
	2 No. Planimeters @ Rs. 200 each								400	
2	0 No. Tapes metallic 100 feet @ Rs. 3	0 each	1 .				_		600	
	0 No. Tapes metallic 50 ft. @ Rs. 20/								400	
	2 No. Instrument drawing boxes 1st s			300 e	ech .	•	•	•	600	
	4 No. Instrument drawing boxes 2nd					•	•	•	800	
	6 No. Instrument drawing boxes 3rd a					•	•	•	600	
	2 No. parallel rulers @ Rs. 40 each	5120 (U)	L98,	100.6	aon	•	•	•		
		189		3334	19	٠	•	•	80	
	Set squares of sizes L. S	•W	943	344	ÿ•	•	•	•	100	
	7 No. Drawing boards @ Rs. 30 each	- 0	a ir	1.11	•	•	•	•	210	
-	7 No. T. Squares @ Rs. 10 each .	11	8 X	28.1	(· + .	•	•	•	70	
	8 No. Measuring Chains 100 feet long	1 Lines		- 10 Profession	1.1.64		ı.	•	720	
	6 No. Measuring chains 66 feet long v	PUX.	rowa	• @ R	s. 3 0	each	. •	•	180	
	2 No. French curve boxes @ Rs. 30 es	1220-111	5.2	94 S.	24	٠	•	•	60	
	2 No. Straight edges brass @ Rs. 30 e		•	•		٠	٠	•	60	
	5 No. Rulers 2 feet fourfold @ Rs. 8 e	ach	H	ৰ নয	₹ • .	•	•	•	40	
	1 Slide rule @ Rs. 200 each .	•	•		•	•	•	•	200	
	5 Colour boxes complete @ Rs. 50 eac	h	•	•	•	•	•	•	250	
1	2 No. China slabs for colours @ Rs. 3	each	•	•	`•		•	•	36 [;]	
	2 No. Steel tapes @ Rs. 100 each	•	•	•	•			•	200	
	1 No. Apparatus for printing plans		•						800	
	2 No. proportional compasses @Rs. 3	0 each							60	
	2 No. Glasses magnifying @ Rs. 40 ea	ch				•		•	80	
	8 No. Poles surveying @ Rs. 15 each								270	
	4 No. Ranging rods @ Rs. 5 each						-	-	120	
	8 No. Umbrellas field @ Rs. 50 each	•	•	•	•	•	•	•	900	
	2 No. Chronographs @ Rs. 90 each	•	:	•	•	•	:		1,080	
	1 Camera @ Rs. 400 each	•	•	٠	•	٠	٠	•	400	
	4 Binoculars @ Rs. 200 each .	•	•	٠	٠	•	٠	•	800	
									16,036	16,08
(b) Pl	ants and Machinery—									
1	G.M.C. Truck @ Rs. 10,000 each	•	٠	٠	٠	<u>،</u> ۲		٠	10,000	
4	Weapon carriers @ Rs. 7,000 each	٠	•	•	•	•	•	•	28,000 38,000	
6	Jeeps with trailers @ Rs. 6,000 each	•	٠	•	•	•	٠	• •	the state of the s	
									74,000	74,000

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Details-Contd.

(0)									Total
) Tools—					<u> </u>		<u>.</u>	<u></u>
	6 No. Augers with extension pieces @ Rs. 1	00 eac	sh.	•	•	•		600	
	6 No. axes carpenters @ Rs. 15 each	•						90	
	12 No. hammers of sizes @ Rs. 5 each	• .	•	•		•	•	_ 60	
	24 No. G. I. Buckets @ Rs. 4 each	•	•	•	•	•		96	
	24 No. axes country @ Rs. 8 each	•	•		•			192	
	12 No. hammers stone breaking @ Rs. 2 each	n .	•	•				. 24	
	Pegs iron and nails L.S	•		•	•	•	•	100	
	24 No. Pick axes @ Rs. 5 each	•				•		120	
	12 No. Plumbs brass @ Rs. 3 each \cdot .	•	•	•	•	•	•	86	
	6 No. Saws Hand @ Rs. 8 each	•	•	•		•		48	
	1 No. stoncil plate figures @ Rs. 25 each	•	•	•	•			25	
	1 No. stencil plate letters @ Rs. 30 each			•		•		30	
	24 No. Fire buckets @ Rs. 4 each	•	•	•		•	•	96	
	4 No. Iron safes @ Rs. 400 each	•	•	•	•	•	•	1,600	
								3,117	3,11
(d)	Camp equipment-	F	A						
	12 No. chairs folding with arms @ Rs. 16 es	ich }			•	•	•	192	
	24 No. tables camp folding @ Rs. 35 each			S.				840	
	12 No. Cotton durries @ Rs. 80 each	•.3		3.	•	• '		960	
	16 No. Yakdans (record boxes) @ Rs. 40 ea	ch	3.0	7 .	•			640	
	1 No. Swiss cottage double fly tent $14' \times 14$	' @ R	s. 1,20	00			•	1,200	
	6 No. Swiss cottage double fly tents $12' \times 1$	2' @]	Rs. 1,(000	•		•	6,000	
	20 No. double fly tents $10' \times 10'$ @ Rs. 700 e	ach	63.3	2.	•		٠	14,000	
	20 No. tent double fly $8' \times 8'$ @ Rs. 500 eac	h .	217	n				10,000	
	12 No. servants tents @ Rs. 600 each		2015	. .	•	•		7,200	
	12 No. shouldaries @ Rs. 600 each .					•		7,200	
	6 No. necessary tents @ Rs. 150 each 🛛 🖓	यमव	जयत		•.	•	•	900	
	7 Bath Boards wooden @ Rs. 5 each .	•	•		•	•		35	
	7 Wash hand basins @ Rs. 4 each	•	•		•	•	•	28	
	7 Jugs @ Rs. 4 each	•	•	•			•	28	
	6 Cots folding @ Rs. 50 each	•		•	•	•		300	
	86 Country charpoys @ Rs. 9 each .	•			•		•	824	
	4 Lamps petromax @ Rs. 50 each .	• .	•	•	•	•		200	
	24 Hurricane lanterns @ Rs. 5 each	•	•	•	•		•	120	
	7 Buckets G.I. @ Rs. 5 each	•		•		•	•	35	
	4 Boxes for petromax lanterns @ Rs. 5 each	h	•	•	•	•	٠	20	
(6)	Office furniture—							50,222	50,222
••	7 No. tables for officers @ Rs. 125 each .				·			875	
•	20 No. tables with two drawers, handles and	locks	a R.	. 60 e	ach	•	•	1,200	
	4 No. tables camp folding for clerks @ Rs.					•	•	140	
	48 No. Office cane chairs @ Rs. 15 each .		-		•	:	•	720	
	6 No. easy cane chairs @ Rs. 30 each					•	•	180	
	16 No. Cupboards with shelves & Locks @ R	s. 100			•	•,	•	1,600	
	26 No. record stands with shelves @ Rs. 35		÷	•	•	•	•	910	
	5 Nos. Yakdans or boxes @ Rs. 40 each		•	•	•	•	•	200	

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Details	Contd.

8. N o.	, 			Item								Estimated cost	Total
7	No. Benches for peon	8 @	Re. 2	5 eac	h							175	
	12 No. Teapoys @ Rs			•		•	•	•	•	•	•	180	
	20 No. Hurricane lant			. 5 00	ch.			•	•		•	100	
	4 No. cupboards with for plans @ Rs. 125	h six	draw			each,	3′ wi	de 4'	long a	nd 5	′ high	500	
	12 No. Buckets G. I.			ch	•		•	•	- •		•	60	
	14 No. baskets waste	-			ach	•		•		•	•	42	
	16 No. call bells @ Ra	. 4 es	ich	•		•	•	•	•		•	64	
	12 No. stools wooden	@ Rs	. 6 ea	ch	•	•	•	•	•	•	•	72	
•	1 No. Typewriter por	table	@ R	6. 3 0	υ.	•	•	•			•	300	
	5 No. typewriters Re-	mingt	ion ra	nd 🧭) Rs. 4	50 ea	sh.		•	.•		2,250	
	5 Nos. acales with we	ights	1 to	20 to	las @	Rs. 3 () each	L .	•	•	•	150	
	12 Nos. cash and star	ps bo	X08 8	teel (@ Rs.	20 eac	h.	.•	.•	.•	.•	240	
	5 pigeon holes for de	spatcl	h cler	k8 @	Rs. 5) each	•	•	•	•	•	250	
	ellaneous petty items peons, etc.	such	as pe	n-kn	ives, s	oissor.	i, loci	cs, in	kstand	ls, liv	ories	1,500	
	product, creat t	•	•	•	•	•	•	•	•	•	``		
						100	12					11,708	11,708
	. & C. of T. & P	٠	•	٠	A	68		a.	•	•	•	8,000	8,000
A	STRACT-				- YE	18.02	2.84	65					
	Scientific instruments	and I	Drawi	ng m	atoria	ls .	3.00	Ø.	•	•	•	16,036	
	Plants and Machinery	•	•	•	-9	•		ÿ.	•	•	••	74,000	
	Tools	•	•	•	•	l III II	641	•	•	•	•	3,117	
	Camp equipage 🔒	•	٠	٠	•	•	19		٠	•	•	50,222	
	Office furniture ,	•	•	٠	1	•	2.12	28	•	•	•	11,708	
	R. & C. of T. & P.	•	•	٠	- 62	-163	3.47	÷.,	•	•	٠	8,000	
					UC I	2010	22.6		TOTA	L	•	1,63,083	1,63,083

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Serial			Estimated	Probable	Expenditure				
No.	Itom		amount	1948-49 6 months	1949-50	1950-51			
						Rs.	Rs.	Rs.	Rs.
1	Surveys through the Survey of India direction of C.W. I.N.C.	s at	laff u	nder	the	5,86,500	42,000	3,22,500	2,22,000
2	Other river and land surveys to be a C.W.I.N.C. staff.	arrie	ed out	t by	•	48,500	6,000	28,500	1,400
3	Soil Surveys	•				17,000		17,000	-,
4	Temporary Buildings			•		10,000	5,000	5,000	••
5	Discharge and Silt Observations					69,310	17;000	34.310	18,000
6	Meteorological Surveys	•			•	2,000	1.000	600	400
7	Geological investigations and Mineral	surv	VOVS			1,87,960	25,000	1,62,960	••
8	Communications	•	•		•	15,000	10,000	5,000	••
9	Special T. & P. for Laboratory, Appa	ratus	for a	oil Sı	irveys	11,000	11,000	••	••
10	Electric load and property surveys	•	•		•	15,000	••	15,000	••
11	Working of motor vehicles	•			•	30,000	7,500	15,000	7,500
12	Establishment	•				2,84,880	70,000	1,44,880	70,000
13	т.&Р	•	-	55	31	1,63,083	40,000	1,13,083	10,000
14	Contingencies and Sundries .	•	as	28	224	69,767	15,500	36,167	18,100
	TGTAL	•	- Viji			15,10,000	2,50,000	9,00,000	3,60,000

YEARLY DISTRIBUTION OF THE AMOUNT OF THE OVERALL ESTIMATE FOR SABARMATI INVESTIGATIONS

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(Sd) M.D. MITHAL, Director, Irrigation and Waterways.

ESTIMATE FOR PRELIMINARY SURVEYS AND INVESTIGATIONS IN CONNECTION WITH PROJECTS FOR MULTIPURPOSE DEVELOPMENT OF THE SABARMATI BASIN PREPARED IN ACCORDANCE WITH THE INSTRUCTIONS OF THE AD-HOC COMMITTEE

ABSTRACT

I. WORKS															
1. Dams and Appurtenan	t wor														
A. preliminary Expen	808			•				•			•		•		75,120
K. Buildings .	•	•	•	•	•	•	•			•		•	•		10,000
2. Main Canal and Brand	hes		•		•	•	•				•				1,44,900
3. Discharge and Silt Ob	BOLVA	tions		•					•	•					33,400
4. Meteorological Observ	ation	5	•		•	•			•	•					2,000
5. Mineral Surveys	•	•	•	•		•	•		•		•	•	•	•	5,000
6. Surveys for Piscicultu	F 0		•		•	•	•	•	•	•				•	1,000
7. Malaria Surveys		•	•		•	•	•	•	•	•	•		•	•	2,000
8. Electrical Load Survey	ув		•	•		•	•	•	•	•		•			10,000
9. Economic and Proper	ty Su	tveys	•	•				•	•	•	•			•	5,000
10. Communications	•	•	•	•	•	•	•	•	•	•	•	•	•		10,000
11. Special Tools and Play	nt	•	•	٠	•	•		•	•	•	•	•	•		71,000
PO(conti							·								3,69,420
2% conti	mBette	toe	٠	•	•	-		•	•	٠	•	•	•	۰.	7,388
II. TOOLS AND PLANT					Si	12	èle.	2			То	tal W	orks	•	3,76,808
Tools and Plant	•	•	•	•	(7. N.			59	•	•	•	•	•	•	1,41,000
	2%	cont	inge	ncios	18		•	×-	•	•	•	•	•	•	2,820
III. ESTABLISHMENT	•	•	•		1		11.	1.	•	. •	•	•	٠	•	1,43,820 2,66,210
					Y	144	64.9			C	BAND	Тот	AL.		7,86,838
					de	63	64.3	52				6	Say	•	7,87,000
					10	161	12	n, -							
				•	licht	Sile	22	1				(8d.)) M. I	D. M17	THAL,

सन्यमेव जयते

Director, Irrigation and Waterways.

DETAILS

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			$\boldsymbol{\nu}$	UT A	ILS								
I. WORKS-													
Dams and Appurtenant													
A. Preliminary Expense		A	1										
1. Survey of the reservoir 10 ft.—5ft. intervals on			grapn	y and	groui	ICI BU	rvey	and j	HOLEII	ug co	ncours		
40 square miles @ 375/p	-		•	•	•	•	•	•	•	•	•	•	15,000
 Survey of the dam sites of 32"=1 Mile. 	and weir si	tes by air j	photog	g raphy	and g	grour	d sur	veys a	and pl	lottin	g on s	cale	
1280 acres @ 4-0 per ac	re			•	•	•						•	5,120
3. Rapid 2" map of Dharo				•	•	•		•		•	·	•	2,000
4. Geological Investigation by boring, core drilling,									the r	08 0rv (oir ba	sins	
46 holes each of 50-230	•	• •			•	•	•	•	•	•	•	•	46,000
5. Soil analysis and burro						sting	•	•	•	•	•	•	5,000
6. Model experiments by t	ne indian y	vaterways	Statio	n Poor	18		•	•	•	•	•	•	2,000
K. Buildings													75,120
Temporary Buildings						•			•			•	10,000
II. Main Canals and Branch		• •				•							·
(a) Surveys of the comr		for alignm	nent of	f canal	e								
1,20,000 acres @ 1-2-0				CENTS.	3	•		•		•	•	•	1,35,000
(b) Miscellaneous Survey	ys .		£33	523	122	5						• `	5,000
(c) Longitudinal Section	n of the riv	ver and its	tribu	taries	with	CTOBE	secti	ons 1	00 mi	il o s @	25/-		
per mile.	•••	• •	- 631	\cdot R	• //	· .	•	•	•	•	•	•	2,500
(d) Soil Surveys, L.S.	• •	• •			-	•	•	•	•	•	•	•	2,400
			- Y)	146	11								1,44,900
III. Discharge and Silt obset and four khallasies at e and laboratory equipmen	ach dischar	riod Octobe ge site, cos	er 194 st of r	8 to M opes, o	ay 19 discha	50=2 arge	20 mo rods,	nths). floats	On gaug	e boat ges, si	inan ilt san	aplers	•
4 sites at Rs. 5,000/- per		r for 20 m	onths.		255	1	•	•	•	•		•	· 33,400
IV. Meteorological observation	ons, raingau	ges, tempe	rature	, humi	idity a	and v	wind '	veloci	ty obs	ervat	ions	•	2,000
V. Mineral Surveys	• •	•	40	यमव	नयत				•	•	•	•	5,000
VI. Surveys for Pisciculture			•	•			•	•				•	1,000
VII. Malaria Surveys				•					•				2,000
VIII. Electrical Load Surve	Va					•	•	•	•		•	•	10,000
IX. Economic and Property	-					•		•		•		•	5,000
X. Communications							-		•				10.000
XI. Special Tools and Plant	. 1 Diamond	drill com	nlete v	with ac	- 	ries (d Ra	. 60.00	- 10 680	h.			60,000
Testing apparatus and l		-	-								moist	ыгө	•••
content, consolidation, e		• •	•	•	•			•		•	•		11,000
•			-									,	71,000
	2% contin	ngencies											3,69,4 20 7,388
	Total w		-	-	•							_	3,76,808
	TOMM M	ULR										•	410,000
II. TOOLS AND PLANT		. 7 mahin	lan A	70001	anab								49,000
1. Motor vehicles for su 2. Working-expenses fo				1000/-	. cercu		•	•		:	•	•	49,000 22,000
3. Scientific instrument			le.	•	•	•	•	•	•	•	•	•	30,000
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Ordinary Tools and Pla	ant	•	•	•	٠	٠	•	•	٠	•	٠	•	•	5,0
Camp equipage	• •	•	•	•	•	•	٠	٠	٠	•	•	•	•	15,0
, Office Furniture	• •	•	•	•	•	•	•	•	•	•	•	•	•	15,0
R. & C. of T. & P.		•	•	•	•	٠	•	•	٠	•	•	•	•	5,0
														1,41,0
	2% cont	ingen	loies	•	•	•	•	•	•	•	•	•	•	2,8
	Total To	ols an	nd Pla	nt									•	1,43,8
ESTABLISHMENT-														_
1. Pay of Officers-														-
Executive Engin	eer l No. 🧔	9 875	/- p. 1	n. for	15 m	onths		•	•			•	•	18,
Assistant Engine	eers 8 No. @	3 56 0	/• p.n	n, for	15 ma	onthe						•	• •	25,2
Asstt. Goologist	1 No. @ 50	0/: p.	m. fo	r 6 ma	nthe	•			•		•	•		8,0
Drill Foreman 1	No. @ 1000)/- p.1	m. for	6 mo	ntha				•				•	θ,(
														47,3
A D A D A D														¥1,3
2. Pay of Establishmen														
Accountant 1 No						•	•	•	·	•	•	•	•	3,(
Head Clerk 1 No.						•	•	•	•	•	•	•	•	2,7
Senior Clerk 3 No					Contract Contract	12	•	•	•	•	•	•	•	6,1
Storekeeper 1 No	- · ·			A	 A state 	876.	25	•	•	•	•	•	•	2,2
Senior Draftsmar						h	63	•		•	•	•	•	3,0
Junior Clerks 7 N							8° -	•	•	•	•	•	•	9,7
Junior Draftsman	-		-	 OA, G 	mont	ha	g-	•.	•	•	•	•	•	2,1
Tracers 2 Nos. @				1.20	993	294	Υ.÷	٠	•	•	•	•	•	3,1
Sub-Assistant Su						8.10	•	•	•	•	•	•	•	2,5
Compounder 1 No					81.4	3 h i	•	•	•	•	•	•	•	2
Overseers 12 Nos					The second second		<u>R</u> .	•	•	•	•	•	•	43,2
Research Assista							9	•	•	•	•	•	•	3,6
Laboratory Asst						ths	÷.	•	•	•	•	•	•	3,4
Silt Analyst 1 No								•	•	•	•	•	•	3,0
Asstt. Silt Analy						hs	۰.	•	•	•	•	•	•	1,3
Gauge readers 5]	· ·	-				•	•		•	•	•	•	•	5,2
Senior Observers					onth	ß.	•	•	•	•	•	•	•	5,4
Daffadars 4 Nos.						•	•	•	•	•	•	•	•	1,9
Barkandazes 5 N					hs	•	•	•	•	•	•	•	•	2,4
Peons 13 Nos. @					•	•	•	•	•	•	•	•	•	6,4
Khallasies for ove								•	•	•	•	•	•	5,9
Laboratory Khall	lasies 3 Nos	. @ 3	33/- p	m. for	15 n	nontha	3	•	•	•		•	•	1,4
Chowkidars 5 No	e. @ 33/- p.	.m. fo	or 15 I	nonth	8	•		•	•	•	•	•	•	2,4
Dak Runners 5 N	los. @ 33/-	p.m.	for 1	5 mont	the	•	•	•		•	•	•	•	2,4
Ferro printer 1 N	ío. @ 60/• p	.m. f	or 15	mont	18	•	•	•	•	•	•	•	•	9
Daftri 1 No. @ 3						•	•	•	•	•	•	•	•	4
Special pay for 3	Clerks for l	handl	ing ce	sh for	15 п	aonthe	@ 2	0/- p.	m.	•	•	•	•	8
														1,26,8
8. Dearness Allowance					•	•	•	•	•	•	•	•	•	7,0
4. Dearness Allowance					nths	•	•	•	•	•	•	•	•	38,0
5. Travelling allowance					-	•	•	•	•	•	•	•	•	20,0
6. Travelling allowance					onthe	3.		•	•	•	٠	•	• .	15,0
7. Establishments cont	ingencies (f	or 15	mon	the).	•	•	•	•	•	•	•	•	•	12,0
														2,66,2

15 M. of I. & P.

71

TOOLS AND PLANT

49,0
22,0
71,0
10,2
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	Copper ghadas for water 10 Nos. @ 1 Iron pegs and nails L. S.		NOI1	•	•	•	•	•	•	•	•	•	•	150
	Pick axes 48 Nos. @ 6/- each		•	•	•	•	•	•	•	•	•	•	-	100
		•	•	•	•	•	•	•	•	•	•	•	•.	288
	Hand Saws 12 Nos. @ 3/- each	•	•	•	•	•	•	•	•	•	•	•	•	72
	Stenoil plate figures 1 No. @ 29/- cash	• • •	•	•	•	•	•	•	•	•	•	•	•	96
	Stencil plate letters 1 No. @ 30/- eac			•	•	•	•	•	•	•	•	•	•	29
	Fire buckets 48 No. @ 8/- each			•	•	•	•	•	•	•	•	•	•	30
	Nail extractors 6 No. @ 10/8/- each	•	•	•	•	•	•	•	•	•	•	•	•	384
	Phahorahs 48 No. 10/- each	•	•	•	•	•	•	•	•	•	•	•	•	63
	Crowbars 24 No. @ 25/- each	•	•	•	•	•	•	•	•	•	•	•	•	480
	Sundries	•	•	•	•	•	•	•	•	•	•	•	•	600
		•	•	•	•	•	•	•	•	•	•	•	•	72
										Τ	otal	•	•	5,000
4.	Iam p E quipage													
	Chairs folding 16 No. @ 12 each		•	•	•	•	•	•		•		•	•	192
	Tables camp folding 16 No. @ 30/- e	aoh			•				•	•	•			480
	Swiss cottage double fly tent I No. 1	$12' \times 1$	2' @	1,000	/- eac	h.					•			1,000
	Double fly tents 10 No. 10' × 10' @ '		_	•		•	•		•				•	7,000
	Shouldaries 12 No. @ 500/- each	•							•					6,000
	Necessary tent 1 No. @ 100/- each													100
	Country charpoys 24 No. @ 8/- each			~1		3.								192
	Sundries	•	. 1	6 B	122	9.E.	à.				•			36
			4	981			2							15,000
				13318	1975	83976	3							
	1. Mar			6053			7							
5. (fice Furniture			-		1Ý	9							
5. (Officer's Writing tables 1 No. @ 170			No.		Ň				•		•		170
5. (Officer's Writing tables 1 No. @ 170 Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil	cloth	6 No	- I Country of the	25/-	each		•	•	•	•	•	•	170 750
5. (Officer's Writing tables 1 No. @ 170 Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No.	cloth	6 No	- I Country of the	25/-	each	A	• •	• •	• •	• •	• •	• •	
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each	cloth	6 No	- I Country of the	25/-	each	3	• • •	• • •	• • •	• • •	• • •	• • •	750
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each	cloth @ 10	6 No 00/- e	- I Country of the	25/-	esoh	3	• • •		• • •	• • • •	• • •	• • •	750 2,500
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124	cloth @ 10 5/- ca	6 No 00/- e ch	ach	25/-	each	2	• • •	• • • •	• • •	• • • •	• • • •		750 2,500 1,000
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^{\dagger} \times 3' \times 2\frac{1}{2}'$ 'with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @	cloth @ 10 5/- ca	6 No 00/- e ch	ach	25/-	esch	6			• • • •	• • • •	• • • • • • •		750 2,500 1,000 210
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ Steel trunks 16 No. @ 25/- each	cloth @ 10 5/- ea 9 40/-	6 No 00/- e ch . each	ach	25/	each		• • • •	• • • •	• • • • • • •	• • • •	• • • •		750 2,500 1,000 210 2,000
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{2}'$ 16 No. @ 60,	cloth @ 10 5/- ea 3 40/-	6 Nc 00/- e ch each h	ach	्रि स्मेव	each				• • • • •	• • • • •	• • • • •		750 2,500 1,000 210 2,000 640
5. (Officer's Writing tables 1 No. @ 170. Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 121 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7	cloth @ 1 5/- ea 3 40/- No. @	6 Nc 00/- e ch - each h 3 30/-	ach	्रि स्मेव	each				• • • • • •	• • • • •	• • • • •		750 2,500 1,000 210 2,000 640 400
5. (Officer's Writing tables 1 No. @ 170. Writing tables $5^* \times 3' \times 2\frac{1}{4}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{4}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{4}' \times 1\frac{1}{4}'$ 16 No. @ 124 Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{4}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7 Steel stamp boxes 6 No. @ 10/- each	cloth @ 1 5/- ea 3 40/- No. @ h .	6 Nc 00/- e ch - each h 3 30/-	ach	्रि स्मेव	each		· · · · ·	· · · ·	• • • • • •	• • • • •	• • • • •		750 2,500 1,000 210 2,000 640 400 960
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^4 \times 3' \times 2\frac{1}{4}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{4}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{4}' \times 1\frac{1}{4}'$ 16 No. @ 124 Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{4}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel stamp boxes 6 No. @ 10/- eaco Cotton floor carpets 5 No. @ 100/-	cloth @ 1 5/- ea 3 40/- No. @ h .	6 Nc 00/- e ch - each h 3 30/-	ach	्रि स्मेव			• • • • • •	· · · · · · · · · · · · · · · · · · ·	• • • • • •	• • • • • •	• • • • • •	· · · ·	750 2,500 1,000 210 2,000 640 400 960 21
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^4 \times 3' \times 2\frac{1}{4}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{4}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{4}' \times 1\frac{1}{4}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{4}' \times 1\frac{1}{4}'$ 16 No. @ 60, Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{4}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel stamp boxes 6 No. @ 10/- eaco Cotton floor carpets 5 No. @ 100/- 0 Teapoys 16 No. @ 20/ each	cloth @ 10 5/- ea 9 40/- - eac No. @ h	6 Nc 00/- e ch - each h 3 30/-	ach	ग्निव	े <i>पि</i> जयने		· · · ·	· · · ·	• • • • • •	• • • • • •	• • • • • • • •	· · · · ·	750 2,500 1,000 210 2,000 640 400 960 21
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7 Steel stamp boxes 6 No. @ 10/- each Cotton floor carpets 5 No. @ 100/- Teapoys 16 No. @ 20/ each Cupboards $4' \times 3' \times 5'$ with 6 drawer	oloth @ 10 5/- ea 9 40/- - - eac No. @ h - each - s each	6 Nc 00/- e ch - each h 3 30/-	ach	ग्निव	े <i>पि</i> जयने	Vo. @	· · · · · ·		· · · · · · · · · · · · · · · · · · ·	• • • • • • •	• • • • • • • • •		750 2,500 1,000 210 2,000 640 400 960 21
5. C	Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7 Steel stamp boxes 6 No. @ 10/- eac Cotton floor carpets 5 No. @ 100/- 0 Teapoys 16 No. @ 20/ each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- 0	oloth @ 10 5/- ea 9 40/- - - eac No. @ h - each - s each	6 Nc 00/- e ch - each h 3 30/-	ach	ग्निव	े <i>पि</i> जयने		· · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • •	• • • • • • • •		750 2,500 1,000 210 2,000 640 400 960 21
δ. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7 Steel stamp boxes 6 No. @ 10/- each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- of Call Bells 12 No. @ 4/- each	oloth @ 10 5/- ea 9 40/- - - eac No. @ h - each - s each	6 Nc 00/- e ch - each h 3 30/-	ach	ग्निव	े <i>पि</i> जयने	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		• • • • • • • • • • • •	• • • • • • • • • • • •	• • • • • • • • • • • •	· · · · ·	750 2,500 1,000 210 2,000 640 400 960 21
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7 Steel stamp boxes 6 No. @ 10/- eac Cotton floor carpets 5 No. @ 100/- 0 Teapoys 16 No. @ 20/ each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- 0	oloth @ 10 5/- ea 9 40/- - - eac No. @ h - each - s each	6 Nc 00/- e ch - each h 3 30/-	ach	ग्निव	े <i>पि</i> जयने		· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • •	• • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·	750 2,500 1,000 210 2,000 640 400 960 211
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18''$ 7 Steel stamp boxes 6 No. @ 10/- each Cupboard $4' \times 3' \times 5'' \times 18''$ 7 Steel stamp boxes 6 No. @ 100/- G Cotton floor carpets 5 No. @ 100/- G Coupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- G Call Bells 12 No. @ 4/- each Peon belts 13 No. @ 5/- each High Chairs for tracers 2 No. @ 20,	cloth @ 1 5/- ea 2 40/- - - - - - - - - - - - - - - - - - -	6 No 000/- 0	ach	ग्निव	े <i>पि</i> जयने	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • •	• • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·	750 2,500 1,000 210 2,000 640 400 960 21' €
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5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawors 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15'' \times 18'' 7$ Steel stamp boxes 6 No. @ 10/- eac Cotton floor carpets 5 No. @ 100/- G Teapoys 16 No. @ 20/ each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- each Peon belts 13 No. @ 5/- each High Chairs for tracers 2 No. @ 20, Chamber pot 1 No. @ 5/- each Locks 36 No. @ 3/- each	cloth @ 1 5/- ea 2 40/ - - - - - - - - - - - - - - - - - - -	6 No 000/- 0	ach · · · · · · · · · · · · · · · · · · ·	• • • • •	े <i>पि</i> जयने	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·	750 2,500 1,000 210 2,000 640 400 960 21(€
5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel stamp boxes 6 No. @ 10/- each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- each Call Bells 12 No. @ 4/- each High Chairs for tracers 2 No. @ 20, Chamber pot 1 No. @ 5/- each Looks 36 No. @ 3/- each Brass pad looks 8 Nos. @ 10/- each	cloth @ 10 	6 Nc 000/- 0	ach · · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	े <i>पि</i> जयने	No. @					•••••••••••••••	· · · · · · · · · ·	750 2,500 1,000 210 2,000 640 400 960 21: 6
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5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 122 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel trunks 16 No. @ 25/- each Cupboard $4' \times 3' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel stamp boxes 6 No. @ 10/- each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- each Call Bells 12 No. @ 4/- each High Chairs for tracers 2 No. @ 20, Chamber pot 1 No. @ 5/- each Looks 36 No. @ 3/- each Brass pad looks 8 Nos. @ 10/- each	cloth @ 10 5/- ea 2 40/ - eac h	6 Nc 000/- 0	ach · · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	े <i>पि</i> जयने	No. @				••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••	· · · · · · · · · · · · · · · · · · ·	750 2,500 1,000 210 2,000 640 400 960 211 6 108 120
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5. (Officer's Writing tables 1 No. @ 170, Writing tables $5^* \times 3' \times 2\frac{1}{2}'$ with oil Writing table with 2 drawers 25 No. Office chairs 50 No. @ 20/- each Easy chairs 6 No. @ 35/- each Cupboards $6' \times 4' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 124 Record stands $4' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ 16 No. @ 60, Benches with backs $5' \times 15' \times 18'$ 7 Steel stamp boxes 6 No. @ 10/- each Cupboards $4' \times 3' \times 5'$ with 6 drawer Waste paper baskets 14 No. @ 2/- each Call Bells 12 No. @ 4/- each High Chairs for tracers 2 No. @ 20, Chamber pot 1 No. @ 5/- each Looks 36 No. @ 3/- each . Brass pad looks 8 Nos. @ 16/- each Pigeon holes for despatoh clerks 5 1 Scales and weights 5 No. @ 20/- each	cloth @ 10	6 Nc 000/- e - - - each - - - - - - - - - - - - - - - - - - -	ach	· · · · · · · · · · · · · · · · · · ·	े <i>पि</i> जयने	No. @				•••••••••••••••••••••••••	•••••••••••••••••••••••••••••••••••••••	· · · · · · · · · · · · · · · · · · ·	750 2,500 1,000 210 2,000 640 400 960 21' f f 108 120 125 100

Hurricane Lanterns 24 No. @ 5 Table Lamps 10 No. @ 25/- each										•	-	•	120
	•••	*	•	•	•	•	•	•	•	•	•	•	
Cycles 2 No. @ 225/-each		•	•	• •	•••	·	•	•	•	•	•	•	45 0
Safos 4 No. @ 400/-oach	•		•		•	•	•	•	•			•	1,600
Stools wooden 12 No. @ 6/- eacl	h.	•		•	•	•		•	•	•			78
Sundries	•	•	٠	•	•	•	•	•	•	•	•	•	374
									To	tal			15,000
. R. & ('. of T. & P											•		5,000



I. WORKS												Year 1948-49	Year 1949-50
(i) Preliminary Expenses											•		
1. Survey of reservoir basin	n		•	•	•	•	•	•	•	•	•	7,500	7,50
2. Survey of Dam Site .		•	•	•	•	•	•	•	•	•	•	5,120	- •
3. Rapid 2" map of Dharoi		i sito	•	•	٠	•	•	•	•	•	•	2,000	
4. Geological investigations	3		•	•	•	•	•	•	•	•	•	• ••	46,00
5. Soil analysis etc		•	•	•	•	•	•	•	•	•	•	5,000	••
6. Model Experiments .		•	•	•	•	•	•	•	•	•	•	••	2,00
(ii) Buildings													
Temporary Buildings .		•	•	•	•		•	•	•	•	•	10,000	• •
(iii) Main Canals and Branch	ies										3		
I. Survey of the command		-08						•				67,500	67,5
2. Miscellaneous Surveys					•	•						•••	5,0
3. Longitudinal Section of		iver		•					•	•		2,500	•
4. Soil Surveys .									•		. '	2,400	•
(iv) Discharge and silt observa	tion											20,000	13,40
(v) Meteorological Observation.	8		•	•		•			•	•		2,000	•
(vi) Mineral Surveys						•	•	•	•	•		5,000	•
(vii) Surveys for piscisulture						-						••	1,0
(viii) Malaria Surveys					0	dias	3.		•	•	•	2,000	
(ix) Electric Load Surveys		•	•		633	388		8				••	10,0
(a) Economic and property Su	rveu		•	. 1	1043			S.			•	2,500	2,5
(xi) Communications .	•				- 68			3.				10,000	•
(xii) Special Tools and plant					.90	48s		7 .	•			••	60,0
(xili) Testing Apparatus and	labo	rator	y equ	sipme	nt	1.71	11		•			11,000	
Contingencies .		•	•		- 1	9113	2.00	•	•	•	•	2,555	4,99
-					A			Æ			~	1,57,075	2.19,8
II. TOOLS AND PLANT Tcols and Plant					6	4000	巡	2	•	•		1,43,820	• •
III. ESTABLISHMENT		•	•							•	•	1,33,105	1,33,10
					स	GRANT	Tor	AT.				4.34,000	· 3,53, 00

	Yearly distribution of	f the amount o	f the foregoin	g estimate
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(Sd.) M. D. MITHAL, Director Irrigation and Waterways

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APPENDIX VII

C. P. AND BASTAR PROJECTS

Central Provinces and Berar together with Bastar State which has recently merged into this province are one of the richest provinces of India in minerals. There are vast deposits of coal, bauxite, iron, copper, manganese, limestone etc. etc. The quality of coal found, however, is rather inferior and on that account practically no industrial use of the mineral wealth of the tract has so far been attempted. Surveys for the prurpose of utilising the water resources of the area were undertaken about thirty years ago but the results were surprisingly disappointing. In the main it was brought out that in spite of the copious rainfall over the entire area the resources could not be utilised to produce cheap power or cater for much irrigation ! At the request of the C. P. Government a fresh survey was undertaken by the CWINC and it was discovered that potential for power exceeded one million kW. and water could also be made available for perennial irrigation of nearly a million acres of cultivated and cultivable land.

In Bastar State at the request of the State Ministry a similar survey was carried out. This State has about the richest iron ore deposits concentrated in two small areas one on either side of the river Indravati. The percentage of iron in the ores is believed to be from 68 to 70. Potential of power on the Indravati river was found to be nearly 3,00,000 kW. continuous. The plateau of Jugdalpore was similarly discovered to be in a very undeveloped state, only a small portion being utilised for cultivation while actually cultivation could be extended over a much larger level and fertile area.

The possibilities of development were discussed with the Government of C. P & Berar and their technical officers and at a conference held in April, 1947 it was decided to select 8 projects besides those on the Narbada and Tapti for investigations with a view to prepare the detailed development estimates. C. P. Government also desired that the work of investigations should be done by the CWINC. The sites selected for investigations are given in the accompanying list in which other details of the projects are also shown. Similarly the projects for Bastar State have also to be investigated by CWINC. Details of the projects in that area are also shown in the list. The estimate amounting to Rs. 71,17,140 has been prepared to cover the cost of necessary work involved in the surveys and investigations. It is proposed to set up a Circle with three divisions and requisite number of sub-divisions, subordinate and ministerial staff to man the work of investigations. As in other programmes of investigations, survey works of dam sites, reservoir areas, areas to be commanded for irrigation will be completed through the agency of the Survey of India Department. Hydrological surveys and Geological surveys will be done in close co-operation with the Indian Meteorological Department and Geological Survey of India respectively. Provision has also been made for surveys for malaria control, fish cluture, navigation, soil-conservation etc. Provision for the acquistion of necessary plant for geological and hydrological and other surveys has been adequately made. The work is estimated to take four years to complete. The principal feature of the 12 projects 8 in C. P. and Berar and 4 in Bastar state are shown in accompanying statement.

Index map showing dam sites etc. is enclosed.

K. M. BHATIA,

Project Officer, C. W. I. N. C.

				!	>			ABTTA HVA					•		
SJ. No.	Name of trībuta ry	Name of Nearest village	Longi- Nam tude and state latitude prov of left bank in w at dam site dam read	es of s or hices hich and fall	Maps in which the dam & water spread falls	Approx. distance from head in miles	Catch- ment area in 8q. milea	R. L. of top of proposed dam M.S.L.	Approx. height of dam above bed of river in t		Capa- Subme roity in god a million in ac. ft. acres	Submer- ged area in acres	Minimum power (Projects) itself kW.	Minimum power in connec tion with other kW.	Irrigation Poten- tial acres
-	5	ę	4	ъ,	Ð	7	œ	6	10	Ξ	12	13	14	15	16
I Pen	l Pench River .	North of Alkata,	79°16'E 21°43' N	C. P.	55 0/5,1		1,416.8	1,750	125	11.12	662	15,870	6,300	6,300	1,00,000
2 Wai	2 Wainganga . rivar	North of Khana	80° E 92°93' N	C. P.	55N/15 84/R/3	86. 100	1,377.28	1,450	75	8 - 745	•36	15,488	1,800	1,800	50,000
3 Pan <u>3</u>	3 Penganga river	At Amti	77°22' E 19°58' N	C. P. & a little of Hydera-	8 56E/5,1 f 55H/4 . 55D/16	. 252	1,596.8	1,600	120	2.97	l • 48 3	35,200	13,400	13,400	3,00,000
4 War	4 Wardha river	East of Morai	78°5'E 10°33' N	C. P.	55, K/3,7	01 R	1,726-72	I,150	116	6-765	0.533	24,000	4,370	4,370	75,000
5 Pairi	Pairi river	North of Nirai de	81°59' 80" E	° C. P.	64H/14 & L/2:	ि 2 मेन ज्	1,196.8	1,140	110	4 · 455	1-22	48,000	6,360	6,360	1,00,000
6 Jonk ri <i>r</i> er	r ri /er .	East of Uprani	20 41 1 82°33'E 21°35' 30° M	C. P.	64K/10 64/K/10 64/K/10	8	1,227.2	880	112	• 746	1-22	50,000	5,000	6,000	1,00,000
7 Hasado .	чdо	North of Lotlota	82°42' 30" E 22°28' 30" M	C. P.	64 J/11,10 104 64 J/11	10 104	3,000	1,050	120	1.5	. 893	16,448	6,520	6,520	3,00,000
8 Mahanadi	. ibana	At Satiara	~ 64	C. P. & Eastern States.	64 M/6 64 N/6 7,10	62	1,133	1,207	77	5-280	1-22	28,000	5,000	5,000	1,50,000
9) Indri 10 Stribu	9) Indravati river 10 Stributary of	Chitrakote	81°43'	Eastern States	11		5,000						27,000	27,000 V	Very little
11 J Goda	wari	Bargur	81°24' E	Eastern			7,347						32,500 (65,000 V.	Very little
		Bhopalpat- nam.	- 80°18′E	C P. & Eastern	65B/5 65 A/ 4,8 B/1 5 0	4,8 4,8	16,312	450	160	5.280	8 • 75]	1,54,000	87,680 1	1,28,000 V	Very little
12 Sabari	·	Guma	81°52' E 18°35' N	C. P. & Eastern States	ie,1/a		2,744	800	100	1.980	2 -4	64,000	14,400	22,000	6,90,000

ROUGH DATA FOR DAM SITES

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C. P. & BASTAR PROJECTS

Overall estimate for the preliminary surveys and investigations on 12 projects in the Central Provinces and Bastar State. (4 in upper Mahanadi basin, 4 in middle Godavari basin, and 4 in Bastar State).

I. WORKS

ABSTRACT

1. Dame and Appurtenant	Wor	ka													Rs.
(A) Preliminary Expe			•		•	,	•	•							6,80,000
(K) Buildings					•	•	•			•	•		•		1,50,000
2. Main canals and branch	188						•			•					10,60,000
3. Discharge observations															3,10,000
4. Silt Observations			•												1,37,200
5. Property Surveys									•			•	•	-	28,800
6. Meteorological Surveys															1,08,720
7. Geological Surveys					•					•	•		•	•	19,61,040
8. Communications	•	•	•	•	•	•			•	•		•	•	•	1,50,000
										•				-	45,85,760
		•							2%	Conti	ngono	ies	•	•	92,000
					and	Fai	10		Тот	AL W	ORKS		•	•	46,77,780
II. TOOLS AND PLANT	•			. <		12		3.			•	•	•	•	4,46,000
I. ESTABLISEMENT .		•		•	1.1		•		•			•	•	• .	19,93,380
					- QSA	10	247		Tor	L	•	•	•	•	71,17,140
Distribution—					- VI	เก	11								
1/3 debitable to upper 1	laha	nadi	basin		11	14.2	11			•	•				23,7 2 ,380
1/3 debitable to middle (State		110.00	÷.,		•		•			23,72,380
1/3 dobitable to Bastar S Allotment required	štato	proj	oota	•			25	7-	•	•	•	•	•	•	28,72,380
			1.4				0.4		442						

lst year 2nd year 3rd year 4th year

16,52,000 20,65,000 17,00,000 17,00,000

DETAILS

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I. WORKS

1. Dam and Appurtement Works

(A) Preliminary expenses

(a) Surveys to be carried out by Survey of India.

Reservoir Surveys	teys	urve	r 8	Reservoit	R
-------------------	------	------	-----	-----------	---

Pairi			۰.				•		•	•				75	sq. miles
Jonk					•		•		•	•				78	do.
Hasado		•				•		•			•		2	26	do.
Mahanadi					•			•			•			44	do.
Bhopalaps	itna	m							•	•	•			241	do.
Sabari	•	•		• .				•			•	•		100	do.
Chitrakot	and	Bara	9ur	•										3 00	do.
Pench	•	•				•		•						25	do.
Waingange	3										•			25	do.
Ponganga			•	·`					•			•		55	do.
Wardha	•	•	•	•	•	•	•	•	•	•	•	•		38	do.
														1,007	do.

1,007 sq. milos @ 375/- per sq. m Surveys to be carried out by O.W.I.N.O.	ile	•	•	٠	•	•	•	•	.•	Ra. 3,80,00
Longitudinal Sections and other miscellane reservior, surveys, pisciculture, etc.	ous s	urvej	78 like	e canal	alig	nment	surv	078,	specia	1
12 sites @ 25,000/- per site	•	•	•	•		•	•	•	•	3,00,00
						-	•	•	•	6,80,00
(K) Buildings-										0,00,00
Temporary buildings-Lump Sum										
Main canals and branches	•	•	. •	•	•	•	•	•	٠	1,50,00
Survey of irrigation area.										
18,75,000 acres @-/9/- per acre	•			_						10 40 0
Discharge observations (No. of sites-12) (one at each pr	oioci	, site)	•	•	•	•	•	•		10,60,00
Expenditure per site	•	,							Inon	
l current meter @ 1,200/-					_				(nott-	recurrin
1 large boat @1,000/-						•	•	•		1,20 1,00
1 small boat @ 500/-	•	•	•	•		•	•	•		50
1 set velocity rods @ 200/ · .	•	•	•	•		-	•	•		20
1 set sounding rods @ 100/-	•	•	-			•	•	•		10
Ropes, etc.				•	•	•	•	•		60
Chronometers				•	•	•	•	•		20
Rack & pinion arrangement	•			•		•	•	•		20
Anchors	÷				÷			·		1,00
(b) Recurring	16	2			•	•	•	•		
	182	5	•	•	•	•	•	•		5,00
l gauge reader @ 75/- for 4 years	•	8	•	•	•	•	•	٠		3,6 0
1 Boatman @ 60/- p.m. for 4 years	1//	8-	•	•	•	•	•	٠		2,88
6 Khalasies @ 50/- for 4 years	19	•	•	٠	•	•	٠	•		14,40
Y /3 V V	W.									20,88
Total for one site	11.		•	•	•	•	•	•		25,88
Total for 12 sites .	117		•	•						8,10,00
. Silt observations	COL-	P								
(i) Equipment non-recurring @ 1,000/- per site		ί.	•	•	•		•			12,00
(ii) 12 silt observers @ 100/- for 4 years .				•		•				57,60
(iii) 16 Khalasies for 4 years @ 50/- p.m	•			•	•					57,60
(iv) Miscellaneous on carriage and transport				•			•	•		10,00
										1,37,20
Property Surveys.—										
2 surveyors @ 100/- p.m. for 3 years .	•	•	•		•	•	•	•		7,20
12 khalasies @ 50/ p.m. for 3 years	•	•	•	•	•	•	•	•		21,60
										28,80
Meteorological Surveys.										
(a) Equipment non-recurring.										
60 new rain gauges @ 500/- each . (b) Recurring.	•	•	•	•	•	•	•	•		30,00
2 Meteorological Assistants @ 200/- for 4 ye	3.78									19,200
2 Senior observers @ 120/- for 4 years .		•	•			-	-	-		11,520
60 part-time observers @ 16/- for 4 years	•	•	•	-		• • •	•	•		48,000
on hard-strees and the tot & loans	•	•	•		-		-	•		

15 M. of I. & P.

(a) Equipment non-recurring.						•							R 8.
8 Diamond Drills @ 75,00	•		•	٠	•	•	•	•	•		•	•	6,00,000
Dismonds and other spare			-		•	•	•	•	•		•	•	3,20,000
2 calyx drills 5"-6" somple					i spar	98 .	•	٠		•	•	•	50,000
8 special boats for drills @) 2, 000	/- ca o	h.	•	•	•	•	•	•	•	٠	•	16, 000
Testing apparatus .	•	•	•	•	•	•	•		•	•	•	•	1,00,000
													10,86,000
(b) Recurring expenditure.													
(3 years operations ar			enou	gh).									
I Geologist @ 800/- p.m. i	-		•	•	•	•	•	•	•		•	•	28,800
S Assistant Geologiste 🥝 4	•	-	are	•	•	•	•	•	٩		•	•	28,800
1 Drill foreman @ 1,000/-	•		•	٠	•	•	•	•	•		•	•	86,000
S Operators (1 per drill) (-	B .	•	•	•	•		•	•	•	43,200
48 helpers (6 per drill) @				•	•	•	•	•	•		•	•	1,38,240
Fuel and other expenditur	ro @ 24	0,000	- p.m	. for	\$0 mc	nths	•	•	•		•	•	6,00,000
Tat	al for (leolo	rical s	10. FV Ø	71 .								8,75,000 19,61,040
. Communications.								-	·	•	•		
Lump Sum	•	•	•	•	•	•	•	•	•		•	•	1,50,000
Total of Works			-	-							_	_	45,85,760
2% Contingencies	•	1	26	20)	12				•	•	•		92,000
		6		- 6	DAND	Тота	L WO)RX8					46,77,760
OOLS AND PLANT-		i i		8	293								
(a.) Camp equipment.		1	994H	2004	189								
13 tonts 14' × 14' @ 1,200/- each			0.4	71.	11								14,400
\$0 tents 10' × 10' @ 800/- each	• •	•	14	Y 84	11		•	•	•	•	•	•	14,000
30 shouldaries @ 600/- each	• •	1	<u>185</u>	1.64	60 M		•	•	•	•	•	•	18,000
30 servants tents @ 500/- each	• •	- #	15/		22		•	•	•	•	•	•	15,000
Camp furniture	•••	1	dr-Si	S)	20			•	•	•	•	•	7,200
	•		Sector Sector		-	•	•		•	•	•	•	
			सत्यम	নি এ	यत								78,600
) Other toole and plant.													
(i) Non-recurring. 15 8/4 ton weapon carrier trucks @	7 0901		_										1.05.000
6 jeeps with trailers @ 7,000/- each			••	•	•	•	•	•	•	•		•	. 1,05,000 . 42,000
12 outboard motor @ 1,000/- each		•	•	•	•	•	•	•	•	•		•	. 12,000
48 levelling instruments @ 1,000/- e		•		•	•	•	•	•	•	•		•	. 48,000
48 measuring chains @ 50/- each		•	•	•	•	•	•	•	•	•	•	•	. 2,400
48-100 ft. tapes @ 30/-each .	•	•	•	•	•	•	•	•	•	•		•	-
48-50 ft. tapes @ 20/- each .	•	•	•	•	•	•	•	٠	•	•		•	. 1,440
8 Theodolites @ 2,000/- each .	•	•	•	•	•	•	•	•	•	•		•	. 960
15 binoculars @ 300/- each	•	•	•	•	•	•	•	•	•	•		•	. 16,000
20 drawing boards @ 30/- each	•	•	•	•	•	•	•	•	•	•		•	• 4,500
AN CITEMITH NOWLOW (OF 90/+ 98/00)	•	•	•	•	•	•	•	•	•	•		•	. 600
	•	•	•	•	•	•	•	•	•	•	1	•	. 3,000
20 plane tables @ 150/- each .	-L			•	•	•	•	•	•	٠		•	. 1,800
20 plane tables @ 150/- each . 12 Prismatic compasses @ 150/- ea	ch	•	-										
20 plane tables @ 150/- each . 12 Prismatic compasses @ 150/- ea 4 planimeters @ 500/- each .		•		•	•	٠	•	٠	•	•	ı	•	. 2,000
20 plane tables @ 150/- each . 12 Prismatic compasses @ 150/- ea		a) 200	/- eac	h	•	•	•	•	•	•	I	•	. 2,000 . 7,200 . 1,000

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(ii) Recourring expenditure. Repairs and carriage of scientific instrume	nts fo	r 4 y	706.74	•							R 50:0
Running expenses for trucks and jeeps for	4 yea	rs .	•	•	•	•	•	•	•	•	1,50,0
											2,00,0
	Tota	(a)	& (b)	Tools	and	Plant	•	•	•	•	4,46,0
ESTABLISHMENT.											
(Provision is for 4 years)											
1 Superintending Engineer @ 1850/- p.m.	•			•	•		•				88,8
3 Executive Engineers @ 800/- p.m. each .	••••	٠	•	•	•	•	•	•	•	•	1,15,6
6 Assistant Executive Engineers @ 600/- p.m. 6 Assistant Engineers @ 500/- p.m. each	CACD	•	•	•	•	•	•	•	٠	•	1,72,5
1 Superintendent @ 300/- p.m.	:	:	:	:	:	:	:	:	•	•	1,44,(14,4
8 Head Clerks @ 200/- p.m. each	•	•	•	•	•	•	•	•			28,
8 Accountants @ 200/- p.m. each 1 Stenographer @ 200/- p.m	•	٠	•	•	•	•	•	•	•	•	28,
18 Upper Division Clerks including S.D.Cs. @		•	•	•	•	•	•	٠	•	•	9,0
32 Lower Division Clerks @ 75/- p.m. each	100/•]	p.m.	евсл	•	•	•	•	•	•	• .	86,
	•	•	•	•	•	•	•	•	•	•	1,15,
3 Steno-typists @ 100/- p.m. each	•	•	•	•	•	•	•	•	•	•	14,4
1 Head Draftsman @ 300/- p.m.	•	٠	•	•	• ,	•	٠	•	٠	•	14,0
8 Senior Draftsmen @ 160/- p.m. each .	•	•	٠	•	•	•	•	•	•	•	23,(
8 Draftemen @ 100/- p.m. each	• .	•	٠	•	٠	•	•	•	•	•	38,4
8 Tracers @ 75/- p.m. each	•	•	•	•	٠	•		•	•	•	28,8
48 Overseers @ 150/- p.m. each		•	•	•	•	•	•	•	•	•	8,45,(
3 Sub-Assistant Surgeons @ 150/- p.m. each	- E			۰.	•	•			•		21.0
6 Research Assistants @ 180/- p.m. each	1353		100	÷ •	•			•			51,1
6 Laboratory Assistants @ 125/- p.m. each	650	<u>م</u>	635	9							\$8.0
8 Compounders @ 75/- p.m. each	132		133								10,8
8 Ward boys @ 50/- p.m.	Sillio		310				-	•	•		7,2
1 Jemadar @ 40/- p.m.	00443	632	889				•	·		•	1,9
28 peons @ 30/- p.m.	U.A.i	11.			•	•	••	•	•	•	40.5
50 Barkandazes @ 30/- p.m.	140	1.51	1.1	•	•	•	•	•	•	•	
12 Daffadars @ 30/- p.m.	C. Stern	1.55	(all)	•	•	•	•	•	•	•	73,4
1 Daftri @ 40/- p.m.	156		121	<u>\</u>	•	•	•	•	•	•	17,8
i Dateri @ woj. p.m.	an Si	29)	1.5	f -	•	•	•	•	٠	•	1,9
		10.00			Tor	L	•		•	•	11,93,3
Dearness allowance and increments @ 25 %	मयमे		तयने		•	•		•	٠		8,00
Travelling allowance		•		•	•						8,00,0
Establishment contingencies including office fu	niture	: ty	Dewri	ters et	¢.		•		•		\$,00,0
	•	• - •	6			-	-	-	-		

The 3rd May, 1948

(8d.) K.M. DRATIA Project Officer, O.W.I.N.C.

Estimates for preliminary surveys and investigations in connection with projects for multipurpose development in C. P. and Bastar State prepared in accordance with the suggestions of the Ad-Hoc Committee.

ABSTRACT

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I. WORKS-															
1. Dams and Appurtenant We	orke—	-													Rs.
(A) Preliminary expense	6						•	•	•	•	•	•	•	•	5,24,000
(K) Buildings .		•					•	•		•	•	•	•	•	1,00,000
2. Main canals and branches								•			•	•			7,59,375
3. Discharge observations		•										•		•	1,65,280
4. Silt observations	•	•	• •.				•	•	•	•	•		•		70,600
5. Property Surveys		•	• •				•	•	•					•	28,800
8. Meteorological surveys		,					•	•	•		•	٠		•	84,040
7. Geological Surveys		•	• •						•	•	•		•	•	16,59,360
8. Communications .			•	•	• •		•	•	•	•	•	•	٠	•	1,00,000
														-	35,01,455
				•			% Con Fotal		encies RES	•	:	•	•	•	70,029 35,71,484
II. TOOLS AND PLANT					•		•	•	•				•	•	4,27,380
III. ESTABLISHMENT .	•	•	•••		15	2	-	•	•	•	•	•	•	•	14,10,375
				á	1308			5			TOTAL	•	•	•	54,09,239
1/2 of above debitable to 1/2 of above debitable to ALLOTMENT REQUIRED	l proj	. Proj Bots i	jects on n Basta	Pair r Ste	ri, Joni ste on	k, Ha Saba	asado ri and	and I Ind	Mahan ravati	nad (3	i rivers projecte) ri	vers	•	27,04,620 27,04,620
				6		DTA	20-91 ILS		18 la						
I. WORKS					સવ્યમ	ণ গ	યત								
1. Dame and Appurtenant [orka-	-					· .								
(A) Preliminary expenses	-		•												
(a) Surveys to be car. Reservoir survey	ried o e	ut b y	7 the Su	rvøy	of Ind	lia.									
Pairi	•		•	•	•	•	•	-	•		• •		•	75	sq. miles.
Jonk	•	•			•				•		• •			78	do.
Hasado	•	•	•	•	•	•	•		•		• •			26	d o.
Mahanadi .		•	•		•	•	•	•	•		• •		•	44	do.
Bhopalapatnam	•	•	•	•	•	•	•		•				•	241	do.
Sabari	. •	•	•	•	••	٠	•		•				•	100	do.
Chitrakot & Bara	asur		,	•	•	•			•				•	300	do.
															(Approx.)
														864	do.
(b) Surveys to be car	-int a		q. mile			per	sq. mi	ile		•	•	•		R	ls. 8,24,000
Longitudinal		-				6 011#	AUTVA	va li	ke can	al s	lienmer	nt er) TVAV	8. 6 11-0-0	ial recorvoir
sur veys, p	iscicu	liture	, etc. 25,000								• •			•	[2,00,000
		-	-												5,24,000

										Rs.
Temporary buildings Lump Sum .	•	•	•	•	•	•	-	•	• •	1,00,000
2. Main Canals and Branches — Survey of irrigation area.										
13,50,000 acres @ -/9/- per acro	•	•	•	•	•	•	•	•	• •	7,59,375
. Discharge observations—										
Number of sites-8 (one at each dam site)		•								
Expenditure per site										
(a) Equipment non-recurring—										
1 current meter @ 1200/	•		•	•	•	•	•		• •	1,200
1 large boat @ 1000/		•	•	•		•	•	•	• •	1,000
1 amall boat @ 500/	•	•	•	•	•	•	•	•	• •	500
I set velocity rods @ 200/	•	•	•	•	•	•	•	•	• •	200
'l set sounding rods @ 100/	•	•	•	•	•	•	•	•	• •	100
Ropes etc	•	•	•	•	•	•	•	•	• •	600
Chronometers	•	•	•		•	•	•	-	• •	200
Rack and pinion arrangements .	•	•	•	•	•	•	•	•	• • •	200
Anchors	•	•	•	•	•	•	•	•	• •	1,000
			223						_	5,00
(b) Recurring	ß	Nig	Rite	2					-	
l gauge reader @ 75/- for 3 years .	63	1315		23	•	•	•	•	2,700	
Boatman @ 60/- for 3 years	- 9			S.		•	•		2,160	
6 Khalasies @ 50/- for 3 years	- 6	•	S.• /	8.	•	•	•	•	10,800	
		0.445	274	7					15,660	
	Tot	al for (one sit	θ.				<u> </u>	20,660	
		8 site	3014.8	50.	•	•	•		1,65,280	
1. Silt observations—	- 6	136		3						
(i) Equipment non-recurring @ 1000/- per	site	1000	22.7						. .	8,000
(ii) 8 Silt observers @ 100/- for 3 years .				÷						28,800
(iii) 16 khalasies @ 50/- for 3 years		()~~ ~!!	ન ગાલ	a						28,800
									• •	
(iv) Miscellancous on Carriage & Transport	•		•							5.000
(iv) Miscellancous on Carriago & Transport	•	•	•	•	•	•	•	•	•••	
(iv) Miscellancous on Carriago & Transport	•	•	•	•	•	•	•	•	•••-	
	•	·	•	•	•	•	•	•	• • -	
	•		•	•		•	•	•	• • - -	70,600
5. Properly Surveys-	•		•	•	•	•	•	•	· · ·	70,600
5. Property Surveys- 2 surveyors @ 100/- p.m. for 3 years .	•	•	•	•	•		•		· · - - - · ·	70,600 7,200 21,600
5. Property Surveys- 2 surveyors @ 100/- p.m. for 3 years .	•	•	•	•	•		•	•	· · · - - · ·	70,600 7,200 21,600
5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years .	•	•	•	•	•	•	• •	•	· · -	70,600 7,200 21,600
5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years .	•		•	•	•				· · -	70,600 7,200 21,600
5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years	•	•	•	•	•	•	•		· · ·	70,600 7,200 21,600 28,800
 5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years . Meteorological Surveys— (a) Equipment non-recurring— 50 new rain gauges @ 500/- each 	•	•	•	•	•	•			· · ·	70,600 7,200 21,600 28,800
 5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years 5. Meteorological Surveys— (a) Equipment non-recurring— 50 now rain gauges @ 500/- each (b) Recurring— 	3 уеа		•	•	•	•	•	•	· · ·	70,600 7,200 21,600 28,800 25,000
 5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years A Meteorological Surveys— (a) Equipment non-recurring— 50 new rain gauges @ 500/- each (b) Recurring— 2 Meteorological Assistants @ 200/- for 	-	18	•	•	•	•	•	· ·	· · ·	70,600 7,200 21,600 28,800 25,000 14,400
 5. Property Surveys— 2 surveyors @ 100/- p.m. for 3 years 12 Khalasies @ 50/- p.m. for 3 years 3. Meteorological Surveys— (a) Equipment non-recurring— 50 new rain gauges @ 500/- each (b) Recurring— 		8	•	•	•	· · ·	•	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	5,000 70,600 21,600 28,800 25,000 14,400 8,640 36,000

7. Geological Surveys-

ί.

(a) Equipment non-recurring—												Rs.
8 Diamond Drills @ 75,000/- sa		•	•	•	•	•	•	•	•	•	•	6,00,00
Diamonds and other spares @ 4	10 ,0 00/- 1	per set	•	•	•	•	•	•	•	•	•	3,20,00
2 Calyx drills 5"-6" complete wi	th equip	ment a	nd sp	ares	•	•	•	•	•	•	•	50,00
8 special boats for drills @ 2000	0/- each	•	•	•	•	•	•	•	•	•	٠	16,00
Testing apparatus for rocks and	rock ma	storial	•	•	•	•	•	•	•	•	•	1,00,00
											-	10,86,000
(b) Recurring expenditure												
1 Geologist @ 800/- for 2 years	• •	•	•	٠	•	•	•	•		•	•	19,20
2 Assistant Geologists @ 400/-	for 2 ye	ars .	•	•	•	•	•	•	•	•	•	19,20
1 Drill Foreman @ 1000/- for 2	years .	•		•	•	•	•		•	•	•	24,000
8 Operators (1 per drill) @150/-	- for 2 y	78 878	•	•	•	•	•	•	•	•	. •	28,800
48 helpers (6 per drill) @ 80/-	for 2 yea	ars .		•			•	•			•	92,16
Fuel and other expenditure @ 2	20,000/- 1	p.m. fo	r_20 n	nonth		•	•	•		•	•	4,00,00
											-	5,83,360
Total for Geological surveys	•••	•	•	•	•	•	•	٠	•	•	•	16,89,38
. Communications				2								1 00 000
Lump sum	• •	0	lige	31	÷.	•	•	•	•	•	•.	1,00,00
			OTAL O			•	•	•	•	•	•	84,11,81
		2%	Contin	ngenoj	ios	•	•	•	•		•	70,23
		GRAME	TOT.	AL W	DRES	•			•			84,82,054
		0.52	2008	SBM	y .							
OOLS AND PLANT		- Se			7	·					-	
OOLS AND PLANT-				N	9	·					-	
a) Camp equipage-		-		R	2.	•						9.60
a) Camp equipage 8 tents 14'×14' @ 1200/- each		A			A	•	•	•		•	•	•
 Camp equipage 8 tents 14' × 14' @ 1200/- each 20 tents 10' × 10' @ 800/- each 	 	Fab-e			3	•	•	•	•	•		16,900
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each . 	 	Fab-e			3	•	•	• •	•	• •	•	16,900 12,000
 Camp equipage 8 tents 14' × 14' @ 1200/- each 20 tents 10' × 10' @ 800/- each 	 	# File-	भूति दुर्दे वि	स्ति स्ति स्ति स्ति स्ति स्ति स्ति स्ति		•	• • •	• • •	• • •	• • •		9,600 16,900 12,000 10,000 4,800
 a) Camp equipage	 	# 620-0	UN Z	स्थित जयने		• • •	• • •	• • •	• • •	• • •		16,000 12,000 10,000 4,800
 a) Camp equipage	• • • • • •	H BRD-C		जयने		• • •	• • •	• • •	• • •	• • •		16,000 12,000 10,000 4,800
 a) Camp equipage	• • • • • • • • •		यमन	जयने		• • •	• • •	• • •	• • •	• • •		16,900 12,000 10,000 4,800 52,400
 a) Camp equipage			मित्र यसन	त्राप्त जयने		•	• • • •		• • • •	• • • •		16,000 12,000 10,000 4,800 52,400 1,05,000
 a) Camp equipage	h / .		प्रा यसन	जयने		•			• • • •			16,000 12,000 10,000 4,800 52,400 1,05,000 42,000
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each 20 servants tents @ 500/- each Camp furniture b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 	h / . •		21.0	जयने		• • • • • • • •	• • • •	• • • •	• • • •	• • • • •	• • • • • •	16,000 12,000 10,000 4,800 52,400 1,05,000 42,000 8,000
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each . 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 8 outboard motors @ 1,000/- each 	h / . •			जयने		• • • • • • •	• • • • •	• • • • •	• • • • •	• • • • •	• • • • • • • •	16,000 12,000 4,800 52,400 1,05,000 42,000 8,000 32,000
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each . 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 32 levelling instruments @ 1,000/- 	h / . •		210 210 211 210 211 210 211 210 211 210 211 210 211 210 211 210 211 210 211 210 211 210 211 210 211 210 211 211	जयने		• • • • •	• • • • •	• • • •	• • • • • • • • • • • • • • • • • • • •	• • • • •	· · · ·	16,000 12,000 4,800 52,400 1,05,000 42,000 8,000 32,000 1,600
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each . 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 	h / . •		210 210 210 210 210 210 210 210 210 210	जयने		• • • • • • • • • • • • • • • • • • • •	• • • • •	• • • • •	• • • • • • • • • • • • • • • • • • • •	• • • • •	· · · · ·	16,60(12,00(4,80(52,40(1,05,00(42,00(8,00(32,00(1,60(96(
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each. 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 80/- each 	h / . •		210 210 210 210 210 210 210 210 210 210	जयने		• • • • • • • • • • • • • • • • • • • •	• • • • •	• • • • •	• • • • • •		· · · · ·	16,900 12,000 4,800 52,400 1,05,000 42,000 8,000 8,000 32,000 1,600 960 640
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each. 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 30/- each 82-50 ft. tapes @ 20/- each 	h / . •		210 210 210 210 210 210 210 210 210 210	जयने		• • • • • • • • • • • • • • • • • • • •	• • • • •	• • • • • •	• • • • • • •		· • • • • • • • • • • • •	16,000 12,000 4,800 52,400 1,05,000 42,000 8,000 32,000 1,600 980 640 13,000
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each. 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 30/- each 82-50 ft. tapes @ 20/- each 6 Theodolites @ 2,000/- each 	h / . •		210 210 210 210 210 210 210 210 210 210	जयने 		• • • • • • • • • • • • • • •	• • • • • •		• • • • • • • •	• • • • • • • •	· · · · · · ·	16,000 12,000 4,800 52,400 1,05,000 42,000 8,000 32,000 1,600 960 640 13,000 3,000
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each 20 servants tents @ 500/- each Camp furniture . b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 8 outboard motors @ 1,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 30/- each 8 22-50 ft. tapes @ 20/- each 6 Theodolites @ 2,000/- each 10 bincoulars @ 300/- each 	h / . •		210 210 210 210 210 210 210 210 210 210	जिस जिस जिस जिस जिस जिस जिस जिस जिस जिस		• • • • • • • • • • • • • • • • • • • •	• • • • • • • •		• • • • • • • •	• • • • • • • • • • •	· · · · · ·	16,00 12,00 10,00 4,80 52,40 1,05,00 42,00 8,00 32,00 1,60 96 640 13,00 450
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each 20 servants tents @ 500/- each Camp furniture b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 8 outboard motors @ 1,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 30/- each 6 Theodolites @ 2,000/- each 6 Theodolites @ 2,000/- each 10 binoculars @ 300/- each 16 drawing boards @ 30/- each 16 plane tables @ 150/- each 	h / . each . 		210 210 210 210 210 210 210 210 210 210	ज्यते 		• • • • • • • • • • • • • • • • • • • •	· · · ·	· · · · ·	• • • • • • • • • •	• • • • • • • • • • • • • •	· • • • • • • • • • • • • •	16,000 12,000 4,800 52,400 1,05,000 42,000 8,000 32,000 1,600 960 640 12,000 450 2,250
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each. 20 servants tents @ 500/- each Camp furniture b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 8 outboard motors @ 1,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 30/- each 6 Theodolites @ 2,000/- each 10 binoculars @ 300/- each 10 binoculars @ 300/- each 15 drawing boards @ 30/- each 16 plane tables @ 150/- each 12 Prismatic compasses @ 150/- each 	h / . each . 		210 210 210 210 210 210 210 210 210 210			• • • • • • • • • • • • • • • • • • •	· · · ·	· · · · ·	• • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • •	· • • • • • • • • • • • • • • •	16,000 12,000 10,000 4,800 52,400 1,05,000 42,000 32,000 1,600 960 640 12,000 3,000 450 2,250 1,800
 a) Camp equipage 8 tents 14'×14' @ 1200/- each 20 tents 10'×10' @ 800/- each 20 shouldaries @ 600/- each 20 servants tents @ 500/- each Camp furniture b) Other tools and plant (i) Non-recurring. 15 3/4 ton weapon carrier trucks @ 6 jeeps with trailers @ 7,000/- each 8 outboard motors @ 1,000/- each 32 levelling instruments @ 1,000/- 32 measuring chains @ 50/- each 32-100 ft. tapes @ 30/- each 6 Theodolites @ 2,000/- each 6 Theodolites @ 2,000/- each 10 binoculars @ 300/- each 16 drawing boards @ 30/- each 16 plane tables @ 150/- each 	h / . each . 	- each - - - - - - - - - - - - - - - - - - -				• • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •	· · · · ·	• • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • •	· • • • • • • • • • • • • • • • • • • •	16,900 12,000 10,000

2,16,600

Repairs and carriage of scientific inst	rume	ents f	or 3 y	66 78	•	•	•	•	•	•	•	\$7,500
Running expenses for trucks and jeep	s for	3 y o	ars	•	•	•	•				•	1,12,500
		•									-	1,50,000
2 Total (a) and (b)	Tool	s and	l Plan	ŧ	•	•			•	•		4,19,000
2 % Contingencie	98	•	•	•	•	•			•	•	•	8,380
Grand Total Tools and	d Pl	ant	. •	•	•	•	•	•	•	•	•	4,27,380
ESTABLISHMENT												
(Provision for 3 years).												
l Superintending Engineer @ 1,850/- p.m	•			•		•						66,600
2 Executive Engineers @ 800/- p.m.												57,600
4 Asstt. Executive Engineers @ 600/. p.m	ı.	•									•	86,400
4 Asstt. Engineers @ 500/- p.m. each		•	•					•		•		72,000
1 Superintendent @ 300/- p.m.		•	•								•	9,600
2 Head Clerks @ 200/- p.m. each			•		•		•					14,400
2 Accountants @ 200/- p.m. each .	•			•				•		÷ .		14,400
1 Stenographer @ 200/- p.m. each .		•	•	•				÷				7,200
13 Upper Division clerks including S.D. C	h. @	100/	- p.m.	each								46,800
23 Lower Division clerks @ 75/- p.m. eac		213	123	臣子	а.				•	•		62,100
2 Steno-typists @ 100/- p.m. each .	. 16	1.1		bare.	9					•		7,200
1 Head Draftsman @ 300/- p.m.				1907								9,600
2 Senior Draftsmen @ 100/- p.m. each		SHE		979		•			:	•	•	11,520
6 Draftemen @ 100/. p.m. each .		11	191	14				. •	•	•		21,600
6 Tracers @ 75/- p.m. each		- 10	19.81	14.		•		•	•			16,200
32 Overseers @ 150/- p.m. each .		Alt	1.8	917								1,72,800
2 Sub-Asstt. Surgeons @ 150/- p.m. each	- 2		1800	100.0		• '	•		•			9,600
4 Research Asstt. @ 180/- p.m. each	- 1	1.5	1295	1.0	r					•		25,920
4 Silt Analysts @ 180/- p.m. each .		•				۰.						14,40
4 Laboratory Asstts. @ 125/- p.m. each		110	मेव उ	तयने		•					•	18,000
2 Compounders @ 75/- p.m. each .			•	•					•			4,800
2 Ward boys @ 50/- p.m. each .	•		•	•	•	•	•					3,600
1 Jemadar @ 40/- p.m		•	•									1,440
21 peons @ 30/- p.m. each	•	•	•		•				•		•	22,68(
44 Barkandazes @ 30/- p.m. each .		•	•		•		•					47,52
10 Daffaders @ 30/- p.m. esch .	•	•	•	•	•		•					10,800
l Daftri @ 40/- p.m	•	•	•	•		•	•		•		•	1,440
											-	8,40,300
Dearness allowance @ 25% .		•		•				•	•			2,10,075
Travelling allowance	•									•		1,80,000
Establishment contingencies including of	fice	furnit	ure, t	ypewr	iters,	etc.				•	•	1,80,000
						TABL					-	

3-5-1948.

II.

(Sd) K. M. BHATIA,

Project Officer, C. W. I. N. C.

APPENDIX VIII

REPORT

ASSAM PROJECTS REPORT

Assam, the easternmost Province of India, covers an area of 63,000 square miles and gets an annual precipitation of 286 million acre feet. It has tremendous water power potential and a vast scope for industrialisation from its mineral and forest wealths. It suffered a strategic strain during the last war and with partition has become still more important and therefore needs an industrial development all round.

The Province can roughly be divided into 2 main valleys, the Brahmaputra valley in the north and the Surma valley in the south. The waters of these rivers at present cause devastating floods, destroying crops, water logging lands and creating problems of soil erosion and denudation. At the instance of the Government of Assam, the Central Waterpower, Irrigation and Navigation Commission undertook a preliminary survey for multipurpose schemes to solve the above problems as well as to provide cheap power for industrialisation. The available data which is very meagre showed that 12 schemes, 3 in the Surma valley and 9 in the Brahmaputra valley could be mooted. Of these 4 schemes on the Barak and Someshwari rivers in the Surma valley and Dihang and Manas rivers in the Brahmaputra valley were entrusted for investigation to the Central Waterpower, Irrigation and Navigation Commission at a conference held by His Excellency the Governor of Assam in October 1947.

The Central Waterpower, Irrigation and Navigation Commission started investigations on these four schemes in January 1948, and two of the rivers Dihang and Barak have been inspected by an Engineer, Dihang having been inspected by a Geologist also. The inspection has shown that schemes on both the rivers are promising.

The four schemes are briefly described below in order of priority and their principal features are shown in the accompanying statement.

1. Dihang—It is the main tributary of the Brahmaputra and possesses 2 excellent storage sites within 13 miles of its debouch from the hills. A 500 feet dam will impound lake of 9 82 million acre feet and generate at least one million K. W. of continuous power. The scheme will provide for flood absorption by storing the supply of the main tributary at times of rain thereby releasing the capacity of Brahmaputra in the lower basin to absorb floods from other tributaries. The lake will be 70 miles long and help in opening mp the tribal areas of Assam.

2. Barak—Barak rises in the hills of Manipur State, bifurcates into two estuaries the Surma and the Kusiyra, which both fall into the Meghna river. When Meghna is in floods, its back water effect interrupts drainage of the Surma Valley with the result that the plains of Catcher and Sylhet districts become almost one sheet of water. A storage scheme on this river would absorb floods thereby reclaiming the plains of Surma Valley from water-logging and will provide irrigation to the reclaimed areas as also generate about 2,90,000 K. W. of power, which can be used in industrial exploitation of the tremendous forest wealth of Manipur and Lushai hills. As these hills are of shalys formations, 3 alternate schemes as shown in the statement have to be investigated.

3. Manas—Manas is the largest tributary of the Brahmaputra at the western end of Assam. The river is snow cum rain fed and large icebergs are reported now and again to form artificial dams in the river and cause unexpected floods when any one of them gives way. A 400 feet high dam will solve this flood problem, generate 2,50,000 K. W. of continuous power and provide irrigation to the western areas of Assam. The Government of India have under consideration a project for a navigation canal between Ganges, Tista and Brahmaputra to provide water transport between Assam and West Bongal. The Manas project will shorten one of the links in the development of this canal as it will make Manas navigable throughout the year and the canal can be connected with Brahmaputra through Manas.

4. Someshwari—S meshwari river provides a site for power generation at the southern fringe of Gharo hills. The river has a catchment area of 803 square miles and a 340 ft. high dam will store the entire run-off. There are rich coal fields and purest limestone quarries near this site and the power generated is expected to help in the development of these industries.

To enable these 4 schemes to be put through, detailed investigations covering topographical surveys of reservoir areas, surveys for irrigation, hydrological surveys, meteorological observations, geological surveys, navigational surveys, soil conservation surveys and pisciculture surveys have to be undertaken. It is proposed to open up a Circle with 3 Divisions and 9 sub-divisions to carry out these investigations and complete them in a period of 3 years. Besides the civil staff, the geological staff and the meteorological staff have been provided and the total estimate for the investigations amounts to Rs. 50,00,000.

5. Index map showing dam sites, etc. is enclosed.

K. M. BHATIA, Project Officer, C. W. I. N. C.

3-5-1948.



z Name of z Tributary	Name of Name of near- Tributary est village	Name of Name of near- Longitude and Map in which Tributary est village Latitude of left dam and wate bank of dam spread fall site	Longitude and Map in which Latitude of left dam and water bank of dam spread fall site	Approx. catch. ment area in sq. miles	Maxi- mum water Level	App- rox. beight of F.T. L. over river level in feet	Approx. length of water sp- read at M.W.L. at dam site in miles	Submer- ged area in acres		Approx. Capacity length of in m.a.ft. dam in feet	Average rain-fall for 11 years (Inches)	Run-off as per Inglis* formula (at 50%, M, a, ft.	Power potential K, W.
1 2	en	4	PIQ	e	2	j ∞	9	10	11	12	13	14	15
1 Dihang	Rengging	95°-14'-30" E 28°-11'-30" N	r 82/P.L.	89,600	1,000	470	89	60,000	1900	9.82	170-43	56·08	1,000,000
2 Manas	Matharguri	90°-56′-30″ 26°-48′-30″	E N 78/J.M. N.	11.300 1.000	1.000	400	34	64.700	1900	10-67	105-73	54 · 18 46 · 94	240,000
3 Someshwari	i Masighat		E 78 K/S. E.							1		31.86	00 20
4 (I) Barak	Sibanurikhal	25°-13'-30" 93°-3'-0"	N E 83 H/N.W.	800	400	330	58	33,200	2000	4.75	120-14	4.80 2.67	000,60
4(II) Barak	Bhuhandhar	24°-32'-0" 93°-12'-30"	N N.E.S.W.S.E. 4 F. S3H/N W.S. W	E. 4,800	500	440	129	89,600	4000	16.00	8 2 · 10	17-9	290,000
4(III)A Barak	Bhubandhar	24°-41′-0″ 24°-41′-0″ 93°-6′-0″	N F. 83/N.W.S.W.	5,270	400	340	108	9 4, 000	4000	15-15	82.10	10-5 19-5	225,000
	Ē	24°-41'-0"		5,270	300	240	80 80	58,300	4000	7.19	82-10	11-6 19-5	116,000
4(III)C Irang	Lingmum Gallon	93~-0'-0" E 24°-41'-30" N 93°-15'-0" E	83 H/N.W. 83 H/S.W.	1,475	450	250 up	upto upper Dam 31 6,700	Dam 6,700	2000	0.74	82.10	11-6 5-44	21,000
Suptrum a		24°-30'-30" N	N.W.	1,440	450	260	28	7,000	2000	0-93	82.10	3·22 5·3	21.000
												3.15	

Overall estimate for preliminary surveys and investigations for four projects in Assum

ABSTRACT

	Pe	oriod o	of invo	etiga	tion	•	•	•	•	•	•	. 3 y	roars
Detailed estimates as prepare	d and	submi	tted to	w.	M. P.	for 1	5 mon	the op	orati	ons			
(Establishment provided for 1	12 to 1	l4 mor	aths)		•		•						23.08 lacs
Deduct non-recurring cost	•	•	•	•	•	•	•		•	•	•	•	10.3 lacs
													12.78 laca
Assume 3 times this cost for 3	yoan	opera	ations	•		•		•	•	•	•	•	38.4 lacs
Add non-recurring cost	•	•	•	•	•	•	•	•	•	•	•	•	10.3 lacs
										Tota Say	-	·	48.7 lacs 50 lacs

3-5-1948.

(Sd.) K. M. BHATIA,

Project Officer, C. W. I. N. C.

Rough estimates of preliminary investigations of the Assam Projects for the years 1947-48 and 1948-49

					6			84					1947-48	1948-49
					ABS	TRAC	T	1					Rs.	Rs.
1. Surveys by Survey of I	ndie	Depa	rtine	nt.		14.	138	<u>.</u>		•	•	•	10,000	4,00,000
2. Surveys by C. W. I. N.	c.	•	•	•	- 4		L DELLA	1	•	•	•	•	5,000	1,10,000
3. Discharge observations	(4 si	ites)	•	•	- 12	- 10	971	53		•	•	•	2,500	30,000
4. Silt Observations	•	•	-	•	-			÷.	•	•	٠	•	2,000	23,000
5. Property Surveys .	•	•	•			सन्धम	ন লয	त.	•	•	•	•	••	10,000
6. Meteorological Surveys	•	•	•	•	•	•	•	•	•	•	•	•	••	40,000
7. Seismological Surveys	•	•	•	•	•	•		•	•	•	•	•	••	20,000
8. Geological investigation	6	•	•	•	•	•	•	•	•	•	•	•	••	8,00,000
9. Communications .	•	•	•	•	•	•	•	•	•	•	•	•	••	25,000
10. Temporary buildings	•	•	•	•	•	•	•	•	•	•	٠	•	••	25,000
11. Camp equipage	•	•	•		•	•		•	•	•	•	•	20,000	10,000
12. Tools and Plant .	•	•	•	•	•	•	•	•	•	•	•	•	1,00,000	80,000
13. Establishment .	•	•	•	•	•	•	•	•	•	•	•	•	40,000	2 40,000
14. Dearness allowance	•	•	•	•	•	•	•	•	•	٠	•	•	16,000	96,000
15. Travelling allowance	•	•	•	•	•	•	•	•	•	•	•	•	12,000	72,000
16. Office contingencies		•	•	•	•		•	•	•	•	•	•	60, 000	60,000
										Total	•	•	2,67,500	20,41,000

NEW DELRI ; 18-11-47. MAN SINGH, Director of Walerways, C.W.I.N.C.

DETAILS

					÷		Rs.	Rs
Surveys to be carried by Survey of India Department und	er di	rection	of	the C	.w.I.	N. С.		
(a) Gorge sites 25 sq. miles at 110/- per sq. mile	•	•	•	•	•	•	2,750	••
River survey 1,000 sq. miles at Rs. 44/- per sq. mile		•			•		44,000	••
Moving aircraft etc.	•		•				3,250	••
(b) Surveys and map publications								,
Gorge sites 5,000 acres at Rs. 4/- per acre							20,000	
River Survey 900 sq. miles at Rs. 160 per sq. mile	•	•	•	•	. •	•	1,44,000	••
26000 buryey 000 by, miles at 185. 100 per by, mile	•	•	•	•	•	•_	1,11,000	••
						_	1,64,000	••
(c) Contoured surveys of Assam projects flood plain in protective measures, 3,48,000 acres at -/9/- per acre	Assa	m for	Irrig	ation	and o	other •	1,96,000	4,10,000
I Summer to be summind out by an under dimension of the C W I	77	a						
 Survey to be carried out by or under direction of the C. W. I. (a) Longitudinal Sections of rivers and cross-sections, 650 			150/		.:I.a		07 #00	
						•	97,500	• •
(b) Other miscellaneous surveys, e.g., canal alignment, sp	ecial	reserv	OIL a	urvey	s, etc.		17,500	115,009
II. Discharge observations.—								
Number of sites 4	5							
aliac	3	2						
Expenditure per site. Equipment Non-recurring	18	R	*					
l current meter at 1,200/-		54	•	•		•	1,200	
1 boat large at 1,000/	334	3.	•	•	•	•	1,000	
1 boat small @ 500/		9.	•	•	•	•	500	
Velocity rods	1.4	·	•	•	•	•	200	
Sounding rods	14.4	•	•	•	•	. •	100	
Ropes, etc	11/1	. ·	•	•	•	• 1	600	
Chronometers		ð	•	•	•	•	200	
Recurring expenditure.—		1					3,800	
(Provision is made for 12 months)		P-					3,000	
	जयते	ŧ.					1 800	· · ·
I supervisor @ $150/-p.m.$	•	•	•	•	•	•	1,800	
1 Boatman @ 40/- p. m	•	•	•	•	•	•	480	
4 Khalasis (also suitable as Boatmen) @ 30/• p. m.	•	•	•	•	•	•	1,440	
T. A., etc	٠	•	•	•	•	•	605	
							4,325	
4 Sites equipment @ 3,800 per sito						•	15,200	
		•	•	•	•	•	17,300	32,500
4 Sites recurring expenditure @ 4,325 per site .								
4 Sites recurring expenditure @ 4,325 per site .								
V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be em	ploy	ed for	taki	ng ob	servat	ions		
 V. Silt observations at the above 4 sites One silt observer and one analyst are proposed to be em at each site. 	ploy	ed for	taki	ng ob	servat	ions		
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be em at each site. (i) Equipment non-recurring.— 	ploy	ed for	taki	ng ob	servat	ions	4,000	4 000
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be emat each site. (i) Equipment non-recurring.— Apparatus, 4 sets	iploy	ed for	taki	ng ob	sorvat	ions •	4,000	4,000
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be emat each site. (i) Equipment non-recurring.— Apparatus, 4 sets	nploy	ed for	taki	ng ob		ions •	4,000	4,000
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be emat each site. (i) Equipment non-recurring.— Apparatus, 4 sets	nploy	ed for	taki.	ng obi		ions	·	4,000
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be emat each site. (i) Equipment non-recurring.— Apparatus, 4 sets	nploy	ed for	taki	ng ob	servat	ions •	4,800	4,000
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be emate each site. (i) Equipment non-recurring.— Apparatus, 4 sets (ii) Recurring expenditure.— (Provision is made for 12 months) 4 silt observers @ 100/- p. m. each 4 silt analysts @ 100/- p. m. each 	•	•	•	ng ob	servat	ions • •	·	4,000
 V. Silt observations at the above 4 sites.— One silt observer and one analyst are proposed to be emate each site. (i) Equipment non-recurring.— Apparatus, 4 sets	•	•	•	ng ob:	servat • •	ions • •	4,800	4,000

Y. Property Surveys R. 1.8 upervises for 12 months @ 10/. p. m. 1.8 upervises for 12 months @ 80/. p. m. 1.8 upervises for 12 months @ 80/. p. m. 1.8 upervises for 12 months @ 80/. p. m. 1.8 upervises for 12 months @ 80/. p. m. 1.8 upervises for 12 months @ 80/. p. m. 1.8 upervises for 12 months @ 80/. p. m. 1.8 upervises for 12 months @ 10/. p. m. 1.8 upervises for 12 months @ 10/. p. m. 1.8 upervises for 12 months @ 10/. p. m. 1.8 upervises for 12 months @ 10/. p. m. 25,000 Misseliancous apparatus and wangles etc. 1.8 upervises for 12 months 1.8 upervises for 12 months 2.8,000 1. Materize sparsitizet @ 12/. p. m. 1.440 16 Observers (part-time) @ 15/. p. m. 2.880 8 upervises for 1.8,000 2 Snow surveyors @ 120/. p. m. 2.880 1.336 2 snow surveyors @ 120/. p. m. 2.880 8 upervises for 1.8,000 VIII. Seismological Assistant @ 900/. 1.636 2.880 8 upervises for 12 months 1.636 2 Snow surveyors @ 120/. p. m. 2.880 40,000 10 upervises for the show @ 40,000/. VIII. Seismological Assistant @ 900/. 1.636 2.890 5000 5000 4 portal bosts for drill @ 2.900/. each 1.60,000 10 apervises for the show @ 40,000/.	v. Property Surveys.—									Ď.	
4 Surveyors for 12 months @ 80/. p. m. 4,820 12 Khalesis for 12 months @ 80/. p. m. 4,820 Patwaris Lump Sum 580 VI. Metorological Survey (Rain gauges and Snow courses). It is proposed to instal 50 new gauge including tamperature, 25,000 humidity and wind velocity at 25 places Micellancous apparatus and gauge including tamperature, 25,000 kield in the survey of the sur											
12 Khalesis for 12 months @ 30/. p. m. 4320 Patwaris Lump Sum 560 VI. Meterological Surveys (Rain gauges and Snow courses). It is proposed to instal 50 new gauge mations. 560 (b) Exploring a superior installation of gauges non-recurring— 50 ruis gauges (including temporature, 25,000 humidity and wind velocity at 25 places also none soff recording gauge) werego rate of aby 500.* 25,000 (i) Recurring expenditure (Provision is made for 12 months 25,000 (i) Recurring expenditure (Provision is made for 12 months 24,000 1 Senior observer (b 12/. p. m. 2,440 24,000 1 Senior observer (b 12/. p. m. 2,880 16 16 Retainers (part-time) @ 12/. p. m. 2,880 16 16 Retainers (part-time) @ 12/. p. m. 2,880 16 16 Retainers (part-time) @ 15/. p. m. 2,880 16 17 Ssimological Surveys 1,835 2 2 Snow surveyors @ 120/. p. m. 2,880 16 VII. Ssimological Surveys 1,60,000 1 VII. Ssimological Surveys 1,60,000 1		• •	•	•	•	•	•	•	•		
Patravis Lump Sum 560 VI. Meteroford Survey, Relat gauges and Sow courses). It is proposed to instal 50 new gauge stations. 560 (b) Equipment installation of gauges non-recurring— 50 min gauges (including temporature, 25,000 humidity and wind velocity at 25 places Miscellancous apparatus mere sample etc. 25,000 (i) Recurring expenditure.— (Protection is made for 12 months 1,440 16 Observers (part-time) @ 150/-p. m. 1,440 16 Observers (part-time) @ 150/-p. m. 2,880 16 Retainers (part-time) @ 150/-p. m. 2,880 16 Retainers (part-time) @ 150/-p. m. 2,880 16 Retainers (part-time) @ 150/-p. m. 2,880 17 Bis will be taken up separately in consultation with the Director of Meteorological Surveys approxes (Molor) - p. m. 2,880 VII. Geological Surveys 1,550 This will be taken up sequeces) for the above @ 40,000/- each 1,60,000 10 Banond Drill with equipment complete @ 75,000/- each 2,00,000 11. Geological Hoscignical ons 5,000 (i) Equipment non-recurring— 4 4 Diamond Drill with equipment sete. 5,000 10 Geologial (mological Jost or ocks and rock material 4,7000 5 portion of recost and rock material 5,000		•	•	•	•	•	•	•	٠	-	
VI. Meteorological Surveys (Rain gauges and Snow courses). It is proposed to instal 50 new gatations. 60 bits gauges (including temperature, 25,00 humidity and wind velocity at 25 places also some self recording gauges) average rate of say 500/. such. 25,000 stations. 20 Diversion of the cording temperature, 25,00 humidity and wind velocity at 25 places also some self recording temperature, 25,000 stations. 25,000 stations. (i) Recurring expenditure. (i) Recurring expenditure. 2,400 (ii) Recurring expenditure. (ii) Recurring expenditure. 2,400 (iii) Recurring expenditure. (iii) Recurring expenditure. 2,400 (iv) Recurring expenditure. (iv) P. m. 2,400 (iv) Recurring expenditure. (iv) P. m. 2,400 (iv) Recurring expenditure. (iv) P. m. 2,800 (iv) Recurring expenditure. (iv) P. m. 2,880 (iv) Recurring expenditure. (iv) P. m. 2,849 This will be taken up separately in consultation with the Director of Meteorological Surveys. 40,138 VII. Seismological Aurveys. 75,000 (iv) Recurring expenditure. 4 Diamond Drills with equipment once of 5,0000. (iv) Recurring expenditure. (iv) Recurring expenditure. (iv) P. m. for 12 months (iv) P. m. for 12 months		•	•	•	•	•	•	•	•	-	
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50 rain gauges (including temperature, 25.000 humidity and wind velocity at 25 places also some soft recording superatures are soft as y 600/. each	•	rrina-	-								
also some self recording gauges) average rate of acy 500/- sech. 25,000 Miscellancous apparatuus anow samples etc. 4,000 29,000 (i) Recurring expenditure				v and	l wind	i velo	oitv a	t 25	nlaces		
Miscellancous apparatus show samples etc. 4,000 29,000 (i) Recurring expenditure (Provision is made for 12 months 2,400 1. Meteorological Assistant @ 200/- 2,400 1 Senior observor @ 120/- p. m. 1,440 10 Observers (part-time) @ 12/- p. m. 1,536 2 Snow surveyors @ 120/- p. m. 1,536 2 Snow surveyors @ 120/- p. m. 2,880 Say 40,000 VII. Scienological Surveys 2,880 Say 40,000 This will be taken up separately in consultation with the Director of Meteorological Surveys but a lump sum provision is made of Rs. 20,000/- 8,000 5,000 VII. Scienological Investigations 1,66,000 1,66,000 1,66,000 10 Diamond S (and other spares for the above @ 45,000/- each 1,60,000 1,60,000 1 Catyx Drill 5'6' complete with equipment etc. 5,000 47,000 5,40,000 (ii) Recurring expenditore 5,000 5,40,000 5,40,000 (iii) Recurring expenditore 1,20,000 5,40,000 5,40,000 (iii) Recurring expenditore 1,20,000 5,40,000 5,40,000 1 Diall Porenan (n for 12 months 1,2,000 2,60,000 2 Asstt. Geologi	also some self recording gauges) avera	go rate	e of sa	y 500	/- eac	h		• •••		25,000	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Miscellaneous apparatus snow samples etc.	•	•	•	•	•	•	•		4,000	,29,000
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This will be taken up separately in consultation with the Director of Meteorological Surveys but a lump sum provision is made of Rs. 20,000/. VIII. Geological Investigations										40,130	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	VIII. Geological Investigations.— (i) Equipment non-recurring—	A	NE S		22						
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4 special boats for drills @ 2,000/- each	• • • • •	ient et	с	SS 7/	9 ·	•	٠	•	•	-	
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1X. Communications Lump Sum . <t< td=""><td></td><td></td><td></td><td></td><td>•</td><td></td><td></td><td>•</td><td>•</td><td></td><td></td></t<>					•			•	•		
Lump Sum .<	Running expenses of 4 engines for drills for	r 10.m	onths	@ 5,	0061+	$\mathbf{P} \in \mathbb{C}$	iЩ	•	•	2,00,000	2,60,000
Lump Sum .<	1X Communications -										
Temporary buildings.— Lump Sum . <										25,000	5,000
Lump Sum .<	-	•	•	•	•	•	•	•	•		0,000
XI. Camp equipage 4 tents 14'×14' @ 1,200/- each 12 tents 10'×10' @ 800/- each 12 tents 10'×10' @ 800/- each 12 shouldaries @ 600/- each 12 shouldaries @ 500/- each 12 servants tents @ 500/- each 12 servants tents @ 500/- each 12 servants tents @ 500/- each 13 trucks @ 7,000/- each 13 trucks @ 7,000/- each 13 trucks @ 7,000/- each 13 trucks @ 1,000/- each 13 trucks @ 1,000/- each 14 trucks @ 1,000/- each 15 trucks @ 1,000/- each 16 trucks @ 1,000/- each								_		25.000	25,000
4 tents 14' × 14' @ 1,200/- each 4,800 12 tents 10' × 10' @ 800/- each 9,600 12 shouldaries @ 600/- each 9,600 12 shouldaries @ 600/- each . <	-	•	•	•	•	•	•	•	•	20,000	-0,000
12 tents 10' × 10' @ 800/- each 9,600 12 shouldaries @ 600/- each 7,200 12 servants tents @ 500/- each . <										4 000	
12 shouldaries @ 600/- each . . . 7,200 12 servants tents @ 500/- each 6,000 Camp furniture 6,000 Camp furniture 2,000 29,600 XII. Tools and plant .		•	•	٩	•	•	•	•	•	•	
12 servants tents @ 500/- each 6,000 Camp furniture 2,000 29,600 XII. Tools and plant .		•	٠	•	•	•	•	•	•		
Camp furniture	- ,	•	•	•	•	•	•	•	•	-	
XII. Tools and plant (i) Non-recurring 13 trucks @ 7,000/- each 4 jeeps @ 7,000/- each 4 country boats @ 1,000/- each		•	٨	•	•	•	•		•		00 000
(i) Non-recurring 13 trucks @ 7,000/- each 4 jeeps @ 7,000/- each 4 country boats @ 1,000/- each	-	•	•	•	•	•	•	•	•	2,000	29,000
13 trucks @ 7,000/- each 91,000 4 jeeps @ 7,000/- each 28,000 4 country boats @ 1,000/- each 4,000	-										
4 jeeps @ 7,000/- each											
4 country boats @ 1,000/- each		٠	•	•	٠	٠	•	•	•	•	
		•	٠	·	•	•	.•	•	•		
4 Outboard motors @ 1,000/- each		•	•	-	•	•	•	•	•	-	
	4 Outboard motors @ 1,000/- each .	"	1	•	٠	•	•	•	•	4 ,0 00	

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М	levelling instruments	3 @ 1,000/-	each											
		• •		•	•	•	•	•	•	•	• .	•	24,000	
01	easuring chains 24 @) 15/- each		•	•	•	•	•	•	• .	•		360	
20	6-100' tapes @ 30/-	each .	•		•			•		•	•		780	
30		ach .	•		· .								600	
4	Theodolites @ 1,20	0/- each											4,800	
6	Binoculars @ 200/-	each .			•					•			1,700	
12	drawing instrumente	boxes 2nd	class	@ 20)0/- es	ich		-	•				2,400	
	ales with offsets, Fr												500	
	Drawing Boards @						•				•	•	360	
	0		-	-	-	•	•	•	•	•	•	• –		
	Recurring expenditur	e.—-										-	1,64,000	
	Repairs Working of trucks	•••	•		:	:	:	:	:	÷	:	:	4,000 12,000	
	Istablishment		•	-				-		-		-	2-,004	
	vision is made for 3	l4 months).												
. 3	Executive Engineer	rs @ 600/- j	p. m. (each				•	•	•			25,000	
9.	Assistant Engineers	S. D. Os. @	350	/р. п	n. eac	h			•		•		44,100	
• 1	Superintendent @ 2	50/- p. m.	•	•					۰.	•			3,500	
	Head Clerks @ 160/	• =	ì			•	•						6,720	
	Stenographer @ 160	-						•	•	•		•	2,240	
	Accountants @ 150/	· •									÷		6,300	
	Upper grade clerks (1200	5						3,360	
	Accounts clerks @ 8				5	52	87E,	2			•	•	3,360	
	Sub-divisional clerks			h	35			59	•	•	•	•	10,080	
	Steno-typists @ 80/				78	392		8	•	•	•	•		
	Lower grade clerks	-		•	68			8	•	•	•	•	3,3 60	
					- 98	7442	2948	Y • .	•	•	•.	•	3,080	
	Record keepers @ 5	• •		•	. 1	A F	0.51	•	•	•	•	•	2,310	
	Assistant Accounts	_	• •			41.3	5N 1		•	•	•	•	4,620	
	Assistant Sub-divisio		• •		11.0.00	9n	C	R	•	•	•	•	6,930	
	Assistant Record ke		- p. n	2. ead	eh	162	217	n	•	•	•	•	2,3 10	
	Typists @ 55/- p. m		۰.	•	1 ich	SHC.	2.	1 ·	•	•	•	•	2,310	
	Despatchers @ 55/-	-	•	•				•	٠	•	•	٠	2,310	
1	Head draftsman @	300/- p. m.	•	•	- र ा	त्यमेव	जयर	•	•	•	•	•	4,200	
3	Senior draftsmen @	170/• p. m.	each	•	•	•	•	•	•	•		•	7,140	
8	Draftsmen @ 100/- (each .	•			•	•	•	•			•	11,200	
. 3	Overseers (Headqau	rters) @ 10	0/- p,	m. e	ach	•	•		•			•	4,200	
8	Tracers @ 60/- p. m	. each	•									•	6,720	
36	Overseers @ 100/- p	, m. each									•		50,400	
6	Research Assistants	@ 160/- p.	m. ee	ıch				•					13,440	
5	Silt Analysts @ 100	/- p. m. eac	h										7,000	
	Sub-Assistant Surg			m eau	eh					-			4,200	
	Compounders @ 40	-										•	1,680	
	Ward boys @ 30/- r			•		-		-			•	•	1,260	
	Jemadar @ 35/- p.					•	•	•			•	•	490	
	Peons @ 30 / p. m.				•	•	•	•	•	•	•	•		
	Dafadars @ 30/- p. ::		•	•	•	•	•	•	•	•	•	•	11,340	
	Barkandazos @ 30/- p.		•	•	•	•	•	•	•	•	•	•	5,040	
	Daftri @ 35/- p. m.		•	•	•	•	•	•	•	•	•	•	10,800	
1.	Dartri @ 35/- p. m.	• •	•	•	•	•	•	•	•	•	•	•	490	2,79,9
	Dearness and Travell	ing allowan	C68.	•									Say	2,80,00
	.ump Sum . Iontingencies.—	• •	•	•	•	•	•	•	•	•	•	•	1,96,000	1,96,0
XIV. C														

Estimate for preliminary surveys and investigations in connection with the projects in Assam Province prepared in accordance with the instructio of the AD-HOC Committee.

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					AB	STR	4 <i>CT</i>								
1. Surveys by Survey of	Indi	а.	•		•	٠	"	•		•		•	•		6,16,500
2. Surveys by C. W. I. N.	. C.		•	•		•	•								1,50,000
3. Discharge observations	3	٠	•	•	•			•		•		•	•	•	57 ,76 0
4. Silt Observations		•	•		•	•		•		•		•	•	•	26,000
5. Property Survey		•	•	•	•	•						•		•	9,600
6. Meteorological Survey		•	•	•	•	•		•	•	•	.,	•	•	•	60,800
7. Seismological Survey		•	•	•	•	•	•		٠	•	•	•	٠	•	25,000
8. Geological Survey					•			•	•	•	•			•	8,53,280
9. Communications Lum	p Su	m	•	•		•	•	•				•	•	•	50,000
10. Buildings Lump Sum		•	•		•	•		•	•		•	•	•	•	50,000
11. Camp equipage	•	•				•	•	•	•			•		•	29,6 00
12. Tools and Plant		•	•				•		•			•		٠	2,80,170
13. Establishment	,	•	•	•	•	•	٠	•		•	•	•	•	•	8,65,000
												Total	•	• -	30 ,73, 710

DETAILS

	(i) Air photography of gorge sites(ii) River survey. 5 mile strip										ation	• *****	Brok	•	5,000
	putra. $202 \times 5 = 1,010$	101 K	Jugen	1012	TOURCE	and	I OBOL V	on uj	h ro t	us juu	CLION	with	Diati	11 a -	
	Say 1,000 sq. miles @ Rs. 44 p	er sq.	mile	,	Y.D.	211	¥ .	•	•		•	•		•	44,000
	(iii) Moving aircraft	•	•		1.0	444	4	•	•	•	•	•	•	•	5,000
	(b) Field Surveys and Publication	<i>s.</i> —		1		1 22	600								
	(i) Roservoir sites 20 sq. miles	@ 37	5 per	eq. n	nile		2.1		•	•	•	•	•	•	75,00
	(ii) River area 1,000 sq. miles (Q 375	por	sq. m	ilo	-	1	•		•	•	•	•	•	3,75,000
	(iii) Irrigation potential on Man	as 2,0	00,00	0 acre	s @ •	/9/- p	er aor	9	•	•	•		•	•	1,12,500
					सन्धम	ाव ज	यत								6,16,500
I.	Surveys to be carried out by C. W.	. I. N	. C	_											
1.	Surveys to be carried out by C. W. (a) Longitudinal sections of river				50 pe	r mile		•	•	•	•	•	•	•	30,00
1.	•	s 20 0	mile	e @ 1	-			rvoir,	piscio	cultur	• •, •tc.	•	•	•	•
11.	(a) Longitudinal sections of river	s 20 0	mile	e @ 1	-			rvoir,	piscio	• eulture	• •, •t c.	•	•	•	30,00 1,20,00 1,50,000
1.	(a) Longitudinal sections of river	s 20 0	mile	e @ 1	-			rvoir,	piscio	cultur	• •, •t c.	•	•	• • -	1,20,00
	(a) Longitudinal sections of river(b) Other miscellaneous surveys l	s 20 0	mile	e @ 1	-			rvoir,	piscio	cultur	• 9, 9t c.	•	•	• • 	1,20,00
	(a) Longitudinal sections of river(b) Other miscellaneous surveys l	s 200 iko ca	mile mal s	e @ 1 lignn	ient, s	specia	1 resei		•			meshv	Vari)	• • -	1,20,00
	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l Discharge Observations 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•			• meshv	• • • •	• • -	1,20,00
Т. П.	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l <i>Discharge Observations</i> Numbor of sites 4 (2 for projects 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•				• • • • •	• - -	•
	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l Discharge Observations— Number of sites 4 (2 for projects (a) Equipment expenditure non-re 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•			meshv	• • • •	• • -	1,20,00 1,50,00
	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l Discharge Observations— Number of sites 4 (2 for projects (a) Equipment expenditure non-re 1 Current meter @ 1,200 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•			meshv	• • • • •	• • •	1,20,00
	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l Discharge Observations— Number of sites 4 (2 for projects (a) Equipment expenditure non-re 1 Current meter @ 1,200 1 Boat large @ 1,000 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•			meshv	• • • • •	• • •	1,20,00 1,50,00 1,20 1,20 1,00
	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l Discharge Observations— Number of sites 4 (2 for projects (a) Equipment expenditure non-re 1 Current meter @ 1,200 1 Boat large @ 1,000 1 Boat small @ 500 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•			meehv	• • • • •	• • • • •	1,20,00 1,50,00 1,50,00 1,20 1,20 1,00 50
	 (a) Longitudinal sections of river (b) Other miscellaneous surveys l Discharge Observations— Number of sites 4 (2 for projects (a) Equipment expenditure non-re 1 Current meter @ 1,200 1 Boat large @ 1,000 1 Boat small @ 500 1 Set sounding rods @ 100 	s 200 ike ca and 2	mile mal s mor	e @ 1 lignn	ient, s	specia	1 resei		•			meshv - - - -	• • • • • •	• • • • •	1,20,00 1,50,00 1,50,00 1,20 1,20 1,00 50 10

4,000

94	

		94									
(b) Recurring—											
1 Gauge reader @ 75 for 2 years						-				•	1,800
1 boatman @ 60 for 2 years										÷	1,440
6 Khalasis @ 50 for 2 years	•			•	•		•				7,200
	•	-	-	-	•						10,440
					m -+-	1.6	one si			_	14,400
							sites		:	:	57,760
. Silt Observations—											
(i) Equipment non-recurring @ 1,000/- per site			•		•			•		•	4,000
(ii) 4 Silt observers and Analysts @ 100/- for 2 y	oars	•	•			•	•	•	•		9,600
(iii) 8 Khalasis @ 50/- for 2 years	•	•	•	•	•	•		•			9,600
(iv) Miscellaneous on Carriage and Transport	•	•	•	•				•	•		2,800
										-	26,000
Property Survey-										-	
1 Surveyor @ 100/- for 2 years	•	•									2,400
6 Khalasis @ 50/- for 2 years	•	•	•	•	•	•	•	•	•	•	7,200
•											9,600
I. Meteorological Survey (rain gauges and snow cours	scə)—									-	
(i) 50 more rain gagues as proposed to be installed	d (in	Bara	k & S	omes	hwari)	givin	g one	gauge	o for	4,000	0F 000
sq. miles @ 500/	mal	20	10	•	•	•	•	•	•	•	25,000
Snow survey apparatus	ES.	1.5	Hest.	3	•	•	•	•	•	•	7,500
(ii) Recurring expenditure—	1512	22.8	126	9							
1 Meteorological Assistant @ 200/- for 2 years		855	3110	•	•	•	•	•	•	٠	4,800
1 Senior observer @ 120/- for 2 years .	ANR		891	•	•	٠	•	•	•	•	2,88
16 Observers @ 20/- for 2 years (part-time)	14	if l	11		•	•	•	•	•	•	7,680
16 Retainers (part-time) @ 15/- for 2 years	14	13.2	1.1		•	•	•	•	•	•	5,760
2 Snow surveyors @ 150/- for 2 years .	1		100	•	•	•	•	•	•	•	7,200
	11	60	派法	}							60,820
I. Seismological Survey	-	and the second	ALC: NO.								
Lump Sum	सत्य	मेव	नयते	•	•	•	•	•	•	•	25,000
II. Geological Survey—											
(i) Equipment non-recurring—											
4 Diamond Drills @ 75,000/- each	•	•	•	•	•	•	•	•	•	•	3, 00 , 000
Diamonds and other spares @ 40,000/- per set	•	•	•	•	•	•	•	•	•		1,60,000
1 Calyx drill 5"-6" complete with equipment	and s	spares	з.	•	•	•	•	•	•	•	25,000
4 Special boats for drills @ 2,000/- each .	•	•	•	•	•	•	•	•	٠	•	8,000
Testing apparatus for rocks and rock material		•	٠	•	•	•	•	•	•	•	47,000
											5,40,000
(ii) Recurring expenditure—											
1 Geologist @ 800/- for 2 years	•	•	•	•	•	•	•	•	•	•	19,200
1 Asstt. Geologist @ 400/- for 2 years .	•	•	•	•	•	•	•	•	•	•	[9,6 00
1 Drill Foreman @ 1,000/- for 2 years .	•	•	•	•	•	•	•	•	•	٠	24,000
4 Operators (1 per drill) @ 150/- for 2 years	•		•	•	•	•	•	•	•	•	14,400
24 Helpers (6 per drill) @ 80/- for two years	•	•	•	•	•	•	٠	•	•	•	46,080
Fuel and other running expenses @ 10,000 p. m	n ber	dril)	for 20) moi	aths	•	•	•	•	• _	2,00,000
											3,13,280
							'fota		•	•	8,53,280

IX.	Communications-														
	Lump Sum	•	, ,	•	•	•	•	•	•	•	•	•	•	• -	[]5 0,000]
x . :	Temporary buildings—														~~~~~
1	Lump Sum	•	• •	٠	•	•	•	•	•	•	•	•	•	'-	50,000
XI.	Camp equipage-														
	4 tents 14'×14' @ 1,20)0/- each	• •	٠	•	•	•	•	•	•	•	•	•	•	4,800
	12 tents 10'×10' @ 800	/• each	· ·	•	•	•	•	•	•	•	•	٠	٠	٠	9,600
	12 shouldaries @ 600/- e	each .		•	•	•	•	•	•	•	•	•	•	•	7,200
	12 servants tents @ 500	/- each	•	•		•	•	•.	•	•	•	•	•	•	6,000
	Camp furniture	•	• •	۲	•	٠	•	٩	٩	٠	•	•	•	• -	2,000
	211 1 . 1 Thisse													-	
XII.															
(i) Non-recurring—														91,000
	13 trucks @ 7,000/- eacl	n.	• •	•	•	•	•		•	•	•	•	•	•	28,000
	4 jeeps @ 7,000/- each		· ·	•	•	•	•	•	•	•	•	•	•		8,000
	4 outboard motors @			•	•	•	•	•	•	•	•	٠	•	•	24,000
	24 levelling instruments	-		•	•	• `	•	٠	•	٠	•	•	•	•	360
	24 measuring chains @			•	•	•	•	•	•	•	•	•	•	•	720
	24 metallic tapes @ 30/-			•	•	anias.	λ. T	•	•	•	•	•	•	•	8,000
	4 Theodolites @ 2,000/		•••	•	63	19.8	20		•	•	•	•	•	•	2,400
	8 Binoculars @ 300/-		• •		2.6.3		635	3	•	•	•	•	٠	•	2,±00 540
	18 Drawing boards @ 3		- · · ·	•	994		825	•	•	•	٠	•	•	•	3,600
	18 drawing instruments		o @ 200)/- eac	h	10.53	8579	•	•	•	•	•	•	•	1,500
	3 planimeters @ 500/-		• •	•	- 201	1059	197	•	•	•	•	•	•	•	2,250
	15 plane tables @ 150/-		•		11	Lift.	11	•	•	•	•	•	•	•	1,800
	12 nos. Prismatic compa				- 19	U N	1.1	•	•	•	•	•		•	8,000
C)ther miscellaneous draw	ing apps	ratus li	ke set	squar	'es, sci	Mes, cu	irves	•	•	•	•	•	·	
					Carrie	10	85	<u>}</u>						-	1,80,170
(ii) Recurring expenditure				-	The second									
•	Repairs and carriage of	scientifi	e instru	ments	for 2	years	카지ન	•	•	•	•	•	٠	•	25,000
	Running expenses for t	rucks and	d jeeps	for 2	years	•		٠	•	• .	•	•	•	•	`75,000
															1,00,000
						÷.						To	tal	. –	2,80,170
	Establishment—													-	<u></u>
хии. /	1) Provision for 24 mont	he													
(1) Provision for 24 month 1 Superintending Engir		.850/. f	or 24 •	months			•					•	•	44,400
	2 Executive Engineers								•					•	38,400
	6 Assistant Engineers				•							•		•	57,600
					. m.			•			•		•	•	7,200
	1 Superintendent for C 1 Head Draftsman for							•				•		•	7,200
	1 Stenographer for Cir							•					•	•	4,800
	2 Head Clerks for Exec	utive En	gineero'	. Ощч	өв (б) %	00/- n	. m. es	ch	•	•	•	•	•		9,600
	2 Accountants for Exec	utive P	GINCOLS	2 086		00/- n	. m. e	ach .			•	•	•	•	9,600
	2 Accountants for Exec 13 Upper grade clerks in		Sup Sup S	ivicion	al clar	ka @	100/. 6	ach						•	31,200
	13 Upper grade clerks in 2 Stenographers to Exe	ant inc. F	nainaa	കി	00/- m	m	- 00/- 0 ch		-		•	•		•	4,800
	2 Stenographers to Exe 2/3 Lower grade clerks in		ngmoor	s w r koeses	00/- Pi	tuniot	a @ 7:	5 n. m	1. eacl	h.		•			41,400
	2/3 Lower grade clerks if	actualing	record	rooher	is annu	Abise		- P. 11			-		-		-
	6 Draftsmen @ 100/- p.				۰.	~							•	•	14,400

15 M. of I. & P.

6 Tracers @ 75/- p. m. each			•	•	•	•	•				•	•		10,800
24 Overseers @ 150/- p. m. each	•													86,400
4 Research Assistants @ 200/- p. 1	m.	овс	h.											19,200
4 Laboratory Assistants @ 75/- p	. m	1. 6	ach						•					7,200
2 Sub-Assistant Surgeons @ 150/-	. p.	m	eac	h.							•			7,200
3 Compounders @ 50/- p. m. each	-												•.	3,600
2 Ward boys @ 50/- p. m. each														2,400
1 Steno to Geologist @ 100/- p. m.														2,400
l Clerk to Geologist @ 75/- p. m.											•			1,800
3 Draftaris @ 40/- p. m. each .														2,880
1 Jemadar to S. E. @ 40/- p. m.														960
21 Peons (8 per Division = 16) Circle Office 3 Geologist and Assistant 2	}	@	3 0/-	p. m.	. each				•		•		•	15,120
36 Barkandazes @ 30/- p. m. each	J.													25,920
10 dafadars @ 30/- p. m. each	•		•	•	•	•	•	•	•	•	•	•	•	7,200
to duradure (g toj- p. m. oton	•		•	•	•	•	•	•	•	•	•	•	• -	7,200
														4,71,360
												Say	. –	4,72,000
Dearness allowance @ 25 % .					•									1,18,000
Travelling allowance	•		•	• .									•	1,50,000
Establishment contingencies includi	ng	offi	ce fi	urnitu	re, ty	pewri	ters, e	te.				•		1,25,000
				£	10	Rie	2		m.+	-) TD-4		hment	_	P. 6 K. 000
				Ezh	1345	246	843		TOL	at E31	180118	nment	-	8,65,000
				- VA	380	Red	265							
,				- 62	SERVE	<158L	842						-	



(Sd.) K. M. BHATIA, Project Officer, C.W.I.N.C. 3-5-1948

APPENDIX IX

COORG PROJECT REPORT

The province of Coorg is a small centrally administered area in South India, west of Mysore State. The total area is 1,582 square miles and population of less than 2,00,000. It receives an annual rainfall of about 125". A number of schemes for irrigation and hydro-electric generation were projected by the provincial engineers in the past, but all of them were shelved for one reason or another. A small province like Coorg cannot take up independently investigations, preparation, and execution of such large scale projects for the development of its water and power resources.

C. W. I. N. C. was, therefore, approached by the Chief Commissioner of Coorg to take up the investigations of the feasible projects in the province, and also to take up the question of renovation of existing irrigation and fish culture tanks. Director, Irrigation and Assistant Director toured Coorg in October last, and inspected most of the sites. As a result of the inspection, the three projects—Herangi, Barapole and Lakshmantirtha, were considered suitable for investigations. Main features of these projects are given below (See Index Map).

Herangi Project—This project was first conceived in 1877 on representation of an influential zamindar of the place who drew attention to the possibility of utilising the Herangi river as a source of irrigation. A scheme prepared in 1899 for an anicut across Herangi near Herur village was later on abandoned as it was considered unremunerative. Similar attempts at reviving the project were also unsuccessful and the scheme was later on shelved. In order to make it a paying project, a dam with possibility of hydel energy along with irrigation is envisaged. A suitable site near the boundary of Herangi and Halgunda villages in the narrow gorge has now been located and is considered suitable for about 100' high dam. It would be affording irrigation to about 7,000 acres and generate about 1,800 kW. of continuous power.

Barapole Project—This project envisages two dams about 100'—150' high, one each on Konganahole and Kokatahole, the two tributaries of the Barapole river, and through pipes leading the discharge about 4 miles away, so that a head of about 1,500' is available for power. The total power available from these two dams is estimated to be about 47,700 kW. of firm power. The power can be utilised in Madras Presidency for the adjoining districts of Malabar and South Kanara which are in need of it. It will also give impetus to new industries being started in Coorg province itself.

Lakshmantirtha Project—This project originally prepared in 1941 consists in having an anicut across Lakshmantirtha river just below its confluence with Ramtirthahole. The anicut will supplement water required to irrigate about 3,000 acros in Coorg province. The execution of the project was however objected to by the Mysore Government as in their view it would have had detrimental effect on the existing irrigation lower down the river in Mysore territory. To speed up agreement it is proposed to hold a meeting of the engineering representatives of the C.W.I.N.C., Madras Government and Mysore Government to go into the question whether it would be possible to allow the construction of an anicut, or it would be necessary to provide storage at the site. Survey and investigation work will have to be done for either project.

An overall estimate of Rs. 6,64,700 has been framed to carry out the surveys and investigations work on all the three projects and to put up proposals for renovation of irrigation tanks. Surveys of the reservoir areas and dam sites provided in the estimate are proposed to be carried out by the Survey of India Department, whereas the surveys for the irrigation areas would be done by the C.W.I.N.C. staff. Property surveys, electric load surveys and mineral surveys have also been included in the estimate. Geological investigations, including boring and drilling in the abutments and foundation, are proposed to be carried out in conjunction with the Geological Department and have been adequately provided for in the estimate. Fixing of new rain gauges, temperature and humidity recording stations shall be set up and read by the Meteorological Department. Discharge and silt observations are porposed to be recorded regularly and have been provided for in the estimate. To carry out these investigations it is proposed to open one division with three sub-divisions along with the requisite staff for two years, the time which it is estimated the work will take to complete. Necessary provision for this has been made in the estimate. Provision has also been made for the purchase of necessary office equipment, scientific and ordinary tools and plant, and motor vehicles, etc. It is also proposed to house the entire staff in temporary buildings for the duration of the investigations.

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M. D. MITHAL, Director, Irrigation and Waterways, O. W. I. N. C.

Overall estimate for preliminary surveys and investigations of Irrigation and Hydel Projects in the Coorg Province.

ABSTRACT

					A	BSTI	RACI	Г							_
I. WORKS II. TOOLS AND PLANT III. ESTABLISHMENT	• •	• • •		• • •	• •	• •	• • •		• •	• •		• •	• •	_	Rs; 2,11,260 1,14,240 ;3,39,240
											1	Fotal			664,740
					Г)ETA	ILS								<u> </u>
WORK8— (i) Dams and Appurtenan Proliminary Exponses :		ka												•	
I. Survey of the reserv intervals on a scale				hotog	raphy	and g	groun	d sur	vey ar	nd plot	ting c	ontou	rs @1	0 '5 '	
10 sq. miles 2. Survey of the Dama scale of 32"=1 m	sites a					Iotogr	aph y	and g	roun	d surv	eys an	d plo	tting c	na	3,750
1,280 acres	@ Rs.	4/• pe	er aor	e	•	•	•		•	•		•	•	•	5,120
 Geological investigat drifts, etc. 	ions o	of foun	datio	ns of	the da	ims ai	nd we	ir site	s incl	uding	boring	, core	drilli	ng,	
Kokatahole dam	•		•			-1770	123		15	Nos.					
Konganahole dam	•			•	0	12	d.	2	15	Nos.					
Herangi dam	•	•			GE	3450	3 A	23	15	Nos.					
Lakshmantirtha we	ir	•		•	16			8	5	Nos.					
					- 63	886		69 -	50	Nos.					
50 Nos. each of	50'.2	500 ft	@ R	a 20/.	nor f	oot	294	7	00	. 1108,					50,000
Soil Analysis			-		. for .		6710	•	•	•	•	•	•	•	•
(ii) Buildings :			uuuu		1	24	70 1		•	•	•	•	•	•	2,000
Temporary Buildin (iii) Main Canals and Br	gs anche		•	•	1			A	•	•	•	•	•		5,000
1. Surveys of the comm Herangi			for e	lignm	ient of	f cana	ls :		7.000) acres					
Lakshmantirthe	•	•	•	•	स	त्यमेव	जय-	ð) acres					
	• .							_	10,000) acres	•				
10,000 acres (2. Miscellaneous survey	8	-		•	•	•	•	•	:	•	•	•	:	•	11,250 4,000
3. Longitudinal section				id its	tribut	aries	40 mi	les @	/Rs. 2	35/ pe	r mile			•	1,000
(iv) Discharge and Silt o One boatman and	4 Kh	tions. alaais e (a) R	at ea								ge rod	ls, flo	ats, et	c. incl	uded. 30,000
(v) Meteorological Observ		•				• •	J		,	•	•	•	•	•	50,000
Raingauges, temperat			ity, et	c. obe	ervati	ions			.S.	•		•			2,000
(vi) Mineral Surveys	•	•	•	•	•	•	•		S.	•	•	•	•	•	2,000
(vii) Electric load surveys (viii) Eco nomic and Prop	ertsi m	Arrienta	•	•	•	•	•			•	•	•	•	•	10,000 5,000
(vz) Communications (z) Special tools and play	-		•	•		•		Ĺ		•	•	•	•	•	5,000
1, Dia mond drill	comple	ete wi	th ac)essor	ies @,	Rs. 6	0,000	each.			•				60,000
Testing apparatus						•	•	•	•	•	•	•	•	•	11,000
	A A A		•											<u> </u>	2,07,120
	209	6 cont	inger	oies		•	•	٠	٠	•	٠	٠	•	·	4,140
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plant		•	• •	•				•	•		•	•	10,0 5 0
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1,000/-	р. ш.	101 1	year	•	•	٠	•	٠	٠	٠	٠	•	12,00
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					212	2	•	٠	•	•	•	•	69,12
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				181.00			•			•		٠	4,32
				31.07	1	83			•	•	•	•	17,85
Rs. 200)/- p.m	ı. for	2 years	90433		9.				•		•	9,60
s. 104/- p	. m. f o	or 2 y	ears	147	111			•	•	•	•	•	4,99
ls. 33/- p	.m. fo	or 2 y	oars	1414	54.3	(•		•	79
) Rs. 33/	/- p.m	. for :	2 years	1453	6.3.	20.							79
33/- p.m	. for 2	2 year		15.6	217								6,32
Rs. 33/-	p.m. f	for 2 :	years	ALL SAL	94 S.	54							9,50
				·s .	-				÷			•	3,16
-	• •			सत्यमेव	নয	ते	ľ	•	•	•		Bs.	1,31,26
br Office	ine For	9 1100											
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ont for 2	years	lump	sum	•	•	•	•	٠		٠	•	•	32,000
													56,000
		2 %	conting	encies	٠	•	٠	٠	4	٠	٠		3,32,58(6,66(
		Total	Establ	ishment	•	٠	•	•	٠	,	٠	. Rs.	3,39,24(
													3,39,24(
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	ears nts etc. plant 2% (Tota 1 No. @ 8 Nos. @ @ Rs. 56 1,000/- t. @ Rs. 200 Rs. 180 93/- p.m Rs. 33/- 1 9 Rs. 33/- @ Rs. 33/- @ Rs. 33/- @ Rs. 33/- @ Rs. 33/- % Cor Office for estab 2 years 1	 survey parties rears nts etc plant 2% contin Total Tool 2% contin Total Tool 1 No. @ Rs. 8 8 Nos. @ Rs. 4 @ Rs. 500/- p. 1,000/- p. m. 4. @ Rs. 240/- p Rs. 200/- p.m Rs. 200/- p.m Rs. 200/- p.m 93/- p.m. for 93/- p.m. for 93/- p.m. for 2% continues 33/- p.m. for 2% s. 33/- p.m. 2 years lump a 2 years lump a 	<pre>survey parties 6 Vel rears nts etc plant 2% contingenoi Total Tools and</pre>	 aurvey parties 6 Vehicles @ rears nts etc. plant 2% contingencies Total Tools and Plant 2% contingencies Total Tools and Plant 1 No. @ Rs. 875/- p.m. for 8 Nos. @ Rs. 560/- p.m. for 8 Nos. @ Rs. 560/- p.m. for 9 Rs. 500/- p.m. for 2 years 1,000/- p. m. for 1 year 4. @ Rs. 240/- p.m. for 2 years 8s. 180/- p.m. for 2 years 93/- p.m. for 2 years 8. 33/- p.m. for 2 years 8. 33/- p.m. for 2 years 33/- p.m. for 2 years 93/- p.m. for 2 years 	<pre>survey parties 6 Vehicles @ Rs. 7,0 rears</pre>	 kurvey parties 6 Vehicles @ Rs. 7,000 ears ats etc. plant 2% contingencies Total Tools and Plant 2% contingencies Total Tools and Plant a tools and Plant b Nos. @ Rs. 875/- p.m. for 2 years @ Rs. 500/- p.m. for 2 years @ Rs. 500/- p.m. for 2 years a tool - p.m. for 2 years a tool - p.m. for 2 years a tool - p.m. for 2 years b Rs. 240/- p.m. for 2 years c a tool - p.m. for 2 years<td><pre>survey parties 6 Vehicles @ Rs. 7,000 each ears ints etc</pre></td><td>Aurey parties 6 Vehicles @ Rs. 7,000 each</td><td>Aurovey parties 6 Vehioles @ Rs. 7,000 each</td><td>Aurovey parties 6 Vehicles @ Rs. 7,000 each</td><td><pre>survey parties 6 Vehicles @ Rs. 7,000 each</pre></td><td><pre>rurey parties 6 Vehicles @ Rs. 7,000 each</pre></td><td><pre>vurvey parties 6 Vehicles @ Rs. 7,000 each</pre></td>	<pre>survey parties 6 Vehicles @ Rs. 7,000 each ears ints etc</pre>	Aurey parties 6 Vehicles @ Rs. 7,000 each	Aurovey parties 6 Vehioles @ Rs. 7,000 each	Aurovey parties 6 Vehicles @ Rs. 7,000 each	<pre>survey parties 6 Vehicles @ Rs. 7,000 each</pre>	<pre>rurey parties 6 Vehicles @ Rs. 7,000 each</pre>	<pre>vurvey parties 6 Vehicles @ Rs. 7,000 each</pre>

M. D. MITHAL, Director, Irrigation and Waterways, C. W. I. N. C.

Éstimate for preliminary surveys and investigations of Irrigation and Hydel Projects in the Province of Coorg, which was originally submitted to Government

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	•	•	•	•	•	•	•	•	•	60,000
II. TOOLS AND PLANT	•	•	•	•	•	•	٠	•	•	40,000
II. ESTADLISHMENT	•	•	•	•	•	•	•	•	•	1,24,00
							Tot	al	•	2,24,000
, DI	TA T	ILS							· <u></u>	
I. WORKS										-
Surveys										Rs.
Surveys of the Reservoir Area 6,000 acres @ Rs. 2 1	oer ac	ere .			•	•			•	12,00
Irrigation Area, 10,000 acres @ as. 8 per acre	•		•							5,00
Property, Surveys, etc.					•	•			•	3,00
Exploration Work—Equipment and Staff—										
Drilling, boring etc. 4 sites @ Rs. 4,000 each										16,00
				-	-	-	•		•	_ • • • •
Staff and other geological surveys				•	•		•		•	4,00
Temporary Buildings, Gauge Readers' Huts etc										
S. D. O. quarters temporary (alternative tents) (3) a	it Rs	. 2,500)/-				•	•		7,50
Ovorseers' Huts (12) @ Rs. 750/	12	Re	0.							9,000
Gauge Readors' Huts etc	38	216	93	•		•		÷	•	3,500
Total—Works	3.0	RAS	8							60,000
68		857	19	•	•	•	•	•	•	
I. TOOLS AND PLANT Furniture for Divisional and Sub-Division Offices	742	2914	9							K 0.04
Camp furniture	JU U	111	•	•	•	•	•	•	•	5,000
Transport vehicle and its maintenance	il.A	70		•			•	٠	•	2,000 15,000
Instrument Level Theodolite etc. for surveys		Jackson (28	•	•	•	•	. •	•	10,000
Current moters, boats etc. for discharge and other of	haaru	etione	62	•	•	•	•	•	•	8,000
			19	•	•	•	•	•	·	
Total-Tools and Plant	त्यमे	ন সম	ते	•	•	•	•	٠	•	40,000
II. ESTABLISHMENT										
(a) (1) Pay of Officers										
1 Executive Engineer for 12 months @ Rs. 9	00/- 1	p.m.		•						10,800
3 Sub-Divisional Officers for 12 months @ R	s. 500)/• p.n	ı		•					18,000
Total		-							_	28,800
10000 1 1 1	•	•	·	•	•	•	•	•	•	20,000
(2) Pay of Establishment										
12 Supervisors for 12 months @ Rs. 150/- p.m.										21,600
1 Accountant for 12 months @ Rs. 200/- p.m.		•	•	•	•	•	•	•	•	21,000 2,400
1 Head clerk for 12 months @ Rs. 160/-p.m.	•	•	•	•	•	•	•	•	•	1,920
8 clerks for 12 months @ Rs. 80/- p.m.	·	·	•	•	•	•	•	•	•	7,680
2 Draftsmen for 12 months at Rs. 100/- p.m.	÷			•	•	•	•	•	•	2,400
2 Tracers for 12 months at Rs. 60/- p.m.	•	•		•					•	1,440
1 Dafadar for 12 months at Rs. 30/- p.m.		•	•	•	•	•	•			360
2 Barkandazes for 12 months at Rs. 30/- p.m.				•	•	•	•			720
8 Peons for 12 months at Rs. 30/- p.m.				•		•	•		•	2,880
6 Dak runners for 12 months at Rs. 30/- p.m.	•		•	•	•	•	•			2,160
Total—Establishment	_									43,560
T O (91-TRAMA) TRUTHOLI	•	•	٠	•	•	•	•	•	•	+0,000

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(3) Dearness Allowance	of Offic	ors	-lut	np su	m	•	•	•	•	•	•	•	•	•	4, 000
(4) Dearness Allowance,	other a	llo	wance	es of H	Istabl	ishme	ent—l	ump s	um			•	•	•	20,000
	Total	l	•	•	•	•	•	•	•	•	•	•	•	· _	24,0000
(5) T. A. of Officers		•	•	•		•	•	•			•	•	•	•	8,400
(6) T. A. of Establishme	nt	•	•	•		•	· .	•		•	•		•		12,960
(b) Establishment Conting	encies	•	•	•		•	•	•	•	•	•	•	•	•	6,280
	Total]	Establ	lishme	nt	•	•	•	•	•	•	•	•	•	1,24,000

M. D. MITHAL,

Director, Irrigation & Waterways, C. W. I. N. C.

सन्यमेव जयने

ESTIMATE AS PER INSTRUCTIONS OF AD. HOC COMMITTEE

Estimate for Preliminary Surveys and Investigations in connection with the Irrigation and Hydle Projects in Coorg Province, prepared in accordance with instructions of the Ad-Hoc Committee.

ABSTRACT

I. WORKS .		•	•		•	•			•					•	2,02,460
II. TOOLS AND PLANT	• .	•	•	•		•	•	•	•	•		•	•	•	79,500
III. ESTABLISHMENT	•	,	,		•	٠	•		•	•		•	•	•	1,70,040
											Tc	TAL		•	4,52,000
						DET.	AILS	3							
I. WORKS-		_													
(i) Dams and Appurtenan Preliminary Expenses	t Wo	rks													
1. Surveys of the reser	voir	basin	a hv	air r	hotos	ranhs	and	gron	nd au	TVAV (und r	Jottin		tours of	
10'-5' intervals on												nottin	g con	LOUIS at	3,750
2. Surveys of the dam soale of 32"=1 mile	sites	and v	woir a	sites l	oy air	photo	graph					and I	plottir	ng on a	5,120
8. Geological investigati boring, core-drilling	ions a	and fo	unda	tions	of the	dam (sites a	nd w ludin	eir site g testi	es and ing :	of th	0 TOSO I	rvoir l	esins by	
Kokatahole dam .	•				•		•	••		Nos.					
Konganahole dam						-	453		15	Nos.					
Herangi dam .	•				5	12	er:	2.	15	Nos.					
Lakshmantirtha weir	•	•	•		Gab	199		\$ 3	5	Nos.					
					- 28	1397		<u>s</u> -		Nos.	-				
50 Nos. each of	'50 ′ ∞	= 2.50	റ ′ ത	Rs. 26)/- ner	foot	5.17	8	00	, 1108.					50,000
4. Soil analysis and bur					-	SY 164-18 JP.1	Ieludi	ng te	, ating l	L. S.	•	•	•	•	2,000
						111						•	•	•	", 000
(ii) Buildinge					d	14	20.1	6							
Temporary buildings		•	•		- 29	1.17		¥.	• •	•		•	•	• •	5,000
(iii) Main Canals and Bra (a) Survey of the Commu- Herangi			as for	align	ment	of can	als	1	7 00	0 aoro:	_				
Lakshman trtha	•	•	•	•	4	त्यमेव	ন সম								
									10,00	0 acre) g				
10,000 aores @	Re.	-/9/-]	per a	ore				•			•	•		•	5,525
(b) Miscellaneous Survey	78	•	•	•				•						•	4,000
(iv) Discharge and Silt Ob	serva	tions(2 yo	srs)		•				•	•		•	•	·
One boatman and four discharge rods, boat	s, flo	ats, g	gauge	, slit	sampl	er and	labo	rator							
equipment @ Rs. 5, (v) Meleorological Observati		-	_	-			-		410			• ·	•	•	230,000
observations lump su			• 0708	uyos,		, ,	, <i>num</i>		o.c.,			•	•	•	2,000
(vi) Electrical Load Survey	L. S.	• •	•			•	٠	•							10,000
(vii) Economic and property			L.S.		•		•	٠							5,000
(viii) Communications L. S	Ι.								•						5,000
(ix) Special Tools and Plan	nt.														
1 diamond drill complete) with	h acce	esori	es @	Rs. 6 0	,000/-	each	•					•		60,000
Testing apparatus and la	bora	tory :	and v	vorks	hop eq	uipmo	ent fo	r test	ing						11,000
	Tot	ลไ		-											[1,98,495
		cont	ingen	cies	•	•	•	•		•					3,975
	Ţat	alW	orks	•	•	•	•	•	12,0	2,460					2,02,460

1. Motor vehicles for surv	vav nartia	a .										25,00
Running expenses for 2	•••	•••	•	•	•	•	•					10,00
2. Scientific instruments	-	•	•	•	•	•	•					10,0
3. Ordinary tools and pla		•	•	•		•	•					3,00
4. Camp equipage .				•	•	•	•					. 15,00
5. Office furniture .						•						10,00
6. R & C. T. & P	• •	•	•	•	•	•	•					5,00
· .	Total					•					•	78,00
	2% conti	ngen	cies	•	•	•	•				_	. 1,5
	TotalT	ools	and P	lant	•	•	•	76	,5 00			§79,5
II. ESTABLISHMENT						`						
1. Pay of Officers:												
Asstt. Engineers 2	@ Rs. 56	0/- p.	.m. fo	r two	years	•	•	•				26,8
Asstt. Geologist 1	@ Rs. 500)/ - p.:	m. for	one y	year	•	•	•				6,0
Drill Foreman 1 @) Rs 1,000	/- p.r	n. for	one y	78ar	•	•	•	•	•	• •	12,0
	Total	•	•	•	-	225	•				_	44,8
				Ca	rried :	forwa	rd					2,81,9
2. Pay of Establishment							ES.					
Overseers 8 @ Rs. 24	40/- n.m. f	or 2 1	ARTS	6			ñ.	_	_		46, 080	
Senior Clerks 2 @ Rs				70ars	740	294	7				7,200	
Junior Clerks 2 @ Rs					11	140		•		•	4,464	
Dafadars 2 @ Rs. 33					14	701		•	•		1,584	
Gauge Readers 3 @ 1				- 17 C -			28		•		5,040	
Peons 4 @ Rs. 33/- p				122	-163		6.2	•		•	3,168	
Khalasis 8 @ Rs. 33				1000	-10 C	201	÷.		•	•	6,336	
Chawkidars 2 @ Rs.	33/- p.m.	for t	wo ye	ars	Line	1.577	÷ -		•	•	1,584	
Dak Runners 2 @ R					lo d'alla	1 114	ч. •	•	•	•	1,584	
	Total	•		•	•	•	•	•	•	•	77,040	
3. Dearness Allowance of	officers							•		•	4,800	
4. Dearness Allowance of	Establish	ment		•				•		•	20,000	
	Total	•	•	•	•	•	•		•	•	24,800	
5. T. A. of Officers .											8,000	
	• •	•	•	•	•	•	•	•	•	•		
6. T. A. of Establishment	•	•		•	٠	•	•	•	•	•	12,000	
	Total	•	٠	•	•	•	•	•	•	•	20,000	
	Total	·	•	•	•	•	. •	•	•	•	1,66,720	
	Continger				•	•	•	•	•	•	3,320	
		Tota	iE	tablis	hmen	t.	•	•	•	•	1,70,040	1,70,04
		Gre	and To	otal	•	•	•	•	•	•		4,52,00
Estimate	for Year	Gre	und To	otal	•		•	•	•	•	1948-49	4,52,00

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Estimate for Freuminary investigations of Irrigation and Hydel Projects in Coorg Province of the year 1948-49 and 1949-50.

I. WORKS-												1948-49	1949-50
(i) Dam and Appurtement F	Vorbe												
Surveys and investig													
I. Survey of basin re		۴										1,800	1.050
2. Survey of the dan				•	•	•	•	•	•	•	•	2,560	1,950
3. Geological investi			•			•			•	•	•	•	2,560 50,000
4. Soil analysis for earthen dam .						•	•	•	•	•	• .	 1.000	• • • • •
•			••	•	•	•	•	•	•	•	•	1,000	1,000
(ii) Buildinge	•	•	•	•	•	٠	•	•	•	٠	•	•	
Temporary Buildings	•	•	•	•	•	•	•	•	٠	•	•	5,000	••
(iii) Main Canals and bras													
(a) Survey of the comme		8 67 1	•	•	•	•	•	•	•	•	•	5,62 5	***
(b) Miscellaneous Surveys				•	•	•	•	•	•	•	•	••	4,000
(iv) Discharge and silt observations .				•	•	•	•	•			•	15,000	15,000
(v) Meteorological observa	tions	•	•	•	•	•	•	•	•	-	•	2,000	••
(vi) Electrical load survey	•	•	•	•	•	•	•	•	•	•	•	5,000	5,000
(vii) Economic and property surveys					•	•	•	•	•	•	•	2, 500	2,500
viii) Communications .	•	•	•	•	•	•	•	•	•	•	•	2,500	2,500
ix) Special tools and plant	•	•	•	•		100	53.	•	•	•	•	••	60,000
Testing samples, laboratory etc					20	-62	876	2-	•	•		11,000	***
Contingencies	•	•	•	•	C.R.			59	•	•	•	1.495	2,470
. TOOLS AND PLANT	•	•	•	•				ð.	•	•	•	35,480 79,500 /	1,46,980
II. ESTABLISHMENT	•	•	•	•		1.1	1	•	•	•	•	85,020	85,020
	Gran	d Tot	al	•	J	14	141		•	•	•	2,20,000	2,32,000
					1	-	317	3			(ba)	M. D. MITHAI	
					UC:	2005	200			,		Irrigation &	•

सन्यमेव जयते

Directe + Irrigation & Waterways C. W. I. N. C.