

Administrative

Report of the Public Works Department

(Irrigation). Bombay Presidency

for the year

1895-96

Government

1896



ADMINISTRATION REPORT

OF THE

PUBLIC WORKS DEPARTMENT

(IRRIGATION)

BOMBAY PRESIDENCY,

FOR THE YEAR

1895-96.



Bombay:

PRINTED AT THE GOVERNMENT CENTRAL PRESS.

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PUBLIC WORKS DEPARTMENT

(IRRIGATION)

BOMBAY PRESIDENCY.
FOR THE YEAR 1895-96.

GENERAL REMARKS.

In the year under report the expenditure on Irrigation Works throughout the Presidency amounted to 38 $\frac{1}{2}$ lakhs as compared with 35 $\frac{3}{4}$ lakhs in the previous year. This outlay was divided between Sind and the Presidency proper in the proportion of 6 to 1 respectively.

2. Of the total outlay of Rs. 29,46,395 on Works and Repairs, Rs. 15,18,000 were expended on repairs. The expenditure on repairs was in Sind Rs. 13,35,030 and in the Deccan and Gujarát Rs. 1,82,970.

DECCAN AND GUJARAT.

3. The principal works in progress were the Nira Canal and some alterations and improvements to the Poona Water-supply Works.

4. All works in progress at the end of the last year at Bhátghar were completed. The only new works of importance were: an additional training wall for the north waste weir channel and two small walls in the south weir channel. All the gates on the south weir, 33 in number, were erected and in working order before the monsoon. In September, during an unusually heavy storm before the lake had quite filled, it was found that the gates had moved backwards and forwards on the frame and some damage was done to the concrete filling but none to the gates. Arrangements have however been made to prevent a recurrence of this damage. The gates on both the weirs acted perfectly under a head of 4 $\frac{1}{2}$ feet. With the exception of the tram line on both weirs, the completion of which has been delayed pending the erection of the gates, and a few minor items, the Bhátghar Dam is now complete.

5. The first and second needle gaps in the main weir at Vir were completed, and fish stairs were built at the extreme southern corner of the weir. At Wadgaon a block of three rooms for Inspector, Pátkari, and line keeper was built. The Koralá cut was completed and the canal at that point is now of full section. The remaining earth-work at the end of the main canal was also completed. On one distributary a new outlet pipe was put in; and on several others masonry drainage works were built, and the remaining earth-work was completed.

6. Five new settling tanks have been built, the capacity of each being 11,76,000 gallons, or five days' supply, instead of the three days' supply held by the old tanks. Arrangements have also been made for passing clean water into the filters and for the efficient cleaning of the tanks when required. The four tanks formerly used as storage and settling tanks have been converted into filter beds, giving a filtering area of 45,000 square feet as compared with the 18,300 square feet of the old filter beds. The

new filters have been in operation for more than a year and the result is most satisfactory. The analysis of the canal and filtered water by the bacteriological test, shows that the canal water is not quite up to the standard but that the filtered water is of an exceptionally good quality. The three old filter beds and the adjoining two small pure water tanks have been converted into pure water tanks and together hold about one day's supply. The centrifugal pumps formerly used for pumping canal water to filter beds or filtered water to the service reservoirs, have been removed and are now used for pumping canal water to the settling tanks only. The filtered water is pumped by Worthington pumps to the service reservoirs near the Wanowri Barracks and the Military Prison.

The only work now remaining to be done is the abolition of the small filter bed close to the Sholapur bazar, and the bringing of that portion of the Cantonment under command of the new work.

7. The principal works in the Southern Division on which outlay under the head "Capital" was incurred during the year were:—

(1) The Yerla River Irrigation Works.

(2) The Gokák Canal, (1st Section) and Storage Works.

8. In connection with the Yerla River system, the Nehr Tank service road, repairs to the old store at Nehr and to the slip at top of dam were completed during the year. The items of re-making dam and re-laying pitching were in progress.

Gokák Canal.

9. On the Gokák Canal and Storage Works, the undermentioned works were completed:—

(a) Extension of Main Canal.

(b) Paved causeway at the Konur Ford.

The demarcation of the land submerged was also finished during the year. No marked silting has taken place in the storage reservoir. Arrangements for taking periodical silt observations are being made.

10. As the owners of fields under the command of the Nilgund Tank would not avail themselves of water which only submerged lands around the margin, and gave rise to claims for compensation, it was decided to leave the sluices open. The gates were accordingly removed and the sluices left open during the year.

11. In pursuance of the policy of Government in connection with the treatment of irrigation tanks, large and small, in Gujarat and the Southern Marátha Country, expenditure on repairs and improvements was incurred as noted below:—

Ahmedabad District.

No. of tanks.	Expenditure.
8	Rs. 2,324

Surat and Broach Districts.

No. of tanks.	Expenditure.
47	Rs. 18,776

Belgaum District.

No. of tanks.	Expenditure.
7	Rs. 760

Dhárwár District.

No. of tanks.	Expenditure.
91	Rs. 43,692

The actual outlay during the year on the tanks in the Belgaum and Dhárwár districts fell considerably short of anticipations owing to various causes. As, however, the procedure has now been both simplified and systematized, it is hoped that in future the Budget grants will be fully utilized.

12. The total area irrigated from all works during the year was 73,159 acres and compares with the previous five years as follows:—

Years.			Area irrigated.	Rainfall.
			Acres.	Inches.
1890-91	...	..	73,141	22.49
1891-92	...	...	94,310	17.31
1892-93	...	...	63,772	33.59
1893-94	...	...	78,188	21.62
1894-95	...	...	82,475	22.88
1895-96	...	...	73,159	24.48

Area irrigated and assessment.

13. The following table shows the area irrigated and water-rate assessment for each work during the year:—

Serial No.	Name of Work.				Area irrigated,	Assessment,
					Acres.	Rs.
1	Háthmati Canal	...	...	...	3,439	10,573
2	Khari Cut	...	...	...	3,124	19,497
3	Hartala Tank	...	...	...	70	154
4	Mukti Tank	...	...	...	1,100	4,515
5	Mhaswa Tank	...	...	...	54	230
6	Jamda Canals	...	...	...	1,472	8,212
7	Parsul Tank	...	...	...	252	902
8	Palkhed Canal	...	...	...	1,622	6,398
9	Wadali Canal	...	...	...	339	1,062
10	Ojhar Tambat Canal	...	...	...	528	2,185
11	Ojhar Canal	...	...	...	1,896	6,189
12	Lakh Canal	...	...	...	334	1,120
13	Bhatodi Tank	...	...	...	877	3,271
14	Mutha Canals	...	...	...	8,138	1,77,641
15	Kasurdi Tank	...	...	...	3	8
16	Matoba Tank	...	...	...	1,168	8,971
17	Shirsuphal Tank	...	...	...	720	2,064
18	Bhadalwadi Tank	...	...	...	836	2,233
19	Nira Canal	...	...	...	23,453	86,786
20	Koregaon Tank	...	...	...	343	851
21	Ekruk Tank	...	...	...	2,589	12,291
22	Ashti Tank	...	...	...	1,323	3,977
23	Mhasvad Tank	...	...	...	3,481	12,571
24	Rewari Canal	...	...	...	1,224	5,617
25	Yerla River Works	...	...	...	2,607	9,067
26	Upper Man River Works	...	...	...	1,635	6,664
27	Maini Tank	...	...	...	1,198	4,725
28	Chikhli Canal	...	...	...	377	1,656
29	Krishna Canal	...	...	...	3,204	38,465
30	Muchkundi Tank	...	...	...	20	82
31	Gokak Canal	...	...	...	* 4,464	10,907
32	Madag Tank	...	...	...	933	2,273
33	Dambal Tank	...	...	...	49	150
34	Medleri Tank	...	...	...	145	522
35	Asundi Tank	...	...	...	142	437
Total					73,159	4,52,326

* Includes 116 acres irrigated free under the Canal extension.

14. The total assessments amount to Rs. 4,52,326 and thus show an increase of Rs. 28,222 or more than 6 per cent., notwithstanding a decrease of 9,316 acres in area irrigated, a fact which points to considerable increase in the proportion of the more valuable and higher-rated crops.

Results of Run-off.

15. A statement showing the results of run-off from the catchment areas of tanks for 1895 is appended.

SIND.

16. The inundation of 1895 was a low, variable and, for high-lying areas, a very unsatisfactory one. For the Eastern Nára Canals, however, and the lower part of the Fuleli system, it was a good one.

The Bukkur gauge read 10 feet 5 inches at the beginning of June and the river remained at about that level till the 10th, when it commenced to rise; on the 20th the gauge read 14 feet 1 inch. There was then a rapid fall to 10 feet 8 inches on the 27th, and as rapid a rise to 14 feet 6 inches on July 4th. From that date to the close of the inundation there were a series of rises and falls which were most prejudicial to the cultivator in high-lying tracts. The readings on the gauge were 9 feet 9 inches on July 9th, 13 feet on the 15th, 8 feet 3 inches on the 23rd, 8 feet 2 inches on the 27th, 15 feet 2 inches on August 12th, 11 feet 5 inches on the 17th, 15 feet 3 inches on the 24th, 10 feet 3 inches on the 29th, 12 feet 1 inch on September 4th, from which date the fall was gradual, the reading at the end of September being 6 feet 3 inches. The maximum reading was on August 24th, 15 feet 3 inches.

The readings on the Kotri gauge followed those at Bukkur, but the variations were, as usual, not so great. The maximum was 18 feet 6 inches on August 27th.

17. The level at Bukkur was above the fair irrigation level of 13 feet for only 25 days and at Kotri above 17 feet for only 27 days as compared with 80 and 87 days in the previous year. The figures since 1889 are given below:—

Years.					Bukkur over 13 feet.	Kotri over 17 feet.
					Days.	Days.
1889	...	...	...	...	76	66
1890	...	...	...	...	37	37
1891	...	...	...	...	30	45
1892	...	...	...	...	38	41
1893	...	...	...	...	44	50
1894	...	...	...	...	80	87
1895	...	...	...	...	25	27

The inundation of 1895 was evidently, when judged by this standard, much the worst of the series.

18. The revenue results are not yet accurately known, but it is understood that they will be satisfactory in the Eastern Nára District, while there will be a considerable decrease in the Hyderabad Canals District, in the areas in the Fuleli Canals District dependent on the upper part of the Fuleli, and in the small river canals, which decrease, however, will be more than made up for by a very large increase in the Badin and Bago Tando Talukas, which depend for their supply on the lower part of the Fuleli, the increase being due to absence of flooding. The area under rabi will, of course, show a large decrease as compared with 1894.

19. There were no floods during the year, and a very small number of breaches, which occurred as a rule at the heads of private water-courses without masonry sluices; very little pressure was brought in general on the bunds, but the changes of the river in several places caused considerable damage. The only accident of importance in the Indus Left Bank Division was the destruction of the Kheti sluice in the Eastern Nára District. This gave way quite unexpectedly,

apparently through the sand having been washed through the spaces between the wells on which it was founded. The sluice was erected in 1879 at a cost of Rs. 45,843 mainly with the object of facilitating the execution of other important parts of the Eastern Nára project. The result of the failure of the sluice was the escape of a large quantity of water into the depression known as the Jatri Dhands and consequent local fall in the water level in the Nára. Efforts were made to close the breach, but it was soon seen that this was impossible. It was at first feared that a serious loss of revenue would be the result; but the remissions that had to be granted amounted to about Rs. 2,500 only. The accident had no effect on the supply to the main canals, the Mithrau and the Thar; the loss was on the Khipra and other small canals in the unprotected area.

20. In the Begári Canals District the spill hardly reached the Kashmor bund, but the river approached very near to the bund in the first three miles, and in miles 11 to 14, finally bursting into the Wadhu Dhund opposite the 12th mile and causing a considerable increase in the velocity and consequent erosion of the right bank. The bund was cut through by the dhund in mile 9, but a temporary loop having previously been thrown up, no spill occurred. The loop constructed two years before in mile 7 was also much endangered.

The river itself breached the Kashmor bund in October in mile 12, but owing to the low level of the river at this time of the year there was no spill.

21. In the Shikárpur Canals District the bunds stood firm, but the river cut through the Kásimpur bund in the 6th mile and widened the gap to upwards of $1\frac{1}{2}$ miles. Owing to the low inundation, however, the depth of flood water which escaped through the gap was small and the flood neither reached the Nára nor did any damage.

There were no floods from Bháwalpur this year. Some of the local floods, however, left the river in the middle of June; but being of no great volume they soon dried up and did not reach the Nára.

22. The bunds in the Ghár Canals District were well maintained, as water touched them in only low-lying parts; there were no leaks nor breaches.

23. In the Western Nára District the new Lashari bund being close to the river and on very low ground was rather severely tried. The bund having been completed only 6 weeks before the inundation leaked badly in parts where the soil was "Kalar" or saline earth. Water stood against this bund from 15th June to first week in September, and its highest level was about 2 feet below the highest of last year. On the other bunds the highest water level was much lower than in the previous year. Erosion continued as in 1894-95 opposite miles 2, 25 and 20.

24. In the Karáchi District the bunds stood without injury but they were not severely tried.

The river at Munarki, however, continued its erosion, necessitating the extension of the previous year's loop bund.

At Máchi also, at the 37th mile of the left bank bunds, a loop bund is under construction on account of the encroachment of the river.

25. The river embankments in the Indus Left Bank Division were added to in the working season preceding the inundation of 1895 by the construction of (a) an embankment about 5 miles long in the north of the Hyderabad Collectorate to divert floods in the Nausháhró sub-division; (b) an embankment of similar length on the left bank of the tail of the Gháro Mahmuda in the Hála sub-division to check spill which had occurred for the first time in 1894; (c) two short lengths of embankments between the old and new mouths of the Fuleli to shut out floods which had caused considerable damage to kharif crops and threatened to outflank the head regulator of the new Fuleli; (d) an extension of the Jamshora bund across a gap in the sand hills on which it abuts; (e) a new bund joining the Gidu Bandar bund with the Ganja Takar hills to shut out spill from the neighbourhood of Hyderabad, and (f) an extension of the Hájipur bund to the south.

Besides these new bunds the existing embankments were raised and strengthened as found necessary after the inundation of 1894 and some new loops and sluices were made in connection with the Hájipur bund on which the river had been setting in. The expenditure on these works was met from special funds sanctioned as recommended in a "Joint Report," signed by the Commissioner and the two Superintending Engineers, supplemented by re-appropriations from the ordinary maintenance grant. The embankments were not heavily tried, the inundation being a low one. The only breaches that occurred were two small ones of no importance in the newly constructed bund in the Nausháhro sub-division. They were quickly closed, no damage having been done.

26. The principal works in progress during the year in the Indus Left Bank Division were the Jamrao Canal, the new embankments and extension of old ones referred to in the preceding paragraph, the rebuilding of the Nareja Regulator and the starting of work on the Dád project. On the Jamrao Canal fair progress was made in the First District, but great difficulty was experienced in getting labour for earthwork in the Second District. In the Third District the only work in progress was the contour surveying and the erection of residences for the staff. The new Nareja Regulator on the old Fuleli was completed before the inundation and was of material service in raising the water level to supply the high level canals in the Hyderabad Táluka, on which, had the regulator not existed, there would have been a serious loss of revenue owing to the low inundation. The Dádwah project was sanctioned late in the season but a commencement was made in the excavation of the new feeder to the Gadoro Wah and in the collection of materials for the head regulator. The new mouth to the Mulchand in the Fuleli Canals District, which had been under construction for some years, was opened before the inundation.

27. The principal works in progress in the Indus Right Bank Division were: the excavation of the Dhamrao, nearly completed; extensions and improvements to the Unharwah, completed, and the Sind Canal, nearly completed.

Owing to the erosion of the river and dhund mentioned in paragraph 20 above a new loop is being constructed to the Kashmor bund for the first 14 miles of its length and running at a distance of a mile to a mile and a half behind the original bund, with a new regulator to the Unharwah at the point of crossing of the new loop. Estimate amounts to Rs. 4,84,371 for loop and regulator.

A new loop to the Kásimpur bund is also under construction for the first ~~of its length~~ on account of the breach mentioned in paragraph 21.

28. The usual statement of ~~with a detailed statement~~ showing the various items of works on which the canal clearance grant for the year has been expended, and the establishment debitable to it, is appended (Appendices A and B). A general summary of this expenditure for the whole province is given below:—

Class of Works.	NEW WORKS.				REPAIRS.			Establishment proper.	Tools and Plant.	Total under all heads.
	Capital.	Revenue.	Ordinary Agricultural.	Total.	Works.	Canal Conservancy Establishment.	Total debitable to Clearance Grant.			
Major Works ...	6,71,604	27,119	...	6,98,723	1,34,993	46,210	1,81,203	2,26,788	58,610	11,65,324
Minor Works, Capital ...	55,713	49,584	...	1,05,297	1,62,911	47,850	2,10,761	91,410	408	4,07,878
Do. Revenue ...	...	4,29,486	...	4,29,486	4,55,281	84,146	5,39,427	2,10,171	3,275	11,82,859
Ordinary Agricultural ...	...	...	47,917	47,917	3,57,533	43,624	4,01,157	99,206	2,030	6,50,810
Total ...	7,27,317	5,06,189	47,917	12,81,423	11,10,718	2,21,830	13,32,548	6,27,575	64,323	33,05,869
Deposits, Contribution—										
Ordinary ...	...	...	1,291	1,291	2,482	...	2,482	41	4	3,818
Total ...	7,27,317	5,06,189	49,208	12,82,714	11,13,200	2,21,830	13,35,030	6,27,616	64,327	33,09,687

* Inclusive of Refunds of Revenue Rs. 2,447.

GENERAL.

29. The revenue receipts during the year amounted to Rs. 8,27,755, of which Rs. 5,90,554 were on account of works in the Deccan and Gujarāt and Rs. 2,37,201 on account of works in Sind. These receipts represent direct revenue accounted for in the Public Works Department, and do not include the receipts credited under Land Revenue. The figures for the year under report compare with those for the previous two years as follows :—

	1893-94.	1894-95.	1895-96.
	Rs.	Rs.	Rs.
Major Works—			
Protective Works	1,02,419	94,550	1,02,652
Productive Works... ..	4,12,162	4,20,360	4,73,953
Total ...	5,14,581	5,14,910	5,76,605
Minor Works—			
Imperial—			
Works for which Capital and Revenue Accounts are kept	1,42,331	1,36,546	1,47,000
Works for which only Revenue Accounts are kept	77,667	75,115	73,580
Agricultural Works—	1,833	1,320	1,547
Provincial—			
Works for which Capital and Revenue Accounts are kept	30,643	16,780	23,023
Total ...	2,52,477	2,29,761	2,51,150
GRAND TOTAL ...	7,67,058	7,44,671	8,27,755

30. The expenditure of the year was distributed under different heads as under :—

	Imperial.		
	Rs.	Rs.	Rs.
Capital—			
Major Works—			
Protective Works	26,648		
Productive Works... ..	(a) 8,89,495		
		9,16,143	
Minor Works and Navigation—			
Works for which Capital and Revenue Accounts are kept		(b) 1,09,621	
Revenue—			
Major Works—			
Protective Works	57,738		
Productive Works... ..	3,94,667		
		4,52,405	
Minor Works and Navigation—			
Works for which Capital and Revenue Accounts are kept	4,11,699		
Works for which only Revenue Accounts are kept... ..	13,64,533		
		17,75,632	
Agricultural Works—			
Works for which neither Capital nor Revenue Accounts are kept		(c) 5,70,718	
Contribution Works		17,624	
Total, Imperial ...			38,42,143

	Provincial.	Rs.	Rs.
Capital—			
Minor Works and Navigation		16,409	
Revenue—			
Minor Works and Navigation... ..		5,116	
Total, Provincial			21,525
		Grand Total...	38,63,668

(a) Includes Rs. 6,683 }
 (b) " " 4,634 } On account of expenditure in England and exchange.
 (c) " " 9,760 }

31. The total expenditure is classified as follows :—

	Deccan and Gujarát.	Sind.	Total.
	Rs.	Rs.	Rs.
Works	(a) 1,45,681	(b) 12,82,714	14,28,395
Repairs	(c) 1,82,970	(d) 13,35,030	15,18,000
Establishment	2,17,457	6,27,616	8,45,073
Tools and Plant	7,670	64,327	71,997
Suspense Account	810	—607	203
Total	5,54,588	33,09,080	38,63,668

(a) Exclusive of Rs. 156 on account of Receipts on capital account.

(b) Do. Rs. 223 do. do.

(c) Inclusive of Rs. 802 on account of Refunds of Revenue.

(d) Do. Rs. 2,447 do. do.

32. The cost of works establishment for certain districts in the Central and Southern Divisions is shown in Appendix C. The information as regards Sind works has been omitted from the statement for reasons given in the report for 1893-94.

33. Maps showing the position of the principal irrigation works in the Gujarát, the Deccan and the province of Sind are attached,

GUJARAT AND THE DECCAN.

GUJARAT.

AHMEDABAD DISTRICT.

The season was on the whole unfavourable, causing decrease in the area irrigated, owing to shortness of water-supply consequent on insufficient rainfall, the total registered at Parántij being 22·86 inches against 51·49 inches for the preceding year, and the average of 31·37 inches for the ten years ending 31st December 1895.

2. The total area irrigated was 3,439 acres (1,495 kharif and 1,944 rabi) against 4,199 acres (1,797 kharif and 2,402 rabi) for the last year, and the revenue amounted to Rs. 10,573 against Rs. 11,854.

3. The cost of maintenance and repairs, &c., was Rs. 4,395, including special repairs to the channel, against Rs. 4,196 for the last year. One flood occurred on 21st June 1895, when the water rose only 1·9 feet above the crest of the weir, the rainfall on that day being 80 cents.

4. During the year under report, a sum of Rs. 1,500 was sanctioned for further experiments on the Bhujwa Nála with a view to ascertaining the loss by absorption, &c., of water passed from the Háthmati into the Khári by this nála. After some investigation it was decided to abandon these experiments, as sufficient information had already been collected to show that the loss was trifling, if indeed any occurred. It is now proposed to let water from the Háthmati into the Bhujwa during the rains of 1896-97, and proposals with this object are being submitted, the object being to utilise spare water of the Háthmati for the extension of irrigation under the Khári Cut and elsewhere lower down.

5. During the season 3,124 acres were irrigated (3,107 kharif and 17 rabi) and the assessment amounted to Rs. 19,497, out of which free grants and remissions to the extent of Rs. 4,655 were given, leaving a net revenue of Rs. 14,842, against a net revenue for last year of Rs. 12,907. The increase is due to cultivators taking to irrigation more freely than formerly. Had the rainfall been up to the average the increase of revenue would have been much more marked.

6. The cost of maintenance and repairs was Rs. 3,222 compared with Rs. 3,954 last year.

7. There was, owing to scanty rainfall, a marked decrease of water in the Khári, and it was with some difficulty that the lands under the Chandola Tank were supplied with the water required.

8. The improvements to the Náika Channel, referred to in the last year's Administration Report, were sanctioned and carried out during the year at a cost of Rs. 1,066.

9. The total outlay on improvements up to the end of 1895-96 was Rs. 16,137, the total estimated cost being Rs. 16,274.

10. The cost of maintenance amounted to Rs. 885 as against Rs. 896 for last year.

11. During the year, the sum of Rs. 1,583 was spent on special silt clearance from the bed of the river Khári, in addition to the ordinary repairs to the sluices on which a sum of Rs. 999 was expended.

12. The renewal of the bund at Dhamatwan, washed away during the floods of 1894, was sanctioned in June 1895, and a sum of Rs. 2,416 was expended on it during the year, the estimated cost being Rs. 11,045. There was no flood of any importance in the Khári.

13. The damage done during the floods of 1894 was repaired at a total cost of Rs. 2,704, of which Rs. 2,379 were spent in 1895-96. The expenditure on current repairs to this channel amounted to Rs. 2,683.

14. The channel from the south of the Railway Line between Viramgám and Jukhwada (to join the existing Viramgám Drainage Channel) which was in progress last year was completed during the year at a total cost of Rs. 1,829,

of which Rs. 1,009 were spent in 1895-96. Work originally proposed on the north of the Railway Line, as well as that required in connection with the Ghoda Feeder has not yet been put in hand.

Tanks.

15. Repairs to the following tanks were undertaken from contributions by villagers and from Local Funds:—

Names of Tanks.	Repairs.	Remarks.
	Rs.	
Asalgaum	528	Not completed.
Shiawada	1,063	Completed.
Juhar	738	Not completed.

16. Irrigation Tanks in the Daskrohi Taluka were inspected during the year at a cost of Rs. 63, for the purpose of making out lists and giving effect to orders contained in Government Resolution No. 34 W. I.—419 of 5th March 1895.

KAIRA DISTRICT.

17. The survey for draining the Charotar in the Matar Taluka has been completed, and the plans will shortly be submitted to Government.

Surveys.

Proposals for the Sundesar Drain, Karamsad Drain and Cambay Drainage were submitted.

SURAT AND BROACH DISTRICTS.

18. The Pakhajan-Ambhel Channel in Wagra Taluka of the Broach Collectorate, described in previous reports, was completed during the year at a total cost of Rs. 27,064, of which Rs. 3,147 were expended during the year. The sanctioned estimate amounted to Rs. 29,219.

The
Channel.

Pakhajan-Ambhel

19. The Akhod-Naderda Channel, in Wagra Taluka of the Broach Collectorate, estimated to cost Rs. 6,984 was in progress. Owing to delay in acquiring the necessary land the work is making slow progress. Rs. 1,442 were expended during the year.

The
Channel.

Akhod-Naderda

20. Repairs and Improvements to 47 Tanks were sanctioned during the year. Rs. 12,239 were expended on repairs and Rs. 6,537 on improvements: Total Rs. 18,776.

Old Works.

Wagrej Protective Works.

21. The eroded portions of the embankments were repaired during the year at a cost of Rs. 1,067.

THE DECCAN.

KHANDESH IRRIGATION DISTRICT.

22. During the year under report Imperial Funds were spent, as detailed in the following table, on existing Major and Minor works for which Capital and Revenue Accounts are kept;—

Works,	Capital outlay.	Revenue outlay.
	Rs.	Rs.
Lower Panjhra River Works ...	2,040	2,914
Jamda Canals	334	3,721
Hartala Tank ... ..	...	93
Mhaswa Tank ... ..	...	404
Parsul Tank	267	344

23. The Capital outlay on the Lower Pánjhra River Works was on the improvements to the Nahalod Channel, estimated to cost Rs. 2,242, and on the Japi Bandhára, estimated to cost Rs. 1,205. Both these works are still in progress. The revenue outlay was for ordinary repairs to the Mukti Tank and the Channels under it, and for the up-keep of plantations. Arrangements were made to locate two rain gauges in the tank catchment, to ascertain accurately the run-off into the tank. Repairs to the Mandal and Japi Bandháras were carried out.

24. The Capital outlay on the Jámda Canals was for completing the improvements to cross-drainage between the new superpassage and culvert No. 1 in mile No. 3 of the Right Bank Canal. The Revenue outlay was as usual for canal clearance, repairs to masonry works and buildings, and other items connected with the general up-keep of the canals.

25. Similarly the Revenue expenditure on the Hartála and Mhaswa Tanks was for works of ordinary maintenance and revenue management. At Hartála, a small expenditure was incurred for erecting a new stand for the rain gauge which had been shifted from the tank dam to a more useful position in the catchment area.

26. The capital expenditure on the Pársul Tank was on plantations, completion of silt clearance, widening the Saundana Channel to deliver water to the Nándgaon Branch, and for completion of the survey of land under command of the tank. The revenue outlay was on ordinary works of maintenance.

27. An outlay of Rs. 1,267 was incurred from the Capital grant for Protective Irrigation works—Famine Relief, for maintenance of buildings at Chankápur and on a survey for extension of old irrigation channels to land commanded by the proposed tank and for a new canal in the upper Girna valley. The survey is progressing, and will, it is expected, be completed during the rains. Want of good surveyors to do the work delayed progress.

28. The expenditure on Works for which only revenue accounts are kept was Rs. 32,754, distributed as under :—

	Khándesh.	Násik.	Total.
	Rs.	Rs.	Rs.
Original works or Improvements ...	10,532	17,333	27,865
Repairs ...	1,802	3,087	4,889
Total ...	12,334	20,420	32,754

The works in the Násik District which are situated in the Tapti catchment basin are included in the Khándesh Irrigation charge, and are shown separately in the above statement.

29. Proposals for the repairs and improvements of the following channels from the Imperial and Patphala Funds were drawn up during the year :—

1. Satana.	7. Kashti.
2. Arai.	8. Pállá.
3. Mahár Pátua.	9. Kanasi.
4. Dangraj.	10. Manur.
5. Wadel.	11. Samoda.
6. Námipur.	12. Deshsirwada.

13. Shempur.

With the exception of those for the Satana Channel the proposals in respect of all the other channels have been carried out. There are several other

channels which require attention, and this is being given as far as is possible with the establishment available.

30. In addition to the expenditure from Imperial funds, outlay was also incurred on old irrigation channels from the Patphala Fund, made up of proceeds of a cess voluntarily paid by the irrigators. The total outlay during the year was Rs. 2,700, of which Rs. 2,023 were spent on 24 works in the Násik District and Rs. 677 on 16 works in Khándesh.

31. The outlay during the year on Works for which neither Capital nor Revenue accounts are kept amounted to Rs. 1,241. Of this sum Rs. 1,041 were spent on maintaining the following rain and river gauges:—

1. Mosam River gauge and rain gauge at Mulher.
2. Tapti River gauge near Bhusával.
3. Aner River gauge at Ganpur and the rain gauges at Wárla and Baijápur.
4. Pánjhra River gauge at Pankheda and rain gauge at Pankheda and Lakhala.
5. Rain gauge at Nizámpur.
6. Talváda Nála gauge at Mandal and the rain gauge at Mandal and Titana.

Buildings other than Canal Buildings.

32. The remaining Rs. 200 were spent on repairs to the Irrigation Office at Malegaon, and to the Powder Magazine and subdivisional office at Sakri.

33. The expenditure from Incorporated Local Funds, for improvement of communications over irrigation channels, carried out from combined Imperial and Local Funds was Rs. 387 on the following works:—

- (1) Overbridge on the Deothan Channel in Baglan Táluka, of the Násik District.
- (2) Overbridge for Dabhade Road on Pátua Channel in Malegaon Táluka.
- (3) Slabbed road bridge on Jirwada Channel in Kalwan Táluka.

34. The Mukti Tank was first replenished on the 10th July 1895 and it filled to overflowing on 16th September 1895. The heaviest rainfall, 3.49 inches, was gauged on 7th September 1895. An examination of the rainfall and its effects gives on 8th and 9th August a run-off of 20.92 per cent. and from 6th to 9th September a run-off of 23.42 per cent. of the rainfall.

35. The Mhaswa Tank commenced filling on 10th June and overflowed on 20th July 1895. The greatest rainfall occurred on 7th September and was gauged 5.23 inches. The run-off from 12th to 15th June 1895 was 44.68 per cent. of the rainfall, and from 19th July to 20th July 1895 was 27.44 per cent. of the rainfall.

36. The Hartála Tank was first replenished on 7th September 1895, and the highest water-level was reached on 22nd September 1895, when it stood at 5.20 feet below crest of waste weir. The heaviest rainfall, 1.36 inches, was gauged on 10th July 1895. An examination of the rainfall and its effects gives, from 19th September to 22nd September, a run-off of 17.53 per cent. of the rainfall. The water-level stood at a depth of 5.87 feet above the sill of outlet at the beginning of January 1896.

37. The Pársul Tank commenced filling on 19th June 1895 and filled to overflowing on 22nd September 1895. The greatest rainfall occurred on 14th September and was gauged 3.41 inches. An analysis of rainy periods gives, from 18th June 1895 to 22nd June, a run-off of 7.98 per cent., and from 12th September to 23rd September, a run-off of 27.60 per cent. of the rainfall.

Floods.

38. There were no extraordinary floods during the year.

39. The percentage of works establishment to total outlay was 11 per cent. which is one per cent. less than that of the last year, owing to the increased expenditure on 2nd Class revenue works.

Works Establishment.

NA'SIK DISTRICT.

Kadwa River system. 40. This system comprises the following works situated in Dindori and Niphád Tálukas :—

1. Wághad Tank.
2. Pákhed Canal.
3. Wadáli Canal.
4. Ojhár Támbat Canal.

41. The usual temporary dam was set up at the close of the monsoon and the water-level in the tank rose to R. L. 113·70, the storage on November 10th being 257·173 millions of cubic feet. Outlay of Rs. 79 (Work Rs. 56 and Establishment Rs. 23) was incurred during the year, chargeable to the Capital Account of the work, for survey and sinking trial pits for ascertaining the necessary depths of foundation for the waste weir.

The Wághad Tank and the Bungalow near it were maintained at a cost of Rs. 720, Executive establishment charges being Rs. 314.

42. The canal, 17 miles in length with 9 miles of distributaries, was properly maintained at a cost of Rs. 2,707. There was no expenditure on Capital account. The canal was closed 7 times (38 days in all) during the year for the usual silt and weeds clearance.

The charges for establishment, excluding direction and collection, were :—

					Rs.
Executive	...	...	...	...	1,441
Revenue	...	...	...	...	656

The cost of repairs per mile was Rs. 104.

Wadáli Canal. 43. The canal, 8½ miles long, was maintained at a cost of Rs. 543, or Rs. 64 per mile.

There was no expenditure on Capital account; establishment charges were as under :—

					Rs.
Executive	...	...	...	...	349
Revenue	...	...	...	...	186

The canal was closed 4 times for 20 days in all, for the usual silt and weeds clearance.

Ojhar Támbat Canal. 44. The length of the canal is 4½ miles, and the expenditure on repairs amounted to Rs. 389 or Rs. 86 per mile.

The charges for establishment were :—

					Rs.
Executive	...	...	...	...	297
Revenue	...	...	...	...	234

There was no expenditure on Capital account.

45. The total number of trees on the Pákhed Canal is 9,485, of which 100 are new mango trees planted during the year. Rs. 172 were expended on watering and hedging. On the Wadali Canal there are 2,122 trees, principally babul and mango. The cost of watering and hedging was Rs. 60.

The number of trees on the Ojhar Támbat Canal is 712; Rs. 47 were spent on watering and hedging.

46. There are 192 old Bándháras in the District, irrigating 17,844 acres and yielding Rs. 80,908 as irrigation share of consolidated revenue. This is inclusive of the new Bándhára at Borala, Táluka Chandor, bringing under irrigation 26 acres of additional land assessed at Rs. 104.

47. The expenditure on original works (Extensions and Improvements) was Rs. 5,437 as noted below :—

No.	Name of Work.	Allotment.	Expenditure during the year.	REMARKS.
	IMPERIAL,	Rs.	Rs.	
	IRRIGATION MINOR WORKS AND NAVIGATION.			
	WORKS FOR WHICH ONLY REVENUE ACCOUNTS ARE KEPT.			
	<i>I. A.—Extensions and Improvements.</i>			
1	Improvements to the Datali Bandhára and Irrigation Channel, Táluka Sinnar ...	I. 51 C. 1,281	1,207	In progress.
2	Improvements to Thangaon Bandhára, Táluka Sinnar ...	I. 93	87	Completed.
3	Improvements to Bandhára No. 26, near village, at Khedgaon, Táluka Dindori...	85	69	Do.
4	Improvements to Bandhára No. 27, at Gondegaon, Táluka Dindori, and No. 7 at Niphád.	C. 173 I. 1,071	1,163	In progress.
5	Surveys for Bandhára extensions and improvements in the Godávári Basin, Násik Collectorate ...	102	37	
6	Improvements to Shewada Bandhára, Táluka Sinnar...	I. 497 C. 66	536	In progress.
7	Constructing 5 feet culverts on road diversion for Wadgaon-Sinnar road, Pachora Bandhára Channel ...	I. 215 C. 709	918	Completed.
8	Constructing 5 feet culvert near Lonarwádi village, for crossing Channel from Bandhára Niphád, Táluka Sinnar ...	I. 153 C. 153	305	Do.
9	Improvements to (Channel diversion) Thangaon Bandhára Channel No. 42 ...	C. 52	...	
10	Improvements to Bandhára Musalgaon, near Habiwádi, Táluka Sinnar ...	I. 103 C. 11-8-0	111	Do
11	Improvements to Bandhára at Shirwáda, Táluka Niphád ...	I. 225 C. 91	317	In progress.
12	Improvements to Dhoterkhed Bandhára and Channel at Shirwáda (Wani), Táluka Niphád ...	I. 250 C. 79	226	Do.
13	Constructing a masonry regulator for irrigating the Mahár's land at Datali Bandhára, Táluka Sinnar ...	35	35	Completed.
14	Constructing two slab drains on Rámeshwar Bandhára Channel at Dindori ...	I. 370 C. 82	426	Do.
	Total ...	5,947	5,437	

AHMEDNAGAR DISTRICT.

Ojhar Canal.

48. The expenditure on maintenance and repairs was Rs. 3,206

Lákh Canal.

49. The expenditure on maintenance and repairs was Rs. 2,497

Bhátodí Tank.

50. The expenditure on maintenance and repairs was Rs. 2,058.

On the 1st April 1895 the water in the tank stood at 11·85 feet above sill of outlet sluice, *i.e.*, at R. L. 81·85. By 10th June the water had fallen to R. L. 76·88, and on 11th June there was a small replenishment and the tank gradually began to fill up to 27th June, on which date the R. L. of water was 77·64; it again dropped to R. L. 77·31 on 7th July; from 8th July the tank again began to fill and water overflowed the waste weir on 23rd September. On 31st March 1896 the water in the tank stood at 17·34 feet above the sill of outlet sluice, against 10·90 feet on the same date in the previous year.

POONA IRRIGATION DISTRICT

51. During the year under review, the expenditure under Capital amounted to Rs. 26,221, of which the greater portion was on the alterations and improvements to the Poona water-supply works, the total estimated cost of which is Rs. 1,69,701.

52. The following shews the actual cost of each item :—

	Rs.
(1) Constructing new settling tanks ...	68,411
(2) Converting old settling tanks into filter beds ...	21,924
(3) Converting old filter beds into pure water tanks ...	22,584
(4) Piping and valves ...	19,097
(5) Compound wall ...	13,247
(6) Alterations to the pumping machinery ...	16,890
Total	<u>1,62,153</u>

53. Five tanks have been built, the capacity of each being 11,76,000 gallons with a depth of 12 feet, or about the maximum supply for one day. The storage capacity, therefore, of the five tanks is 5 days' supply instead of 3 days held by the old tanks. During the monsoon, when the water from Lake Fife is heavily laden with silt and when the consumption is at a minimum, each tank can be allowed over 5 days for settling before the water is passed into the filters. Each tank is provided with an automatic radiating drainer, by means of which the water is drawn off close to the top surface. Valves and wash-out pipes are also provided for the efficient cleaning of the tanks when required.

54. The four tanks which were formerly used as storage and settling tanks have been converted into filter beds, giving a filtering area of 45,000 square feet, as compared with 18,300 square feet with the old filter beds. The filtering material is sand, overlying coarse sand, road metal and open brick drains, each the width of one brick. This water is led by these drains to the main channel which communicates with a central measuring system, whence it is taken to the pure water tanks. The measuring system is similar to that which was adopted in the Berlin water works. It is simple, efficient, and gives the most perfect control over the discharge from the filters and the rate of filtration. The rate which has been adopted for these filter beds is 400 gallons per square yard per 24 hours, and this is never exceeded. With this rate of filtration, any three of the filters can discharge a day's supply when the consumption is at a maximum.

55. In the old works there were 3 filter beds adjoining two small pure water tanks. These five have now been converted into pure water tanks, and together hold about one day's supply. They have been roofed in with concrete supported on masonry arches and pillars. Openings have been made in three of the dividing walls, so as to provide two reservoirs for the storage of the filtered water, each having separate inlet and outlet arrangements. Floating gauges have been provided, so that the depth of water in each tank can be ascertained without opening the manholes—the protection therefore to the filtered water is as complete as possible.

56. The centrifugal pumps, which were formerly used for pumping canal water to the filter beds or filtered water to the service reservoirs, have been removed and are now used for pumping canal water to the settling tanks only. The filtered water is pumped by Worthington pumps to the service reservoirs near the Wanowrie barracks and near the Military Prison. Practically the whole of the pumping is done by a Poncelet wheel driven by the canal water. In the event of the water power failing, a steam triple expansion Worthington pump is available and can supply the service reservoirs or the settling tanks. A centrifugal pump driven by steam is also available to supply canal water to the settling tanks.

57. Water is distributed to Poona by three distinct sets of mains.

(1) The lower service commanded by the pure water tanks, direct by gravitation.

(2) The middle service commanded by the reservoir near the Wanowrie barracks, the supply to which is pumped from the pure water tanks, the lift being 50 feet. This supplies the district which is too high to be served by the lower service.

(3) The upper service commanded by the two reservoirs near the Military Prison, the supply to which is also pumped from the pure water tanks, the lift being 110 feet. This supplies the Wanowrie district, which is too high to be commanded by the middle service.

The pumps are now in efficient working order and capable of maintaining the maximum supply in all the reservoirs.

58. The new filters have been in operation for more than a year and the result is in every way most satisfactory. Specimens of the canal and filtered water are sent to the Chemical Analyser, Bombay, once a month, and the results are most uniform. The following shews the comparison between canal and filtered water.

Free ammonia.

Canal water—varies from 0.03 to 0.01 parts per million.

~~Filtered water—from 0.02 to 0.01 parts per million.~~

Albumenoid ammonia.

Canal water—varies from 0.08 to 0.06 parts per million.

Filtered water—varies from 0.04 to 0.03 parts per million.

59. It would appear from this analysis, that the canal water is so good that filtering is almost unnecessary. The action, however, of the filters is exhibited in a much more marked manner by the bacteriological test. In February and March 1896, samples of water were tested by the Executive Engineer according to the method laid down by Professor Hankin. Tubes containing the medium in which bacteria can be cultivated were obtained from Professor Hankin. The transmission of tubes was delayed; and they were received in February, when the canal was closed. Only filtered water therefore could be tested. The results of these samples were as follows:—

18 }
24 } Bacteria per cubic centimetre.
26 }

60. In March the canal water was tested, and it was found that there were 130 microbes per cubic centimetre. The 3 samples of filtered water showed, 10, 16, and 24 bacteria per cubic centimetre respectively. Professor Hankin's standard for good water is 100 bacteria per cubic centimetre. The above test therefore shows that the canal water is not quite up to the standard, and that the filtered water is of an exceptionally good quality and the filters most efficient. Testing water bacteriologically is not a difficult operation, but requires extreme care to avoid bacteria from outside coming in contact with the sample to be tested, and if the above tests had been made by an expert the results would in all probability

have been better. During the monsoon, when the canal water is very thick with silt, the sand in the filter bed gets more quickly clogged than in the cold and hot seasons, when the water is clear. A filter can be kept at work without cleaning for 2 months in the monsoon and for 4 or 5 months afterwards. The quantity of sand that has to be washed is found to be extremely small, as the filters get stopped by the growth of the slimy vegetable layer that accumulates on the surface of the sand. This, when allowed to dry in the sun, cracks and detaches itself from the sand and can be removed without carrying much of the sand with it. When this top layer has been cleared away, the surface of the sand is raked up and smoothed over. Water from one of the filters is passed upwards through the sand and allowed to run to waste and the filter is then ready for work.

61. The only work now remaining to be done is the abolition of the small filter bed close to the Sholápur bazár, and the bringing of this district under command of the new works. The plans and estimates for this work are sanctioned, and it is hoped that the work will be put in hand very shortly.

62. New mains were laid in the Suddar bazár at a cost of Rs. 3,135, and Rs. 3,280 were expended in providing valves to pipe outlets on the Mutha Canal.

63. On the 1st April 1895 the water at Lake Fife was 21·28 feet above the sill of canal sluices, and the minimum level was reached on the 17th June when the depth was 10·97 feet. The water began to rise on the 18th June and the lake filled to overflowing on the 22nd of that month. The highest flood of the year occurred on the 18th July 1895 when the water rose to R. L. 247·22 or 3·15 feet above finished crest level of waste weir. The flood of July 1891 rose to R. L. 249·17 and that of 21st July 1894, the highest ever recorded, rose to R. L. 249·52 or 5·45 feet above finished crest level. The standard and planks were fixed on the weir by the end of September, and on the 6th November the water stood at 4·00 feet above the finished crest of the weir.

64. The draw-off from the storage commenced from the 9th November, *i.e.*, 15 days later than the previous year. On the 31st March 1896, the level of the water was 21·47 feet above the sill of the sluices, *i.e.*, 0·07 higher than on the same date in 1895.

65. The Right Bank canal was closed for 20 days and the Left Bank canal for 16 days during the year for silt and weed clearance.

66. The rainfall of the year at Poona amounted to 32·48 inches, the average for the last 46 years being 29·45 inches.

67. The canals and the Poona water-supply works were maintained in an efficient state throughout the year at a total cost of Rs. 28,771 as detailed below :—

	Rs.
Mutha Canals	12,939
Poona Water-supply	15,832

Out of these amounts Rs. 6,008 were for establishment charged to works in the case of the Mutha Canals and Rs. 5,508 for the Poona Water-supply.

A canal lining wall near Manik Nála aqueduct was constructed during the year at a cost of Rs. 420, to stop leakage through the fissured rock.

68. During an unusually heavy storm on the night of 9th June 1895, the Kásurdi Tank dam was breached. The repairs to this dam were in progress during the year, and Rs. 1,743 have been expended against an estimate of Rs. 1,827. A revised estimate for Rs. 3,001 has been submitted, owing to the occurrence of a flood which widened the breach after the first estimate was prepared.

69. The water in this tank stood at 17·83 feet above sill of outlet on 1st April 1895. The draw-off for irrigation reduced the level until 4th June, when it stood at 8·85. From the 5th June it commenced to be replenished and filled to overflowing on the 2nd August, and on the 31st March 1896 the level was 19·44 above sill of outlet, or 1·50 feet higher than on the same date in the previous year. The expenditure on maintenance and repairs amounted to Rs. 1,088, including Rs. 397 for establishment charged to works.

70. On the 1st April 1895 there was no water in the tank and it remained empty till the 25th May 1895. The tank was replenished on the 26th May and water rose to 11'00 feet above the outlet sill on that day. The draw-off commenced from the same date and on 6th September water stood at 7'88 feet. Between September and November the water rose to 25'75 feet above outlet. The draw off commenced from 10th November, and on 31st March 1896, the water stood at 19'55 feet. The expenditure on maintenance and repairs amounted to Rs. 1,224, including Rs. 468 on establishment charged to works.

71. At the beginning of the year, the water-level stood at 20'07 feet above the outlet sill, or 9'17 feet higher than on the same date in the previous year. The tank filled to overflowing on the 15th September 1895. The draw-off commenced from 21st October and at the close of the year, 31st March 1896, the water-level stood at 28'25 or 8'08 feet higher than on the same date in the previous year.

The expenditure on maintenance and repairs during the year amounted to Rs. 811, including Rs. 434 for establishment charged to works.

72. Rain and river gauges were maintained as usual in the Poona District and observations regularly recorded. The registers of heights of water were kept for all tanks and diagrams recorded.

73. The amount spent during the year was Rs. 15,545. All the works in progress at the end of last year were completed. The only new works of importance undertaken were an additional training wall in the north waste weir channel and two small walls in the south weir channel. All the gates on the south weir were erected and in working order before the monsoon and water was stored up to $4\frac{1}{2}$ feet above crest level. During an unusually heavy storm early in September, before the lake had quite filled, it was found that the gates had moved backwards and forwards on the frames and some damage was done to the concrete filling. No damage of any kind was done to the gates and arrangements have been made to prevent a recurrence of this damage. The gates on both weirs acted perfectly under a head of $4\frac{1}{2}$ feet. The gates having now been tested and found to act well under the above head, arrangements will be made to close the south weir next year in time to secure the full storage above weir crest. The completion of the tramway lines on both weirs has been delayed pending the completion of the erection of the gates, they will now be put in hand and completed as soon as possible. With the exception of this work and a few unimportant items the Bhátghar Dam is quite complete.

74. The under-sluices were finally opened for the monsoon on the 21st June, when the tank level stood at 25'30 feet above the under-sluice sill. They were closed again on the 14th August. No heavy floods occurred in the intervening period, the maximum level reached being only 33 feet on the 8th of August. After the shutting of the under-sluices, water reached the sill of the waste weirs on the 7th September 1895. The tank was thus filled in 24 days. The maximum height to which the water rose while the waste weirs were open was 1'10 feet above crest on the 8th September 1895. The automatic gates of the north waste weir were shut on the 14th September 1895 and those of the south waste weir on the 26th of the same month. Water was first drawn for irrigation on the 19th November 1895, when the water-level in the tank was 79'52 feet, the highest level yet attained. The volume of water discharged from the catchment area between the time of opening the sluices on June 21st, 1895, till the water rose to the maximum height of 79'52 feet on 19th of November 1895 was 36,435,547,728 cubic feet, giving a run-off of 123 inches from the Ghát catchment area of 128 square miles.

The level of water on 31st March 1896 stood at 62'27 feet, that is, 8'37 feet higher than last year.

75. The first and second needle gaps in the main weir were finally completed, and fish stairs were built at the extreme southern corner of the weir.

76. The highest flood during the year occurred on the 8th August 1895 and rose to 4.10 feet over the main weir and 9.50 feet over the subsidiary weir, showing a discharge of 50,000 cubic feet per second.

77. At Wadgaon a block of 3 rooms has been built for the Inspector, Patkari and line-keeper. The Koralla cut work was completed. The canal at that point being now of full section, the remaining earth-work at the end of the main canal was completed.

78. The only new pipe outlet put in was No. 39 A, 6" diameter, in mileage 67 miles 2 furlongs. On several of the distributaries masonry drainage works were built and remaining earth-work done, notably Nos. 18, 48, 53, and 59.

79. Special repairs were done both to the Kara and Nimbori banks, and also in places nearer the head of the canal. The Kara banks are now in safe condition.

Ordinary repairs and maintenance have been carried out throughout, and both canals and distributaries were kept in good working order.

The charges for maintenance and repairs amounted to Rs. 16,702 and those for special repairs to Rs. 1,952. The total amount expended on capital works on the Nira Canal and the Bhatghar Dam was Rs. 22,983.

SHOLA'PUR DISTRICT.

80. The waste weir that was lowered 6 feet in 1893, in order to reduce the water-level in the tank and enable the repairs to the dam to be undertaken, was raised 2 feet during the year. The remaining 4 feet will be raised in next two years (1896-97 and 1897-98). The work executed consisted of concrete hearting with masonry facing for a length of about 1,000 feet. The expenditure on this work was Rs. 2,273, including materials collected for next year's work, and has been debited to the head "Extensions and Improvements." There was no expenditure on the Capital account which stands as under :—

	Rs.
Estimated amount	16,09,890
Allotment for 1895-96	Nil.
Expenditure, 1895-96	Nil.
Total Expenditure	15,81,471

81. The dam and canals were repaired and maintained during the year at a cost of Rs. 6,694, including special repairs to canals.

82. There was no extraordinary flood, during the year likely to affect the dam or canals. The cut in the waste weir began to overflow on 15th September 1895, and the maximum depth of water that passed over it was 1.70 feet.

83. An iron foot-bridge, in place of the old decayed and rotten wooden one, was constructed to the outlet tower of the perennial canal. The span of the bridge is 70 feet. The main girders are four feet deep, and 74' 10" long. One end of the bridge rests on the tower, and the other on masonry facing of the approach embankment. The main girders are placed 3' 9" apart from centre to centre. The roadway is formed of teak planks placed $\frac{1}{2}$ " apart on the bottom booms of the main girders.

84. The Capital account of the tank was closed in 1885. The expenditure on the bridge, which was Rs. 3,042 against the estimate of Rs. 3,151, was debited to "Extensions and Improvements."

The dam and canals were repaired and maintained during the year at a cost of Rs. 5,994.

85. There was no extraordinary flood during the year. The waste weir began to overflow on 8th September 1895, and the maximum depth of water that passed over the crest of the waste weir was 3 feet.

86. The Capital account of this tank was closed in 1893. No original work was executed during the year. The dam and canal were repaired and maintained in good condition during the year at a cost of Rs. 2,360.

87. The cracks that appeared in the dam were kept under watch, and plans and estimate for remaking the cracked portion of the dam and providing a berm behind the same have been prepared. Actual work of remaking the seriously cracked portion of the dam will be carried out after the rains of 1896.

88. There was no extraordinary flood during the year. The cut in the waste weir of the tank began to overflow on 8th September 1895, and the maximum depth of water that passed over it was 6.50 feet.

89. The Capital account of this tank was closed in 1892. No original work was executed during the year. The dam and canal were repaired and maintained in good condition during the year at a cost of Rs. 365.

90. The waste weir of the tank began to overflow on 20th September 1895, and the highest depth of water that passed over it was 3.80 feet.

BIJAPUR DISTRICT.

91. The tank was maintained during the year at a cost of Rs. 209 against Muchkundi Tank. Rs. 171 for the previous year.

92. The rainfall gauged at the tank was 14.40 inches against 20.76 inches in the previous year. From June to December 1895, 12.58 inches fell, as compared with 17.87 inches for a similar period in 1894.

93. The highest level of water in the tank was 10.10 feet above the sill of sluice, as compared with 14.64 feet in 1894, but the storage was sufficient for all requirements.

94. The survey for increasing the catchment area of the Muchkundi Tank, in progress in 1894-95, was completed during the year under report at an outlay of Rs. 283 against the estimate of Rs. 261.

95. An expenditure of Rs. 21 was incurred for removing the shutters of the sluice of the Nilgund Tank, and conveying them to the Executive Engineer's Head-quarter Store, the sluice having been kept open agreeably to orders issued in Government Resolution No. 98 W. I.—1141, dated 17th July 1894.

96. The outlay incurred during the year on repairs and extension and improvements to tanks, for which only revenue accounts are kept, was Rs. 305 against Rs. 949 for last year. A contribution of Rs. 14 was paid for repairs to these tanks by the rayats interested in them.

SA'TA'RA DISTRICT

97. The expenditure incurred chargeable to the Capital account of this canal, during the year under report, was Rs. 189 on account of liabilities for compensation for land taken up for the canal.

98. The canal was maintained and kept in working order at a cost of Rs. 954, including Rs. 77 for plantation, against Rs. 947 in the previous year. An additional sum of Rs. 503 was spent on the canal for special silt clearance.

99. In addition to the above the following works were also carried out during the year as a charge against the Revenue account under Extension and Improvements:—

	Rs.
(1) Constructing a permanent trough aqueduct (in progress) ...	198
(2) Constructing a masonry escape with iron sluice doors (completed) ...	317
(3) Constructing two module heads (completed) ...	175
(4) Subdividing irrigated survey numbers of the Rewári village (in progress) ...	63

100. The reconstruction of the slipped portion of the Nehr Tank Dam described in previous years' reports, was in progress, and the following sub-heads of the revised estimate were completed during the year under report :—

- (1) Nehr Tank Service Road.
- (2) Repairs to old store at Nehr.
- (3) Repairs to 1895 slip at top of dam.

Remaking dam and Relaying pitching. 101. The embankment was raised to R. L. 2,653 and the pitching on the safety bank to R. L. 2,665. These two items will be completed during 1896-97.

Famine Memorial Pillar, Nehr Tank. 102. Last year, partial collection of materials was made; the work was completed during the year under report. Survey of a new site for a weir at Wakeshwar was also completed during the year.

103. The expenditure on all these capital account works was Rs. 6,439.

104. The Nehr Tank Right Bank Canal and the two Yerla Canals were maintained in good order at a cost of Rs. 3,092, including Rs. 361 for plantation, against Rs. 3,090 in the previous year. An additional sum of Rs. 660 was spent on the canals for special silt clearance, repairs to banks, &c.

105. The expenditure incurred chargeable to the capital account of this system of canals, during the year under report, was Rs. 105 on account of liabilities for compensation for land.

106. The Pingli Tank and Canals under this system were maintained in working order at a total cost of Rs. 2,310, including Rs. 153 spent on plantation, against Rs. 2,474, in the previous year. In addition to this, special repairs consisting of removing silt from the Dahiwadi, Bidal, Lodhawde and Gondowli Canals, and repairs to banks of the Pingli, Gondowli, Dahiwadi and Bidal Canals were carried out at a cost of Rs. 788, and a Famine Memorial Pillar on the Pingli Tank was erected at a cost of Rs. 136.

107. There was no expenditure on the capital account of this canal during the year under report, and the maintenance charges amounted to Rs. 1,375 including Rs. 191 spent on plantation, against Rs. 1,352 of the previous year. An additional sum of Rs. 216 was spent on Special Repairs, consisting of filling in with masonry the hollows below the cross-wall in the waste weir channel, repairs to the left bank and flank wall and also some general repairs to the wall below the canal crossing.

108. No works chargeable to capital account were carried out during the year under report, and the canal was maintained at a cost of Rs. 366, including Rs. 39 spent on plantation, against Rs. 422 in the last year. An additional sum of Rs. 172 was spent on special silt clearance.

109. No works chargeable to Capital account were executed during the year under report in connection with this system of canals. The canal was maintained and kept in working order at a cost of Rs. 4,153, including Rs. 464 spent on plantation, against Rs. 4,058 of the previous year. Special Repairs to the Main Canal and branch channels, consisting of silt clearance, were carried out at a cost of Rs. 1,534, and Nālas Nos. 3, 17 and 46 were also cleared of silt at a cost of Rs. 281.

110. In addition to the above the following works were also carried out during the year as a charge against the Revenue Account under Extensions and Improvements :—

	Expenditure, 1894-95.	Expenditure, 1895-96.
(1) Constructing 3 Chankidārs' huts (completed)...	... ..	291
(2) One Persian wheel at Shenoli (completed) ...	... ..	67
(3) Constructing 5 Module heads (completed) ...	... 95	443
(4) Providing furlong stones (completed) ...	... 19	115

BELGAUM DISTRICT.

Gokak Canal, 1st Section
and Storage Works.

111. A full description of the Gokak Canal 1st Section and Storage Works was given in the Administration Report for 1891-92.

This year also there has been neither settlement of nor leakage through the embankments at the ends of the weir. The stone pitching on the inner slopes has stood well and suffered no damage by the action of the waves.

The concrete laid close to the left bank Gauge Notch to protect the weir foundations from the overfall is sound.

112. The compensation paid during the year for the submerged land amounted to Rs. 5,131, and from the commencement to Rs. 1,57,991. There remains nearly Rs. 50,000 still to be paid.

113. The capital expenditure during the year was Rs. 14,033. The charges for maintenance and repairs amounted to Rs. 2,469 against Rs. 2,410 in the previous year. Some special repairs to the canal slopes in cutting are included in this sum.

114. The work of demarcating the land submerged was completed during the year by the special establishment appointed for the purpose.

115. The tank fell to the lowest point on the 10th April 1895, when the water-level stood at R. L. 2001.74, i.e., 4.28 feet below the crest of the weir.

The reservoir first over-flowed on the 4th June 1895.

The maximum flood, which rose to R. L. 2008.95, (i.e., 2.95 above weir crest) occurred on the 9th August 1895; the discharge being then estimated at 50,828 cubic feet per second, equal to a run-off of 0.08 inch per hour from the whole area of the catchment basin.

The under sluices were closed on the 11th October 1895.

No remarkable floods occurred during the year.

The total discharge of the river between 1st July and 31st October 1895 inclusive was 86,709 millions cubic feet, representing a run-off of 34 inches from the catchment.

116. The Southern Mahratta Railway Company have made arrangements to take water for their Engines from the scouring channel. Their connections are complete, but no water has been taken as yet.

117. Besides the monsoon and cold weather irrigation, the storage gave a constant supply to the Falls Mills, and this amounted to 58 cubic feet per second from the 1st August 1895, only 47 cubic feet a second having been given prior to that date.

118. The water in the reservoir first fell below the crest of the waste weir on the 20th January 1896.

No water applications were refused during the year.

119. One gauge notch, in addition to that reported last year, has been built in the scouring channel for gauging purposes.

120. No very marked silting has been noticed in the storage reservoir; arrangements for taking periodical silt observations are being made.

121. The extension of the Gokak Canal, which was under construction last year, was completed during the year under report. The expenditure of the year was Rs. 3,511 and from the commencement Rs. 5,368. A project for a further extension of the canal to the Jagnur Nala is being prepared.

This was the first year that irrigation under this extension was practiced, and water was allowed free for kharif crops. The area irrigated free was 116 acres.

122. The paved crossing, which was under construction last year, was completed during the year under report. The total expenditure of the year is Rs. 5,455 and from commencement Rs. 9,243.

123. The Malaprabha River gauge at Gurlhosur in the Parasgad Taluka was maintained during the year.

124. Large tanks irrigating over 50 acres, repaired and improved during the year, were as follows :—

Particulars.	Number of Tanks.	Expenditure during the year.
		Rs.
Commenced in the previous year	1	255
Commenced and completed during the year under report...	2	102
Commenced but not completed during the year	2	304
Total ...	5	661

125. Smaller tanks irrigating less than 50 acres, repaired and improved during the year, were as follows :—

Particulars.	Number of Tanks.	Expenditure during the year.
		Rs.
Commenced in the previous year ... ..	...	...
Commenced and completed during the year under report...	1	19
Commenced but not completed during the year	1	80
Total ...	2	99

126. About the end of July 1895, an estimate amounting to Rs. 578 was sanctioned for surveying old Irrigation Tanks in the Belgaum District, examining and selecting for repairs and preparing the necessary plans and estimates. Work was commenced in August 1895, but for some time progress was necessarily slow on account of the rains. The work done during the year is as follows :—

Tanks newly surveyed	1
Tanks formerly surveyed, but now completed and checked	9

DHARWAR DISTRICT.

127. No expenditure was incurred during the year chargeable to Capital Account.

128. These are four in number, viz., Madag, Dambal, Medleri and Asundi.

129. In addition to these, the Mavinkop Tank, which lies on the extreme border of the Dhárwár Collectorate and irrigates land in Kánara, is under the control of the Revenue Department.

130. The following is the detail of expenditure incurred on maintenance and repairs of the 4 (four) tanks during the year :—

Number.	Tanks,	Maintenance and Repairs.	Plantation.	Survey.	Total.	REMARKS.
		Rs.	Rs.	Rs.	Rs.	
1	Madag	426	135	...	561	
2	Medleri	279	...	...	279	
3	Dambal	195	...	77	272	
4	Asundi	268	...	...	268	
	Total ...	1,168	135	77	1,380	

Last year's expenditure amounted to Rs. 1,575. There is therefore a saving of Rs. 195, or 12·4 per cent., on the maintenance of these tanks as compared with last year.

131. No water could be admitted into the canal from 17th April to 20th June 1895, owing to the low level of water in the tank; after that date there was a fair supply of water throughout the year.
Replenishments.
Madag Tank.

132. Water was below outlet sill till 29th May 1895; during that time water for irrigation was used by lift. There was a fair supply of water after that date till the end of March 1896.
Medleri Tank.

133. There was no water in the tank till 7th April 1895. Replenishment in October and November brought a fair supply of water into the tank. It ran dry several times in the interval.
Dambal Tank.

134. There was no water in the tank till 13th April 1895. Several replenishments took place after that date and there was a supply of water till the end of March 1896.
Asundi Tank.

135. Large tanks irrigating over 50 acres, repaired and improved during the year, were as follows :—
2nd Class Revenue Works.

Particulars.	Number of Tanks.	Expenditure during the year.
		Rs.
Commenced in the previous year	23	14,747
Commenced and completed during the year under report	8	5,083
Commenced but not completed during the year ...	23	17,272
Total ...	54	37,102

136. Smaller tanks irrigating less than 50 acres, repaired and improved during the year, were as follows :—

Particulars.	Number of Tanks.	Expenditure during the year.
		Rs.
Commenced in the previous year	10	1,507
Commenced and completed during the year under report	9	1,285
Commenced but not completed during the year ...	18	3,798
Total ...	37	6,590

137. Survey is being made with a view to put the canal in efficient repairs. A sum of Rs. 464 was spent on annual petty repairs and Rs. 130 on special repairs, consisting of closing breaches in the bank caused by heavy floods. Also a sum of Rs. 43 was spent on special repairs from the estimate sanctioned in 1894-95.

138. The Rain Gauges were maintained during the year throughout the district. The rainfall registered during the year shows an increase as compared with the previous year, and there was therefore no demand for canal water for Rabi crops under the 1st Class tanks, which caused a considerable decrease in the area irrigated and water rates assessed.

139. The state of the projects intended as Famine Relief Works was as follows :—

- | | |
|---|-----------------------------|
| (1). Kardikop Project. | } Surveys are well in hand. |
| (2). Pudukkatti site in Dhárwár Taluka. | |
| (3). Gujmagdi site in Ron Taluka. | |
- } Surveys are practically complete
} Projects will be submitted shortly.

RATNA GIRI DISTRICT.

140. The repairs to this tank consisted of removing sluice gates at the beginning of the monsoon and tarring and fixing them again at the close of it. The earthen dam was also repaired to the extent required. The outlay during the year amounted to Rs. 40.

141. The repairs to this tank consisted of removing, repairing and refixing sluice gates as usual, tarring wood-work of railing, of gangway and of the gate to the small drain, and stopping leakages through the masonry work, &c. The expenditure incurred during the year was Rs. 85.

142. The repairs to the dam consisted of coal-tarring wood-work of sluice gates, renewing chunam pointing, and repairing pitching with new khandkies, where necessary, and repairing wood-work. The expenditure incurred during the year was Rs. 38.

SIND.

BEGA'RI CANALS.

143. The masonry inlet and escape designed to pass hill and river floods over the supply channel which feeds the canal, which was commenced in 1894-95 and fully described in the last report, was completed.

	Rs.
Amount of estimate	5,130
Expenditure up to date	4,964
Expended during the year... ..	2,964

144. The improvements which have been in progress on this canal and which have been fully described in former reports were completed by the construction of the karia heads referred to in the last report.

	Rs.
Amount of estimate	1,85,060
Expenditure up to date	1,87,273
Allotment for the year	13,012
Expenditure during the year	13,012

145. The new regulator and new mouth together with the Inspection Bungalow and Baulk sheds, described in last year's report, were completed before the inundation of 1895 at a total cost of Rs. 61,721, of which Rs. 27,443 were charged to Capital Account and Rs. 34,278 to Revenue Account.

				Rs.
Amount of sanctioned estimate	...	...	...	68,007
Expenditure up to date	...	...	...	61,721
Allotment for the year	...	...	...	24,008
Expenditure during the year	...	...	...	23,717

146. During the inundation 1895, the river eroded its right bank immediately below the mouth of the Unharwáh and threatened to cut into the canal behind the regulator. It has, therefore, been found necessary to construct a new regulator $1\frac{1}{2}$ miles lower down the canal. The new regulator is similar in design to the one referred to above and described in last year's report, but the height to springing has been raised to 18 feet in order to allow for the fall in the bed of the Canal. Baulk and inspection sheds are also provided. The works are well in hand and will be completed before the inundation.

				Rs.
Amount of estimate	...	...	...	57,898
Allotment for the year	...	...	...	18,900
Expended during the year	...	...	...	18,900

147. Surveys of the Main Canal and branches, existing and proposed, were carried out at a cost of Rs. 345 for the preparation of estimates for the proposed remodelling of the canal, which is rendered necessary by the alteration of its gradients, due to excessive scour and silting.

A small masonry sluice was constructed over a karia on the Desert Canal, half the cost of the sluice being contributed by Government. It was completed at a cost of Rs. 417.

148. The clearance of the silt deposited by the floods which crossed the supply channel referred to in the last report was completed before the inundation. The expenditure of the year was Rs. 6,166, making the total expenditure Rs. 18,165 against the estimated cost of Rs. 22,000.

149. The special repairs due to the failure of the regulator which were described in the last report were completed during the inundation. The expenditure of the year was Rs. 3,528, the total expenditure being Rs. 13,516 against the estimated cost, Rs. 15,000.

150. The special repairs recommended by the Inspector-General of Irrigation and the experimental line of inner bund, fully described in the report of 1893-94 and referred to in the last report, were completed during the year.

				Rs.
Amount of estimate	...	...	...	50,469
Expenditure up to date	...	...	...	45,894
Expenditure during the year	...	...	...	9,198

151. The construction of a loop embankment to the Kashmir Bund on the site of the old regulator at Unharwáh, mentioned in last year's report, was completed during the year.

				Rs.
Amount of estimate	...	...	...	16,993
Expenditure up to date	...	...	...	15,079
Do. during the year	...	...	...	5,084

152. The erosion of the right bank of the river, noticed above, rendered special measures necessary for the maintenance of the bund. The first 3 miles and the 11, 12 and 13 miles being greatly endangered and portions of the 11th and 12th being already cut away, and the portion of the bund between these also

endangered by the erosion caused by the river setting into the mouth of the dhand, it was considered advisable to construct a new loop embankment nearly 14 miles in length from the commencement of the bund and joining the old bund in the 15th mile.

153. The works are in rapid progress and will, it is hoped, be completed above flood-level before the inundation.

Amount of estimate	...	...	...	Rs.
Expenditure during the year	...	...	...	4,13,580
				1,00,496

The necessary surveys for the location of the new loop embankment were carried out at a cost of Rs. 578 against the estimated cost of Rs. 645.

154. The ordinary maintenance and repairs necessary were carried out and the usual Abkaláni establishment employed, the expenditure being as follows :—

Maintenance and Repairs— Desert Canal.					Rs.
Repairs	...	...	...	...	27,005
				Rs.	
Establishment	...	{ Abkaláni...	...	3,608	
		{ Revenue	...	2,080	
		{ Works	...	1,499	
Gardens	...	...	...	52	
				<hr/>	7,239
				Total	34,244

155. The ordinary maintenance and repairs necessary were carried out and the usual Abkaláni establishment employed, the expenditure being as follows :—

Maintenance and Repairs— Unharwáh.					Rs.
Repairs	...	...	...	...	16,131
		{ Abkaláni	...	3,434	
Establishment	...	{ Revenue	...	1,180	
		{ Works	...	1,051	
Gardens	...	...	...	88	
				<hr/>	5,753
				Total	21,884

156. The clearance of the tail of this canal mentioned in the last report was continued and the groynes made, to reduce the width necessary.

The expenditure on this work amounted to Rs. 9,216.

The expenditure on ordinary maintenance and repairs was as follows :—

					Rs.
Repairs	...	...	...	...	37,679
				Rs.	
Establishment	...	{ Abkaláni	...	4,520	
		{ Revenue	...	2,374	
		{ Works	...	1,497	
Gardens	...	...	...	81	
				<hr/>	8,472
				Total	46,151

157. Ordinary repairs were carried out and the usual establishment entertained. Good progress was made with the protection of the bund by fencing. A sum of Rs. 569 was expended in connection with the Survey of the river Indus. The expenditure was as follows :—

Maintenance and Repairs—
Kashmor Bund.

Repairs	...	...	...	...	Rs.	13,222
					Rs.	
Establishment	...	{ Abkaláni	...	...	21,143	
		{ Revenue	...	...	839	
		{ Works	...	...	1,322	
Gardens	...	...	...	...	352	
						23,656
					Total	36,878

158. The ten gardens in the district were maintained at a cost of Rs. 573 and the receipts amounted to Rs. 31 as compared with Rs. 23 of the year before.

Plantations.

159. The following is a summary of the entire expenditure during the year in this district.

Major Works—					Rs.	
Capital	...	...	...	...	35,055	
Extensions and Improvements	...	...	...	...	24,091	
Clearance and repairs	...	...	...	...	90,509	
					Rs.	
Establishment	...	{ Abkaláni	...	...	11,562	
		{ Revenue	...	...	5,634	
		{ Works	...	...	4,047	
Gardens	...	...	...	...	221	
						21,464
					Total, Major Works	1,71,119
Minor Works—Kashmor Bund—					Rs.	
Repairs	...	...	...	...	1,28,578	
					Rs.	
Establishment	...	{ Abkaláni	...	...	21,143	
		{ Revenue	...	...	839	
		{ Works	...	...	1,322	
Gardens	...	...	...	...	352	
						23,656
					Total, Minor Works	1,52,234
					Total, Major and Minor Works	3,23,353
Add—Regular Establishment and Tools and Plant	...				58,527	
					Total	3,81,880

160. The total cost of establishment was Rs. 58,527, and the percentage of it on the total outlay of Rs. 3,23,353 was Rs. 18.10 as compared with 15.82 the year before.

161. The total cost of the Abkaláni establishment was Rs. 45,120 as compared with Rs. 32,048 the year before. The increase is not real, but is due to the usual adjustment between Abkaláni establishment and repairs not having been made this year.

SHIKARPUR CANALS.

162. The improvements to this canal and branches, fully described in the last two years' reports, were nearly completed except a small regulator and few karia heads. The whole system will be brought into full operation during the next inundation season.

Extensions and Improvements—Sind Canal.

Amount of estimate	...	...	...	...	Rs.	3,21,482
Expenditure during the year	...	...	...	...		1,54,121
Do, up to date	...	...	...	...		3,04,179

163. Two road-bridges, one over the Dengrowáh and the other over the Koraiwáh, were converted into regulators to control the supply in the event of a breach. The bridges have spans of 30' and 25' respectively. A pier $2\frac{1}{2}$ feet wide was constructed in the centre of each and the abutments were extended on the upstream side by 4' to support the regulating apparatus which consists of iron wales and teakwood needles. The cost of the works is detailed below :—

	Amount of Estimate.	Expenditure.
	Rs.	Rs.
Bridge over Dengrowáh	2,926	2,891
Do. Koraiwáh	2,216	2,090

164. Water service was provided to the office and bungalow of the Executive Engineer, Sukkur, at a cost of Rs. 226.

165. Special repairs consisting of a new loop to close the breach of 1894, raising and strengthening the retired portion of Sukkur-Begári Bund, and of making a sluice through it, mentioned in last year's report, were completed at a total cost of Rs. 39,731, as detailed below :—

	Amount of Estimate.	Expenditure.
	Rs.	Rs.
New loop, Sukkur-Begári Bund	21,035	18,327
Raising and strengthening retired portion, Sukkur-Begári Bund	22,850	19,370
Sluice through retired portion, Sukkur-Begári Bund... ..	2,035	2,033
Total	39,730	

166. Compensation, amounting to Rs. 8,814, for land taken up for the retired bund, in the 21st and 22nd miles of the Sukkur-Begári Bund, as described in last year's report, was paid during the year.

167. A new loop to this bund, from the left bank of the Nára Supply Channel at the Railway bridge to the Garkino Sluice to protect the Nára bank, was constructed during the year at a cost of Rs. 4,771 against the estimated cost of Rs. 8,240. The crest of the bund is 4.75 feet above the highest flood level, the top width is 6 feet with river slope 3' to 1' and rear slope 2' to 1'.

168. Portions of the Kásimpur Bund in the 6th and 7th miles were cut away, and the first mile endangered during the inundation of 1895. The whole of the Bund in the first 8 miles was therefore realigned and its construction is now in progress. The expenditure of the year was Rs. 40,000 against the estimated amount of Rs. 1,26,602. The section of the bund is 6 feet top width, river slope 3 to 1, and rear slope 2 to 1 with berms 4 feet wide at water-level on both sides.

169. Ordinary clearance of canals and repairs to bunds were carried out during the year. As the channel which fed the Sind Canal was silted up at its mouth during the inundation of 1895, a new mouth to it from the Dilmor Dhund has been made, and this will be used in case of necessity. The old mouth has also been thoroughly cleared.

170. The outlay on maintenance and repairs was as follows :—

		Rs.	Rs.
Works	{ Canals ... ..	...	63,833
	{ Bunds in Rohri District ... ..	...	3,073
	{ River Bunds ... ..	...	8,886
Establishment	{ Abkaláni	12,500	
	{ Revenue	1,837	
	{ Works	5,458	
		<u>19,795</u>	
			<u>95,587</u>

171. The total expenditure on establishment during the year was Rs. 19,795 as compared with the average of the previous 3 years—Rs. 17,047. The excess was due to the engagement of the whole Abkaláni establishment throughout the season, as it was feared that men would not be available when most required, owing to the heavy rabi harvest of the previous season.

172. Seeds of Lai were sown along the front slopes of all the river embankments not already covered with brushwood. These have now sprung up in most places and will protect the earthwork. The new trees which spring up outside the bunds and canals and within their apportioned limit are being taken care of. Those in a dangerous position were sold and Rs. 3,747 realized during the year as under :—

					Rs.
Sind Canal	...	...	...	...	2,729
Rohri Canal	...	...	...	...	880
River embankment	...	...	...	...	138
Total					3,747

A sum of Rs. 2,021 was refunded during the year, to the purchasers of trees along the Sind Canal sold to them during the previous year, owing to the limit of widening being altered.

173. A further survey of the Rohri District by cross lines and of the Reni nadi which passes through the desert, was taken in hand at the suggestion of Inspector-General of Irrigation, and was completed at a cost of Rs. 10,374 against an estimated amount of Rs. 13,267. The detail of the expenditure incurred, compared with the estimated amount, is as under :—

				Estimate,	Expenditure.
				Rs.	Rs.
Work	...	...	...	6,716	4,629
Establishment	...	...	...	6,415	5,623
Tools and Plant	...	...	...	136	122
				13,267	10,374

174. The following is a summary of the expenditure during the year in the Shikárpur Canals District :—

					Rs.
Extensions and Improvements	...	...	...	...	1,59,328
Repairs—				Rs.	
Clearance of canals	...	...	...	63,833	
Repairs to bunds	...	...	...	3,073	
					66,906
Establishment	{	Abkaláni	...	5,887	
		Revenue	...	1,530	
		Works	...	4,565	
					11,982
					2,38,216
Ordinary Agricultural Works.					
Repairs—				Rs.	
Special	...	...	...	61,281	
Ordinary	...	...	...	8,886	
					70,167
Establishment...	{	Abkaláni	...	6,613	
		Revenue	...	307	
		Works	...	893	
					7,813
Add—Surveys in Rohri	...	...	...	...	2,796
				Total	3,18,992
Add—Regulator Establishment and Tools and Plant				...	30,691
				Total	349,683

The total cost of establishment was Rs. 30,691, and the percentage of it on a total outlay of Rs. 3,18,992 comes to Rs. 9·61 as compared with Rs. 13·29 in the previous year.

The total cost of the Abkaláni establishment for the year was Rs. 19,795 as compared with Rs. 18,650 the previous year. The excess is due to reasons explained in paragraph 171 above.

GHAR CANALS.

175. Thirty-nine new karia heads varying from 3 to 1½ feet width were constructed during the year at a cost of Rs. 15,052. These together with the 50 constructed between 1880-81 and 1884-85 and 5 during 1894-95 make up a total of 94 karia heads, constructed at a total cost of Rs. 46,083 against the estimated amount of Rs. 59,659.

176. The expenditure on maintenance and repairs of this canal and on the Abkaláni establishment was as follows:—

					Rs.
Works	...	...	...	...	...
Establishment	{	Abkaláni	...	...	3,156
		Revenue	...	...	942
		Works...	...	...	2,407
					<hr/>
Gardens	...	...	...	...	6,505
					363
					<hr/>
				Total	39,515

177. The above figure for "Works" includes a sum of Rs. 10,000 spent on clearance of channels leading into the Ráhuja head of the Sukkur Canal. The estimated cost for this work is Rs. 45,688, and the works will be completed before the Sukkur Canal is opened for irrigation. Extra clearance amounting to Rs. 4,936 was also required to the old head, Sukkur Canal, after the inundation, to get the canal ready for the rabi supply.

178. The expenditure during the year under this head was Rs. 6,803 as detailed below. A new curtain wall in front of the Fordwáh was taken in hand and completed at a cost of Rs. 1,407. This was found necessary owing to serious scour having taken place on one flank of the regulator on the up stream side. A new regulator for the Ghariwáh, a zamindári karia lately taken over by Government, was built at a cost of Rs. 1,917. Some pitching was done to the bank of the Ghár at Lárkhána at a cost of Rs. 2,269. An old school building on the Nekarwáh at Wárah was purchased and repaired to make it suitable for a lándhiat a total cost of Rs. 301. Surveys of certain canals, &c., for improving the water-supply in the Nasirábad Táluka were commenced during the year and are still in progress. The expenditure up to date is Rs. 909.

179. Ordinary clearance and embanking was executed and the usual abkaláni establishment maintained. Also Rs. 11,966 were spent on clearance and embanking of the Ghariwáh referred to in last paragraph. The total expenditure on Ghár Canals, maintenance and repairs, was Rs. 1,06,629 detailed as under:—

					Rs.
Works	...	...	...	...	93,717
Establishment...	{	Abkaláni	...	...	Rs. 6,679
		Revenue	...	...	1,563
		Works...	...	...	4,100
					<hr/>
Gardens	...	...	...	...	12,342
					570
					<hr/>
				Total	1,06,629

Maintenance and Repairs
Ghár Bunds.

180. The ordinary repairs were carried out and the usual abkaláni establishment maintained, the expenditure being as follows :

						Rs.	
Works	...	...	...	...	...	2,846	
						Rs.	
Establishment...	{	Abkaláni...	...	...	...	2,939	
		Revenue ...	...	...	...	338	
		Works ...	...	...	...	925	
						<hr/>	4,202
						<hr/>	
					Total	...	7,048

181. The nurseries at Lárkhána and Naodero on the Ghár, and those at Urzi Bhutto and Ruk on the Sukkur Canal were maintained. Trees likely to fall into the canals were cut down and sold. The entire avenue of "táli" trees at the Ghár mouth had to be cut and removed owing to the erosion of the river. The total receipts from sale of timber, &c., amounted to Rs. 3,076.

Fisheries.

182. The receipts from sale of fishing rights during the year amounted to Rs. 2,384 as under :—

Ghár Canal	...	...	...	...	Rs.	1,976
Sukkur Canal	...	...	...	...	...	400
Ghár Bund	...	...	...	...	...	8
Total					...	<hr/> 2,384

183. The following is a summary of the entire expenditure in the Ghár Canals District during the year :—

New Works—

Capital and Revenue Account Works—					Rs.	
Capital Account	...	...	...	...	...	15,052
Revenue Account	...	...	...	...	...	6,803
Total					...	<hr/> 21,855

Repairs—

Capital and Revenue Account Works—						
Clearance and other works	...	...	...	...	Rs.	1,26,364
Establishment	{	Abkalani	...	...	Rs.	9,835
		Revenue...	...	...	...	2,505
		Works	...	...	...	6,507
Gardens	...	...	...	...	...	933
						<hr/> 19,780

Agricultural Works—

Works	...	...	...	...	2,846
Establishment...	{	Abkaláni...	...	2,939	
		Revenue ...	...	338	
		Works ..	...	925	
				<hr/>	4,202
			Total	...	1,75,047
		Add—Contributions, ordinary		...	80
			Total	...	1,75,127
		Add—Regular Establishment and Tools and Plant		...	41,044
			Total	...	2,16,171

184. The total cost of establishment was Rs. 41,044, and the percentage of it on total outlay of Rs. 1,75,127 was Rs. 23.44 as compared with Rs. 29.49 the year before.

185. The total cost of abkaláni establishment for the year was Rs. 23,982, as compared with Rs. 21,133 the previous year. The apparent increase is due to the fact that a portion of the charge during 1894-95, viz., Rs. 5,130, was transferred to expenditure on clearance of canals and repairs to river bunds on account of work done by Mukádams and Beldárs during the inundation season, while during the year no such adjustment was made, the figures given being actual expenditure on Beldárs.

WESTERN NÁ'RA.

186. Most of the works described in last year's report were completed during the year. The main canal was extended in length 2 miles and 6 furlongs, making up a total length of 29 miles $7\frac{1}{3}$ furlongs. Embankments have also been raised to full height.

The Gangrout branch which takes off at mile 6-7 of Dhámráo Canal was completed to a length of 8 miles 2 furlongs.

Another branch, Khub Naorang, with regulator at head in the upper reaches of the main canal, was excavated for the better irrigation of Dehs Bāthoro, Khub Naorang and Kandhra.

To pass off surplus water when necessary, an escape to Hamal Dhand has been excavated nearly 4 miles in length, and the Karia heads have been commenced, 14 of which will be completed before the coming inundation season. The expenditure during the year was Rs. 64,926.

187. The ordinary clearance of the canal was carried out and the necessary abkaláni establishment maintained, the expenditure during the year being as follows:—

					Rs.
Repairs ...	...	...	...	...	1,946
Establishment	...	...	{ Abkaláni	... 2,213	
			{ Revenue	... 1,195	
			{ Works ...	... 769	
				—	4,177
			Total ...		6,123

188. For reasons given in last year's report, nothing was done towards the widening of this canal. The up-stream piers, front abutment and wing walls of the Head Regulator, were raised at a cost of Rs. 332. The floor of some of the karia heads also, being below the level of the canal banks, was raised at a cost of Rs. 178.

The expenditure during the year was Rs. 510 only. The canal will be widened if the Rájwáh project is sanctioned; otherwise it is complete.

189. The construction of a sluice over the diversion of the Youngwáh, commenced and reported last year, was completed at a cost of Rs. 1,666 against the estimated amount of Rs. 1,670, the expenditure during the year being Rs. 1,144.

190. In order to control the water at tail and to shut out water when too high in the Chello, a sluice has been constructed with a double row of needles up and down stream. The sluice consists of 3 openings each 5 feet, pavement 10 feet below Highest Flood Level in the Chello. The work is nearly completed. Expenditure during the year was Rs. 2,749 against the estimated cost of Rs. 4,419.

191. For purposes described above for the Arthurwáh, a sluice over Gowardwáh at tail, consisting of 2 spans 6 feet each, height to springing $9\frac{1}{2}$ feet, rise of arch $1\frac{1}{3}$ feet and width of roadway 6 feet, was taken in hand. The expenditure during the year was Rs. 2,589 against an estimated cost of Rs. 2,826.

192. To allow of the supply being reduced and to cut off water in case of a breach, a regulator has been constructed at the head of this canal. It consists of 3 openings each of 10 feet with the ordinary row of needles in front. One opening has been fitted as a boat passage and the lower beams made moveable. The springing is 14 feet above the pavement, which itself is 3 feet deep and composed of concrete and brick masonry. The expenditure during the year was Rs. 5,557 against the estimated cost of Rs. 5,986. The work is nearly completed.

193. Of the surveys sanctioned in Government Resolution No. 96 W. I.—1105, dated 11th July 1894, the following were taken in hand during the year :—

Surveys.

1. Munchar.
2. New canal to irrigate northern portion of Dadu Táluka.
3. Masarwáh.

The first is nearly completed, while the last two are wholly completed. The projects will be ready during the next cold weather. The Rájwáh survey has been completed and a project submitted to Government for sanction.

An Index map has been prepared which shows the lines along which the surveys have been taken for the Munchar, Dadu and Sehwán surveys. Information as to the area culturable is being collected.

The object of the surveys is the better irrigation of the country, and the replacement of the old Zamindári Karias, which being badly aligned are falling out of use.

194. Ordinary clearance and repairs to canals were carried out where necessary, and the usual establishment maintained. The old embankments of Western Nára in miles $\frac{100}{3}$ to $\frac{106}{5}$, and $\frac{125}{4}$ to $\frac{131}{6}$ on the Right Bank, and $\frac{113}{4}$ to $\frac{120}{7}$ on the Left Bank were shifted back to form a berm in front and allow of distributaries being taken off in safety. This was the more necessary as the ground falls very rapidly away from the Nára.

195. Owing to the precipitate hydraulic fall in the Gul Mahomedwáh, caused by the great off-take in the first 6 miles, the steep banks were fast-disappearing by erosion; it therefore became necessary to rebuild the banks at some distance from the edge, leaving a good berm in front.

196. The expenditure under this head including the Pritchard Canal was :—

					Rs.
Works	...	...	...	...	60,968
					Rs.
Establishment	...	{	Abkaláni	...	8,109
			Revenue	...	3,914
			Works	...	6,154
Gardens	...	...	...	...	733
					<hr/> 18,190
				Total	<hr/> 79,158 <hr/>

197. The ordinary repairs were executed and the usual abkaláni establishment maintained, the detail of expenditure being as follows :—

Maintenance and Repairs—
Dadu and other Canals.

Dadu Canals—

					Rs.
Works	...	...	...	...	8,507
					Rs.
Establishment	...	{	Abkaláni	...	245
			Revenue	...	72
			Works	...	215
					<hr/> 532
				Total	<hr/> 9,039 <hr/>

<i>Mārviwāh</i> —						
Works	...	...	...	...	Rs.	926
Establishment	...	...	...	...	Rs.	
			{	Abkalāni	...	163
				Revenue	...	39
				Works	...	54
						256
				Total	...	1,182
<i>Phitta Canal</i> —						
Works	...	...	...	...	Rs.	1,532
Establishment	...	...	...	...	Rs.	
			{	Abkalāni	...	284
				Revenue	...	130
				Works	...	300
						714
				Total	...	2,246
<i>Wahurwāh</i> —						
Works	...	...	...	...	Rs.	285
Establishment	...	...	...	...	Rs.	
			{	Abkalāni	...	120
				Revenue...	...	20
				Works	...	58
						198
				Total	...	483

Extensions and Improve-
ments and Special Repairs—
Nára Bunds.

198. The construction of the loops, &c., which had been commenced and were mentioned in last year's report was completed, the detail of cost being as follows :—

		Estimated cost.	Total expenditure.
		Rs.	Rs.
Extensions and Improvements	...	64,566	57,419
Special Repairs	...	83,208	83,120

For renewing and strengthening the Nára Bunds, the question of land compensation, for which provision has been made in the estimate, remains yet to be settled, otherwise the works are fairly completed.

The works carried out this year consisted of the construction of ten new sluices and repairs to old ones.

199. Owing to the large expenditure incurred during 1894-95, and the low inundation of 1895, few repairs were required this year, except in places where the slopes were disfigured by wave wash. The expenditure was as follows :—

			Rs.	Rs.
			Rs.	Rs.
Works	...	...	...	2,357
Establishment	{	Abkalāni	6,428	
		Revenue	408	
		Works...	763	
				7,599
		Total	...	9,956

200. During the year under review the receipts from plantations amounted to Rs. 628 as compared with Rs. 234 in the previous year. Some of the gardens are now in a flourishing condition and others are being rapidly improved. Rs. 3,464 were realized by the sale of timber on canal banks, &c.

201. A sum of Rs. 2,819 was realized from sale of fishery rights during the year.

202. The following is a summary of the entire expenditure during the year:—

				Ra.	Ra.
Works	...	...	...	...	1,15,032
Repairs—					
Special	...	...	...	34,897	
Ordinary	...	...	...	76,521	
					1,11,418
Establishment.	{	Abkaláni	...	17,562	
		Revenue	...	5,058	
		Works	...	8,313	
Gardens	...	...	...	733	
					31,666
					2,58,116
Add—Regular Establishment and Tools and Plant	...			50,407	
					3,08,523

203. The percentage of cost of establishment, Rs. 50,407, to outlay on Works, Rs. 2,58,116, was Rs. 19.53, as compared with 16.63 in the previous year.

KARA'CHI CANALS.

204. Under this head an expenditure of Rs. 1,68,094 was incurred during the year under report, of which Rs. 14,537 were spent on improvements to Bunds Right Bank (Baghar to Bhi-man) and Rs. 49,819 on improvements to Bunds Left Bank. The sum of Rs. 20,989 was spent on raising embankments along the Khanto Canal now considered part of the river bund line. The work continues in progress.

205. The expenditure incurred on this work was Rs. 6,863 during the year, as a portion of the funds provided for it had to be diverted to meet outlay on other works. The length of embankment completed up to end of March 1896 is 53 miles 1,200 feet, out of a total length of 56 miles 1,570 feet. It is expected that the whole work including sluices will be completed next season.

206. Four masonry regulators to large canals taking off from the river, commenced in the previous year and described in the last report, were completed during the year at a total cost noted against each as under:—

			Estimate.	Expenditure.
			Ra.	Ra.
Regulator over Khanto	„	...	15,838	15,837
Do.	Kalri	...	14,108	15,918
Do.	Satta	...	21,481	21,328
Do.	Ghár	...	6,849	6,855

207. Considerable progress was made in constructing masonry sluices over Zamindari Kariahs, no less than Rs. 14,999 having been spent during the year, Rs. 5,080 on the Karias Right Bank and Rs. 9,919 on the Karias Left Bank. Of the sluices constructed on the Right Bank, 5 are in the Mánjhand Bunds and one in the Baghar to Uchito Bund. Nine sluices were completed in "Bunds Left Bank" and three others are in progress. The latter will be completed before the commencement of the next inundation.

208. The Bund Chauki in the Panah to Baghar Bund, commenced last year, was completed at a total cost of Rs. 3,692, and that at Sunda in mile $\frac{2}{3}$ of the Sunda Hilaya Bund was commenced and completed during the year at a cost of Rs. 3,808.

209. Gauges, mile and furlong posts, mentioned in last year's report were fixed up to the 62nd mile of the Left Bank Bunds at a total cost of Rs. 3,680, of which Rs. 1,454 were expended during the year, while an amount of Rs. 3,100 was similarly expended on the 61 miles of the Right Bank Bunds against a sanctioned amount of Rs. 3,155. The gauges are made of teakwood, let into cast iron standards, which in turn are buried in a layer of concrete firmly rammed, as reported last year. The mile posts consist of rectangular iron plates 9"×6" rivetted on to T iron posts.

210. The only works executed under this head were (1) Draining the Udhejani Dhand in the Sujával Táluka, and (2) Draining the Mujri Dhand in the Mirpur Bathoro Táluka, the expenditure during the year being Rs. 1,428 and Rs. 930, respectively, against the sanctioned amounts of Rs. 1,728 and Rs. 2,776. Both works will be in operation after next inundation. They are expected to render culturable certain considerable areas which were never before free from water until too late for the transplantation of seedlings.

211. On maintenance and repairs a sum of Rs. 2,07,928 was expended, of which Rs. 68,072 were spent on special and Rs. 48,177 on ordinary repairs to river bunds; Rs. 63,843 were expended on ordinary repairs and clearance of canals, Rs. 26,884 on establishment and Rs. 952 on gardens.

212. The special repairs consisted of (1) loop in the Munarki Bund, Rs. 7,750, (2) loop in the Pinyári Head Regulator in mile No. 9, Rs. 2,000, (3) loop near Machi in mile 37, Rs. 1,515, and (4) loop from mile 60 to Khanto Canal, Rs. 56,807; all the loops have been completed except (3) loop near Machi.

213. On ordinary repairs to river bunds, a sum of Rs. 48,177 was expended; of this Rs. 33,505 were spent on the Right Bank and Rs. 14,672 on the Left Bank embankments, as compared with an expenditure of Rs. 27,492 and Rs. 38,358 respectively in the year before.

214. The usual abkaláni establishment was maintained at a cost of Rs. 10,400. Of this, Rs. 4,112 was on the Right Bank and Rs. 6,288 on the Left Bank embankments, the detail being as follows:—

				Right Bank.	Left Bank.	Total.
				Rs.	Rs.	Rs.
Establishment	Abkaláni	...	...	2,560	4,432	6,792
	Revenue	...	...	344	458	802
	Works	...	...	1,408	1,398	2,806
Total				4,112	6,288	10,400
The figures of the previous year being				7,092	8,302	15,394

215. Ordinary clearance and repairs to canals to the amount of Rs. 63,843 were executed, of which Rs. 30,854 were expended on canals on the Right Bank and Rs. 32,989 on those on the Left Bank. The previous year's expenditure was Rs. 28,978 and Rs. 41,065, respectively.

216. Two gardens were maintained at a cost of Rs. 952 (Purijan Garden, Rs. 482, Garden at Dero, Rs. 470), as compared with Rs. 944 of the previous year.

217. The usual abkaláni establishment was employed, the total expenditure being Rs. 16,484. Of this Rs. 7,562 were for canals on the Right Bank and Rs. 8,922 for canals on the Left Bank, the detail being as follows:—

				Right Bank.	Left Bank.	Total.
				Rs.	Rs.	Rs.
Establishment	{ Abkaláni	...	...	3,102	4,038	7,140
	{ Revenue	...	...	1,187	1,346	2,533
	{ Works	...	...	3,273	3,538	6,811
Total				7,562	8,922	16,484
The figures of the previous year				8,483	9,490	17,973

218. During the year an expenditure of Rs. 949 was incurred on recording survey stations as under:—

	Rs.
1. Permanently recording 40 survey stations between Uderolal and the coast	520
2. Permanently recording Riverain Survey Stations on the Bund Line	429
Total	949

219. The following is a general summary of the entire expenditure in this district:—

	Rs.
Extensions and Improvements	1,68,094
Repairs { Special repairs to bunds.	68,072
Ordinary	1,12,020
	1,80,092
Establishment { Abkaláni	13,932
Revenue	3,335
Works	9,617
Gardens	952
	27,836
<i>Agricultural Works.</i>	
Repairs	949
Total	3,76,971
Add—Regular Establishment—Tools and Plant	58,861
Mathematical Instruments and Establishment	2,024
Grand Total	4,37,856

220. The percentage of cost of establishment, Rs. 58,861, on the outlay, Rs. 3,76,971, was 15.61 as compared with 22.75 of the previous year.

221. The cost of work establishment was Rs. 27,836, as compared with Rs. 34,311 of the year previous. The reduction is due to the low inundation and absence of breaches.

EASTERN NA'RA CANALS

222. There were no floods in the year under review, but the water-supply derived from the Nára Supply Channel was ample. In the month of September the Masonry Sluice in the Ketí Bund was destroyed; the cause of its failure has been fully reported on. A temporary bund has been made round the site which will keep the water in the Nára pending a decision as to the necessity or otherwise for a new sluice. The Játri sluice remained closed throughout the year; this was done for the purpose of keeping the water-level in the Játri Dhands low to enable them to receive flood water, should occasion arise.

223. The important operations of the year were: (1) the completion of a sluice with an escape channel in the Kilankar Bund; (2) the completion of a sluice (Maroi Sluice) in the Runjo Bund (Kakaho to Kilankar); (3) the completion of other sluices (Kurthari, Dhilyar and Kadhkandiari) in the Nára embankment

(left bank) from Khipra to the head of the Thar Canal; (4) the practical completion of a Public Works Department Bungalow at Tando Mitha Khán; (5) the completion of a new escape channel for the Umarkot Branch with alterations to an existing Masonry Sluice near Umarkot; (6) the completion of kariah heads on the Kipra Canal; (7) the collection of materials for kariah heads on the Mithrau, Thar and Dim Canals, and for the new regulator at the head of the Mithrau Canal in the new bund in the Makhi Dhand.

224. The Kilankar and Maroi Sluices and the three small sluices (Kurthari, Dhilyar and Kadhkandiari) in the embankment (Khipra to the head of the Thar Canal) along the left bank of the Nára, which were commenced last year, were completed at a total cost of Rs. 10,683, Rs. 4,631 and Rs. 3,353 (for the three small sluices) respectively, the expenditure of the year being Rs. 6,683, Rs. 1,441 and Rs. 1,043.

Productive Public Works,
Eastern Nára Capital
Account.

225. During the year a sum of Rs. 1,991 was spent on constructing an embankment on the Nára Right Bank from Bakar to Sirenwári, and of Rs. 1,149 in raising the embankment from Khipra to the head of Thar Canal. These works were practically completed during the previous year, the expenditure now shown being on account of fencing the bunds to prevent damage by cattle.

Earthwork.

226. The bungalow at Tando Mitha Khán has been practically completed, the total cost to end of March being Rs. 3,173 against an estimate of Rs. 3,102.

Buildings.

227. The usual Abkaláni, Revenue and Works establishments were maintained and ordinary repairs done at a cost of Rs. 26,169, the following being items of extraordinary expenditure:—

Eastern Nára Revenue
Account.

(1) Repair of Játri Sluice—cost Rs. 5,324. Expenditure of the year Rs. 4,926—completed.

(2) Repair of Ghag Sluice—cost Rs. 1,748. Expenditure of the year Rs. 192—completed.

(3) Reopening the cut through Allah Bund near the tail of the Puran Dhoru, Rs. 6,526—completed.

(4) Constructing a temporary bund round the ruined site of Ketí Sluice, Rs. 5,096, against a sanctioned estimate of Rs. 8,084. The work was in progress at the close of the year. A further appropriation to complete the work has been asked for.

(5) Repairing and closing breaches in the bund from Sirenwári to Kilankar made by the flood of 1894, Rs. 4,131—completed.

228. Rs. 6,360 were spent on the collection of materials for the construction of a new regulator for the Mithrau Canal. The amount of the estimate is Rs. 25,624. The work cannot be completed except in a year when the Nára Supply Channel is completely closed for the cold weather.

Productive Public Works,
Mithrau Canal Capital
Account.

229. A sum of Rs. 13,290 has been spent in collecting materials for constructing karia heads on the Mithrau Canal, the estimated amount being Rs. 57,249. Where these karias pass under the Local Funds road, the roadway is to be widened from 6 feet to 10 feet at the cost of the District Local Board. The work will be completed by the end of March next.

Distributaries.

230. The usual Abkaláni, Revenue and Works establishments were maintained and minor repairs executed at a cost of Rs. 20,977, to which however must be added Rs. 5,499, the exceptional expenditure incurred in repairing and closing breaches in the protective embankment Mithrau Canal. This amount represents the balance of the estimate for Rs. 11,798 sanctioned during 1894-95.

Mithrau Canal Revenue
Account.

231. A sum of Rs. 463 was expended on completing a regulator at the 7th mile, Chor Branch, the total expenditure being Rs. 2,639.

Productive Public Works,
Thar Canal Capital Account.

232. A new escape from the Umarkot branch, with alterations to the existing masonry head close to Umarkot, was commenced and completed at a total cost of Rs. 5,306 against an estimate of Rs. 6,825.

233. A sum of Rs. 2,446 was spent on the collection of materials for karia heads estimated to cost Rs. 5,109. The work is in hand and will be completed before the close of the current official year.

234. The usual Abkaláni, Revenue and Works establishments were maintained and minor repairs done at a cost of Rs. 8,574.

235. A sum of Rs. 3,183 was spent on the completion of karia heads commenced last year, the total expenditure being Rs. 5,144.

236. A sum of Rs. 5,506 was spent on the collection of materials for karia heads.

237. The usual Abkaláni, Revenue and Works establishments were maintained and minor repairs carried out at a cost of Rs. 3,048.

238. The maintenance of the garden at Sindhri cost Rs. 633 against an appropriation of Rs. 650; and that of the Samara one Rs. 153 against an appropriation of Rs. 154, the receipts from the former being Rs. 840 and from the latter Rs. 400.

239. The following is a summary of expenditure in this district :—

				Rs.	
New Works—					
Capital Expenditure	..	...	Rs.	52,498	
Revenue expenditure	...	...	"	1,284	
Ordinary Agricultural works	..	...	"	...
				<hr/>	53,782
Repairs—					
Clearance	...	...	"	8,398	
Other works	...	...	"	40,361	
Maintenance of gardens	...	...	"	786	
				<hr/>	49,545
Establishment ...	Works	...	Rs.	6,467	
	Abkaláni	...	"	10,942	
	Revenue	...	"	7,558	
				<hr/>	24,967
				<hr/>	74,512
					<hr/>
					1,28,294
Add—Regular establishment charges				...	39,166
,, Tools and plant charges				...	2,221
" Total charges under all heads				...	<hr/>
					1,69,681

240. The average expenditure of three previous years on establishment charged to maintenance grant was Rs. 24,875,

FIRST DISTRICT JÁMRÁO CANAL.

241. The position of the head works of the Jámráo Canal was described in the Administration Report for 1894-95; the country in the neighbourhood is practically uninhabited, and labour and food have to be imported.

242. This work was the first one undertaken, as it included the closing of the mouth of the spill channel called the Jámráo Sang; necessary for the protection of the line of the proposed canal. The bank was raised and strengthened, and, before the admission of water into the Nára River in June, had been made sufficiently strong to withstand floods in the present condition of the Nára.

Work was continued throughout the year, and the whole of the bank completed to the final section proposed:

243. The country around Jámráo is sandy and the sand is so fine that it is moved by strong winds. The continuous strong winds are mainly from the south during the inundation season, and it was accordingly necessary to protect the top and south slope of the bank with 6" of earth. Some of the earth had to be carried five thousand feet, but the work was completed before the end of the year.

244. The total length of the bank including the loop across the Jámráo Sang (channel) is 9,100 feet and the quantity of earthwork including soiling 59½ lákhs of cubic feet, and the cost Rs. 49,320 approximately.

245. The necessity of pushing on the work mentioned in the preceding paragraph hindered the construction of the residential quarters, but some buildings were made habitable by May for the staff and by 12th June for the Executive Engineer; further progress with buildings was then interrupted by the inundation, the water covering all the clay, so that no bricks could be obtained, the land above the water-level being all sand.

When the inundation ceased and the water had fallen, work on the buildings was resumed and all the accommodation necessary was provided before the end of the year under report.

246. The following are the descriptions of the buildings completed or finished, so as to be habitable during the year :—

Buildings of Burnt Brick and Mud.

Name.	Plinth area.	Remarks.
First Class Chauki	36 × 65	With extra 104 square feet.

Buildings of Sun-dried Brick and Mud.

Servants' Quarters for First Class Chauki	...	54 × 20½	
Stables do. do.	...	46½ × 17½	
Upper Subordinates' Quarters	...	38½ × 29½	
Out-house for do.	...	22 × 13	
Accountant's Quarters	...	42½ × 23	
Cook-house for do.	...	10 × 10	
Quarters for clerks	...	68½ × 22½	
Cook-house for clerks	...	15 × 13	
Lower Subordinates' Quarters	...	29½ × 22	
Cook-house for do.	...	10 × 10	
Quarters for Inspecting Officer	...	46 × 42	
Post Office	...	27 × 20	
Cook-room for do.	...	10 × 10	
Quarters for Store-keeper, &c.	...	42½ × 23	
Cook-house for do.	...	10 × 10	
Quarters for Mechanical Engineer	...	43½ × 24	
Cook-house for do.	...	10 × 10	
Quarters for Hospital Assistant	...	42½ × 23	
Hospital	...	53 × 29	
Store	...	53 × 21½	
Lime Stores	...	42 × 23	
Workshop and Smithy	...	40½ × 18	
General Office for Executive Engineer	...	50 × 29	With extra 583 square feet.
Shop No. 3	...	33 × 22	
Shop No. 4	...	39 × 14	

Buildings with wattle walls.

Police Lines	...	64½ × 18½
Quarters for Servants of Inspecting Officer	...	65 × 17
Temporary Store converted into Head Workmen's lines	...	50 × 23

Buildings with corrugated iron walls.

Name.	
Shop No. 1	... 50 × 16, also 7 feet verandah.

ALONG THE MAIN CANAL THE FOLLOWING WERE THE BUILDINGS :—

Buildings of sun-dried brick and mud, completed.

Name.	Plinth area.
Quarters for Subordinate at Canal Falls	... 43½ × 23
Cook-house for do. ...	... 10 × 10
Shop at 12½ miles ...	... 53 × 15

Buildings of burnt brick and mud, very nearly completed.

Second class chauki at 13 miles	... 52 × 26½ with extra 560 square feet.
Out-houses for servants do.	... 42 × 20
Stables for do ...	... 40 × 15 with 7' Verandah 20 feet long.

247. The condition of the surroundings of Jámrao during the inundation was not accurately known to the staff before this year, and a brief note for record will be useful.

The inundation.

No flood water came down the Nára; the water was limited to the quantity let in by the sluices at Rohri and the supply was not as large as usual, the heights on the 12th mile gauge not exceeding 20 feet. This quantity of water was however sufficient to cover the whole of the brick earth, and no clay whatever could be got at within the limits of the river embankment and there is very little anywhere near beyond the embankments. The level of the water in the river rose between 5 and 6 feet to about R.L. 106 at Jámrao, so boats drawing four feet of water could come down easily.

The reduced level was about 106·40 on a gauge some three-quarters of a mile above canal head regulator site, or 3·40 above full supply level in the canal. A strong wind blew with but few interruptions from the south or almost directly up-stream from the middle of June to October.

The conditions were thus very favourable for laden boats to travel down-stream with the current and to sail back up-stream with the wind.

The time occupied over the journey of about 100 miles from Rohri to Jámrao varied, for boats coming down-stream, from two days, the minimum during a calm, to eleven days when the boats were delayed by wind. Boats going up-stream seldom took more than four days to sail to Rohri.

The subsoil water rose and fell with the inundation in the neighbourhood of the Nára, and the water in wells or holes in the ground rose to a little higher level than the surface water if the latter had any way of escape and was flowing away. It was clear that it would be useless to try and embank any portion of the brickfield for work during the inundation, unless the field could also be drained at the same time, and unfortunately this is not practicable. The water did not leave the brickfields until October, and until the end of November the ground was too wet for work.

248. A contractor who had undertaken the work of conveying stone declined to carry out his agreement and other arrangements had to be made. From the preceding paragraph it will be seen that the season was favourable for carriage. There was some little trouble in starting the work but finally abundance of boats were procured, and 279 boats of capacity varying from 150 to 700 maunds of 80 lbs. were at work.

Stone.

The quantity of stone carried during the season was 591,032 cubic feet, and including cost of preparing ground for heaps, &c., cost Rs. 83,500 approximately.

249. In June 1895 revised plans for the headworks were sent for completion and to be estimated, and orders were also received to resurvey the first 8 miles of the canal. The complete plans and estimates for the new designs and canal line were ready in August.

Revision of plans.

250. Permission to commence the earthwork of the main canal was received in July 1895, and a number of good contractors tendered but at rates higher than estimated, excepting one who commenced work in August on the 5 miles of the canal with the deepest cuttings and heaviest earthwork. This contractor has been working well throughout the season.

As the inundation had been a poor one and the crops not so good as usual, it was hoped that Sindhi labour would come to work, but though the works were widely advertised and information circulated throughout the neighbouring districts, very little Sindhi labour was obtained, and in the height of the season the Sindhis did not number 20 per cent. of the labourers.

During the three cold months from December to the end of February a strong gang of Patháns came for the earthwork, and finished nearly two miles of the easiest part of the canal where the cutting was least.

The total quantity of earthwork executed up to March 31st was 24,637,650 cubic feet at a cost of Rs. 1,33,465.

251. The lime specified for the works is an hydraulic lime manufactured according to Mr. Price's specification, the proportion of lime to clay being 11 to 2. Manufacture of this lime was commenced. A set of kilns was built, six of which were 10'×10' by 12 feet high and two were 15'×15' by 12 feet high.

An engine of 13 horse power, and a set of four mortar mills with shaft and belting to enable all four to be driven by the engine, were erected for grinding the lime.

A store-shed of two rooms 19'×20' for storing the finished hydraulic lime was completed.

The limestone is first burnt with wood fuel and then mixed with clay in the mortar mills and made into balls which are dried and burnt with charcoal. The resulting lime is a good hydraulic lime.

By the close of the year there was in stock 4,020 cubic feet of hydraulic lime and 5,430 cubic feet of unburnt balls mixed ready for burning.

252. During the last days of January permission to commence the work of the head regulator was received. A pumping well was at once sunk, and pump and engine got into position. The sand is very fine and in the excavation below water level runs to a very flat slope. The work of the head regulator is founded on wells, some of which are to have their tops sunk to 5 feet below water level and others to 9 feet below water level. The former were commenced and as soon as they are completed and some firm structure built to support the engines and pipes of the pumps, the engine and pumps will be moved on to them and the deeper excavation commenced. By the end of the year 8 wells had been sunk and partly filled with concrete, 22 wells were built up 10 feet and partly sunk, and 8 wells were built up 10 feet.

The total masonry laid was 16,568 cubic feet brick masonry and 1,085 cubic feet concrete. These figures include the work on under-sluices referred to in paragraph 261 below.

253. A commencement was made of the work of forming concrete blocks 4'×4'×2' for the aprons of the weir and other works. A simple and inexpensive form of frame was devised and found to work suitably and the blocks turned out well.

254. Brick burning was well started by a competent firm of contractors, and at the close of the year seven kilns were at work and the stock of bricks amounted to 484,308 bricks.

255. The revised plans had rendered necessary the strengthening of a further portion of the Rata Bund similar to the work described in a preceding paragraph. This was taken in hand and the main portion of the earthwork executed before the close of the year. The expenditure was Rs. 2,160.

256. As the inundation waters of the Nára cover the land around the site for the headworks, excepting the tops of sand hills, some means were necessary for getting to the higher ground near the site of the headworks and to the river bank for unloading stores, &c., during the inundation. The small bank to connect the right down-stream training works with the Rata Bund was, therefore, commenced and the greater part of the body of the bank completed rapidly to give the means of communication desired. The cost was Rs. 3,130 for 464,737 cubic feet of work, including clearing site and trenches, &c.

Bank to connect Right Down Stream Training works with Rata Bund.

Work establishment.

257. The cost of the establishment charged to works was Rs. 1,214 only.

258. The Nára river was gauged and the discharge estimated both near Rohri in the Nára Supply Channel and at Jámrao. The results seemed to indicate that there was no loss of water between these two places, the Jámrao results closely agreeing with the Rohri ones and slightly exceeding them.

Gauging the Nára.

259. A large stock of Tools and Plant comprising all kinds necessary for the commencement of the work was obtained and brought down to Jámrao. The principal items are three engines of 13 H. P. and 12 H. P. and five mortar mills, two nine-inch centrifugal pumps, three crab winches, twelve Bulls dredgers and $4\frac{1}{2}$ miles of tram rail and numerous minor items.

Tools and Plant.

All the tools were brought down from Rohri by boat. For the heavy engines the boats were filled up with timbers required for well curbs and piles, &c., for the work, and the engines securely packed on these timbers. The total expenditure on Tools and Plant during the year was Rs. 38,094.

Deepening the Nára Supply Channel.

260. In the accounts of the First District Jámrao Canal for the year 1895-96, there is an item of outlay of Rs. 2,22,869 for deepening the Nára Supply Channel.

This is merely an adjustment item and no work was done during the year, it having been completed during the previous year.

261. The commencement of the Head Regulator necessarily included work on the excavation of the under-sluices and on a retaining wall which is included in the estimate for the undersluices.

Under-sluices.

The masonry work on wells has been referred to in paragraph 252—Head Regulator; the expenditure also includes concrete blocks and a share of lime-kilns, erecting mortar mills and general arrangements for carrying out the work.

Constructing a weir across the Eastern Nára.

262. This is the principal part of the headworks and the largest estimate, and all materials at site are grouped into one list under this estimate. The expenditure was almost all on materials.

263. The improvement of the channel of the Nára, described in paragraph 224 of last year's report, was continued during the hot weather and until the inundation water was admitted into the Nára. The channel is now in fair order from Rohri to Jámrao.

Excavating a channel and protecting the down-stream side of under-sluices.

264. In addition to the earth-work excavation of the main canal, the area of the canal was cleared of jungle for about 14 miles. As the width of land occupied by the canal and spoil banks is 500 feet and the jungle was thick, the clearance was a considerable piece of work. A cleared track was made along the whole 17 miles of the first district and the irregularities of the ground cut down to some extent, so as to form a good and easy track for camels and animals. As the ground is sandy the track is not suitable for carts.

Main Canal

265. The following is a summary of all irrigation expenditure in this district :—

				Ra.	
New Works—					
Capital expenditure	...	...	...	3,57,571
Revenue expenditure	...	...	...	...
Repairs—					
Clearance to Canal	...	...	...	...
Other works	...	...	...	...
Maintenance of Gardens	...	...	...	...
Establishment	...	Work	...	...
		Abkaláni	...	...
		Revenue	...	...
				<hr/>	
				3,57,571	
Add—Regular Establishment charges				...	63,869
,, —Tools and Plant charges				...	33,094
				<hr/>	
Total charges under all heads				...	4,59,534

Note.—A book adjustment on account of the deepening of the Nára Supply Channel has been excluded from this statement.

SECOND DISTRICT JA'MRA'O CANAL.

266. The district comprises sixty miles of the Main Line Jámráo Canal, i.e. from mile 17 to mile 77, and seventeen miles of the West Branch from its head to mile 17. All the minor branches which will take off from the above sections are also in this district.

The district is divided into two Sub-divisions, viz., the Sháhdádpur and Mirpur Khás Sub-divisions.

Sháhdádpur Sub-division 267. The total amount of earth-work executed was as follows:—

Situation.				Agency.		Total Cubic feet.
Main Line, mile 23rd	...	...	...	By Contractor	...	246,135
Do. miles 18, 19 and 20	...	...	...	By Sind Gang	...	2,053,903
Do. miles 24, 26, 30 and 38	...	...	...	By piece-work	...	1,952,068
				Total	...	42,52,106

Masonry works. 268. The following masonry works were carried out during the year:—

Names.				Work done.	
Regulator, 17th mile	...	...	...	Excavation to bed level.	
Do. 31st mile	...	...	...	Do. do.	
Bridge, 24th mile	...	...	...	Do. for foundations.	
Do. 39th mile	...	...	...	Do. and masonry of piers and abutments to springing.	
Do. 43rd mile	...	...	...	Do. do.	do.
Second Class Chauki, 24th mile	...	...	...	Do. for foundation.	
First Class Chauki, 39th mile	...	...	...	Do. do.	

Considerable delay was caused by the unsatisfactory nature of the foundations which have been met with, especially in the case of the Regulator in 17th mile and the Bridges in the 24th, 39th and 43rd miles.

269. During the year the following lines were surveyed :—

Name of Work.	Miles surveyed.	Miles levelled.	Cross Sections miles.	Miles checked.	REMARKS.
Rawtiani minor	18½	18½	27	18½	
New head to Dimwáh	5½	5½	...	5½	
Sinjhoro minor	10	10	12	...	
Dutao minor	5	5	6	...	
	39	39	45	24	

270. All the land in connection with the Main Line has been taken up by the Land Acquisition Officer, and a service road running along the right boundary of the canal has been made. Mile and furlong stones have been fixed along the canal line.

271. Two Shelter Landhis were constructed, one at Ahmedabad opposite the 20th mile and about one mile to the west of the line, the other at Burhoon, opposite the 29th mile of the Main Line and about two miles to the west.

272. A well, 8 feet internal diameter, was sunk for the use of the Sind Gang near the 20th mile of the Main Line.

273. The total quantity of earth-work executed in this sub-division is as follows :—

Situation.	Agency.	Total.
<i>Main Line.</i>		Rs.
Miles 43, 44, 51, 60, 61, 62, 68, 71, 72, 73, 74 to 76½	By Contractors	74,58,303
Mile 67	By Steam Excavators	3,00,000
Miles 67, 68	By piece-work	4,25,163
Mile 68	By Mianas... ..	6,46,809
		88,30,275
West Branch	By piece-work	9,77,900
	Total Cubic feet ...	98,08,175

274. The progress in regard to masonry works was as follows :—

Name,	Work done.
Bridge, Mile 51	Foundations excavated.
Do. 60	Do. do.
Do. 72	Finished except approaches.
Regulator, Mile 56	Foundations excavated.
Second Class Chawki, Mile 72, Main Building ...	Finished to top of plinth.
Servants' quarters	Do. up to 6 feet.
Stables	Concrete in foundations.
Headquarter Buildings at Mirpur Khás ...	Nearly finished.

275. Work of surveying and levelling was done to the extent noted below :—

Surveying and Levelling.

Name of work.			Miles levelled.	Miles surveyed.	Cross Sections miles.	Miles checked.	REMARKS.
<i>New Canals.</i>							
Main Line	...	...	2	2	...	...	Peruwáh to Dosowáh.
Do.	...	...	6	6	...	...	Kapriwáh to 56th mile.
Do.	...	...	13	13	...	...	42nd—55th mile.
Do.	...	...	...	...	...	6	50th—56th mile.
Do.	...	...	11	11	...	...	55th—66th mile.
Do.	...	...	...	...	...	7	B.M. at Sakho Khalifa's tomb.
Do.	...	...	...	...	...	1	Main Line to Khalifa's tomb.
Do.	...	...	11	11	...	...	55th to 66th mile.
Do.	...	...	2	2	...	...	55th to 57th mile.
Do.	...	...	35	35	...	...	42nd—77th mile.
Do.	...	...	...	5	...	...	Pegged out Boundary Line.
Do.	...	...	...	...	...	6	From line to B.M. in Mirpur.
West Branch	...	...	17	17	17	17	From 0—17th mile.
Do.	...	...	...	...	...	7	From line to B.M. in Mirpur.
Do.	...	...	17	17	...	...	Line altered.
Do.	...	...	...	...	...	7	From line to B. M. in Mirpur.
Bhitare Minor	...	...	7	7	...	...	From West Branch to tail.
Do.	...	...	...	...	...	2	Tail to peg 352, West Branch.
Kapri Minor	...	...	5	5	5	...	0 to tail.
West Branch	...	...	17	...	...	...	Pegged out Boundary Line
Mirpur Minor	...	...	15	15	15	15	First Line.
Do.	...	...	13½	13½	13½	13½	Second Line.
Do.	...	...	...	...	...	13½	Checking 2nd Line.
Do.	...	...	13½	...	...	...	Pegged out Boundary Line.
Dalore Minor	...	...	18	18	40½	18	
Patoi Minor	...	...	13	13	11½	16	First Line.
Do.	...	...	16	16	25	16	Second Line.
Dalore minor	...	...	...	...	...	7	From minor to B.M. at Sakho.
Berani Minor	...	...	3½	3½	4	3½	
Survey, &c.	...	...	4	4	...	...	In Sand Hills.
Doso Dharono Minor	...	...	14	13½	17½	6½	
Patoi Minor	...	...	12½	...	...	...
<i>Old Canals.</i>							
Kapriwáh	...	...	2	2	½	...	Tail of Kapri minor to Main Line.
Dosowáh	...	...	½	½	...	...	On both sides Main Line.
Sangrowáh	...	...	6	6	1½	...	Bhitare minor to tail of Bumpharwáh.
Bumpharwáh	...	...	2	2	½	...	From tail of Bhitare minor.
Dosowáh	...	...	2	2	½	...	East of Mirpur minor.
Peruwáh	...	...	3½	3½	½	...	Do. do.
Kahuwáh	...	...	4½	4½	1	...	Do. do.
Lethwáh	...	...	4	4	1	...	Do. do.
Sanrowáh	...	...	6½	6½	1½	...	Do. do.
Dosowáh	...	...	6½	6½	1	6½	
Naobutwáh	...	...	3	3	½	3	
Bumpharwáh	...	...	3½	3½	½	3½	
Lethwáh	...	...	6½	6½	1	6½	
Kahuwáh	...	...	4½	4½	½	4½	

276. Three Shelter Landhis were constructed, one at Sakho (60th mile, Main Line) the other at Dosowáh (67th mile, Main Line) and the third by Departmental Agency at Jhuabi, opposite the 75th mile, Main Line, about 2 miles to the east.

277. The service road and the fixing of mile and furlong stones were continued from the end of Sháhádápur Subdivision. Service road, &c. The stones had to be refixed according to new chainage from mile 66 to 77, which was accordingly done. Boundary lines were nicked out.

278. Jungle-cutting was done departmentally in miles 58, 62, 71 and 72—77, and by contract in 5 takis in mile 43. Jungle-cutting.

279. A well was dug at Dosowáh at the 67th mile, Main Line, Jámráo Canal, for the Mianas and piece-workers, and it was afterwards found necessary to enlarge it and line it with timber. Well.

280. The steam excavators which were procured from England were set to work on a deep cutting near Mirpur Khás. The Steam Excavators. excavators themselves are quite capable of doing all that was expected of them; but great difficulty has been experienced in getting the earth taken from the place where deposited by them to the spoil banks. The most satisfactory arrangement has been a light tramway with small trucks each of which holds one bucketful of earth. The work has proved expensive but is still in an experimental stage.

281. A gang of Mianas was imported from Mália and located under police supervision on a section of the canal. They were Mianas. very discontented and great difficulty was experienced in keeping them on the work. Eventually the Commissioner placed the gang under the control of the Collector of Hyderabad, and they went to work on the earth-work of the Kotri-Rohri Railway.

282. It will be observed from the tables given above that the total earth-work done in the whole district during the year under report was 14,060,281 cubic feet. Of the masonry works very little was done towards the construction of regulators, the delay in the case of 17th mile regulator being due to the unsatisfactory nature of the foundations met with at the site first selected, and in the case of 56th mile regulator to want of sweet water. Three of the bridges were nearly completed and the rest are in fair progress. Very little work has been done on the second class chauki at 24th mile and on the first class chauki at 39th mile, while the work on second class chauki at 72nd mile is well advanced. All head-quarter buildings at Mirpur Khás were nearly completed. Five Shelter Landhis have been constructed. Two wells, one for Sind Convict Gang and the other for the Mianas, have been sunk. Mile and furlong stones have been fixed along the whole line of the main canal, and a service road running along its right boundary constructed. Boundary lines have been nicked out and the jungle-cutting done where necessary. The survey of new and old canals and many of the minors has been carried out, the total number of miles surveyed being as under :—

364 miles surveyed.
316 miles levelled.
205 miles cross-sections.
209 miles checked.

283. The following is a summary of expenditure incurred in this district :—

		Rs.	
New works.	Capital expenditure ... ..	...	1,84,511
	Revenue expenditure ... ..	...	.....
Repairs.	Clearance to canals ... ..	...	.....
	Other works ... ..	...	.....
	Maintenance of gardens ... ..	...	.....
	Works ... ..	...	.....
Establishment	Abkaláni ... ..	...	.....
	Revenue... ..	...	.....
			184,511
Add—Regular Establishment charges.			49,588
Add—Tools and Plant charges ..			9,665
Total charges under all h			2,43,764

THIRD DISTRICT, JA'MRA'O CANAL.

284. The principal works carried out during the year were a contour survey of the district and construction of a first class chauki at Digri, and other buildings connected with it.

285. The area surveyed measured 1,100 square miles, the total length of levelling performed being 1,430 miles. Readings were taken a furlong apart and about 110 permanent bench marks were established at various points in the area surveyed. A correct map of the country levelled, to the scale of 1 mile to 1 inch was prepared by the reduction of village maps and their interpolation in the Great Trigonometrical Survey Revenue maps, and contours one foot apart traced thereon.

Buildings at Dighri.

286. The following buildings were completed :—

First Class Chauki.
 Servants' Quarters for the above.
 Stables for do. do.
 Upper Subordinates' Quarters.
 Cook-house for the above.
 Clerks' Quarters.
 Cook-house for the above.
 Store-house.

A latrine was under construction at the close of the year and the ground was being levelled and partly laid out for a nursery and garden.

287. In addition to the above, plans were prepared and arrangements made for starting the construction of a second class chauki at Jhudo. Under instructions from the Superintending Engineer a line of levels was run from Mirpur Khás to Hyderabad to connect the Jámráo Canal levelling with the levels near Hyderabad.

288. The following is a summary of all irrigation expenditure in this district :—

					Rs.
New works—					
	Capital expenditure	...	...	...	27,588
	Revenue expenditure	...	...	...	.....
Repairs—					
	Clearance to canals	...	...	...	.....
	Other works	...	...	...	.....
	Maintenance of Gardens...	...	...	...	.....
Establishment	... { Work	...	...	...	...
	... { Abkaláni...	...	...	...	...
	... { Revenue	...	...	...	...
	Total	...			27,588
	Add—Regular Establishment charges	...			19,760
	Add—Tools and Plant charges	...			1,870
	Total charges under all heads	...			49,218

HYDERABAD CANALS.

289. The estimate for improving the Dad, amounting to Rs. 19,49,332, was sanctioned late in the year. The excavation of the new feeder to the Gadorowáh was commenced in a length of about 4 miles, and materials for the Head Regulator of the main canal were purchased. The total expenditure was Rs. 14,671.

290. No new work was sanctioned under this head. The usual maintenance works, clearance, repairs to banks, &c., were carried out and call for no special remarks. The expenditure was :—

				Rs.	Rs.
Works ...	...	...	...	...	38,198
Establishment ...	{	Abkalani ...	...	4,177	
		Revenue ...	...	1,746	
		Work ...	...	4,663	
				<u>10,586</u>	
Total ...					<u>48,784</u>

Works for which only
Revenue Accounts are kept.

291. No new works were sanctioned and the expenditure on ordinary maintenance was as follows :—

				Rs.	Rs.
Works ...	...	...	...	...	70,652
Establishment...	{	Abkalani ...	...	5,699	
		Revenue ...	...	2,863	
		Work ...	...	7,796	
				<u>16,358</u>	
Total ...					<u>87,010</u>

292. The following two new embankments, commenced in the previous year as works necessitated by the flood of 1894, were completed before the inundation :—

- (a) Bund to divert floods in the Nausháhro Subdivision ;
- (b) Bund to check spill in the Hála Subdivision.

The expenditure of the year on the former was Rs. 4,278, and the total expenditure was Rs. 18,257 against an estimate of Rs. 20,960. The total expenditure on the latter was Rs. 8,953 against an estimate of Rs. 8,622. The expenditure of the year was Rs. 3,973.

293. On the maintenance of these works during the year, Rs. 1,843 were expended as follows :—

				Rs.	Rs.
Works ...	...	...	...	...	1,137
Establishment...	{	Abkalani ...	...	670	
		Revenue ...	...	36	
		Work ...	...	...
				<u>706</u>	
Total ...					<u>1,843</u>

The bunds answered the purpose for which they were constructed ; only two small breaches occurred in the bund in the Nausháhro Subdivision, but these were soon closed and did no damage.

294. Two gardens are maintained in this district at Bhour and Mithiáni. The expenditure on the former was Rs. 467 and on the latter Rs. 383, the receipts being Rs. 194 and Rs. 169 respectively. As pointed out in last year's report, the revenue of the year was anticipated to a certain extent by a payment made in 1894-95 on account of produce to be realised in 1895-96.

295. A few maistries and mukádams were employed for short periods to assist in supervising the new bund works in progress and some special clearance. The aggregate expenditure was Rs. 291.

296. The following is a summary of expenditure under all heads for this district :—

		Rs.	Rs.
New works—			
Capital expenditure	...	14,671	
Revenue expenditure	...	...
Ordinary Agricultural works	...	8,251	
		<u>22,922</u>	

<i>Repairs—</i>					Rs.
Clearance	...	...	...	...	88,530
Other works	...	...	...	...	20,607
Maintenance of Gardens	...	...	...	...	850
					<hr/> 1,09,987
					Rs.
Establishment.	{ Works...	...	...	12,459	
	{ Abkaláni	...	...	10,546	
	{ Revenue	...	...	4,645	
					<hr/> 27,650
					<hr/> 1,37,637
					1,60,559
<i>Add—Regular Establishment charges...</i>					59,461
<i>Add—Tools and Plant charges...</i>					537
					<hr/>
Total under all heads					2,20,557
					<hr/>

297. The average expenditure of 3 previous years on establishment charged to the maintenance grant was Rs. 26,306.

FULELI CANALS.

Fuleli Canals—Capital. 298. Under this head the following works were in progress or completed during the year.

299. This work, which was described in last year's report, was practically completed during the year, and was opened before the inundation :—

New head to Mulchand.

				Rs.
Estimate...	...	...	...	57,001
				<hr/>
Expenditure to end of 1894-95	...	...	...	35,792
Do. in 1895-96	...	...	...	21,209
				<hr/>
				57,001
				<hr/>

300. The Wadhuwáh, which takes off from the Fuleli above its head regulator used to tail into the Indus 4 or 5 miles below Hyderabad, but owing to the construction of the new bund to the Ganja Takar this tail is cut off and the canal has now been extended to the east of the hills and parallel to the Badin road, eventually tailing into the Fuleli. The extension is small but will drain off flood water to a certain level. As it takes off above the Fuleli head regulator, which has to be partially closed when the river is high, water will be run at a higher level than in the Fuleli and a large revenue is expected from both kharif and rabi cultivation in high inundation :—

				Rs.
Estimate	...	...	...	5,492
Expenditure	...	...	...	5,636

Survey in connection with an escape to the Fuleli Canal.

301. At present the Fuleli is not under control. The survey was undertaken to prepare a project for an escape at its tail to save breaches in high flood and to enable this canal to flow throughout the year :—

				Rs.
Estimate	...	...	...	666
Expenditure	...	...	...	296

The project has been submitted for sanction.

302. As one escape to the Fuleli will not bring it entirely under control, this survey has been commenced to enable a project to be prepared for a second escape to take off at 46 miles from the mouth of the new Fuleli, and just above the new Alipur regulator. The line is an excellent one through good land at present lying waste :—

Surveying a second escape to the Fuleli from the Alipur regulator

Estimate	...	...	...	Rs.
Expenditure	...	...	...	762
				119

The survey is in progress.

Constructing regulating sluice over the heads of karias in Badin Táluka.

303. This work, intended to reduce waste of water and the number of breaches which occur annually at certain of the more dangerous water-courses taking off from the Fuleli and its branches, was carried on during the year :—

Estimate	...	...	...	Rs.
				20,005
Expenditure, 1894-95		...	...	5,000
Do. 1895-96		...	...	10,000
Total	...			15,000

Re-constructing the regulator over old Fuleli at Nareja.

304. This work, which was described in the last report, was finally completed during the year. The cost of the work has been divided between Capital and Revenue according to Code rules :—

Estimate	...	...	...	Rs.	
				38,682	
				Capital.	Revenue.
				Rs.	Rs.
Expenditure to end of 1894-95		...	...	...	16,000
Do. in 1895-96	...	...	...	3,374	18,654
Total	...			3,374	34,654
Total	...			38,028	

Fuleli Canal Revenue Account—Extensions and Improvements.

Constructing Head Regulator over Imamwáh Husri, in Hyderabad Táluka.

305. When the level of water is high many breaches occur in the banks of the Imamwáh Husri, which takes off from the old Fuleli just above the Nareja regulator. To prevent this a regulator is being constructed and it will be completed before the inundation. During the year materials were collected and a little masonry work was done :—

Estimate	...	...	...	Rs.
Expenditure	...	...	...	3,247
				506

306. The strengthening of this bund, which protects the jaghirs of the Mirs of Sind and also some Government land and buildings in the neighbourhood of Hyderabad, was completed during the year. To make the bund quite safe considerable further expenditure will be required :—

Estimate	...	...	...	Rs.
				16,868
Expenditure to end of 1894-95		...	...	8,993
Do. in 1895-96	...	...	...	7,845
Total	...			16,838

New bund from end of existing Gidu Bandar Bund to Ganja Takar.

307. This work, which was described in the last report, is intended to complete the line of embankments which will protect the low-lying lands in the neighbourhood of Hyderabad from being flooded :—

					Rs.
Estimate	...	...	...	...	8,914
Expenditure to end of 1894-95...			...	...	4,916
Do. in 1895-96		...	...	...	2,747
				Total	7,663

308. This work which was commenced last year was finally completed. The work is intended to protect land and buildings in the vicinity of Hyderabad from being flooded. A third sluice was constructed in the bund to give a sufficient supply for rabi cultivation within it:—

Raising and strengthening
Jamshora Bund.

					Rs.
Estimate	...	...	...	...	6,505
Expenditure to end of 1894-95...			...	...	5,243
Do. in 1895-96		...	...	...	1,262
				Total	6,505

309. This work which consists in extending the Jamshora Bund to Gidu Bandar will prevent the Economic garden and roads round Hyderabad from being flooded:—

Extending Jamshora Bund.

					Rs.
Estimate	...	...	...	...	3,759
Expenditure	...	...	...	...	2,668

310. This work which was described in the last report was completed during the year. It is intended to protect the land lying between the two mouths from being flooded, and the regulator at head of new Fuleli from being out-flanked:—

Constructing new bund to
check spill between old and
new mouths of Fuleli.

					Rs.
Estimate	...	...	...	...	24,506
Expenditure to end of 1894-95			...	...	14,552
Do. in 1895-96		...	...	...	8,097
				Total	22,649

Maintenance and repairs
Fuleli Canal.

311. The clearance work was of the usual description as detailed in the statement at the end.

312. Two small gardens were maintained during the year at a cost of Rs. 447. The receipts were Rs. 78 only, but the gardens have not been long in existence and they may be expected to yield better results in the future.

Plantations.

313. The total expenditure on the Fuleli during the year was as follows:—

					Rs.	Rs.
New works—						
Capital	...	...	...	...		40,634
Revenue	...	...	...	...		42,781
Repairs—						
Works	...	...	...	...	1,21,485	
Gardens	...	...	...	...	447	
						1,21,932
Establishment .	{	Abkalani	...	...	5,902	
	{	Revenue	...	...	5,013	
	{	Work	...	...	10,269	
						21,184
				Total	...	2,26,531

Works for which only Revenue Accounts are kept. Extensions and Improvements, Hájipur Bund.

314. The raising and strengthening of this important bund was commenced in 1894-95 and was completed during the year. The cost has been divided between Extensions and Improvements and Maintenance and Repairs as follows :—

Estimate	...	...	...	Rs.	Rs.
					82,542
				Extensions and Improvements.	Maintenance and Repairs.
					Rs.
Expenditure to end of 1894-95	...	...	...	12,729	10,781
Do. in 1895-96	...	...	...	22,115	28,279
Total	...				73,904

Extending Hájipur Bund from old Bagyar to Dhadhko.

315. The extension was commenced in 1894-95 and completed in 1895-96 at a cost of Rs. 4,020, the expenditure of the latter year being Rs. 107.

Maintenance and repairs, Indus Canals and Hájipur Bund.

316. On the ordinary maintenance of the Hájipur Bund and the small canals in the district which take off direct from the river, Rs. 48,597 were expended. This included part of the cost of a small new loop below the Wasing Wah and Nur Wah.

The details were as follows :—

Works	...	...	...	Rs.	Rs.
Establishment	{	Abkaláni	...	1,116	45,776
		Revenue	...	427	
		Works	...	1,278	
					2,821
Total	...				48,597

317. Besides the ordinary maintenance establishment sanctioned annually on regular estimates, it was necessary in this district to entertain a considerable number of maistries, &c., to supervise the numerous special works in progress. The whole expenditure on this head was Rs. 2,562.

318. The following is a summary of expenditure in this district :—

				Rs.	Rs.
New works—					
Capital Expenditure	...	...	...		40,634
Revenue Expenditure	...	...	...		65,263
Ordinary Agricultural Works	...	...	...
					1,05,897
Repairs—					
Clearance	...	...	...	96,680	
Other works	...	...	...	70,581	
Maintenance of gardens	...	...	...	447	
					1,67,708
Establishment	{	Work	...	11,547	
		Abkaláni	...	7,018	
		Revenue	...	5,440	
					24,005
					2,97,610
Add—Regular Establishment charges	...				52,904
Add—Tools and Plant charges	...				—502
Total charges under all heads	...				3,50,012

319 The average expenditure of 3 previous years on establishment charged to the Maintenance grant was Rs. 21,117.

APPENDIX A.

Statement showing the entire Expenditure incurred during the financial year 1895-96 on Irrigation Works, Repairs and Establishment in the Province of Sind.

Service.	Works.	Repairs.	Total.
PRODUCTIVE PUBLIC WORKS.	Rs.	Rs.	Rs.
MAJOR WORKS.			
49.—Capital Account.			
Works	6,71,604	....	6,71,604*
Establishment ... ..	.....	.....	1,60,909
Tools and Plant ... ..	.....	.....	57,250
Total ...	6,71,604	.....	8,89,763
42.—Revenue Account			
Extensions and Improvements	27,119	.....	27,119
Maintenance and Repairs ... ..	.....	1,81,203	1,81,203
Establishment ... ..	.....	.....	65,879
Tools and Plant ... ..	.....	.....	1,360
Refunds of Revenue ... ..	.....	.....	.....
Total ...	27,119	1,81,203	2,75,561
43.—IRRIGATION MINOR WORKS AND NAVIGATION.			
WORKS FOR WHICH CAPITAL AND REVENUE ACCOUNTS ARE KEPT.			
Capital Account.			
Works... ..	55,713	.....	55,713*
Establishment ... ..	.....	.....	12,933
Tools and Plant ... ..	.....	.....	400
Total ...	55,713	.....	69,046
Revenue Account.			
Extensions and Improvements	49,584	.....	49,584
Maintenance and Repairs ... ..	.....	2,10,761	2,10,761
Establishment ... ..	.....	.....	78,477
Tools and Plant ... ..	.....	.....	8
Refunds of Revenue ... ..	.....	.....	.....
Total ...	49,584	2,10,761	3,38,830
WORKS FOR WHICH ONLY REVENUE ACCOUNTS ARE KEPT.			
Revenue.			
Extensions and Improvements... ..	4,29,486	.....	4,29,486
Maintenance and Repairs ... ..	.....	5,36,980	5,36,980
Establishment ... ..	.....	.....	2,10,171
Tools and Plant ... ..	.....	.....	3,275
Refunds of Revenue ... ..	.....	.....	2,447
Total ...	4,29,486	5,36,980	11,82,359
WORKS FOR WHICH NEITHER CAPITAL NOR REVENUE ACCOUNTS ARE KEPT.			
Works and Surveys	47,917	.....	47,917
Maintenance and Repairs ... ..	.....	4,01,157	4,01,157
Establishment ... ..	.....	.....	99,206
Tools and Plant ... ..	.....	.....	2,030
Total ...	47,917	4,01,157	5,50,310
DEPOSITS.			
Contributions, Ordinary.			
Works	1,291	.....	1,291
Repairs ... ..	.....	2,482	2,482
Establishment ... ..	.....	.....	41
Tools and Plant ... ..	.....	.....	4
Total ...	1,291	2,482	3,818
Total under all Heads ...	.....	.....	33,09,687†

Note.—Expenditure exclusive of Establishment and Tools and Plant Rs. 26,17,744
 Cost of Establishment and Tools and Plant 6,91,943
 Percentage of Establishment and Tools and Plant on Outlay 26.43

† Exclusive of Suspense account Rs. —607.

* Net after deducting Rs. 57 and Rs. 166 on account of "Receipts on Capital Account."

APPENDIX B.

Statement showing in detail Expenditure incurred on Works (Repairs) and Establishment

Names of Canals.	CLEARANCE PROPOSED IN CANALS.		Jungle cutting.	Re-moving Toodas.	IMPROVING CANAL HEADS.		STOPS SLOPING AND REPAIRING CUTS.		Buildings and Canals.	Regulators, Bridges and Sluices.	REPAIRS TO CANAL BANKS.		Re-moving spoil banks and inspection paths.
	Cubic feet.	Cost.			Cubic feet.	Cost.	Cubic feet.	Cost.			Cubic feet.	Cost.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
		Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Peccari Canals.													
Desert Canal ...	4,471,721	21,877	619	308	...	...	...	...	2,969	710	1,010,499	4,889	...
Unharwah ...	2,691,807	11,046	72	50	...	...	...	...	1,409	961	427,817	2,016	41
Begari Canal ...	5,402,465	25,337	425	126	...	...	...	...	4,298	2,141	891,563	1,666	...
Kashmir Bund ...	148,046	555	220	...	...	...	...	...	2,506	94	12,058	51	60
Shikarpur Canals.													
Canals in Rohri ...	8,183,523	13,440	577	8,121	345,000	1,500	...	...	2,709	14	1,208,551	5,420	412
Bunds in do. ...	...	...	132	...	...	...	...	...	...	109	...	...	...
Sind Canal ...	2,468,946	11,320	75	247	8,653,364	20,094	...	...	1,184	408	219,420	1,138	150
Sukkur-Begari Bund ...	...	...	25	...	...	...	...	...	1,671	425	...	...	...
Kashmir Bund ...	...	...	15	...	...	...	...	...	58	...	...	...	...
Ghar Canals.													
Ghar Canal ...	12,918,350	57,362	207	1,910	...	...	...	...	570	2,595	5,318,887	22,843	2,097
Sukkur Canal ...	3,188,962	20,454	300	861	...	...	...	...	1,068	8,171	619,821	3,314	...
Ghar Bunds ...	...	...	106	...	...	...	...	...	81	94	...	...	...
Western Nara.													
Western Nara ...	4,667,760	18,240	934	1,047	...	...	...	...	8,157	1,327	5,471,074	23,883	293
Pritchard Canal ...	371,080	1,472	180	636	...	...	...	...	378	996	1,068,692	4,621	87
Damrao Canal ...	371,680	1,629	...	...	...	...	...	...	212	...	...	...	...
Dadu Canals ...	2,069,410	7,178	178	188	...	...	...	...	64	108	174,289	706	65
Phitta Canal ...	365,910	1,281	99	23	...	...	...	...	...	2	...	...	114
Marviwah ...	166,970	597	50	184	...	...	...	...	73	...	2,229	9	...
Wahurwah ...	67,380	265	20	...	...	...	...	...	...	...	...	...	...
Nara Bunds ...	...	...	243	...	...	...	...	...	428	8,720	...	...	...
Karachi Canals.													
Canals North of Kotri ...	1,166,766	4,594	58	48	...	...	...	...	...	...	281,434	922	...
Canals in Talta, &c. ...	758,583	2,197	56	159	...	...	...	...	...	284	27,960	1,265	...
Kalri ...	811,028	2,703	...	628	...	...	...	...	...	18	544,784	1,562	...
Baghu ...	480,428	2,627	289	106	...	...	...	...	809	768	2,874,572	10,113	...
Uchilo ...	54,042	191	...	2	...	...	...	...	...	...	6,311	26	...
Canals in Mipur Batoro ...	734,593	1,274	2	49	...	...	...	...	...	87	148,674	418	...
Pinyari ...	3,353,028	9,024	137	426	...	...	...	...	1,000	8,272	1,987,287	6,401	12
Canals in Sujawal ...	304,975	1,122	84	44	...	...	...	...	...	...	228,330	701	...
Canals in Jati ...	252,500	711	21	...	...	...	...	...	...	...	46,551	175	...
Satta ...	147,540	1,161	86	102	...	...	...	...	38	5	336,912	1,047	...
Canals in Shalbandar ...	254,368	681	48	82	...	...	...	...	...	...	210,000	652	...
Khanto ...	31,702	280	251	27	...	...	...	...	...	15	890,938	1,618	...
Kokawari ...	123,380	154	87	29	...	...	...	...	7	2	212,317	723	...
Bunds, Right Bank ...	...	...	2,443	...	...	...	...	...	952	2,950	...	...	...
Bunds, Left Bank ...	...	...	142	...	...	...	...	...	7	2,661	...	...	...
Eastern Nara.													
Nara Supply Channal ...	1,044,270	6,527	...	...	...	...	...	...	...	759	...	...	...
Eastern Nara ...	174,003	668	794	1,817	...	...	...	...	131	6,198	...	...	...
Mithrao Canal ...	229,448	926	50	278	...	...	...	...	2,139	3,474	233,646	1,086	...
Dunwah ...	...	...	...	...	...	...	...	...	...	803	...	...	...
Heranwah ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Khipra ...	...	...	...	141	...	...	...	...	27	34	...	...	...
Tharwah ...	Weeds.	277	260	117	...	...	...	...	48	1,367	268,908	1,161	...
Hyderabad Canals.													
Mehrabwah ...	707,651	2,581	3	181	...	...	...	...	...	1	7,250	25	...
Nasrat ...	890,832	3,196	2	411	...	...	...	...	687	...	335,857	629	...
Nasirah ...	1,556,737	5,962	...	450	...	...	...	...	33	...	118,915	437	...
Dunbro ...	256,087	961	85	50	...	...	...	...	...	...	241,801	194	9
Dad ...	2,484,424	9,886	62	138	...	...	...	...	443	1	674,977	2,301	...
Kenwah ...	205,871	961	...	199	...	...	...	...	...	...	66,526	512	...
Alibhar Kacheri ...	192,287	930	21	175	...	...	...	...	...	...	2,880	11	...
Marak ...	2,773,035	13,202	13	519	...	...	...	...	...	...	123,018	412	45
Gharo Mahmuda ...	5,889,908	28,826	27	860	...	...	...	...	...	...	285,405	998	851
Kari bhumali ...	1,790,012	7,531	7	497	...	...	...	...	20	99	16,228	67	10
Nasirwah ...	2,384,196	9,501	22	125	...	...	...	...	144	86	54,467	206	151
Sarfranzwah ...	1,105,463	4,461	52	349	...	...	...	...	...	...	46,928	149	164
Other Canals ...	1,812,003	4,736	21	232	...	...	...	...	...	...	1,181,186	3,005	...
Repairs, Indus Survey Marks.	...	...	...	...	...	...	...	...	...	...	...	...	...
Bund to divert flood in Naushahro Subdivision.	235,000	800	...	...	...	...	...	...	...	...	...	A.	...
Bund to check spill in Hala Subdivision.	5,272	20	...	...	...	...	...	...	...	...	...	...	...
Fuleli Canals.													
Fuleli Canals ...	22,795,539	85,111	4,017	5,092	...	26	...	...	1,018	6,809	5,480,934	14,453	777
Other Canals ...	3,979,745	10,569	688	544	...	...	...	...	...	18,386	492,814	3,120	...
Begari Canals District.													
Begari Canals District ...	12,713,539	58,816	1,336	479	...	...	...	...	11,180	8,908	1,841,431	8,773	101
Shikarpur Canals District ...	5,682,471	24,760	824	3,868	8,998,364	21,654	...	...	5,597	956	1,425,977	6,556	598
Ghar Canals District ...	16,052,292	77,818	612	2,771	...	...	...	...	1,670	6,860	5,935,208	25,656	2,697
Western Nara District ...	8,080,090	30,854	1,705	2,023	...	...	...	...	4,302	6,148	6,716,224	28,719	541
Karachi Canals District ...	8,472,933	26,637	8,604	1,732	...	...	2,100	7	2,903	10,239	7,284,311	26,438	12
Eastern Nara District ...	1,417,721	8,598	1,104	1,863	...	...	...	...	2,345	12,128	498,616	3,197	...
Hyderabad Canals District ...	21,788,276	89,630	265	4,186	...	...	...	...	1,327	136	2,952,406	9,813	739
Fuleli Canals District ...	26,776,264	96,680	4,656	5,556	...	26	...	...	1,018	25,195	3,928,798	16,602	777
Total	100,983,606	4,12,298	14,106	21,998	8,998,364	21,650	2,100	7	30,337	64,568	30,560,981	1,24,755	5,459

Accountable to the Canal Clearance Grant in 1895-96 in the province of Sind.

REPAIRS TO RIVER EMBANKMENTS.		SPECIAL WORKS IN CONNECTION WITH RIVER EMBANKMENTS.		Protecting slopes of Embankments and Canals.	Miscellaneous.	Contingencies.	Extraordinary Abkalaní Expenditure, closing breaches, &c.	Total Works.	ESTABLISHMENT.				Total Works and Establishment.	Remarks.
Cubic feet.	Cost.	Cubic feet.	Cost.						Abkalaní.	Revenue.	Works.	Total.		
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
	Rs.		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
...	...	...	...	...	1,357	550	...	33,223	3,608	2,080	1,499	7,187	40,410	
...	...	...	...	...	3,976	174	...	19,747	3,434	1,180	1,051	5,665	25,412	
...	...	...	...	...	2,145	1,422	...	37,760	4,520	2,374	1,497	8,391	46,161	
804,838	4,899	21,002,293	1,12,106	2,230	5,528	628	...	1,28,930	21,143	839	1,322	23,304	1,52,231	
...	...	...	...	271	417	352	62	28,355	3,334	858	2,511	6,703	35,058	
590,249	2,696	...	...	111	25	...	...	3,073	508	37	105	650	3,723	
...	...	...	...	460	...	379	16	35,478	2,045	635	1,949	4,629	40,107	
436,656	3,736	472,935	16,510	1,041	776	186	3	24,373	5,993	219	631	6,843	31,216	
163,691	850	7,970,182	44,771	47	...	68	...	45,794	620	88	262	970	46,764	
...	...	...	...	2,975	3,321	308	...	94,287	6,679	1,563	4,100	12,342	1,06,629	
...	...	...	...	...	3,614	230	...	33,010	3,166	942	2,407	6,505	39,515	
622,335	2,613	...	...	...	...	...	...	2,846	2,939	338	925	4,202	7,048	
...	...	...	...	1,202	1,865	...	1,788	53,241	8,109	3,194	6,154	17,457	70,698	
...	...	...	...	100	30	...	10	8,460	...	...	...	...	8,460	
...	...	...	...	...	106	...	3	1,946	2,213	1,195	769	4,177	6,123	
...	...	...	...	...	61	...	...	8,507	245	72	215	532	9,039	
...	...	...	...	...	13	...	...	1,532	284	130	300	714	2,246	
...	...	...	...	10	3	...	...	926	163	39	54	256	1,182	
...	...	...	...	...	...	...	...	285	120	20	58	198	483	
177,534	944	3,474,879	20,240	...	8,189	2,862	628	87,254	6,428	408	763	7,599	44,853	
...	...	...	...	...	204	...	...	5,826	312	129	240	681	6,507	
...	...	...	...	...	265	...	...	4,206	518	216	484	1,218	5,424	
...	...	...	...	...	470	...	...	5,678	644	379	1,092	2,115	7,793	
...	...	...	...	...	610	...	54	15,376	1,628	463	1,457	3,548	18,924	
...	...	...	...	...	25	...	...	250	...	...	...	...	250	
...	...	...	...	...	45	...	...	1,896	238	97	307	642	2,538	
...	...	...	...	...	467	...	10	21,239	2,733	905	2,396	6,034	27,273	
...	...	...	...	...	64	...	117	2,088	98	36	100	231	2,322	
...	...	...	...	...	33	...	...	948	39	...	...	39	987	
...	...	...	...	...	75	...	...	2,464	256	148	299	703	3,167	
...	...	...	...	...	...	...	...	1,402	57	18	48	123	1,525	
...	...	...	...	...	133	...	5	2,389	297	122	328	747	3,136	
...	...	...	...	...	51	...	...	1,033	320	20	60	400	1,433	
6,068,124	24,399	...	...	...	646	...	110	33,505	2,360	344	1,408	4,112	37,617	
2,068,029	9,057	6,151,363	68,072	...	2,621	...	1,959	82,744	4,432	458	1,398	6,288	89,032	
...	...	...	...	...	...	...	...	753	...	1,382	...	1,382	2,135	
1,433,377	9,226	...	...	...	502	...	401	22,980	6,178	1,643	2,481	10,302	33,282	
2,116,817	5,499	...	...	...	2,778	...	629	18,338	3,094	2,377	2,667	8,138	26,476	
...	...	...	...	...	33	...	772	2,362	263	112	311	686	3,048	
...	...	...	...	...	35	...	...	35	...	...	...	...	35	
...	...	...	...	...	96	...	112	410	248	184	120	553	962	
...	...	...	...	...	1,332	...	205	4,667	1,159	1,860	888	3,907	8,574	
...	...	...	...	...	192	...	8	2,941	429	181	415	1,025	3,966	
...	...	...	...	...	198	...	26	5,048	463	231	540	1,234	6,282	
...	...	...	...	...	583	...	7	7,472	642	397	1,097	2,136	9,608	
...	...	...	...	...	145	...	10	2,107	590	256	683	1,529	3,636	
...	...	...	...	...	344	...	223	13,627	1,336	348	1,083	2,767	16,394	
...	...	...	...	...	67	...	...	1,574	750	333	896	1,979	3,553	
...	...	...	...	...	21	...	...	1,158	474	280	681	1,435	2,593	
135,498	488	...	...	...	375	...	33	15,123	1,319	624	1,636	3,579	18,702	
...	...	...	...	...	1,129	...	17	27,202	1,496	790	2,053	4,339	31,541	
...	...	...	...	...	181	...	...	8,429	732	373	1,133	2,238	10,667	
...	...	...	...	...	256	...	4	10,525	512	297	749	1,568	12,083	
...	...	...	...	...	166	...	...	5,349	619	313	848	1,780	7,129	
...	...	...	...	...	241	...	10	8,295	514	186	645	1,345	9,640	
...	...	...	...	...	8	...	...	8	...	...	...	...	8	
...	...	...	...	...	3	...	306	1,109	593	36	...	629	1,738	
...	...	...	...	...	...	...	...	20	77	...	...	77	97	
9,122	187	...	...	400	1,781	161	1,076	1,21,932	5,902	5,013	10,269	21,184	1,43,116	
68,455	234	2,412,104	12,128	386	555	115	101	45,776	1,116	427	1,278	2,821	48,597	
804,838	4,899	21,002,293	1,12,106	2,280	13,006	2,774	...	2,19,660	32,705	6,473	5,369	44,547	2,64,207	
1,192,596	7,282	8,443,117	61,281	1,930	1,218	975	61	1,37,073	12,500	1,837	5,458	19,795	1,56,868	
622,335	2,613	...	...	2,975	6,935	538	...	1,30,143	12,774	2,843	7,432	23,049	1,53,192	
177,534	914	3,474,879	20,240	1,312	10,267	2,862	2,429	1,12,161	17,662	5,058	8,313	30,933	1,43,084	
1,136,153	83,466	6,151,363	68,072	...	5,689	...	2,255	1,81,044	13,932	3,335	9,617	26,884	2,07,928	
3,550,194	14,725	...	...	...	4,676	...	2,119	49,545	10,942	7,558	6,467	24,967	74,512	
135,498	488	...	...	...	3,909	...	644	1,09,987	10,546	4,645	12,459	27,650	1,37,637	
77,577	421	2,412,104	12,128	786	2,356	276	1,177	1,67,708	7,018	5,440	11,647	24,005	1,91,713	
14,696,725	64,828	41,483,756	2,73,827	9,283	48,036	7,425	8,705	11,07,311	1,17,979	37,189	66,662	2,21,830	13,29,141	
As per booked Accounts ...								11,08,271	1,17,979	37,189	66,662	2,21,830	13,30,101*	The difference is due chiefly to omission of Rs. 949 on Recording Survey Stations
*Exclusive of Refunds of Revenue and outlay on Deposits Contributions														

APPENDIX C.

Statement showing the Expenditure incurred on Work Establishment employed in the Deccan Districts during the year 1895-96, and the percentage it bears to the Outlay on Works and Repairs proper.

No.	Name of Sub-division or District.	OUTLAY ON						Total Contract and Departmental Columns 5 and 8.	COST OF WORK ESTABLISHMENT SANCTIONED BY			Percentage (column 12 bears to column 9).	REMARKS.
		By Contract.		By Departmental Agency.					Chief or Superintending Engineer.	Executive Engineer.	Total.		
		Original Works, including additions and alterations and improvements, and extensions.	Repairs.	Total.	Original Works, including additions and alterations and improvements, and extensions.	Repairs.	Total.						
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Mutha Canals	Rs. 17,408	Rs. 544	Rs. 17,952	Rs. 8,441	Rs. 7,179	Rs. 15,620	Rs. 33,572	Rs. 1,584	Rs. 4,424	Rs. 6,008	Rs. 17-89	Increased percentage due to less Capital outlay.
2	Poona Water Supply	...	2,237	2,237	...	8,087	8,087	10,324	625	4,883	5,508	53-35	Increased percentage due to a mechanic on Rs. 180 per month having been put on.
3	Nira Canal	1,569	402	1,971	20,141	10,478	30,619	32,590	2,718	6,335	9,053	27-78	Increased percentage due to less Capital outlay.
4	Other Poona Irrigation Works	...	12	12	...	3,583	3,583	3,595	...	1,407	1,407	39-14	Increased percentage due to small expenditure.
5	Sholapur Irrigation Works	3,042	...	3,042	2,965	15,413	18,378	21,420	837	1,269	2,106	9-83	High percentage due to the whole establishment having been employed on maintenance and repairs of the 2 canals and Bhatodi Tank. No other works were in progress.
6	Ahmednagar Irrigation Works	...	...	...	...	4,655	4,655	4,655	335	2,771	3,106	*68-72	The percentage is higher than last year's owing to works being scattered which entail greater establishment charges.
7	Nasik Irrigation Works	...	...	...	4,914	3,981	8,895	8,895	787	1,297	2,084	23-44	
8	Khandesh Irrigation Works	...	...	...	36,411	14,422	50,833	50,833	2,219	3,193	5,417	11-00	
9	Dharwar Irrigation Works	...	...	...	14,707	25,708	40,415	40,415	1,390	2,631	4,021	9-95	
	Total	22,019	3,195	25,214	87,579	93,506	1,81,085	2,06,299	10,495	23,215	33,710	18-76	

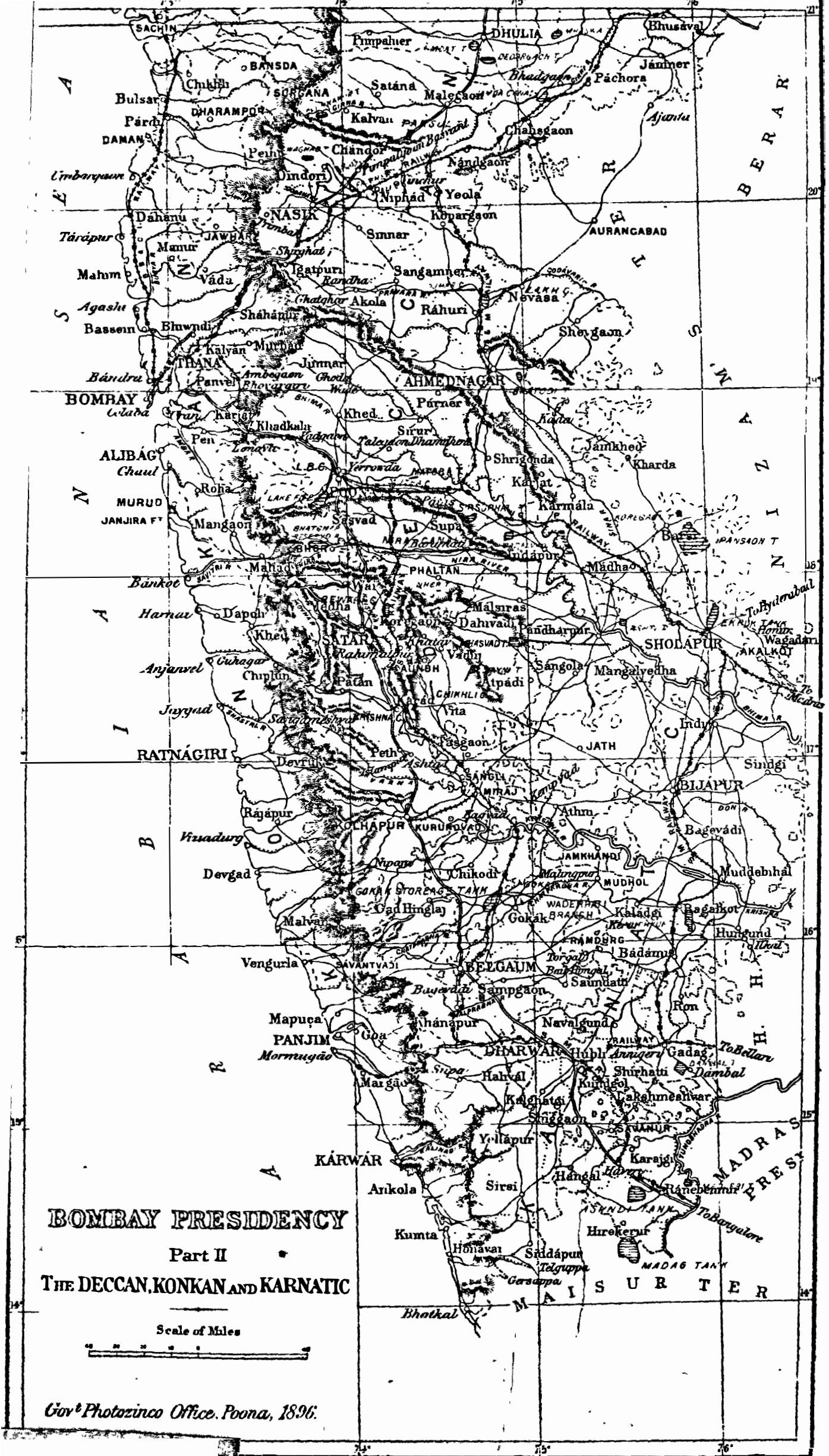
**STATEMENT SHOWING THE RESULTS OF RUN-OFF FROM
CATCHMENT AREAS OF TANKS IN THE
DECCAN FOR THE YEAR 1895.**

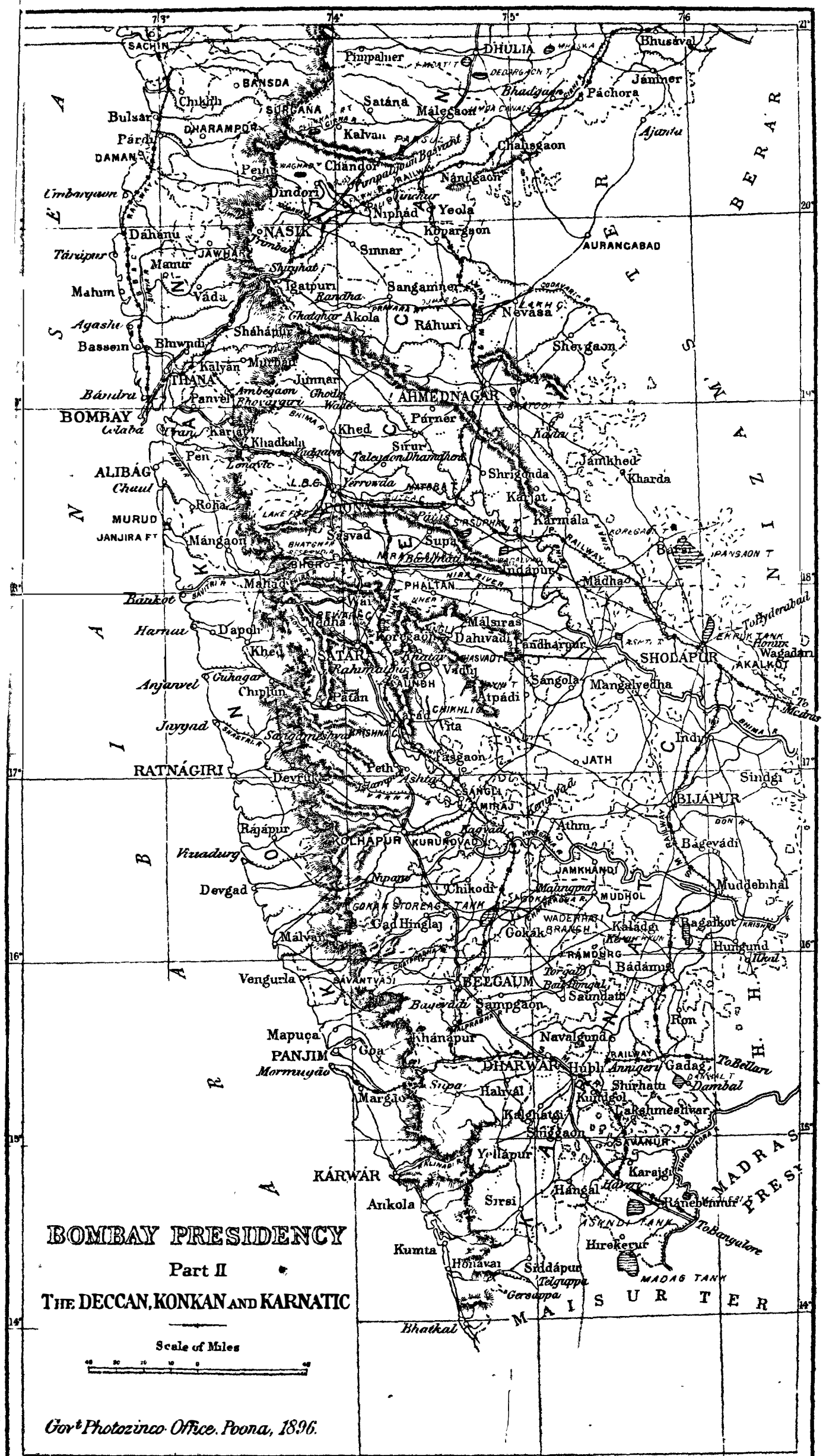
Statement showing the Results of Run-off from Catchment Areas of Tanks in the Deccan for the year 1895.

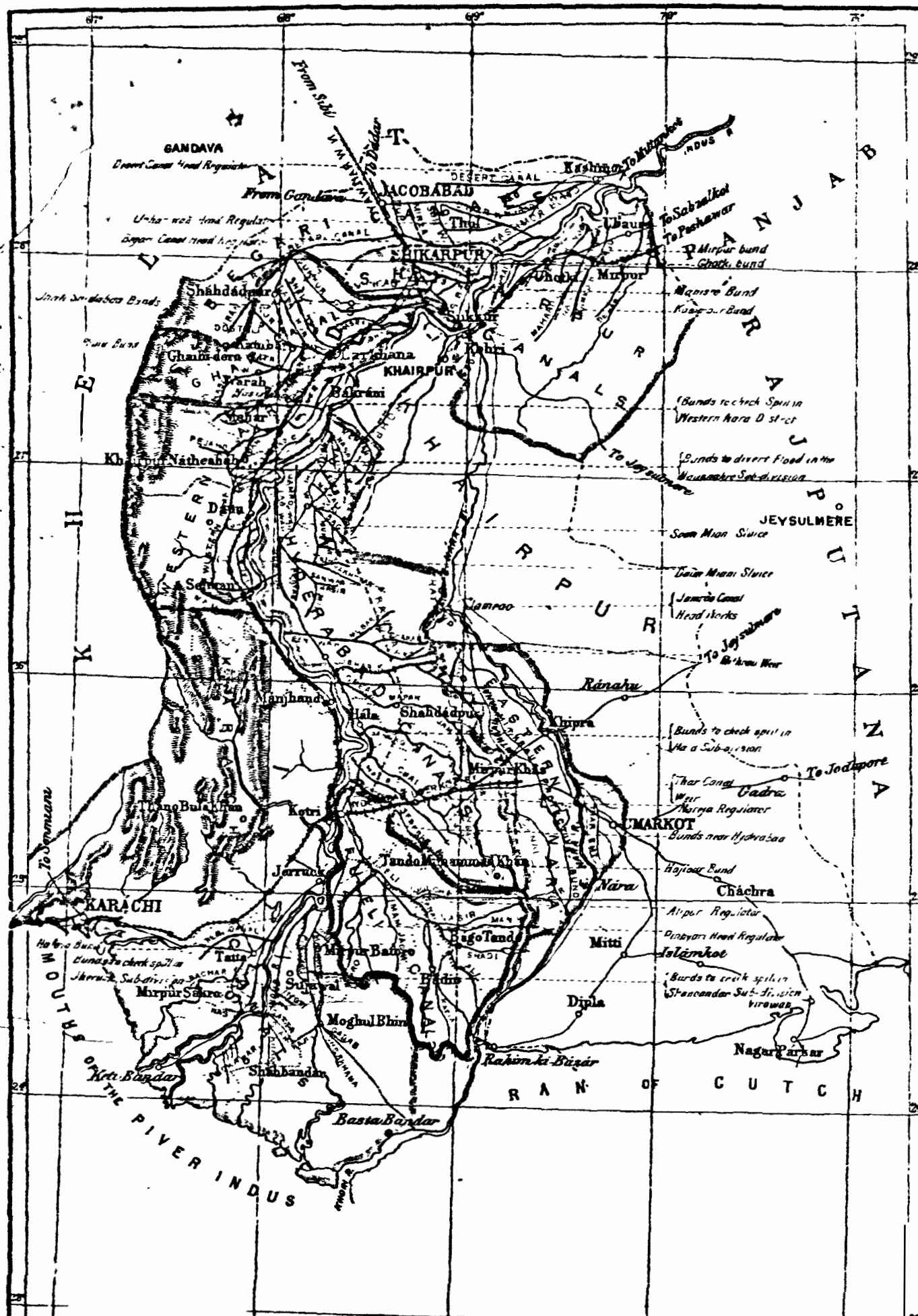
District.	Name of Tank.	Year.	Area of Catchment, Square Miles.	Rainfall in Inches.	Supply due to Rainfall, millions of Cubic Feet.	Actual Run-off, millions of Cubic Feet.	Proportion of Run-off to Rainfall, Column 7 divided by Column 6.	REMARKS.
1	2	3	4	5	6	7	8	9
Khándesh	Mukti Tank ...	1895	34.2	18.29	1,453.20	208.61	.144	The tank was at its lowest water-level on 9th July and filled to overflowing on 15th September 1895. Rainfall taken between these two dates. It is the average of two gauges Dahiana and Sargaon. The tank was at its lowest water-level on 10th June, and filled to overflowing on 20th July 1895. Rainfall is taken between these dates. The tank water was at the lowest level on 6th September. On 22nd September the maximum height was reached. Rainfall is taken between these dates. The tank was at its lowest water-level on 10th June 1895, and filled up to crest of waste weir on 22nd September 1895. Rainfall between these dates.
	Mhasva Tank	Do.	13.4	13.53	421.20	91.60	.217	
	Hartála Tank	Do.	6.8	7.30	115.32	11.23	.098	
Ahmednagar	Bhatodi Tank	Do.	44.0	21.49	2,196.72	753.67	.34	The tank was at its lowest level on 18th June 1895 and filled to overflowing on 22nd September 1895. Rainfall is taken between these two dates. Rainfall from 17th July to October 4th, 1895. The tank was full on 17th July 1895.
Násik	Pársul Tank ...	Do.	17.75	14.06	579.79	82.89	.143	
	Wághad Tank	Do.	29.0	*36.06	2,429.463	1,689.810	.695	
Poona	Shirsuphal Tank	Do.	23.5	13.10	715.19	215.02	.300	This tank did not overflow this year. Rainfall from 1st June to end of September 1895 inclusive. This tank overflowed in September 1895. Rainfall from 1st June to end of September 1895 inclusive.
	Bhádálwádi Tank	Do.	23.0	17.34	926.53	145.00	.157	

Sholápur	{	Mhasvad Tank	...	Do.	...	480	23.99	26,752.11	2,345.83	.088	Rainfall from 1st June to 31st October 1895. The waste weir began to overflow on 15th September 1895, the run-off to that date being 0.144.
		Edruk Tank ...	...	Do.	...	159	35.36	13,061.58	6,277.43	.48	Rainfall from 1st June to 31st October 1895. The waste weir began to overflow on 7th September 1895, the run-off to that date being 0.36.
		Ashti Tank ...	...	Do.	...	92	30.65	6,550.95	2,625.59	.40	{ Do. Do. Do. on 8th September 1895. to that date being 0.30.
Dhárwár	{	Kóregaon Tank	...	Do.	...	4.40	43.95	449.26	195.74	.44	{ Do. Do. Do. do. on 20th September 1895. to that date being 0.36.
		Asundi Tank...	...	Do.	...	23	16.72	893.409	107.651	.12	The tank did not fill.
		Medleri ...	...	Do.	...	11	18.50	472.771	112.242	.237	The tank was first full on 8th October.
Bijápur ...	{	Dámbal ...	...	Do.	...	.43	14.52	1,450.573	105.090	.072	The tank did not fill.
		Muchkundi Tank	...	Do.	...	26	11.13	672.288	51.260	.076	Do.
		Nehr Tank ...	...	Do.	...	59.50	14.28	1,973.93	286.51	.145	The run-off is calculated from 1st June to 9th September on which date the water-level reached the waste weir cut.
Sátára ...	{		...		...	59.50	28.84	3,986.56	737.24	.185	From 1st June to 21st October.
		Maini Tank ...	...	Do.	...	54.00	10.63	1,338.56	160.02	.12	From 1st June to 12th September on which date the tank filled.
			...		...	54.00	29.56	3,708.38	1,810.70	.49	From 1st June to 31st October.

*The rainfall is the average of 3 gauges in the catchment, and columns 6 and 8 are derived accordingly.







BOMBAY PRESIDENCY **Part III** **SIND**

Scale of Miles



Govt. Photodup. (Misc. Poona). 1896

References

Begari Canals	—
Shahpur	—
Chor	—
W. Nara	—
Hydrabad	—
E. Nara	—
Fakht	—
Karachi	—
Jamrao	—
Item	—