

Rare section



---

Rare section  
**ADMINISTRATION REPORT**

OF THE

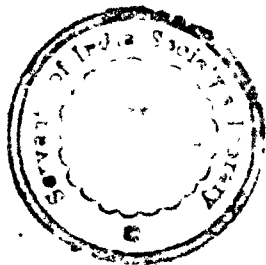
**PUBLIC WORKS DÉPARTMENT,**

**(IRRIGATION)**

**BOMBAY PRESIDENCY.**

**FOR THE YEAR**

**1894-95.**



---

**Bombay:**  
**PRINTED AT THE GOVERNMENT CENTRAL PRESS.**

**1895.**

D26. 2318

C5

~~15504~~

15509

ADMINISTRATION REPORT  
OF THE  
PUBLIC WORKS DEPARTMENT  
(IRRIGATION)

BOMBAY PRESIDENCY,  
FOR THE YEAR 1894-95.

GENERAL REMARKS.

In the year under report the expenditure on irrigation works throughout the Presidency amounted to upwards of Rs. 35 $\frac{3}{4}$  lakhs as compared with Rs. 32 $\frac{1}{4}$  lakhs in the previous year. This outlay was divided between Sind and the Presidency proper in the proportion of 7 to 2 respectively.

2. Of the total outlay of Rs. 26,68,720 on works and repairs, Rs. 15,39,395 were expended on repairs. The expenditure on repairs was, in Sind Rs. 13,31,006, and in the Deccan and Gujarát Rs. 2,08,389.

DECCAN AND GUJARAT.

3. The principal works in progress were:—Nira Canal from the Protective grant, and some alterations and improvements to the Poona Water-supply works from grant under Minor Works and Navigation.

4. The masonry works in the dam and corbelling at Bhátghar, which were reported last year as partially finished, were practically completed during the year. Hand-railing was also fixed over a portion of the south waste weir. All the gates required for the south waste weir were supplied by Messrs. Gahagan and Company, and before the end of the year all sluices, except five, had their frames fixed in position. The automatic gates for the north waste weir worked very satisfactorily under a head of 3 feet above crest levels. As the water from the north weir was headed up on the top wall, two training walls were built to guide the water to the centre of the channel. A wall was in progress across the river in front of the under-sluices to keep back large stones and boulders from the toe of the dam, where they would be a source of danger.

5. A masonry and concrete protective wall had been substituted for the pitching below the subsidiary weir on the left bank of the Nira at Vir as a protection against the erosive action of floods. This was the only work carried out during the year under report at Vir. On the main canal the only works in progress were the completion of the deep rock cutting in the 30th mile near Korahalla and the alteration of some of the distributary heads. Some cross-drainage works and new field outlets were carried out.

6. The improvements to the Poona Water-supply works, which were in progress last year, have all been completed, except a portion of the roofing of the pure water tanks, which is in progress.

7. The cracks that periodically appear in the dam of the Ashti Tank are kept constantly under watch. They are, it is reported, not so serious as to require special remedial measures.

8. The works in the Southern Division, on which there was any outlay during the year, were:—

(1). The Krishna Canal,

(2). The Yerla River Irrigation Works.

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

9. The Krishna Canal was entirely finished, as sanctioned, the stop-gates on Nála No. 21, which was the only item remaining unfinished at the end of last year, having been completed during the year.

10. On the Yerla River system, the reconstruction of the slipped portion of the Nehr dam was in hand, and made good progress towards completion.

11. In connection with the Gokák Canal and Storage Works the following works, described further on, were in progress :—

(a). Extension of Main Canal.

(b). Construction of a paved causeway at the Konur Ford.

12. Pursuant to the policy of Government as regards the treatment of irrigation tanks, large and small, in the Gujarát and Southern Marátha Country, repairs and improvements to tanks were completed or in progress as detailed below :—

*Ahmedabad District.*

Number of Tanks.	Expenditure.
5	Rs. 2,150

*Surat and Broach District.*

Number of Tanks.	Expenditure.
33	Rs. 31,806

*Belgaum District.*

Number of Tanks.	Expenditure.
1	Rs. 4,532

*Dhárwár District.*

Number of Tanks.	Expenditure.
162	Rs. 59,069

13. Orders on the report of the Committee appointed by Government for the consideration of the systematic up-keep of tanks in future and other cognate questions were issued during the year.

14. A Committee, consisting of the Commissioner, C. D. (as President), the Survey Commissioner and Director of Land Records and Agriculture, the Chief Engineer, C. D., the Collectors of Khandesh and Násik, the Executive Engineer for Irrigation, Khándesh and the Executive Engineer, Násik, was appointed during the year to consider and report generally on the present revenue aspect of the Second Class Irrigation Works in Khándesh and Násik, including the Lower Panjhra system, and to make such proposals for its improvement as might seem fit and specially with reference to the desirability or otherwise of abolishing the Pátphala cess. The report of the Committee is now under the consideration of Government.

15. The total area irrigated from all works during the year was 82,475 acres and compares with the previous five years as follows :—

Years.	Area irrigated.	Rainfall.
	Acres.	Inches.
1889-90	83,841	25.75
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	22.83

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

No.	Name of Work.	Area irrigated.	Assessment.
		Acres.	Rs.
1	Háthmati Canal ... ..	4,199	11,854
2	Khári Cut ... ..	2,088	14,479
3	Hartála Tank ... ..	83	208
4	Mukti Tank ... ..	1,028	4,193
5	Mhasva Tank ... ..	127	395
6	Jámda Canals ... ..	1,148	4,743
7	Parsul Tank ... ..	363	1,694
8	Páلكhed Canal ... ..	1,851	7,349
9	Wadáli Canal ... ..	327	1,044
10	Ojhar Támbat Canal ... ..	589	2,113
11	Ojhar Canal ... ..	1,544	4,678
12	Lákh Canal ... ..	310	1,064
13	Bhátodi Tank ... ..	1,698	5,468
14	Mutha Canals ... ..	10,082	1,39,252
15	Kásurdi Tank ... ..	1	8
16	Matoba Tank ... ..	1,420	9,936
17	Shirsuphal Tank ... ..	177	1,079
18	Bhádalvádi Tank ... ..	299	674
19	Nira Canal ... ..	28,370	90,864
20	Koregaon Tank ... ..	391	1,150
21	Ekruk Tank ... ..	3,292	13,464
22	Ashti Tank ... ..	1,459	4,717
23	Mhasvad Tank ... ..	4,226	13,868
24	Revári Canal ... ..	1,541	6,584
25	Yerla River Works ... ..	2,386	8,722
26	Upper Mén River Works ... ..	1,294	6,675
27	Máini Tank ... ..	1,280	5,091
28	Chikhli Canal ... ..	405	1,977
29	Krishna Canal ... ..	4,671	44,377
30	Muchkundi Tank ... ..	19	89
31	Gokák Canal ... ..	4,363	11,915
32	Madag Tank ... ..	924	2,239
33	Dámbal Tank ... ..	172	885
34	Medleri Tank ... ..	137	477
35	Asundi Tank ... ..	211	779
	Total ... ..	82,475	4,24,104

17. The total assessments amount to Rs. 4,24,104 and thus show a decrease of Rs. 1,966 or 46 per cent. notwithstanding the increase of 4,287 acres in the area irrigated.

18. A Statement showing the results of run-off from the catchment areas of tanks in the Deccan for 1894 is appended.

#### SIND.

19. The inundation of 1894 was a very large one, and the whole was a favourable one to the larger part of the Indus Left Bank Division, though its great height, coupled with changes in the course of the river, caused considerable damage in some low-lying parts of the Hyderabad Collectorate, which had for many years been free from floods; and the Rohri floods which entered the Nára valley were the largest since 1878. The river rose steadily up to the 17th May, when the Bukkur gauge read 10 feet 3 inches. It then fell gradually to 8 feet 4 inches on the 3rd June, and from that date rose regularly to 16 feet 4 inches on July 26th. It then fell to 15 feet on August 1st, and again rose to 16 feet 5 inches on August 7th. This was the maximum reading at Bukkur for the year, and afterwards the fall

was gradual till August the 21st, when the reading was 13 feet 9 inches. The river kept at about 14 feet till September 11th, after which the fall was rapid. The readings at Kotri gauge followed those at Bukkur, but without the minor variations.

The maximum at Kotri was 22 feet 7 inches reached on the 17th August. It was greater by 1 foot 3 inches than any reading hitherto recorded.

20. The following table shows that, judged by Mr. Thompson's standard, the inundation was almost too good a one, and also that the cause which delays the escape of the water in the lower Indus was still in existence:—

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

21. The volume of water which passed Bukkur in 1894 was about the same as in 1882, but the flood-level at Kotri was very much higher and it took much longer for the flood to escape, showing how congested the mouth of the river has become during these 12 years.

Silting up of the Delta.

Where formerly the river in flood had a free escape over the whole of the Delta below the bifurcation of the Uchito and Haideri (the two present mouths of the Indus), it is now, owing to the raising of this land by silt, confined practically to these two channels, the result being a general damming up of the water and the permanent raising of the flood-level from Kotri southwards.

While it is probable that in this portion of the river the maximum flood-level has not yet been reached, it is at the same time tolerably certain that all river embankments below Kotri will in the future have to withstand a flood-level due to a reading of 22 feet on that gauge. The special repairs carried out during the period under notice have been based on this supposition.

22. The flood of 1894 in the Nára Valley was the highest on record since 1878. The spill from the Indus in Rohri entered the Nára Supply Channel on July 9th, on which date the 12th mile gauge of the channel read 21' 3", the ordinary maximum full supply being 22 feet. The flood reached its maximum on July 29th when the gauge read 27 feet.

Floods in Nára Valley,

The maximum gauge reading at the 12th mile in previous flood years and the number of days the gauge read over 22 and 25 feet, which may be taken as fair indications of the severity of the flood, are given below:—

Years.	Maximum height of flood.		Days over 22 feet.	Days over 25 feet.
	Ft.	in.		
1872	27	7	49	36
1874	28	9	56	43
1876	27	3	56	43
1878	31	2	66	41
1889	25	7	50	5
1893	26	7	39	11
1894	27	0	46	28



The flood caused considerable damage, which has already been reported on in detail. The lately constructed Pábnái sluice was carried away, and other masonry works more or less damaged. There were many breaches in the bunds along the Nára intended to keep the ordinary supply in the channel. The most serious occurrence was the breaching of the Mithrao protective embankment, which occurred at five places near the 36th mile. Water had never reached this part of the embankment before in any force, and when it came in 1894 it rose very quickly during the night, and leaks occurred which could not be controlled. The water passing through the breaches destroyed a considerable area of kharif cultivation, but fortunately it was found possible by throwing up a small bank lower down to divert the flood back into the "unprotected area" and prevent it extending very far to the south in the "protected area." There was a very large area of rabi grown on lands soaked by the flood, and according to a statement prepared by the Deputy Commissioner the net result is an increased rabi revenue, over the average, of Rs. 71,000 to set against remissions of kharif revenue, Rs. 21,000. In spite of this it is expected that the total revenue will, owing to short cropping caused by the late opening of the canals and fears of floods, be less than that of 1893-94 by Rs. 9,000 or Rs. 10,000. The late opening of the canals was unavoidable and was due to works on the Nára Supply Channel.

23. The only river embankments of any importance in the Indus Left Bank Division were those in the Fuleli Canals District, the Jamshora Bund, the Gidu Bandar Bund and the Hájipur Bund. The first two were maintained intact, though they were to some extent outflanked by spill over the banks of the river at places where no bunds existed, or had been thought necessary. Two breaches occurred in the Hájipur Bund and several of the sluices through it were much damaged. The breaches were closed promptly, and but little, if any, damage to crops occurred.

24. In the northern part of the Hyderabad Collectorate two small floods occurred, one was in the Naushahro Subdivision and the other in Hala; both caused considerable damage to crops, but it is believed that the loss will be more than made up by extra revenue from rabi. It is reported that some 40 years ago somewhat similar floods occurred; but there is nothing on record regarding them, and the areas affected had been considered as quite safe. The floods this season were caused partly by the high inundation and partly by changes in the course of the river. The change which caused the Naushahro flood was a comparatively sudden one, and the new course had not widened itself sufficiently to carry the inundation supply when it came; there was consequently a considerable local rise. The low-lying land between the old and new mouths of the Fuleli, which has always been liable to be flooded in high inundations, was almost entirely under water and the flood found its way into the new Fuleli, outflanking the head regulator, but fortunately to no serious extent.

25. The works in the Begári and Shikarpur canals districts had no undue pressure brought on them, and leaks in the river bunds gave less trouble than usual; but unfortunately water having found a passage under the foundations of the regulator at head of Unharwáh, and also under the Sukkur-Begári Bund in the 22nd mile, breaches occurred at both places, which it was found impossible to close. A breach also took place in the Kásimpur Bund at the site of a new sluice.

26. The spill over the left bank of the river in the Baháwalpur and Rohri Districts was greater than that in any year since 1878, and the whole of the Rohri district was practically under water.

27. In the Ghár Canals District the river bunds remained staunch and gave no trouble.

28. In the Western Nára District, owing to the set of the river being on the Right Bank, causing active erosion,  $1\frac{1}{2}$  miles of the embankments were carried away. Numerous breaches also occurred, the bunds being topped in several places. These embankments, which until lately were maintained by the zamindárs, are now being raised and strengthened by the Irrigation Department.

29. In the Karáchi Canals District, in consequence of the 'escape for the flood water in the Delta being restricted to the two main channels, the river bunds had to bear the full force of an exceptionally prolonged and high inundation. Those on the right bank above Jerruck, were practically swept away, while in those below that town, seven breaches occurred, most of them being near the head of the Delta where the embankment ends.

30. The bund line of the left bank had only one breach in the first 60 miles, but for the 40 miles below that point they were topped and breached in every direction.

31. It is not proposed at present to reconstruct the bunds above Jerruck, chiefly because the Jághirdárs who are responsible for the larger portion are not willing to accept the terms offered by Government. The remainder of the embankments on the right and left banks have been raised and strengthened, with the exception of that portion of the left bank line below the 62nd mile, which has been abandoned and a fresh alignment some miles further inland has been decided on, and the works are in progress.

32. After the inundation a joint report was submitted to Government by the Commissioner in Sind and the two Superintending Engineers, detailing the damage to river embankments and other works caused by the floods, and urging the provision of a special grant to meet the cost of repairs and extensions considered absolutely necessary. The funds asked for were granted, and with these and various amounts taken from the ordinary Budget provisions all necessary repairs and extensions have been carried out. It is believed that the revenue results will be very satisfactory, as the losses on kharif in the areas affected by floods will be more than covered by the extra rabi and the increased kharif on the higher lands.

33. The year 1894-95 is notable as that in which the construction of the Jamrao Canal was commenced, though much progress was not made with it for reasons which will be given further on. The works to improve the supply in the Nára supply channel were completed. In the Eastern Nára District the bunds along the Nára from Bakár to Sirenwári, on the right bank, and from Khipra to the head of Thar Canal, on the left bank, were practically completed. The regulator in the Makhi weir was completed with the exception of part of the down-stream pavement and concrete block protection. In the Hyderabad Canals two new river embankments were commenced, intended to check the floods mentioned in paragraph 5 above.

34. In the Fuleli Canals the 60th mile regulator over the Fuleli was completed, and the new mouth to the Mulchand in connection with it was in progress. A new regulator over the old Fuleli at Nareja, to replace one which had been seriously damaged during the inundation, was commenced, and very considerable extensions and strengthening of the river embankments were undertaken after the inundation.

35. The principal works in progress in the Right Bank Division were as follows:—The excavation of a new branch canal from the Nára called the Dhamrao, and the extensions and improvements to the Unhar and Sind Canals. The first two were practically completed, the latter about half finished. The raising and strengthening of the river embankments has also received considerable attention.

36. Permanent marks have been fixed at various points of the riverain survey in each district which will enable the officers in charge to record accurately any change in the course of the river.

37. During the year under report the Chief Engineer and Secretary to Government, Public Works Department, paid a visit to Sind in order to discuss on the spot certain matters with the local officers and to inspect certain localities

in connection with the operations of the Province. The Inspector Général of Irrigation with the Government of India also visited Sind about the same time on a tour of inspection and discussed matters regarding canals and has made important suggestions which are under consideration.

38. The usual statement of entire expenditure 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 ... ..	3,87,713	10,903	...	3,98,616	2,16,772	40,164	*2,56,936	1,86,918	82,994	9,25,464
Minor Works, Capital...	37,500	66,634	...	1,04,134	1,28,699	42,636	1,71,335	88,245	1,735	3,65,449
Do. Revenue...	...	2,84,407	...	2,84,407	4,15,465	89,890	5,05,355	1,96,704	2,340	9,88,806
Ordinary Agricultural...	...	...	40,300	40,300	3,58,621	33,910	3,92,531	79,087	1,035	5,12,953
Total ...	4,25,213	3,61,944	40,300	8,27,457	11,19,557	2,06,600	13,26,157	5,50,954	88,104	27,92,672
Deposits contribution	...	...	2,885	2,885	4,849	...	4,849	15	..	7,749
—Ordinary ... ..	...	...	...	...	...	...	...	...	...	...
Total ...	4,25,213	3,61,944	43,185	8,30,342	11,24,406	2,06,600	13,31,006	5,50,969	88,104	28,00,421

\* Includes refunds Rs. 4,081.

#### GENERAL.

39. The revenue receipts during the year amounted to Rs. 7,44,671, of which Rs. 5,57,585 were on account of works in the Deccan and Gujarát and Rs. 1,87,086 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 :—

	1892-93.	1902-04.	1894-95.
	Rs.	Rs.	Rs.
Major Works—			
Protective Works...	1,11,742	1,02,419	94,550
Productive Works	4,09,304	4,12,162	4,20,360
Total ...	5,21,046	5,14,581	5,14,910
Minor Works—			
Imperial—			
Works for which Capital and Revenue Accounts are kept ...	1,16,073	1,42,331	1,36,546
Works for which only Revenue Accounts are kept: ...	61,095	77,667	75,115
Agricultural Works ...	1,584	1,833	1,320
Provincial—			
Works for which Capital and Revenue Accounts are kept ...	17,475	30,646	16,780
Total ...	1,96,227	2,52,477	2,29,761
Grand Total ...	7,17,273	7,67,058	7,44,671

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

	Imperial.			
	Rs.	Rs.	Rs.	
Capital—				
Major Works—				
Protective Works ... ..	(a) 1,10,575			
Productive Works ... ..	(b) 5,81,414			
			6,91,989	
Minor Works and Navigation—				
Works for which Capital and Revenue Accounts are kept ... ..			(c) 1,38,625	
			8,30,614	
Revenue—				
Major Works—				
Protective Works ... ..	73,183			
Productive Works ... ..	4,57,248			
			5,30,431	
Minor Works and Navigation—				
Works for which Capital and Revenue Accounts are kept ... ..	4,21,840			
Works for which only Revenue Accounts are kept ... ..	(d) 12,15,863			
			16,37,703	
Agricultural Works—				
Works for which neither Capital nor Revenue Accounts are kept ... ..			(e) 5,51,390	
Contribution Works ... ..			27,088	
			95,77,228	
	Total Imperial			95,77,228
	Provincial:			
Capital—				
Minor Works and Navigation ... ..			4,522	
Revenue—				
Minor Works and Navigation ... ..			4,599	
			9,121	
	Total Provincial			9,121
			Grand Total ...	35,86,347

41. The total expenditure is classified as follows :—

	Deccan and Gujarat,	Sind,	Total.
	Rs.	Rs.	Rs.
Works ... ..	2,98,983	8,30,342	11,29,325
Repairs ... ..	* 2,08,389	† 13,31,006	15,39,395
Establishment ... ..	2,84,778	5,50,969	8,35,747
Tools and Plant ... ..	10,534	88,104	98,638
Suspense Account ... ..	+ 156	— 16,914	— 16,758
Total ... ..	8,02,840	27,83,507	35,86,347

\*Includes refunds of Rs. 4,430.

†Includes refunds of Rs. 4,081.

42. 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 last year's report.

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

	Rs.	
(a) Includes ... ..	3,161	} On account of expenditure in England and exchange.
(b) Do. ... ..	18,569	
(c) Do. ... ..	13,898	
(d) Do. ... ..	1,127	
(e) Do. ... ..	14,145	

# GUJARAT AND THE DECCAN.

## GUJARAT.

### AHMEDABAD DISTRICT.

The season was on the whole a favourable one both for kharif and rabi, as timely rain fell for sowing, and the canal was full throughout the season.

Háthmati Canal.

The total rainfall registered at Parántij was 51·49 inches as against 51·23 for the preceding year, and an average of 31·37 for the 10 years ending 31st December 1894.

2. The total area irrigated was 4,199 acres (1,797 kharif and 2,409 rabi) as against 3,701 acres (1,259 kharif and 2,442 rabi) for the last year, and the revenue amounted to Rs. 11,854 against Rs. 10,368.

3. The increase in irrigation was due to the facts stated above.

The cost of maintenance and repairs amounted to Rs. 4,196, including special repairs to the channel, as against Rs. 4,051 for last year.

One heavy flood occurred on 21st July 1894, when the water rose to a head 6·60 feet, the rainfall being 6 inches.

4. During the year under report experiments were made on the Bhojwa nála with a view to ascertain what the loss by percolation would be if the water of the Háthmati Canal were brought down into the Khári by this nála, and the results were on the whole very satisfactory.

The Bhojwa channel which branches off from the 5th mile of the Háthmati Canal falls into the Khári near Rupal; and a few temporary weirs were put up across it for gauging the discharge at different points. These experiments have not yet been completed.

5. The total amount sanctioned for clearing the Bhojwa nála of weeds, &c., was Rs. 3,627, and the actual outlay during the year was Rs. 1,692.

6. During the season 2,088 acres were irrigated, *i.e.* 2,053 kharif and 35 rabi, and the income amounted to Rs. 14,479, out of which free grants and remissions to the extent of Rs. 1,572 were given, leaving a net revenue of Rs. 12,907 as against a net revenue for last year of Rs. 9,916.

Khári Cut.

The increase was due to a favourable season.

7. The cost of maintenance and repairs amounted to Rs. 3,954, including Rs. 1,472 for special repairs necessitated by abnormally heavy floods.

8. Owing to heavy flood in the Khári, the Chándola Tank was kept full during the year, and hot weather cultivation is on the increase in lands dependent on this tank.

9. No useful progress was made during the year under report on improvements to the Náika channel. In consequence of changes in the course of the Sábarmati River near Dharoda and Náika, the present project may be considered practically completed; certain improvements are, however, desirable in order to increase the water-supply of the channel, and proposals to utilise for this purpose savings anticipated have been submitted.

	Rs.
The outlay during the year was	72
The total estimated cost	16,274
Total outlay up to end of 1894-95	15,071

10. The cost of maintenance amounted to Rs. 896 as against Rs. 899 for last year.

11. Owing to a heavy flood in the Khári in July water rose to a height of 16 feet at Raipur and washed away the protective bund put up some years ago at Dhamatwan. Fortunately the flood occurred at day time and there was no loss to life, though the damage to property was heavy. The washing away of the bund allowed the flood to run into the Meshwa by an old nála. This might have affected the supply of water at the sluices; but timely arrangements were made, by putting up temporary bunds, &c., to divert the course of the water to its original channel, and on the whole no loss of revenue occurred.

The special repairs, necessitated by these floods, cost Rs. 1,434 in addition to ordinary repairs to the sluices, on which a sum of Rs. 892 was expended.

12. A project has been submitted for sanction for the work required at Dhamatwan in order to protect the village and to ensure a proper supply of water to the sluices in future years.

13. The Viramgám Drainage Channel also suffered from a heavy flood, but it acted usefully by carrying off the water which might otherwise have caused much loss to life and property.

The expenditure on current repairs amounted to Rs. 2,568, and the cost of special repairs rendered necessary by the floods referred to above, is estimated at Rs. 2,777, of which Rs. 325, were spent.

14. During the year under report, the construction of a channel from the south of the Railway line between Viramgám and Jakhwada to join the existing Viramgám Drainage Channel was sanctioned. The object of the proposed channel is to prevent flood water from damaging the lands situated on the south of the Railway.

15. A sum of Rs. 820 was spent on a cut commencing from the Railway culvert No. 78, and discharging into the Viramgám Drainage Channel, and the work was nearly completed.

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

Name of Tanks.	Improvements.	Repairs.	Remarks.
	Rs.	Rs.	
Changodar ... ..	127	...	Completed.
Salejda ... ..	82	64	Do.
Sindraj ... ..	237	754	Do.
Wasna Dedhal ... ..	...	781	Do.
Asalgaum ... ..	...	105	Not completed.
	446	1,704	
	2,150		

#### KAIRA DISTRICT.

17. The Karamsad drainage project, the submission of which was delayed during 1893-94, was completed and submitted for sanction.

Surveys.

The survey of the drainage lines in Mátar was in progress and about one-half of the work was completed.

18. The survey of Cambay territory drainage was completed.

Contribution.

## II.

### SURAT AND BROACH DISTRICT.

19. The Pákhajan-Ambhél channel in Vággra Táluka of the Broach Col-  
 lectorate described in the last report was nearly  
 The Pákhajan-Ambhél Channel in Vággra Táluka. completed at a total cost of Rs. 23,917, of which  
 Rs. 16,494 were expended during the year. The  
 sanctioned estimate amounted to Rs. 29,219.

20. Repairs and improvements to 33 tanks were sanctioned during the  
 year. Rs. 15,797 were expended on repairs and  
 Old Works. Rs. 16,009 on improvements. Total Rs. 31,806.

Wágrej Protective Works. 21. The eroded portions of the embankments  
 were repaired at a cost of Rs. 1,379.

## THE DECCAN.

### KHA'NDESH IRRIGATION DISTRICT.

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

Works.	Capital outlay.	Revenue outlay.
Lower Pánjhra River Works	428	1,898
Jámnda Canals	743	3,071
Hartála Tank	...	359
Mhaswa Tank	...	402
Parsul Tank	901	382

23. The Capital outlay on the Lower Pánjhra  
 Lower Pánjhra River Works. River Works was on completing the improvements to  
 the Dhulia channel.

24. The Revenue outlay was on the annual maintenance of the Mukti  
 Tank and of the plantations, on construction of an overbridge on the Mohadi  
 channel, and on additions and alterations to the irrigation store building at Dhulia.  
 These works were completed during the year. The repairs to the Mandál  
 bandhára, with a view to strengthen a portion of it which was unsafe, were in  
 progress and approaching completion.

25. The chief item of Capital outlay on the Jámnda Canals was the  
 Jámnda Canals. completion of the road bridge on the Right Bank Canal,  
 on the cart-track from Bambrud to Kajgaon Railway  
 Station.

26. The revenue expenditure of the year was due to canal clearance,  
 repairs to buildings and masonry works, and other items connected with the  
 general up-keep of canals.

27. The Revenue outlay on the Hartála Tank was incurred principally  
 on completing the repairs to the feed channel, on which  
 Hartála Tank. Rs. 276 were spent during the year.

28. The Revenue charges on the Mhaswa Tank include Rs. 32 for complet-  
 ing the new store shed at Utrud, and the balance was  
 Mhaswa Tank. spent on ordinary maintenance of the tank and the  
 two irrigation channels under it.

29. The Capital outlay on Parsul Tank was on plantation, compensation  
 Parsul Tank. for land, construction of an overbridge on the Dahivád  
 road, a paved crossing on the Nándgaon cart-track,

and excavation for extension of the Soundana channel designed to deliver water to the Nándgaon lands.

30. The Revenue outlay was on the ordinary maintenance of the tanks.

31. The Imperial expenditure during the year on the second class or old irrigation works for which only Revenue Accounts are kept amounted to Rs. 31,219, of which half was spent on works in Khándesh proper and half in the Násik portion situated in the Godávári catchment basin. The outlay is thus distributed :—

	Rs.
Original Works or Improvements . . . . .	25,003
Repairs . . . . .	6,216
Total . . . . .	31,219

32. The following channels were surveyed during the year and proposals for their repairs and improvements were drawn up :—

1. Toli.	7. Brahmanwél.
2. Sompur.	8. Vádgaon.
3. Taharabad.	9. Choundhána.
4. Jirwada.	10. Nitana.
5. Antapur.	11. Jaikheda.
6. Sawki.	12. Wádel.

Projects for the first 10 were sanctioned and the works proposed were completed or in progress.

33. Besides the expenditure from Imperial funds, pátphala, which is a voluntary cess paid by the irrigators, is spent on these channels. The outlay on 21 channels in Khándesh was Rs. 1,901, and on 25 channels in Násik Rs. 2,759.

Rain and River Gauges. 34. The rain and river gauges as detailed in the last year's report were maintained during the year.

Buildings other than canal buildings. 35. The new irrigation office at Málegaon and the powder magazine at Sákri as well as the sub-divisional store and office room there were maintained and kept in repair.

Local Fund Works. 36. The works connected with the improvement of communications over irrigation channels carried out from combined Imperial and Local Funds were—

*In the Násik District.*

- (1). Overbridge on Dhaoloba's nála at Bez, Táluka Kalvan.
- (2). Overbridge on Deothan channel, Táluka Bágán.

*In the Khándesh District.*

- (3). Overbridge on Málpur channel, Táluka Pimpalner.

The local fund expenditure on these, exclusive of establishment charges, was Rs. 980.

37. The Mukti Tank was first replenished on the 8th June 1894 and the highest water level reached was on 27th October 1894, when it stood at 1.50 feet below the waste weir. The heaviest rainfall, 2.31 inches, was gauged on 16th September 1894. Analysis of rainy periods gives from 20th July to 27th July a run-off of 12.40 per cent., and from 9th to 30th September 1894 of 22.90 per cent. of the rainfall.

38. The Mhaswa Tank commenced filling on 9th June 1894 and overflowed on 10th September 1894. The greatest rainfall occurred on 15th Sep-



tember, and was 2.53 inches. The run-off from 15th June to 17th June was 55.80 per cent. of the rainfall and the run-off from 19th to 22nd June was 36.60 per cent. of the rainfall.

39. The Hartala Tank commenced filling on 11th June 1894 and the highest water level practically reached the crest of the waste weir on 27th October 1894, when it stood at 0.2 feet below it. The heaviest rainfall, 5.32 inches, was gauged on 20th July 1894. Analysis of rainy periods gives from 19th July to 21st July a run-off of 21.60 per cent., and from 11th to 20th September of 38.00 per cent. of the rainfall.

40. The Parsul Tank commenced filling on 11th July 1894 and overflowed on 8th August 1894. The rainy period and its run-off was as given below:—

Period.	Rainfall in Inches.	Per cent. run-off.
From 11th July to 8th August 1894	7.61	33.80

The maximum rainfall registered was 1.65 inches on 20th September 1894 at Umrana close to the catchment of the tank.

Floods. 41. There were no extraordinary floods during the year.

42. The percentage on account of works establishment was 12 per cent., which is an improvement on that of the last year, due to the increase of expenditure on 2nd class works.

#### NÁ'SIK DISTRICT.

43. The usual temporary dam was set up at the close of the monsoon and the water level in the tank rose to R. L. 113.13, the storage on November 11th being 247.339 millions of cubic feet.

The charge for Executive Establishment amounted to Rs. 1,831.

44. The canal, 17 miles in length with 9 miles of distributaries, was properly maintained at a cost of Rs. 1,814. There was no expenditure on the Capital Account.

The canal was closed six times (27 days in all) during the year for the usual silt and weeds clearance.

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

Executive ...	Rs. 4,829	a. 1	p. 7
Revenue ...	639	3	11

The cost of repairs per mile was Rs. 70.

45. The canal, 8½ miles long, was maintained at a cost of Rs. 512, or Rs. 60 per mile.

There was no expenditure on the Capital Account.

Establishment was charged at:—

Executive ...	Rs. 1,397	a. 15	p. 8
Revenue ...	152	14	4

The canal was closed for 21 days in all for weed clearance.

46. The length of the canal is 4½ miles, and the expenditure on repairs amounted to Rs. 467, or Rs. 104 per mile.

The canal was closed for weed clearance 7 times, or for 29 days altogether.

The Establishment charge was—

	Rs.	a.	p.
Executive...	1,262	1	5
Revenue ...	204	3	3

There was no expenditure on Capital Account.

47. The total number of trees on the Pálkhed Canal is 9,285; of which 75 were new mango trees planted during the year. Rs. 135 were expended on watering and hedging.

On the Wadáli Canal there are 2,010 trees, of which 15 were planted during the year. The cost of watering and hedging was Rs. 60.

The number of trees on the Ojhar Támbat Canal is 714, of which 30 were newly planted. Rs. 45 were spent on watering and hedging.

43. There are 192 old bandháras in the district irrigating 17,900 acres and yielding Rs. 81,254 as irrigation share of consolidated revenue. This is inclusive of a new bandhára at Borála, táluca Chándor, bringing 26 acres (assessed at Rs. 104) additional land under irrigation.

49. The expenditure on original works (Extensions and Improvements) was Rs. 6,260 as detailed below;—

No.	Name of Work.	Allotment.	Expenditure during the year.	Remarks.
<b>IMPERIAL.</b>		Rs.	Rs. a. p.	
<b>IRRIGATION MINOR WORKS AND NAVIGATION.</b>				
<b>WORKS FOR WHICH ONLY REVENUE ACCOUNTS ARE KEPT.</b>				
<i>* I. A.—Extensions and Improvements.</i>				
1	Improvements to Datali Bandhára and Irrigation Channel, Táluca Sinnar ... ..	I. 3,350 C. 380	I. 3,288 5 9 C. 380 0 0	
2	Constructing a new Gulkhadr Nála Bandhára at Borála, Táluca Chándor ... ..	I. 500	I. 508 0 6	
3	Bandhára extensions and improvements surveys in the Godávári Basin, Násik Collectorate ... ..	I. 112	67 5 7	
4	Improvements to Thangaon Bandhára, Táluca Sinnar... ..	I. { 250 720 } C. 205	890 14 10 206 0 0	
5	Improvements to Bandhára No. 39, Khopdi Budruk, Táluca Sinnar ... ..	I. 871	870 8 9	
6	Improvements to Bandhára No. 26 near village at Khedgaon, Táluca Dindori ... ..	I. 581	496 4 6	
7	Improvements to Bandhára No. 27 at Gondegaon, Táluca Dindori, and No. 7 at Niphád ... ..	I. 150	139 0 6	
	Total ...	I. 6,534	6,260 8 5	

### AHMEDNAGAR DISTRICT.

Pravara River Works: 50. The only expenditure incurred was on maintenance and repairs and amounted to Rs. 4,582.  
Ojhar Canal

Lákh Canal. 51. The expenditure on maintenance and repairs was Rs. 2,142, and a sum of Rs. 507 was spent from the Capital Account in payment of compensation for land taken up for distributaries.

Bhatodi Tank. 52. The expenditure on maintenance and repairs was Rs. 1,963.

53. On the 1st April 1894 the R. L. of surface of water in the tank was 88.10, *i. e.* 18.10 feet above the sill of sluices. The water fell to R. L. 84.75 on the 8th June, when there was a slight replenishment, after which it dropped steadily to the lowest level of the year (R. L. 84.50) on the 11th July, from which date the tank gradually began to fill, and water overflowed the waste weir on 12th September 1894. The R. L. of surface of water on 31st March 1895 was 81.90, *i. e.* 11.90 feet above sill of sluice. Flood observations were not taken.

### POONA IRRIGATION DISTRICT.

54. During the year under review the expenditure under Capital amounted to Rs. 65,708, 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. 1,64,973.

55. The works detailed in the previous report were all completed, with the exception of a portion of the roofing of the pure water tanks, which is in progress.

56. The improvements and alterations were carried out without interfering with the water-supply, and the new filters are complete and in perfect working order. The only further improvement required to complete the efficiency of the system of water-supply is the abolition of the small filter near the Sholápur bazár, which supplies the bazár and a portion of the cantonment.

57. An estimate is under consideration of Government for the improvement of the lower service distribution mains, and provides for the supply, from the new filter beds, of that portion at present served by the Sholápur Bazár filter.

58. On the 1st April 1894 the water at Lake Fife was 17.90 feet above the sill of the canal sluices, and the minimum level was reached on the 12th June when the depth was 9.17 feet. The water began to rise on the 13th June and the lake filled to overflowing on the 18th of that month. The highest flood ever recorded occurred on 21st July 1894 when the water rose to R. L. 249.52 or 5.45 feet above finished crest level. The flood of July 1891 rose to R. L. 249.17. The highest recorded previous to 1891 was in July 1882, when the water rose to R. L. 248.87. The standards and planks were fixed on the weir by the end of September and on the 24th October the water stood at 4.60 feet above the finished crest of the weir.

The draw-off from the storage commenced from the 25th October, *i. e.* 10 days later than the previous year. On the 31st March 1895 the level of the water was 21.40 feet above sill of the sluices, *i. e.* 3.40 higher than on the same date in 1894.

59. The Right Bank Canal was closed for 25 days and the Left Bank Canal for 9 days during the year for silt and weed clearance.

60. The rainfall of the year at Poona amounted to 33.59 inches, the average for the last 45 years being 29.38 inches. The canals and the Poona water-supply works were maintained in an efficient state throughout the year at a total cost of Rs. 33,004 as detailed below :—

	Rs.
Mutha Canals .. . . .	18,702
Poona Water-supply .. . . .	14,302

Out of these amounts Rs. 8,927 was for establishment charged to works in the case of the Mutha Canals and Rs. 2,771 for the Poona Water-supply. A sum of Rs. 2,626 was spent on working the new steam pumps, while the alterations to the water-power and centrifugal pumps were in progress.

61. There was a head of 8.90 feet of water above sill of outlet in this tank on 1st April 1894. On the 2nd May the tank ran dry. Kásurdi Tank, On 23rd July it received a slight replenishment and on the 4th August became dry again; from the 8th September the tank received gradual replenishments and filled to a height of 10.70 feet above sill on 10th September 1894. The water was drawn off for irrigation and on 25th November 1894 it ran dry and remained so on 31st March 1895. The expenditure on maintenance and repairs amounted to Rs. 172, of which Rs. 84 was for works establishment.

62. The water in this tank stood at 17.42 feet above sill of outlet on 1st April 1894. The draw-off for irrigation reduced the level until 22nd June when it stood at 0.50 and the tank ran dry on the 23rd June; from the 24th June it commenced to be replenished and filled to overflowing on the 26th August, and on the 31st March 1895 the level was 17.94 above sill of outlet, or 0.44 feet higher than on the same date in the previous year. The expenditure on maintenance and repairs amounted to Rs. 1,193, including Rs. 699 for establishment charged to works. Rs. 779 were also expended on puddling a portion of the dam with the object of stopping leakage. This puddling has been most successful in stopping several large leaks, and the dam where it was puddled last hot season is now perfectly dry. The puddling is still in progress and it is hoped that all the leakage, which has hitherto been the cause of much anxiety, will be completely stopped.

63. On the 1st April 1894 the water in the tank stood at 14.74 feet above sill of outlet, i. e. 11.04 feet lower than on the same date in the previous year. The tank ran dry on 3rd September and remained so till the 7th of that month. It commenced to be replenished from the 8th September and water rose to 11.30' above outlet sill on 23rd October 1894. At the close of the year the tank again ran dry. The expenditure on maintenance and repairs amounted to Rs. 1,538, including Rs. 586 on establishment charged to works. During the year the outlet valve rods which were broken were replaced by new ones and the 3 valves are now in good working order.

64. At the beginning of the year the water level stood at 10.90 feet above the outlet sill, or 20.35 feet lower than on the same date in the previous year. The tank received gradual replenishments during the year and on 22nd October water rose to a height of 25.80 above the sill of outlet, and on 31st March 1895 the water in the tank stood at 20.17 feet above the sill of outlet.

65. The expenditure on maintenance and repairs during the year amounted to Rs. 848, including Rs. 555 for establishment charged to works.

66. Rain and river gauges were maintained as usual in the Poona districts and observations regularly recorded. The registers of height of water were kept for all tanks, and diagrams recorded.

67. During the year the masonry was practically finished. What was left of the top corbelling was done and all the hand railing finally put up with the exception of the portion over the south waste weir which would interfere with the erection of the gates.

68. All the gates required for the south waste weir were satisfactorily supplied from Bombay by Messrs. Gahagan and Company, and before the end of the year all except 5 sluices had their frames fixed in position ready for the final cementing.

69. The north waste weir automatic gates were all in working order by the end of July and under a head of 3 feet above crest levels worked extremely satisfactorily.

70. The water was stored to 3 feet above crest on the south waste weir by means of a rubble and earthen bank placed in each sluice way. As all the

gates will be finished on the south waste weir before next monsoon, it will be possible to store full supply of 8 feet above weir crest.

71. As it was found that water from the north weir headed up to a dangerous extent on the stop wall, two training walls were built before the previous monsoon to guide the water to the centre of the channel and to deepen it. They effected this object and the result showed that it would be necessary to increase the height and length of the walls so as to control the full discharge from the weir. This extension of the training walls was in progress and nearly completed.

72. A wall was being built across the river in front of the under-slucices with the object of keeping back all large stones and boulders from the toe of the dam, where they would be a source of danger. The work will shortly be completed.

73. The under-slucices were finally opened on the 15th June and shut on the 11th August, and the lake filled to overflowing on the 18th August. The highest flood occurred on 22nd July, when the water was discharged through the slucices under a head of 60.35 feet. On the 1st April 1894 the water in the lake stood at 49.15 feet above lowest slucice level. On the 31st March 1895 the height was 53.9 feet. The total quantity of water discharged through the slucices and waste weirs was 34,402,756,440 cubic feet, giving a run-off of 115 inches from the catchment of 128 square miles.

74. At Vir a masonry and concrete protective wall has been substituted for the pitching below the subsidiary weir on the left bank of the Nira, and will form an efficient protection against the erosive action of floods. The highest flood occurred on the 15th July when the water rose to 7 feet on the main weir and 14.20 feet over the subsidiary weir. The discharge is calculated to have been 93,000 cubic feet per second, nearly equal to the highest recorded flood of 3rd July 1838.

75. On the main canal the only works in progress were the completion of the deep rock cutting in the 30th mile near the village of Koralla and the alteration of some of the distributary heads. The pipe outlets supplying three of the distributaries having been found too small were replaced by cast-iron regulating gates of the usual pattern. A new stop-gate for the regulator of the canal supply was constructed during the year in the 65th mile near the village of Sansar.

76. The only work found necessary was the construction of some cross-drainage works and new field outlets.

77. The puddling of banks was in progress during the year. Two breaches in the banks occurred and were efficiently repaired in time to prevent damage to the irrigation. The ordinary repairs to canal and distributaries were carried out and all the works throughout maintained in proper working order. The expenditure on maintenance and repairs amounted to Rs. 23,736, including Rs. 12,926 for establishment charged to works and Rs. 3,010 for special repairs.

#### SHOLAPUR DISTRICT.

78. The leaks that had occurred in the dam were stopped by removing the affected portion of the dam and remaking it with better material, and constructing two drains from 20 feet in rear of the centre line of the dam to the outer slope of the berm in rear of the dam. A cross drain consisting of rubble filling 4 feet deep was made parallel to the centre line of the dam, connecting the heads of the abovementioned drains into which it will discharge. These drains will prevent water again lodging in the heart of the dam. All bad material removed from the dam was thrown at the toe of the dam to form a berm, dry stone drains being run through it to prevent water collecting in it as formerly. The total cost was Rs. 14,661

Particulars regarding the leaks and opening of a portion of the dam and the precautions taken against any accident were given in the Revenue Report for 1893-94.

The work of remaking the removed portion of the waste weir was in progress but only 2 feet will be raised before the rains in 1895 and the remaining 4 feet within the next 2 years (2 feet each year); i.e., 1896-97 and 1897-98.

79. The Capital account of the work stands as under :—

	Rs.
Estimated amount	16,09,890
Allotment, 1894-95	3,300
Expenditure, 1894-95	2,895
Total Expenditure	15,81,720

80. The dam and canals were kept in good order during the year at an expenditure of Rs. 6,829.

81. There was no extraordinary flood during the year such as to affect the dam or canals; the cut in the waste weir began to overflow on 2nd October 1894, and the greatest depth of the flood was  $1\frac{1}{2}$  feet.

82. The Capital Account of this tank was closed in 1885-86. No original work was executed during the year and the cost of annual repairs to the dam and canals was Rs. 6,799.

Ekrnk Tank.

83. No extraordinary flood occurred during the year and the waste weir did not overflow.

84. No original work was executed during the year, and the dam and canals were kept in good order at a cost of Rs. 2,381.

Ashti Tank.

85. The cracks that periodically appear in the dam are constantly kept under watch; they are not serious, and therefore no special steps have been taken with regard to them.

86. There was no extraordinary flood such as to affect the dam or canals; the waste weir did not overflow.

Koregaon Tank.

87. The dam and canals were maintained in good order, at an expenditure of Rs. 347, and no original work was executed.

88. The waste weir began to overflow on 13th September 1894 and the maximum depth of flood was 1 foot.

#### BIJAPUR DISTRICT.

89. The tank was maintained during the year at a cost of Rs. 171 against Muchkundi Tank. Rs. 280 for the previous year.

90. The rainfall gauged at the tank was 20.76 inches against 25.72 inches in the previous year. From June to December 17.37 inches fell as compared with 21.56 inches for a similar period in 1893.

91. The highest level of water in the tank was 14.64 feet above the sill of sluice as compared with 17.55 in 1893, but the storage was ample for all requirements.

92. The survey for increasing the catchment area of the Muchkundi Tank was commenced in the previous year, and an outlay of Rs. 266 was incurred against the estimate of Rs. 261.

Survey for increasing catchment area of the Muchkundi Tank.

Nilgund Tank.

93. Prickly-pear was cleared off the dam of the Nilgund tank during the year at a cost of Rs. 20.

94. The outlay incurred during the year on repairs to tanks, for which only Revenue Accounts are kept, was Rs. 949 against Rs. 1,442 for last year.

## SATA'RA DISTRICT.

95. On account of favourable rainfall at the close of the north-east monsoon of 1893-94, the discharge of the river in the hot season was sufficient to meet the demands of the cultivators.  
Rewari Canal.

96. No expenditure was incurred chargeable to Capital Account, and the canal was maintained and kept in working order at a cost of Rs. 947, including Rs. 78 on plantation, against Rs. 955 in the previous year.

97. The re-construction of the slipped portion of the Nehr Tank dam, described in previous years' reports, was in progress during the year. Work on the rear slope progressed satisfactorily till the 15th June 1894, when it was proposed to build a new upper-revetment wall with dry stone drains to prevent sliding of the upper portion, and to discharge any leakage that might find its way into the centre of the dam. Before, however, the revised estimate for this could be drawn up, further slips at the top of the dam occurred on 22nd and 28th July 1894. It therefore became necessary to add the repair of the above slips to the new revised estimate, bringing it up to a total of Rs. 38,386, which was sanctioned in Government Resolution No. 18 W.I.—263, dated 8th February 1895. Works in accordance with this revised estimate were in progress till, on the 3rd March 1895, another large slip at the top of the dam took place. The work of taking out this slipped earth and re-making the dam was immediately taken in hand in anticipation of sanction, and nearly half of the extra work was done at the close of the year.  
Yerla River Works.

98. This road was completed with the exception of a portion of about 700 feet in length, which could not be undertaken as the land required for it had not been handed over to this department.  
Nehr Tank Service Road.

99. The old iron rods were replaced by rods of larger section.  
Replacing outlet sluice rods, Nehr Tank.

100. The stones were prepared but had not been fixed by the close of the year.  
Dam chainage marks and Canal bed stones.

101. The following works were commenced during the year under report:—

1. Nehr Store.
2. Famine Memorial Pillar, Nehr Tank.

102. The expenditure on all these Capital Account works was Rs. 5,920.

103. The Nehr Tank, Right Bank Canal, and the two Yerla Canals were maintained in good order at a cost of Rs. 3,090, including Rs. 645 on plantation, against Rs. 3,627 in the previous year.

104. Special repairs to the Khatgun bungalow were completed during the year at a cost of Rs. 342, and special repairs to the Nehr dam, both charged to Revenue Account, were commenced during the year.

105. The original cost, Rs. 13,500, of the portion of the Nehr Tank dam now under reconstruction was written back from the Capital to the Revenue Account of the project.

106. No works chargeable to Capital Account were executed during the year under report in connection with this system of canals.  
Upper Man River Works.

107. The Pingli Tank and Canals under this system were maintained in working order at a total cost of Rs. 2,474, including Rs. 250 on plantation and Rs. 253 on removing silt from Bidal channel, against Rs. 3,028 in the previous year.

108. There was no expenditure on the Capital Account of this canal during the year under report, and the maintenance charges amounted to Rs. 1,352 including Rs. 128 on plantation, against Rs. 1,676 of the previous year.  
Maini Canal.

109. Rs. 1,758 were spent on Revenue Account works, as under :—

	Rs.
1. Constructing a vertical fall on Chitali Branch Channel ...	262
2. Diversion of road in connection with Maini Tank ...	611
3. Repairs to Overseer's quarters at Maini ...	15
4. Silt clearance, Maini Tank ...	870
Total ...	1,758

110. Owing to a short supply of water in the tank, no applications for water were accepted in the villages of Chitali and Mahuli until July when the supply was replenished.

111. No works on Capital Account were carried out during the year under report, and the canal was maintained at a cost of Rs. 422, including Rs. 39 on plantation, against Rs. 528 in the last year. An additional sum of Rs. 104 was spent on special repairs to the canal consisting of silt clearance.

112. Stop-gates on nálas 47 and 63 were completed during 1893-94 and those on nála No. 21 were fixed during the year under report at a cost of Rs. 206 chargeable to the Capital Account of the canal.

113. The canal was maintained and kept in working order at a cost of Rs. 4,058, including Rs. 558 on plantation against Rs. 6,495 of the previous year. Special repairs to the main canal and branch channels were also carried out at a cost of Rs. 2,305.

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

	Rs.
1. Additions to the sub-divisional Office and store-shed at Shienoli (completed) ...	184
2. Constructing 5 module heads (in progress) ...	95
3. Providing furlong stones along the canal (in progress) ...	19
Total ...	298

#### BELGAUM DISTRICT.

115. A full description of the Gokák Canal 1st Section and Storage Works was given in the Administration Report for 1891-92, paragraphs 105—108, and need not therefore be repeated.

116. There has been neither settlement of, nor leakage through, the embankments at the ends of the weir. The stone pitching on the inside slopes is sound and in good order.

117. The only expenditure on the work proper was on account of compensation for submerged land and on demarcation, and amounted to Rs. 787. The total amount of compensation paid from the commencement of the work was Rs. 1,52,858.

118. The Capital expenditure during the year amounted to Rs. 908, making the total from the commencement of the work Rs. 6,46,836, and the charges for maintenance and repairs during the year were Rs. 2,440 against Rs. 2,439 of last year.

119. The reservoir first over-flowed on the 25th May 1894, and the maximum flood, which rose to R. L. 2009.70, or 3.70 feet above the weir crest, occurred on 20th July 1894, the discharge being estimated at 74,260 cubic feet per second, equal to a run-off of 0.12 inch per hour from the catchment basin of 1,080 square miles.

120. The under-sluices were closed on 2nd October 1894.



121. The total discharge of the river between 1st July and 31st October 1894 inclusive was 106,965 millions of cubic feet, representing a run-off of 42 inches from the catchment.

122. The water remained at the level of the crest of the weir until 15th January 1895, on which date (much earlier than is usual) it began to fall and storage to be drawn upon.

123. During the year one masonry gauge notch in Wadarhatti branch, mile No. 1, was built to facilitate gauging.

124. The extension of the main canal is under construction and will be continued beyond the limits of Mállápur. Two super-passages, one aqueduct and three masonry escapes are included in the work, as also an outlet with two distributaries, one of which extends to Badigwad. This extension has under command about 1,000 acres and is expected to give a revenue of Rs. 700. The total estimated cost of the work is Rs. 5,344. Expenditure on the work during the year was Rs. 1,857.

125. A paved causeway at the site of the Konur Ford is under construction. It was originally sanctioned with road surface at B. L. 1984·00, but owing to the raising of the mill weir just above the Falls it has been necessary to increase the height of the ford roadway by 6 inches. The dry rubble filling was completed in the previous year and allowed to settle during the monsoon. The rubble has stood well and is in good order. A slab drain of 8 openings has been built in the branch river portion of the ford through which the supply to the mills passes. The ford will be passable for 8 or 9 months in the year. The estimated cost of this work is Rs. 8,273. The expenditure during the year was Rs. 8,290 and from the commencement of the work Rs. 3,788.

126. The expenditure on the Tumbawakeri tank was Rs. 4,532 altogether, Rs. 3,443, being on repairs and Rs. 1,089 on improvements.

127. The river gauge at Gurlhosur on the Malprabha river was maintained.

#### DHÁRWAR DISTRICT.

128. There was no expenditure on Capital Account during the year.

129. Of these there are four: *Madag* and *Medleri Tanks*, which are practically new; and *Dambal* and *Assundi Tanks*, which are old works enlarged.

130. The following table shows the cost of maintenance of these 4 tanks during the year:—

No.	Tanks.	Maintenance and Repairs.	Plantation.	Survey and Land Compensation.	Total.
		Rs.	Rs.,	Rs.	Rs.
1	Madag Tank	500	145	...	645
2	Medleri do.	303	...	...	303
3	Dambal do.	211	...	110	321
4	Assundi do.	308	...	...	306
	Total	1,320	145	110	1,575

131. There was a fair supply of water in these four tanks at the beginning of the year. Replenishment took place in April, September and October.

*Dambal*—The tank ran dry on 29th March 1895.

*Medleri*— Do. 18th February 1895.

*Assundi*— Do. 31st March 1895.

2nd Class Revenue Works. 132. Large tanks irrigating over 50 acres repaired or improved during the year were as follows :—

Particulars.	Number of Tanks.	Expenditure during the year.
		Rs.
Commenced in the previous year ... ..	19	7,595
Commenced and completed during the year under report ...	14	13,296
Commenced but not completed during the year ...	18	23,735
Total ...	51	44,626

133. Smaller tanks irrigating less than 50 acres repaired or improved during the year were as follows :—

Particulars.	Number of tanks.	Expenditure during the year.
		Rs.
Commenced in the previous year ... ..	22	818
Commenced and completed during the year under report ...	79	9,382
Commenced but not completed during the year ...	10	4,243
Total ...	111	14,443

134. In addition to Rs. 570 spent on maintenance and repairs, Rs. 958 were expended on special repairs which consisted of removing silt, &c., so as to cause the water to reach the villages at the tail, these having paid consolidated rates. A proposal has been made by the Collector to place this canal under the Irrigation Act.

135. The usual rain gauges were maintained throughout the district. The rainfall recorded during the year in comparison with that of the previous year shows a considerable decrease, and there was therefore a large demand for canal water for irrigation purposes.

#### RATNAGIRI DISTRICT.

136. During the year current repairs to the sluice gates and earthen dams of Varad and Pat tanks were carried out at a cost of Rs. 158.

#### „ Sind.

#### BEGARI CANALS.

137. Owing to heavy erosion by the Indus of its right bank above the 1891 mouth of this canal, the small bund which has been constructed for three miles northwards to keep out the river spill, and to which allusion was made in last year's report was carried away for the greater part of its length, with the result that the river water combining with hill floods burst across the canal about a mile above the head regulator and caused a considerable deposit of silt. Instead of reconstructing the river bund it has been considered advisable to build a masonry inlet and escape on the right and left banks of the canals respectively, at the point where these floods strike the canal, and thus to allow them free access into and across it, whenever they occur. This work was sanctioned in Government Resolution No. 27-W.I.—311, dated 15th February 1895, and will be completed before the inundation :—

				Rs.
Amount of estimate	...	...	...	5,130
Expended during the year	...	...	...	2,000

138. The improvements which have been in progress on this canal have already been fully described in former reports. The Unharwáh widening of the main canal, the widening and deepening of Nasir, and the extension of its tail into the Sonwah, together with all masonry works, except kariáh heads, were completed before last inundation:—

				Rs.
Amount of sanctioned estimate	...	...	...	1,85,060
Expenditure up to date	...	...	...	1,74,261
Allotment for the year	...	...	...	53,000
Expenditure during year	...	...	...	52,897

139. During last inundation on the 8th July the head regulator suddenly collapsed, four spans out of eight falling in; this caused a serious in-rush of water into the canal and a partial flooding of the country in rear of the Kashmor Bund. The accident appears to have been caused by water finding its way under the pavement and scouring out the foundations. It has been found undesirable to repair the regulator, and a new sluice and a new mouth, together with inspection bungalow and baulk-sheds, were sanctioned in Government Resolution No. 36-W.I.—433, dated 6th March 1895.

140. The new regulator consists of 9 spans of 10 feet each, height to springing 17 feet, and fitted with a double row of teakwood wales and needles.

All the works are well in hand and will be completed before the inundation:—

				Rs
Amount of estimate	...	...	...	68,007
Expended during the year	...	...	...	38,004

141. The construction of a tehsil at Nasirabad in Khelát was sanctioned in Government Resolution No. 85-A.I.—755 of the 3rd May 1894. An allotment of Rs. 2,500 was given and debited against "Extensions and Improvements" under 42 Major Works working expenses, Desert and Begári Canals. The work is being carried out by the Executive Engineer, Military Works, Loralai, and the accounts adjusted in the Begári Canals Office. The expenditure adjusted up to date has been Rs. 433.

142. The special repairs described in last year's report were completed before the last inundation at a cost of Rs. 73,024, the Special Repairs—Desert Canal. estimated amount being Rs. 86,278. The savings were utilized on the ordinary clearance of the canal. Owing to the silt deposited by the floods which crossed the mouth of this canal, as mentioned above, special repairs were again rendered necessary. The amount of estimate for this was Rs. 22,000, the expenditure up to date being Rs. 11,999.

143. Special repairs were rendered necessary to the canal owing to the scour caused by the in-rush of water through the Special Repairs—Unharwáh. broken regulator at the head. These repairs consisted of closing breaches, construction of hurdles to encourage the deposit of silt and thus restore the canal to its original section where scoured, and the clearance of silt, and are nearly completed:—

				Rs.
Amount of estimate	...	...	...	15,000
Expenditure during the year	...	...	...	9,988

144. The special repairs recommended by the Inspector General of Irrigation and the experimental line of inner bund, fully described in last year's report, are in progress and will be completed before the inundation:—

				Rs.
Amount of estimate	...	...	...	50,469
Expenditure up to date	...	...	...	36,636
Expenditure during the year	...	...	...	27,996

145. Owing to the failure of the Unharwáh Regulator the construction of a loop at its site was necessitated, the new sluice being built at another place. This work was in progress and nearly completed:—

				Rs.
Amount of estimate	...	...	...	16,993
Expenditure during the year	...	...	...	9,995

Maintenance and Repairs —Desert Canal. 146. The ordinary maintenance and repairs necessary were carried out and the usual abkaláni establishment employed.

The expenditure under this head was as follows:—

Works	...	...	...	Rs.	23,434	
Establishment...	{	Abkaláni	...	Rs.	2,065	
		Revenue	...	...	1,778	
		Works	...	...	1,477	
Gardens	...	...	...	85		
					5,405	
Total					...	28,839

Maintenance and Repairs —Unharwáh. 147. The ordinary maintenance and repairs on this canal were executed and the usual abkaláni establishment entertained, the details being as follows:—

Works	...	...	...	Rs.	14,531	
Establishment...	{	Abkaláni	...	Rs.	2,398	
		Revenue	...	...	983	
		Works	...	...	881	
Gardens	...	...	...	90		
					4,352	
Total					...	18,883

Maintenance and Repairs —Begári Canal. 148. A portion of the canal between miles 55 and 62 was partially cleared at a cost of Rs. 9,671 for the first time for several years.

149. The expenditure on ordinary maintenance and repairs and on the usual abkaláni establishment was as follows:—

Works	...	...	...	Rs.	23,951	
Establishment...	{	Abkaláni	...	Rs.	3,294	
		Revenue	...	...	2,217	
		Works	...	...	1,539	
Gardens	...	...	...	86		
					7,136	
Total					...	31,087

Maintenance and Repairs —Kashmor Bund. 150. Ordinary repairs were carried out and the usual abkaláni establishment entertained, and a sum of Rs. 603 was expended in connection with the survey of the river Indus. The expenditure was as follows:—

Works	...	...	...	Rs.	35,179	
Establishment...	{	Abkaláni	...	Rs.	13,000	
		Revenue	...	...	561	
		Works...	...	...	1,176	
Gardens	...	...	...	418		
					15,155	
Total					...	50,334

151. The ~~ten~~ gardens in the district were maintained at a cost of Rs. 679 and the receipt amounted to Rs. 23 as compared with Rs. 2 the year before.

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

		Rs.
Major Works.		
Capital	... ..	92,901
		Rs.
Extensions and Improvements	... ..	433
Clearance and Repairs	... ..	1,39,101
Establishment...	{ Abkaláni	7,757
	{ Revenue	4,978
	{ Works...	3,897
Gardens	... ..	261
		<u>16,893</u>
Total Major Works		<u>2,49,328</u>
Minor Works—Kashmor Bund—		
New Works	... ..	...
Repairs	... ..	73,170
		Rs.
Establishment...	{ Abkaláni	13,000
	{ Revenue	561
	{ Works	1,176
Gardens	... ..	418
		<u>15,155</u>
Total Minor Works		<u>88,325</u>
Total Major and Minor Works		<u>3,37,653</u>
Add—Regular Establishment		53,423
Total		<u>3,91,076</u>

153. The total cost of establishment was Rs. 53,423 and the percentage of it on the total outlay of Rs. 3,37,653 was Rs. 15.82 as compared with Rs. 19.23 the year before.

154. The total abkaláni establishment cost Rs. 32,048 as compared with Rs. 28,064 the year before. The increase was principally due to the breach caused by the failure of the Unharwáh Regulator.

#### SHIKARPUR CANALS.

155. The improvements in progress on this canal were fully described in last year's report. During the year under review all the improvements to the main canal up to the point where the Mirzáwáh and first branch take off were completed. The improvements to the Mirzáwáh and its extension to the Sherwáh were also completed. The excavation of both branches was finished, and the masonry works on them are in progress. Improvements to the Raiswah were also begun:—

		Rs.
Amount of estimate	... ..	3,21,482
Expenditure of the year	... ..	1,00,000
Expenditure up to date	... ..	1,50,058

156. Permanent bench-marks were erected at a cost of Rs. 295 on both banks of the river at certain points of the riverain survey so as to utilize its work in recording the future changes of the river.

Bench Marks—Riverain Survey.

Special Repairs, 1893-94,  
Sukkur-Begári Bund.

157. The loop in the 22nd mile of this bund, which was commenced last year, was completed at a cost of Rs. 67,528, the estimated cost being Rs. 74,033.

158. During the inundation a dangerous leak suddenly showed itself in the new loop above-mentioned, the water passing through a fault in the ground on which the bund was constructed and emerging some distance in its rear. Before the beldár who was on duty could obtain assistance, the ground beneath the bund was scoured out, and a breach occurred all attempts to close which failed. The loop rendered necessary by this breach is in progress, the estimated cost being Rs. 21,035 and the expenditure during the year Rs. 14,937.

Some years ago a retired bund was constructed covering the last three miles of this embankment adjoining the Begári Canal, as it was considered likely that the river would cut away a portion of the original bund. This happened during the last inundation and the full force of the river came on the retired bund. Though no accident occurred to it, still it was considered advisable to strengthen it :—

	Rs.
Amount of estimate ... ..	22,850
Expenditure during year ... ..	15,915

159. The new loop commenced last year in the second mile of this bund was completed. The expenditure was Rs. 39,225, while the estimated cost was Rs. 37,398. The excess was due to the repairs necessitated by a small breach which occurred during the inundation at one of the new sluices.

160. The ordinary clearance and repairs to all canals and bunds were carried out where necessary. The bund across the Muradgáh, alluded to in last year's report, was completed at a cost of Rs. 16,079, of which Rs. 2,500 was contributed by the Nawáb of Báháwalpur. The usual abkaláni establishment was entertained.

The outlay on maintenance and repairs was as follows :—

	Rs.	Rs.
Works—		
Canals ... ..	38,087	
Bunds in Rohri District ... ..	4,463	
River bunds ... ..	18,411	
	60,961	
Establishment ... {		
Abkaláni ... ..	12,125	
Revenue ... ..	1,565	
Works ... ..	4,960	
	18,650	
	Total ...	79,611

The average expenditure during the three previous years on work establishment was Rs. 17,440 as compared with Rs. 18,650 during the year under report.

161. The protection of the front slopes of river embankments from wash during storms by sowing tamarisk seeds, and thus inducing a growth of jungle in front of the bund, has continued to receive attention.

Trees which were likely to cause damage to canals and bunds were cut down and sold, the receipts during the year being Rs. 6,292 as compared with Rs. 626 in the last year, the increase being almost entirely due to the sale of trees cut down to admit of the improvements to the Sind Canal being carried out, and which realized Rs. 5,660.

162. The surveys alluded to in last year's report are in progress. What work had been done was shown to the Inspector General of Irrigation during his visit to Sind, and the suggestions made by him are receiving attention.

The expenditure on this head during the year was Rs. 4,732.

163. The following is a summary of the entire expenditure in the district:—

				Rs.
New Works—				
Extensions and Improvements	...	...	...	1,00,295
				Rs.
Repairs—				
Canal clearance	...	...	...	38,087
Bunds	...	...	...	4,463
				42,550
Establishment	...	{ Abkaláni Revenue Works	...	4,896
			...	1,261
			...	4,008
				10,165
Ordinary Agricultural Works—				
Repairs—				
Ordinary	...	...	...	18,411
Special	...	...	...	73,789
				92,200
Establishment	...	{ Abkaláni Revenue Works	...	7,229
			...	304
			...	952
				8,485
Total				2,53,695
Add—Surveys				1,596
Total				2,55,291
Add—Regular Establishment				33,920
Total				2,89,211

164. The total cost of establishment was Rs. 33,920 and the percentage of it on a total outlay of Rs. 2,55,291 was Rs. 13.29 as compared with Rs. 12.29 in the previous year.

165. The total cost of the abkaláni establishment for the year was Rs. 18,650 as compared with Rs. 15,756 the previous year. The increase was due to the breach in the Sukkur-Begári Bund and to extra establishment required for the Sind Canal.

#### GHA'R CANALS.

166. Five new kariah heads varying from 2 to 2½ feet in width and 4 to 5 feet in height were constructed during the year at a cost of Rs. 1,972.

In the revised estimate for this canal sanctioned by the Secretary of State in 1884-85 provision was made for 72 new kariah heads at a total cost of Rs. 59,659, and of these 30 have been constructed at a cost of Rs. 29,060, the expenditure during the year being Rs. 1,972.

167. As the supply obtained from the Rakuja mouth is not sufficient for the kharif crops when the Bukkur gauge falls below 14', and as experience has shown that it is impossible without very serious silting up of the canal to open the regulator at the head of the old mouth during the kharif season, alterations were made in the latter to permit of it being worked at all seasons without fear of damage.

168. The alterations consisted of removing the masonry above the arches of present openings, and filling in the open space thus obtained with horizontal sleepers 9" × 5" working in grooves in the piers. The sleepers are supported on rolled iron beams laid flat, and strengthened by double-headed rails placed under them. In order that the sleepers should work clear of the gearing for working the gates, the piers were extended 4 feet into the river, and teak beams of

section 2' 3" x 10" were placed between the girders, on which the sleepers rest, and the gates, and as near to the latter as possible so as to minimize leakage. The piers were coated with Portland cement and the arching protected with lead sheeting. The winches for working the gates and the rails for excluding brushwood, &c., were removed and re-set, and the shed over the regulating apparatus was also removed and rebuilt. The work was completed at a total cost of Rs. 15,425 against an estimated cost of Rs. 15,458.

169. The expenditure on the ordinary maintenance and repairs of this Maintenance and Repairs canal and on the abkaláni establishment was as follows:—  
—Sukkar Canal.

				Rs.	
Works	...	...	...	...	27,966
Establishment	...	{	Abkaláni	...	2,728
			Revenue	...	887
			Works	...	2,711
Gardens	...	...	...	...	272
				6,598	
Total				...	34,564

170. The head regulator on the Mirwáh, No. 1, alluded to in last year's report, was completed at a cost of Rs. 2,926; and a sum of Rs. 12 was paid for land compensation due on the Extensions and Improvements—Ghár Canals. sluice over Mirwáh.

171. The ordinary clearance and repairs were executed and the usual abkaláni establishment maintained, the expenditure being as follows:—  
Maintenance and Repairs —Ghár Canals.

				Rs.	
Works	...	...	...	...	52,395
Establishment	...	{	Abkaláni	...	4,135
			Revenue	...	1,388
			Works	...	4,470
Gardens	...	...	...	...	510
				10,503	
Total				...	62,898

172. A large number of breaches occurred owing to the high inundation. Most of them were of little importance and were Breaches. closed with local assistance, but five did considerable damage and were only closed with the assistance of the Revenue officials. Two of these were on the Naorang, and the others on the Chilo Gath and Mirwáh.

173. The ordinary repairs were carried out and the usual abkaláni establishment employed, the expenditure being as follows:—  
Maintenance and Repairs —Ghár Bunds.

				Rs.	
Works	...	...	...	...	5,422
Establishment	...	{	Abkaláni	...	2,680
			Revenue	...	376
			Works	...	976
				4,032	
Total				...	9,454

174. The nurseries at Lárkhána and Náoderø on the Ghár were carefully attended to and also those on the Sukkur Canal at Plantations. Ruk. Owing to erosion by the river at the mouth of the Ghár Canal a small plantation of táli trees had to be cut down and sold, The total receipts from sales of timber realized Rs. 2,310,



175. The receipts from sale of fishing rights during the year amounted to Rs. 2,693, as under :—

	Rs.
Ghár Canal ... ..	2,154
Sukkur Canal . . . . .	499
Ghár Bunds ... ..	40
Total ... ..	2,693

176. The following is a summary of the entire expenditure in the district during the year:—

New Works—

	Rs.
Capital and Revenue Account works—	
Capital Account ... ..	1,972
Revenue Account ... ..	16,435
	18,407

Repairs—

Capital and Revenue Account Works—	
Clearance and other works ... ..	80,361
Establishment ... ..	6,863
{ Abkaláni... ..	2,275
{ Revenue ... ..	7,181
{ Works ... ..	782
Gardens ... ..	782
	17,101

Agricultural Works—

Works ... ..	5,422
Establishment ... ..	2,680
{ Abkaláni ... ..	376
{ Revenue ... ..	976
{ Works... ..	976
	4,032

Total ... 1,25,323

Add—Contributions, ordinary ... 133

Total ... 1,25,456

Add—Regular Establishment ... 36,997

Total ... 1,62,453

177. The total cost of establishment was Rs. 36,997, and the percentage of it on total outlay of Rs. 1,25,456 was Rs. 29.49 as compared with Rs. 36.14 the year before.

178. The total cost of abkaláni establishment for the year was Rs. 21,133 as compared with Rs. 19,244 the previous year. The increase was due to breaches in the Sukkur and Ghár Canals, the former caused by the flood from the Sukkur-Begári Bund.

### WESTERN NA'RA CANALS.

179. This canal passes for the greater part of its length through a salt plain, and great difficulties were experienced in getting labour owing to the want of water and shelter; the work, however, was proceeded with vigorously and the whole length of the main canal, viz., 27¼ miles, with its embankment,

and the whole of the branch canal were completed. The principal works carried out during the year were :—

Main Canal ...	...	1. Excavations and embankments.
		2. Road bridge on Rádhan and Badra road.
		3. Road bridge on Mehar and Badra road.
		4. Fall and do. Nasirabad road.
		5. Road Bridge do Warah road.
		6. Chauki at Khaderi.
Gangraut Branch ...	...	7. Excavations and embankments.
		8. Head regulator.
		9. Regulator and road bridge on Mehar and Nasirabad road.
		10. Improvements to Vicholo and Gulmahomedwáh.

The expenditure was Rs. 81,401.

180. The ordinary clearance of the canal was carried out and the necessary Maintenance and Repairs. ábkaláni establishment was maintained during the inundation. The following are the details :—

Works ...	...	Rs.	1,203
Establishment ...	...	Abkaláni...	2,591
		Revenue...	555
		Works ...	597
			3,743
Total ...			4,946

181. As there is no deficiency of water at present in the Nára owing to a large area of its land being temporarily thrown out of cultivation in consequence of river floods, this canal has not been widened to the full extent. The only expenditure during the year was Rs. 192 paid for land compensation.

Extensions and Improvements—  
Western Nára New Feeder.

182. The new regulator at the head which was commenced last year was completed; the expenditure during the year was Rs. 11,517 and total expenditure Rs. 16,521, the estimated cost being Rs. 16,849. As the land in the upper portion of the Pritchard Canal. Youngwáh is high, it has been proposed to build a sluice of two openings of 5 feet each and height to springing  $6\frac{1}{2}$  feet with a roadway of 6 feet.

\* Materials to the value of Rs. 522 were collected, but the work will be completed before the next inundation.

A sum of Rs. 205 was paid for land compensation on the Pateji Branch of this canal.

183. To supplement the supply at the tail of the Gillespiewáh a sluice was constructed in the 14th mile of the river bunds; this consists of 2 spans of 5 feet each and the channel connecting the sluice with the canal is about 1 mile in length, the bottom width being 4 feet.

The total cost was Rs. 2,498, half of which was contributed by the zamindárs who were benefited by the work.

Maintenance and repairs  
—Western Nára.

184. The ordinary repairs were carried out to the main canal and its feeders, and the usual ábkaláni establishment was maintained.

The expenditure under this head was :—

Works ...	...	Rs.	49,025
Establishment ...	...	Abkaláni	9,050
		Revenue	3,046
		Works	5,630
Gardens ...	...		585
			18,281
Total ...	Rs.		67,286

185. A regulator was built at the head of the Márviwáh; this was found necessary as the level of water had risen in late years (owing to the set of river being towards the head of the canal) and breaching the spoil banks flooded the country.

Expenditure during the year was Rs. 3,332.

Maintenance and Repairs. 186. The ordinary repairs were executed and the usual abkaláni establishment was employed, the details being as follows:—

*Dádú Canals—*

Works	...	...	...	...	Rs.	6,419	
Establishment	...	...	...	...	Rs.	292	
					Revenue	...	77
					Works	...	213
						582	
Total					...	7,001	

*Márvi Canal—*

Works	...	...	...	...	Rs.	554	
Establishment	...	...	...	...	Rs.	237	
					Revenue	...	32
					Works...	...	53
						322	
Total					...	876	

*Phitta Canal—*

Works	...	...	...	...	Rs.	1,857	
Establishment	...	...	...	...	Rs.	304	
					Revenue	...	149
					Works	...	294
						747	
Total					...	2,604	

*Wákurwáh—*

Works	...	...	...	...	Rs.	232	
Establishment	...	...	...	...	Rs.	118	
					Revenue	...	59
					Works...	...	20
						197	
Total					...	429	

187. The expenditure on river bunds was very high owing to the river having cut away nearly  $1\frac{1}{2}$  mile of their length, necessitating the construction of a new loop. This has a top width of 8 feet, front and rear slopes of 4 and 2 to 1 respectively, and a free board of 5 feet. This loop is situated in the 34th mile and is nearly completed.

Owing to the proximity of the river to the present bund two other new loops are being constructed, one near Nari in the 7th mile and the other at Fattehpur in the 22nd mile from the head regulator of the Pritchard Canal.

The estimated cost of the works was Rs. 1,47,774, Rs. 64,566 for extensions and improvements and Rs. 83,208 for special repairs—and the expenditure during the year was Rs. 70,227—the amount spent on special repairs being Rs. 48,223.

Maintenance and Repair  
—River Bunds.

188. Ordinary repairs to bunds were carried out and the usual abkaláni establishment was maintained.

The expenditure was as follows:—

Works	...	...	...	...	Rs.	22,830
Establishment	...	...	...	Abkaláni	Rs.	5,635
				Revenue	...	297
				Works	...	724
						<u>6,656</u>
Total					...	<u>29,486</u>

189. The several nurseries and gardens were carefully attended to. All trees likely to fall into the different canals have been cut down and sold, the sum so realized being Rs. 3,972.

Plantations.

190. A sum of Rs. 2,673 was realized from sale of fishery right.

Fisheries.

191. The following is a summary of the entire expenditure in this district during the year:—

Extensions and Improvements—				Rs.	Rs.
Dhamráo Canal	...	...	...	81,401	
* Western Nára and its feeders	...	...	...	12,436	
Gillespiewáh	...	...	...	1,248	
Márviwáh	...	...	...	3,332	
River Bunds	...	...	...	22,004	
					<u>1,20,421</u>
Repairs—					
Special	...	...	...	57,291	
Ordinary	...	...	...	73,052	
					<u>1,30,343</u>
Establishment—					
Abkaláni	...	...	...	18,227	
Revenue	...	...	...	4,176	
Work	...	...	...	7,570	
Gardens	...	...	...	535	
					<u>30,508</u>
				Total	...
					<u>2,81,272</u>
Add—Regular Establishment				...	...
					<u>46,778</u>
				Total	...
					<u>3,28,050</u>

192. The percentage of cost of establishment—Rs. 46,778—to outlay on works—Rs. 2,81,272—was 16.63 as compared with 15.12 in the previous year.

193. There was an increase of Rs. 8,870 on Abkaláni Establishment as compared with that of last year; of this Rs. 3,743 was due to the construction of the Dhamráo Canal, Rs. 3,292 to increased establishment maintained on river bunds, and the balance, Rs. 1,835, was the increase on the Dádu and other canals, rendered necessary owing to the very high and prolonged inundation.

As long as the set of the river is on the right bank, a large establishment must be maintained on the river bunds; but should the river return to the position it occupied previous to 1890, then the establishment can be decreased considerably.

#### EASTERN NÁRA CANALS.

194. This work, which was fully described in last year's report, was completed during the year, and the channel was re-opened on June 13th, 1894. The wire rope brushwood catchers acted only too well, as it was found impossible to clear away the rubbish as fast as it accumulated. It was therefore found necessary to remove some of the ropes and pass some of the brushwood through the regulator. The constant vibration had the effect of causing considerable wear on the links of the lifting chains of the gates, some of which were found almost cut through when the gates were lifted after

the river fell. The regulator, however, was worked successfully throughout the year and when the floods entered the channel at the 12th mile, and it was necessary to shut off as much water as possible, it was found feasible to cut off almost the whole of the supply entering from the river. The result of this was a heavy deposit of silt above the regulator, which, however, practically disappeared when the gates were re-opened. There is a considerable silt deposit in the lower part of the channel and in the Nára near the junction, caused by the floods of 1892, 1893 and 1894. It will probably be much reduced when a year passes without a flood. Since the channel was deepened it has been at all times possible to admit much more water than required for cultivation.

195. The total estimated cost of the work was Rs. 3,22,770 and the expenditure Rs. 2,96,995, of which Rs. 1,62,154 were expended in 1893-94 and Rs. 1,34,841 in 1894-95. Executive establishment in 1894-95 cost Rs. 13,660 and tools and plant Rs. 876. The expenditure on work establishment was Rs. 1,013. The special district established for this work was abolished on the 15th October 1894.

196. The embankments on the right bank of the Nára between Bakkár and Sirenvári, commenced in 1893-94, were practically completed. The expenditure of the year was Rs. 22,958 and total to end of year Rs. 22,971, against an estimate of Rs. 22,511. It was found necessary, in connection with this work, to strengthen a short length of the Bakhora-Bakkár bund which adjoins it. This will cause an excess of about Rs. 2,000.

197. On the left Bank of the Nára Rs. 43,904 were expended on completing the embankment from Khipra to head of Thar Canal. Including expenditure in 1893-94 the total cost has been Rs. 48,920 against an estimate of Rs. 52,534.

198. Rupees 3,383 were expended on completing the Nára bunds from Jatri to Keti. Total cost Rs. 26,009. Estimate Rs. 26,023.

199. The Pábnái sluice with escape channel on the left bank of the Nára was completed at a cost of Rs. 16,991 against an estimate for Rs. 17,766. The expenditure of the year was Rs. 10,799. During the inundation this sluice was completely destroyed in one night. The accident has already been fully reported on.

200. On the Ghag sluice, a somewhat similar work, Rs. 8,305 were expended, which added to Rs. 3,501 paid in the previous year brought up the total cost to Rs. 11,806, exactly the amount of the estimate.

201. A sum of Rs. 12,007 was spent on collecting materials for the following works, the commencement of which was sanctioned late in the year:—Escape sluice from the Nára at Kilánkar, Rs. 4,000; sluice with escape channel in the Ránjo bund, Rs. 3,190; small sluice in Nára bunds, Rs. 2,810; masonry sluices to Karia heads from Khipra canal, Rs. 2,007.

202. On the regulator in the Makhi weir, which forms part of the scheme for improving the supply in the Mithráo Canal, Rs. 21,927 were expended, making in all Rs. 37,090 to end of the year, against an estimate for Rs. 47,940. Considerable difficulty was experienced in getting the wells sunk owing to the large quantity of water, and it was found impossible to complete a portion of the down stream pavement and concrete block protection before the Nára Supply Channel was re-opened. It is not proposed to bring the regulator into use till the other parts of the scheme are completed. It suffered no damage during the inundation.

203. Various sums were spent on completing six iron and masonry bridges on the Mithráo Canal to replace the original temporary ones: all were completed well within the estimated amount.

204. On the Chor branch of the Thar Canal a regulator was completed. The expenditure of the year was Rs. 1,661, and to end of the year Rs. 2,177, against an estimate for Rs. 3,078. There will be some further payments in current year as the contractor's accounts were not finally settled in 1894-95.

205. The usual abkaláni works and revenue establishment were maintained and works of maintenance carried out at a cost of Rs. 86,276 which included extraordinary works as follows:—Repairing Játri sluice Rs. 5,469; special works on Rata bund Rs. 3,052; clearance in bed of Nára from Chandawai to Purán Rs. 6,171. The following special items of expenditure were also carried out to repair the damage caused by the flood of 1894 for which an extra grant of Rs. 20,000 was made:—Closing breaches from Ibu Pir to Sirenwári Rs. 7,634; repairing Ghag sluice Rs. 1,556; repairing Játri sluice Rs. 393; breaches in Bakhora-Bakkár bund Rs. 1,971; breach in Makhi bund Rs. 742; repairing breaches in Mithrao protective embankment Rs. 6,300; repairing breaches in Dim Canal Rs. 1,532; total Rs. 20,115.

206. Under this head Rs. 8,246 were debited to the Revenue Account, of which Rs. 6,601 represented the original cost of the six temporary bridges on the Mithrao Canal, which were replaced by new ones, and Rs. 1,645 were expended on converting the 16th mile road bridge on the Thar Canal into a regulator.

207. Gardens were maintained at Sindhri and Samara at a total cost of Rs. 875, the receipts of the year being Rs. 930. The expenditure was rather higher than that sanctioned in Government Resolution No. 10 W. L.—43 dated 9th January 1892, owing to special expenditure having been incurred in connection with an experiment as to the possibility of introducing into Sind an improved variety of dates. The gardens however paid their way, which is satisfactory.

208. Besides the regular semi-permanent establishment employed on the canals, several maistris were engaged for the various masonry works in progress in the district. Their engagement was in all cases sanctioned by the Superintending Engineer, and the total expenditure on them was Rs. 1,013.

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

New Works—

		Rs.	
Capital expenditure	{ Nára Supply Channel... Eastern Nára ...	33,711 1,32,186	
Revenue expenditure	...	8,246	
Ordinary agricultural works			1,74,143
Repairs—			
Clearance	...	5,276	
Other works	...	57,469	
Maintenance of gardens	...	875	
			63,619
Establishment	{ Works ... Abkaláni ... Revenue ...	Rs. 7,940 9,749 5,843	
			23,532
			87,151
			*2,81,294
Add—Regular Establishment charges.	{ Nára Supply Channel... Eastern Nára ...	3,415 42,442	
			45,857
„ Tools and Plant charges	{ Nára Supply Channel... Eastern Nára ...	219 195	
			414
			†3,07,565

210. The average expenditure of three previous years on establishment charged to the maintenance grant was Rs. 24,341.

\* Excludes Rs. 157 on account of contribution for repair to Zamindari Karia heads.

† Includes one-fourth cost of Nára Supply Channel.

## JAMRÁO CAÑAL.

211. This important work, which has been under discussion for over 20 years, was sanctioned for construction during the year under review. The estimate, amounting to Rs. 72,03,774, of which Rs. 69,66,526 are for direct and Rs. 2,39,248 for indirect charges, was approved of by the Secretary of State for India in his despatch No. 25, Public Works, dated 3rd May 1894. The canal will take off from the Eastern Nára river at Jamráo about 100 miles south of its artificial head at Rohri, and will be  $117\frac{1}{2}$  miles long with one main branch  $65\frac{3}{4}$  miles long, and  $374\frac{1}{2}$  miles of minor branches classed as distributaries.

212. The head works will consist of a rubble stone and masonry weir across the Nára with a set of scouring sluices, a head regulator, and various training works. The canal will be 125 feet wide at bed at head, and has been designed to carry 3,200 cubic feet per second during the kharif or summer crop season. It is calculated to irrigate 260,000 acres situated partly in the Hyderabad Collectorate and partly in the Thar and Parkar District. The headworks will be in the Khairpur State, and permission to construct the necessary works was readily given by His Highness the late Mir Sir Ali Murad, K.C.I.E., Mir of Khairpur. It is expected that in 10 years from the completion of the work the net revenue will represent a return of 7.42 per cent. on the sum at charge.

213. At first two executive districts were formed, named the 1st and 2nd District Jamráo Canal, respectively. Towards the close of the year a third Executive Engineer was appointed, but the 3rd district was not formally established till April 1895.

214. The work actually done during the year was unfortunately but small; Rs. 5,67,400 had been provided in the Budget for the work, but the actual expenditure under all heads was only Rs. 2,30,344. Though every effort was made, large Contractors could not be induced to come forward for the earthwork of the main line, the reason being that other very large works were being carried out in Sind in addition to those usually in progress. The Rohri-Kotri Railway was started and over six lakhs were expended on earthwork connected with river embankment rendered necessary by the abnormal inundation of 1894.

*First District, Jamráo Canal.*

215. The first district includes the headworks on the Nára and the first seventeen miles of the canal.

216. The formation of the first district commenced in November 1894, and as soon as the nucleus of an office was collected it moved out to Jamráo, where the head-quarters of the district are fixed. The line of canal at first follows a spill channel from the Nára, called locally a "Sáng" and named the Jamráo Sáng; the ground is for the first 12 miles almost entirely sand, and where it is covered by water during the inundation is thickly covered with a jungle of tamarisk and thorn trees. The low ground so covered with jungle is bordered by sand hills of loose fine sand extending for many miles to the west.

There is no large village within 25 miles of the headworks, and the scanty population are found in scattered huts at wide intervals. Labour and food have therefore to be imported.

217. The Inspector General for Irrigation visited the site of the works at the end of December 1894, and under his instructions the commencement of works on the weir, regulator, and works forming the head work was postponed.

The country had been flooded severely during the inundation of 1894, and water was still standing in low ground to be crossed by the canal, and this water, combined with the difficulty in setting out and selecting the best line through the thick jungle, made it impracticable to commence contract work on a large scale on the canal line.

It was clear that the mouth of the Jamráo channel must be closed as provided for in the estimates and that this was the first work to be done; but as

no large contracts, either for the weir or canal, could be given. Contractors would not undertake this comparatively small work, and it had to be done departmentally; shops were opened and food supplies brought in and labour was summoned from the surrounding districts, and, although the mouth of the Jamráo Canal had been enlarged and deepened very considerably by the action of the heavy floods of 1894, still before the year under reference had expired, the mouth was closed with an embankment of substantial section.

218. From the west side of the mouth of the Jamráo Channel a flank embankment, about 8,000 feet long, runs to a range of sand hills which protect the right flank of the canal; in many places this bank was weak and the Jamráo Canal estimates provided for strengthening the whole length of 8,000 feet. Work was concentrated at the weakest points first, and, before the end of the year, had been advanced sufficiently to ensure the safety of this important bank.

The quantity of earthwork and expenditure on the closing of the channel and strengthening of this embankment during the year was 1,240,000 cubic feet and Rs. 10,120, and the work is accounted for under the head 'Strengthening the Rata bund.'

The character of the work, however, had been much changed by the floods since the original estimate was framed, and earth had to be carried for as much as 900 feet to close the mouth of the Jamráo Channel.

219. The next work in point of importance was the provision of quarters for the office and staff on the works; for it is believed to be practicable to continue the work on the canal, though not on the headworks in the Nára, throughout the whole year, in spite of the inundation. Quarters for the hot weather are therefore a necessity.

220. The great importance of closing the mouth of the Jamráo made it necessary to at first employ all available labour on that work, and the construction of the buildings was delayed; but, later, labour was obtained for the buildings, a temporary but roomy thatched shed was erected for the office, a similar but smaller building provided for the European subordinate and the following buildings of sun-dried brick and mud commenced:—

Quarters  $68\frac{1}{2}' \times 22\frac{1}{2}'$  for six clerks, well advanced to completion.

Quarters  $29\frac{1}{2}' \times 22\frac{1}{2}'$  of two rooms termed Lower subordinate quarters, well advanced to completion.

Out-houses of  $54' \times 20\frac{1}{2}'$  for the 1st class bungalow, completed except roof, which is temporarily made of boughs and grass.

Stables  $46\frac{1}{2}' \times 17\frac{1}{2}'$  for bungalow, similarly nearly completed and with temporary roof.

Quarters  $38\frac{1}{2}' \times 29\frac{1}{2}'$  for Upper Subordinate, foundation laid.

Quarters  $46' \times 42'$  for Inspecting Officer, walls half raised.

The first class chauki is to be constructed of burnt brick and mud and the foundations of this are laid.

In addition to the above, two practically fireproof godowns, each  $50' \times 16'$  with verandah 7' have been made, one for the safety of the food supplies and convenience of the shopkeepers, and the other temporarily to be used for tools and stores, but at present occupied by some of the establishment until their quarters are ready.

221. The expenditure on buildings was Rs. 10,119 divided into two classes permanent and temporary, and the amounts spent are as follows.—

	Rs.
Permanent buildings ... ..	7,443
Temporary buildings ... ..	2,676

As the country is chiefly sand, and the buildings have to be constructed on sand-hills above inundation level, and as earth for sun-dried bricks is only available in low-lying ground the buildings necessarily cost more than under ordinary conditions, but they are now being rapidly constructed,



222. Preparations have been made for burning the bricks required for the headworks. It was not deemed advisable to conclude a large contract until the facilities for brick-work were better known; but a contract for one million bricks was approved and a kiln capable of turning out 30,000 bricks a week constructed and firing commenced.

Suitable brick-earth was not readily found, but by continued search it has finally been ascertained that an ample supply of brick-earth is available near the waterway of the Nára and from one to one and a half miles above the site of the weir. The expenditure on bricks was Rs. 200 only, but represents the actual starting of burning and complete arrangements for continuing the work.

223. A large quantity (as proposed at present 1,800,000 cubic feet) of stone has to be brought from Rohri down the Nára to Jamráo by boats, but the depth of water in places is not sufficient for large boats, and it will be necessary to concentrate this carrying work into the inundation season when there is plenty of water available.

A contract was given out, but the quantity of stone conveyed by the Contractor was less than expected and amounted to 10,614 cubic feet, carried at a cost of Rs. 1,087-15-0.

224. The Channel of the Nára is in places obstructed by snags and these are being removed, and before the close of the year 30 miles of channel, where the snags had been worst, were well cleared at a cost of Rs. 2,111.

225. On the canal line little work could be done, but the centre line of the canal, as originally proposed, was lined out and cleared of jungle, and bench-marks or levels established along the lines. It has since been proposed by the Inspector General to alter the line, and new surveys are under progress.

226. Most of the work of the First District Jamrao Canal lies in the territory of His Highness the Mir of Khairpur, and the officials of his Highness have been most courteous and have shown their desire to facilitate the construction of the works.

227. The cost of establishment charged to work was Rs. 312, or about 1.1 per cent. on Rs. 28,494, the value of work done.

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

New Works—		Rs.
Capital expenditure...	...	1,29,765
Revenue expenditure	...	...
Repairs—		
Clearance to Canals	...	...
Other Works	...	...
Maintenance of Gardens	...	...
Establishment ...	{ Works	...
	{ Abkaláni	...
	{ Revenue	...
		1,29,765
Add—Regular Establishment charges		1,29,765
	...	24,245
	„ —Tools and plant charges	18,235
		1,72,245

229. The total includes three-quarters of the expenditure on the work deepening the Nára Supply Channel, which is debitable to the headworks of the Jamráo Canal.

*Second District, Jamráo Canal.*

230. This district comprises the main line of the Jamráo Canal from mile 17 to mile 78, and the first 17 miles of the west branch. Two sub-divisions were formed: (1) The Shahdádpur Sub-division from mile 17 to mile 45, and (2) the Mirpur Khás Sub-division from mile 45 to mile 78.

231. The work done in the Shahdádpur Sub-division was as follows:—

## Lining out—

Sanctioned line from mile 17 to mile 43.

Deviation between miles 21 and 23.

Deviation between miles 24 and 28.

Deviation between miles 40 and 43.

Cross-sections at every mile from mile 20 to mile 30 on an average of one mile in length.

## Levelling—

From B. M. No. XL near the 15th mile of the Jamrao to the 30th mile, and check levelling from the same to the 34th mile.

Levels of deviations between miles 21 and 23, and miles 24 and 28.

Levels of cross-sections at every mile between miles 20 and 30.

## Jungle-cutting—

From mile 17 to mile 24 to a width of 350 feet, and cutting a trench along the centre line to the same. Locating the line on the Deh maps from actual measurements of field boundaries from miles 17 to 24.

## Excavation—

In January ...	...	...	...	42,130
„ February ...	...	...	...	2,80,655
„ March ...	...	...	...	1,127,669

1,450,454 cubic feet to 31st  
March.

232. The excavation was confined to the 18th mile. Work was done in takis from 1 to 11 and 20 to 23 inclusive. Most of the excavation was carried to a depth of only 5 feet, but portions were taken down to the full depth.

233. For the 39th and 43rd mile bridges materials of the value of about Rs. 2,000 have been collected.

234. Mirpur Khás Sub-division—

## Lining out—

From mile 56 to 78.

Deviation between miles 56 and 62.

Deviation between miles 68 and 72.

Cross-sections at every mile from miles 56 to 72.

## Levelling—

From mile 56 to 78.

Deviation between miles 56 and 62.

Deviation between miles 68 and 72.

Cross-sections at every mile from 56 to 78.

Check levels from miles 72 to 78.

Locating line on Deh maps from actual measurements of field boundaries between miles 68 and 72.

## Excavation—

				Cubic feet.
In 68th mile takis 2 to 7 ...	...	...	...	197,673
(carried out departmentally),				
In 68th mile takis 13 to 15	...	...	...	86,893
(by piece-work).				

235. Two steam excavators were obtained from England and were, with some trouble, taken to the section reserved for them some 7 miles north of Mirpur Khás. They were erected and started at work, but the arrangements for carrying away the

spoil to bank were not completed during the year. So far as can at present be judged, they will be a success, and will work at or below the estimated rate.

236. Though no large Contractors came forward for work in this sub-division, numerous small contracts were given out for earthwork, buildings, and masonry works. The total value of the contracts already given out amounted to Rs. 1,31,975.

237. The Sind convict gang at present employed on urgent bund works in the Right Bank Division will be transferred to the Jamráo Canal in June, and will be located at the heavy cutting between the 17th and 20th miles.

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

			Rs.	Rs.
<b>New Works—</b>				
Capital expenditure...	...	...	10,493	
Revenue expenditure	...	...	...	
<b>Repairs—</b>				
Clearance to canals...	...	...	...	
Other works	...	...	...	
Maintenance of gardens	...	...	...	
Establishment...	{	Works	...	}
		Abkaláni	...	
		Revenue	...	
			10,493	
				10,493
		<i>Add—Regular Establishment charges</i>	...	14,279
		<i>Add—Tools and Plant charges</i>	...	38,859
		<b>Total charges under all heads</b>	...	63,631

*Third District, Jamráo Canal.*

239. This district will comprise all work on the main line from mile 78th to tail and on west branch from the 17th mile to tail. It was not formally established in 1894-95, but an Executive Engineer was appointed whose accounts were kept in the office of the Executive Engineer, Second District. For some time, that is, till work has made some progress in the other two districts, the work in the third district will consist mainly of surveys and the erection of buildings.

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

			Rs.	Rs.
<b>New Works—</b>				
Capital expenditure	...	...	101	
Revenue expenditure	...	...	...	
<b>Repairs—</b>				
Clearance to canals ...	...	...	...	
Other works	...	...	...	
Maintenance of gardens	...	...	...	
Establishment...	{	Works	...	}
		Abkaláni	...	
		Revenue	...	
			101	
				101
		<i>Add—Regular Establishment Charges</i>	...	3,764
		<i>Add—Tools and Plant Charges</i>	...	603
		<b>Total Charges under all heads</b>	...	4,468

## HYDERABAD CANALS.

241. No new works were carried out under this head during 1894-95, and the maintenance expenditure calls for no special remarks. The expenditure was:—

Works	...	...	...	...	Rs.	33,413
Establishment...	{	Abkaláni	...	...	Rs.	2,518
		Revenue	...	...	...	1,230
		Works	...	...	...	3,072
						<u>6,820</u>
						<u>40,233</u>

242. The only new work under this head was the new feeder to Bhortiwáh sanctioned from the Superintending Engineer's discretionary grant. This was described in last year's report and was completed during the year at a total cost of Rs. 4,000, of which Rs. 579 was expended in 1893-94 and Rs. 3,421 in 1894-95.

243. The cost of maintenance of these canals was as follows:—

Works	...	...	...	...	Rs.	1,01,890
Maintenance of gardens	...	...	...	...		907
Establishment...	{	Abkaláni	...	...	Rs.	7,264
		Revenue	...	...	...	3,195
		Works	...	...	...	9,038
						<u>19,497</u>
Total					...	<u>1,22,294</u>

244. In order to check the floods which occurred in this district in 1894 for the first time in at least 40 years, two new river embankments were sanctioned. The first, "Bund to direct floods in the Nausháhro Sub-division," is slightly over 5 miles long and runs from the right bank of the Nálakhi above the Darbelo road bridge to the head regulator over the new Dambro. The estimated cost of the work is Rs. 20,960 and good progress was made with it, the expenditure being Rs. 13,979.

245. The second embankment, "Bund to check spill in the Hála Sub-division," is also slightly over 5 miles long, and it is being constructed on the high bank of an old branch of the river called the Gháro Mahmuda; it is intended to stop the spill in the direction of the important town of Tando Adam, which occurred in 1894 for the first time on record. It is a small work estimated to cost Rs. 8,622. Rs. 4,980 were expended during the year, and it will be completed before the inundation.

246. A sum of Rs. 1,004 was expended in this district in making permanent certain of the marks of the Indus Riverain Survey with the object of keeping them as reference points from which to survey future changes in the course of the river. Each mark consisted of a small brick masonry pillar with a portion of an old telegraph post built in.

247. The two gardens maintained in this district worked very well though they do not as yet pay their way. The expenditure was Rs. 907 against Rs. 891 in the previous year, while the receipts were Rs. 598 against Rs. 274 in 1893-94.

Part of the extra receipts was due to a payment in advance on account of the next season's produce; but the gardens are certainly progressing and now realise considerably more than was originally estimated.

248. Besides the establishment employed regularly on the canals and shown separately in the accounts, a few mukadams were employed on the special bund works; the total cost was only Rs. 157.

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

			Rs.	Rs.
New works—				
Capital Expenditure ...	...	...	...	
Revenue Expenditure on Capital works ...	...	...	3,421	
Ordinary Agricultural works ...	...	...	19,963	
				23,384
Repairs—				
Clearance ...	...	...	1,06,516	
Other works ...	...	...	28,787	
				1,35,303
Maintenance of gardens ...	...	...	907	
				1,36,210
Establishment ...	{ Works ...	...	12,110	
	{ Abkalani ...	...	9,782	
	{ Revenue ...	...	4,425	
				26,317
				1,62,527
				1,85,911
				62,594
				929
				2,49,434

250. The average expenditure of 3 previous years on establishment charged to the maintenance grant was Rs. 23,049.

### FULELI CANALS.

251. The regulator at Alipur (60th mile of the Fuleli), which has been described in a former report, was practically completed at the end of 1893-94. The expenditure in 1894-95 was Rs. 50 only, the total cost being Rs. 58,176 against an estimate for Rs. 58,813. The regulator was not brought into use as the new mouth to the Mulchand, which forms part of the project, was not completed.

252. The new head to the Mulchand, which will take off above the Alipur regulator, was in progress during the year, and the head regulator was completed. The original estimate amounted to Rs. 69,188—Rs. 50,401 for the new head and Rs. 18,787 for thorough clearances. During construction certain modifications of the design were made, with the result of increasing the cost of the new work and reducing the clearance. The total expenditure on the work to end of 1894-95 was Rs. 40,471, of which Rs. 35,529 were debited to Capital.

253. On these works, which have been described in a previous report, a sum of Rs. 149 was expended during the year, bringing the total expenditure up to Rs. 22,642 against an estimate of Rs. 29,322. Four of the escapes were completed and worked well.

254. An estimate amounting to Rs. 20,005 was sanctioned during the year for building masonry heads to certain of the more dangerous water-courses taking off from the Fuleli and its branches, with the view of reducing the number of breaches which occur annually at their heads

during rain. Materials were collected and some of the sluices were built at an expenditure of Rs. 5,000.

Fuleli Canal Revenue Account—Extensions and Improvements.

Escape to Shadiwah small.

255. Rupees 251 were spent on this work during the year, bringing the total cost up to Rs. 3,971. Estimate Rs. 3,982. It worked very successfully with the result that no breaches occurred in the canal, nor was any clearance required after the inundation.

256. This small work was completed before the inundation and proved useful. Total cost was Rs. 4,145 against an estimate of Rs. 3,972. The expenditure of the year was Rs. 243.

Changing the tail of Rajwah Talhar.

257. This bund, which protects the Jāghirs of the members of the families of the former reigning Mirs of Sind and also Government land and buildings in the neighbourhood of Hyderabad, was taken over as a Government work during the year. The estimate amounts to Rs. 8,993 and provided for re-arranging some of the old pitching, raising the bund to a height of three feet above flood level, and for a small quantity of new pitching. The work was sanctioned late in the season as a charge against the Revenue Account of the Fuleli Canal, and as much of it as possible was carried out previous to the inundation, during which the bund was maintained intact, though with great difficulty. After the inundation the work was completed, the total expenditure being Rs. 8,993.

Improving Gidu Bandar Bund.

258. This is one of the new works recommended in the joint report, and is intended to protect the land lying between the two mouths from being flooded, and also to guard against the danger of the Head Regulator of the Fuleli being outflanked and rendered useless. It is in two sections, as for a certain part of the length the ground is high. A regulator with two spans of 9 feet each, is provided for the Chandanwāh, a small Government canal, and two sluices, of 7 feet span each, for the irrigation of the Miāni forest. The estimate amounts to Rs. 24,506 and the expenditure of the year was Rs. 14,552.

Constructing a bund between old and new mouths of Fuleli.

259. Owing to the continued rise of the river-floods it was found necessary to strengthen this bund which protects land and buildings in the vicinity of Hyderabad from being flooded. No breach had occurred in the bund itself during the inundation, but it had been maintained with great difficulty, and it had been outflanked to the south at a place where high sand hills formerly existed, but which had been blown away. An additional sluice for a water-course was also found necessary. The estimate amounts to Rs. 6,505, and Rs. 5,000 were expended during the year.

Raising and strengthening the Jamshora bund.

260. This work is intended to complete the line of embankment which will protect the low-lying lands in the neighbourhood of Hyderabad from being flooded. Though none of the existing bunds were actually breached in the inundation of 1894, the water from the river found its way back between the termination of the Gidu Bandar Bund and the range of hills known as the Ganja Takar. The water flooded a considerable area of arable land and cut off communication to a great extent. It reached the hills on which Hyderabad itself is situated and flooded the road to the Railway Station. The estimate for the work was Rs. 8,914 and expenditure Rs. 4,916. A small escape channel through the rock has been cut at the Ganja Takar end of the bund through which any water from the irrigation channels that may accumulate in the low dhoras or hollows will be allowed to escape when the river falls.

New bund between end of existing Gidu Bandar Bund and Ganja Takar.

261. This regulator was seriously damaged during the inundation, two of the piers having been carried away and three of the arches destroyed. It was at first proposed to repair the damage, but at a consultation on the spot, at which the Secretary to Government, Public Works Department, Bombay, and the Inspector-General of Irrigation were present, it was determined that the proper

Reconstructing the Regulator over old Fuleli at Nareja.

thing to do was to rebuild the regulator with an increased water-way at a site a few hundred feet above the old one, utilising as far as possible the old materials.

The new regulator has a clear water-way of 152 feet, divided into 11 spans of 12 feet each and a boat opening of 20 feet. It is constructed of brick masonry and is founded on wells. The wells, in the up and down stream curtain walls which are extended well into the banks, are sunk 10 feet below pavement level, while those in the abutment are sunk 7 feet, and those under the piers 5 feet. It is protected by stone pitching on bed and banks 20 feet wide upstream and 50 feet wide down-stream, the ends of the pitching being supported by concrete walls. The regulator was sufficiently advanced during the year to ensure its completion before the coming inundation. Estimate Rs. 38,682. Expenditure during 1894-95 Rs. 16,000. The cost will be divided between capital and revenue according to the code rules.

262. The clearance work was of the usual description, but owing to the absolute necessity of carrying out the special works in connection with river embankments, the expenditure under this head for the season 1894-95 had to be kept considerably below the average. The important work of clearing inspection paths was, however, continued as far as possible.

263. Two small gardens were established on the Fuleli. The expenditure on their maintenance during the year was Rs. 448, the receipts being Rs. 57. The receipts may be expected to increase in future years.

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

New Works—		Rs.	Rs.
Capital	... ..	...	35,529
Revenue	... ..	...	49,955
			85,484
Repairs—			
Works	... ..	...	1,24,326
Maintenance of Gardens	... ..	...	448
Establishment.	{ Abkaláni	...	6,490
	{ Revenue	...	4,844
	{ Works	...	8,450
			19,784
		Total ...	2,30,042

265. This important bund, on the maintenance of which the safety of the cultivation in the southern part of the Guni Taluka of the Hyderabad Collectorate and in large areas in Karachi depends, was severely tried during the inundation of 1894. Two breaches occurred which were promptly closed, one regulator was washed away, and another damaged. Fortunately through the exertions of the establishment the damage to cultivation was but slight. In some places where the bund was low it was nearly over-topped by the very high flood caused by a heavy rain flood from the Baran River which temporarily raised the already abnormal flood in the Indus by two feet. The river has for the past few years been setting on the Hajipur side, and just after the river fell a portion of the bund line was cut away; it has been found necessary to construct new loops in various sections of the bund and to considerably raise and strengthen others. New regulators are being constructed for the Hasanali, Khair and Khokhar Canals and some small sluices for water-courses passing through the new loops. The estimate for the work amounted to Rs. 82,522. The expenditure of the year was Rs. 23,510. All the new loops were completed and the remainder of the work will be ready before the inundation. The dangerous Budh-ka-Takar section, which is exposed to severe wave action, has been well pitched with stone founded on a concrete base.

266. It was found necessary to extend the bund to the south to stop spill over a high part of the river bank which was well above the level of any known previous flood. The estimate amounted to Rs. 4,020 and expenditure to Rs. 3,497.

Extension of Hájipur Bund.

267. On the ordinary maintenance of the Hájipur Bund and the small canals taking direct from the river Rs. 18,679 were expended during the year as follows :

Maintenance.

		Rs.
Works	...	15,422
Establishment...	{ Abkaláni	Rs. 1,715
	{ Revenue	" 403
	{ Works	" 1,139
		3,257
Total ...		18,679

268. In addition to the ordinary work establishment employed on the maintenance of the canals, it was necessary to employ a number of men of the maistri class to supervise the special works in progress. The cost of these men was Rs. 2,182, the percentage on the expenditure being 0.95.

Work establishment.

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

		Rs.
New works—		
Capital expenditure	... ..	Rs. 35,529
Revenue do.	... ..	" 49,955
Expenditure on works for which only Revenue Accounts are kept	... ..	" 27,007
		1,12,491
Repairs—		
Clearance	... ..	" 91,213
Other works	... ..	" 48,535
		1,39,748
Maintenance of Gardens	... ..	Rs. 448
		Rs. 448
Establishment...	{ Works	Rs. 9,589
	{ Abkaláni	" 8,205
	{ Revenue	" 5,247
		Rs. 23,041
		23,489
		2,75,728
Add—Regular Establishment charges	...	46,867
Add—Tools and plant charges	...	719
		Total under all heads ... 3,23,314

270. The average expenditure of the three previous years on establishment charged to the maintenance grant was Rs. 18,425.

#### KARA'CHI CANALS.

271. Under this head Rs. 66,050 were expended, of which Rs. 12,599 were on the restoration of the old embankments of the Baghár, Rs. 49,869 on river bunds including new sluices and fixing gauges and mile posts, Rs. 1,487 on improvements to course of river in Delta, Rs. 1,565 on experimental cuts for the drainage of Sújával, Rs. 500 on Inspection Chauki on the Punnah Baghár bund and Rs. 30 on a new garden at Purijan.

Extensions and Improvements.



272. These embankments, which are about 60 miles in length, are practically completed as far as Mirpur-Sakro. The crest is only 2 feet over H. W. L., and as there is no regulator at the head of the canal, any sudden rise of the river causes numerous breaches. Designs for a regulator are now in hand, and it is hoped it will be completed before the inundation of 1896.

273. Owing to the increase in flood-level of the river the bunds on both banks have been raised and strengthened at a cost of Rs. 28,178, of which Rs. 7,496 were expended on the Right and Rs. 20,682 on the Left Bank. The top width varies from 6 to 8 feet, the crest is 3 feet over H. F. L., with front and rear slopes of 3 to 1 and 2 to 1 respectively. The front slope requires increasing to 5 to 1 and the crest to 5 feet over H. F. L.; this will be done according as time and funds admit.

To allow of easy inspection a chauki is being built in the "Punnah Baghar" bund on Right Bank, the expenditure during the year being Rs. 500.

Masonry regulators to many of the large canals taking off from the river through the river embankments were sanctioned and the work is in progress and will be completed before this inundation. They are as follows:—

274. This is situated on the 3rd mile of the "Punnah Baghar" bund on the Right Bank and consists of 5 spans of 10 feet, and one of 15 feet, height to springing 15 feet, width of roadway 8 feet. The regulating apparatus consists of a single row of teak wales and needles. Foundations are solid and extend to a depth of 6 feet below pavement which is 3 feet thick.

Estimated cost	...	...	...	Rs. 14,108
Expenditure during year	...	...	...	„ 5,499

275. This is situated in the 61st mile of the Left Bank embankment; it has three openings, two of 9 feet each, and one of 15 feet, height to springing 20 feet, and width of roadway  $7\frac{1}{2}$  feet. The regulating apparatus consists of a single row of teak wales and needles. The foundations are on wells, 87 in number, sunk  $7\frac{1}{2}$  feet below pavement, which is 3 feet thick.

Estimated cost...	...	...	...	Rs. 16,804
Expenditure during the year	...	...	...	„ 3,000

276. This is also on the Left Bank and is situated just below the "Sattah" Regulator in the 62nd mile. It consists of 5 spans of 10 feet each, height to springing  $16\frac{1}{2}$  feet, width of roadway 10 feet. The regulating apparatus consists of a single row of teak wales and needles. The foundations are solid and are  $6\frac{1}{2}$  feet below pavement, which is 3 feet thick.

Estimated cost...	...	...	...	Rs. 13,911
Expenditure during the year	...	...	...	„ 3,000

277. This canal formerly had a separate mouth direct from the river; it has now been made a branch of the Khanto, the regulator for which has been designed of sufficient size to supply both.

The regulator at head of Ghâr, where it takes off from the Khanto, consists of 2 openings of 10 feet each, height to springing  $11\frac{1}{2}$  feet and width of roadway 10 feet. The regulating apparatus consists of a single row of teak wales and needles, and the foundations are solid and extend to a depth of 6 feet below pavement, which is 3 feet thick.

Estimated cost (including new mouth)	...	...	...	Rs. 6,641
Expenditure during year	...	...	...	„ 3,085

278. Eight new masonry sluices over Karias are being constructed; two of these, including one for the irrigation of Shâh Lunka forest, are in the right, and six in the left embankments.

The expenditure during the year was Rs. 2,276.

279. Gauges were fixed at the end of every mile along the bund line on both sides of the river and consist of teak posts fitting into cast-iron standards buried in the ground.

Gauges and mile posts. Permanent mile and furlong posts were also fixed along the whole length of the bund line.

The expenditure during the year under these heads was Rs. 4,431.

280. Owing to the increase in the flood level of the river near "Sunda" some of the river water escaped over the country between the Sunda Hill and the Jamwah; the opening was closed at a cost of Rs. 400.

Sunda Bund. 281. The experimental cuts referred to in last year's report were completed at a cost of Rs. 1,683; of which Rs. 1,565 were expended during the year.

Sajaval Drainage. The cuts are only intended for the drainage of the waste water from the Pinyari and its branches, and have not as yet been satisfactorily tested, as this year the Dhands were filled with flood water through breaches in the Left Bank Bund line.

282. The town of Keti Bandar being threatened with a water famine owing to the silting up of the Uchito Branch of the Indus, the Municipality spent a considerable sum of money in giving the branch a new mouth. This was so successful and the importance of keeping this channel clear was so great, that a further sum of Rs. 1,487 was expended from the discretionary grant at the disposal of the Superintending Engineer in making a cut across one of the bends about 15 miles from the mouth.

Improvements in Delta. The width of cut was 35 feet and depth 4 feet, and water was admitted into it in the end of May. Early in July the whole supply of the branch was practically flowing through it, and it was sufficiently deep for steamers and boats to pass through it.

283. A small sum was expended on completing the garden which was commenced last year. The total expenditure was Rs. 1,481, of which Rs. 30 were expended during the year.

Parijan Garden. 284. On maintenance and repairs a sum of Rs. 2,17,230 was expended; of this Rs. 47,026 were spent on special and Rs. 65,850 on ordinary repairs to river bunds, Rs. 70,043 on ordinary repairs and clearance of canals, Rs. 33,367 on establishment, and Rs. 944 on gardens. Details of this expenditure are as follows:—

285. The special repairs consisted of construction of a loop from mile 60 of the Left Bank embankments to the Khanto Canal, and called the Bahadipur Loop. The new loop has a top width of from 8 to 12 feet and front and rear slopes of 4 and 2 to 1, respectively, with a free board of 4 feet over flood level of 1894.

Special Repairs to River Bunds. The expenditure was Rs. 47,026; the allotment being Rs. 47,200.

286. On ordinary repairs to river bunds a sum of Rs. 65,850 was expended; of this Rs. 27,492 were spent on the Right Bank and Rs. 38,358 on the Left Bank embankments as compared with Rs. 8,044 and Rs. 29,722, respectively, in the year before.

Maintenance and Repairs, River Bunds. 287. The usual Abkalani establishment was maintained at a cost of Rs. 15,394; of this Rs. 7,092 was for the Right and Rs. 8,302 for the Left Bank embankments, the detail being as follows:—

	Right Bank.	Left Bank.	Total.
	Rs.	Rs.	Rs.
Abkaláni... ..	4,403	5,232	9,635
Revenue ... ..	1,039	1,185	2,224
Works ... ..	1,650	1,885	3,535
Total ... ..	7,092	8,302	15,394
The figures of the previous year being ... ..	4,810	5,602	10,412

288. Ordinary clearance and repairs to canals cost Rs. 70,043, of which Rs. 28,978 were expended on canals on the Right Bank and Rs. 41,065 on those on the Left Bank. Maintenance and Repairs, Canals. The corresponding sums in the previous year were Rs. 10,050 and Rs. 12,053, respectively.

289. The usual Abkaláni establishment was employed, the total expenditure being Rs. 17,973; of this Rs. 8,483 were for canals on the Right and Rs. 9,490 for canals on the Left Bank the detail being as follows:—

	Right Bank.	Left Bank.	Total.
	Rs.	Rs.	Rs.
Abkaláni... ..	4,323	3,559	7,882
Revenue ... ..	1,353	2,808	4,161
Works ... ..	2,807	3,123	5,930
Total ... ..	8,483	9,490	17,973
The figures for previous year being ... ..	6,566	9,893	16,459

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

		Rs.	Rs.
Extensions and Improvements ... ..			66,050
Repairs ... ..	Special repairs to bunds ... ..	47,026	
	Ordinary ... ..	65,850	1,12,876
	Canal clearance ... ..	70,043	70,043
Establishment ... ..	Abkaláni ... ..	17,517	
	Revenue ... ..	6,385	
	Works ... ..	9,465	
Gardens ... ..		944	
			34,311
	Total ... ..	2,83,280	
Add for Regular Establishment ... ..			64,468
Mathematical Instruments and Establishment ... ..			6,808
	Total ... ..	3,54,556	

291. The percentage of cost of establishment—Rs. 64,468—on the outlay of Rs. 2,83,280, was 22.75 as compared with 18.46 in the previous year.

292. The cost of work establishment was Rs. 6,490 in excess of that of the previous year in consequence of the exceptionally high and prolonged inundation.

## APPENDIX A.

Statement showing the entire Expenditure incurred during the financial year 1894-95 on Irrigation Works, Repairs and Establishment in the Province of Sind.

Service.	Works,	Repairs,	Total
	Rs.	Rs.	Rs.
<b>PRODUCTIVE PUBLIC WORKS.</b>			
<b>MAJOR WORKS.</b>			
<i>49.—Capital Account.</i>			
Works...	3,87,713	.....	3,87,713
Establishment .....	.....	.....	1,29,568
Tools and Plant .....	.....	.....	81,767
Total .....	3,87,713	.....	5,99,048
<i>42.—Revenue Account.</i>			
Extensions and Improvements .....	10,903	.....	10,903
Maintenance and Repairs .....	.....	2,53,469	2,53,469
Establishment .....	.....	.....	57,350
Tools and Plant .....	.....	.....	1,227
Refunds of Revenue .....	.....	.....	3,467
Total .....	10,903	2,53,469	3,26,416
<b>43.—IRRIGATION MINOR WORKS AND NAVIGATION.</b>			
WORKS FOR WHICH CAPITAL AND REVENUE			
ACCOUNTS ARE KEPT:			
<i>Capital Account.</i>			
Works ..	37,500	.....	37,500
Establishment .....	.....	.....	8,549
Tools and Plant .....	.....	.....	90
Total .....	37,500	.....	46,139
<i>Revenue Account.</i>			
Extensions and Improvements .....	66,634	.....	66,634
Maintenance and Repairs .....	.....	1,71,300	1,71,300
Establishment .....	.....	.....	79,696
Tools and Plant .....	.....	.....	1,645
Refunds of Revenue .....	.....	.....	35
Total .....	66,634	1,71,300	3,19,310
WORKS FOR WHICH ONLY REVENUE			
ACCOUNTS ARE KEPT.			
<i>Revenue.</i>			
Extensions and Improvements...	2,84,407	.....	2,84,407
Maintenance and Repairs .....	.....	5,04,776	5,04,776
Establishment .....	.....	.....	1,96,704
Tools and Plant .....	.....	.....	2,340
Refunds of Revenue .....	.....	.....	579
Total .....	2,84,407	5,04,776	9,88,806
WORKS FOR WHICH NEITHER CAPITAL NOR			
REVENUE ACCOUNTS ARE KEPT.			
Works and Surveys .....	40,300	.....	40,300
Maintenance and Repairs .....	.....	3,92,531	3,92,531
Establishment .....	.....	.....	79,087
Tools and Plant .....	.....	.....	1,035
Total .....	40,300	3,92,531	5,12,953
<b>DEPOSITS.</b>			
<i>Contributions, Ordinary.</i>			
Works ..	2,885	.....	2,885
Repairs .....	.....	4,849	4,849
Establishment .....	.....	.....	15
Tools and Plant .....	.....	.....	.....
Total .....	2,885	4,849	7,749
<b>Total under all Heads</b> .....	.....	.....	28,00,421

Note.—Expenditure exclusive of Establishment and Tools and Plant .. Rs. 21,61,348

Cost of Establishment and Tools and Plant .. .. 6,39,073

Percentage of Establishment and Tools and Plant on Outlay .. .. 29.56

---

APPENDIX B.

---

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

Names of Canals.	CLEARANCE PROPER IN CANALS.		Jungle cuttings.	Removing Tooras.	IMPROVING CANAL HEADS.		SIDE SLOPING AND REPAIRING CURVES.		Buildings and Gardens.	Regulators, Bridges and Sluices.	REPAIRS TO CANAL BANKS.		Removing 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.	
Begári Canals.	Desert Canal ...	11,041,575	78,745	1,125	1,504	...	...	...	95	...	664,601	3,331	440	
	Unharwah ...	2,363,077	8,997	796	259	...	...	...	400	822	728,269	4,596	2,571	
	Begári Canal ...	3,980,343	16,351	922	692	...	...	...	1,483	258	136,572	1,729	1	
	Kashmor Bund ...	23,032	86	3,493	23	...	...	...	3,145	6,813	61,802	294	...	
Shikárpur Canals.	Canals in Rohri ...	2,121,878	9,913	310	1,259	780,636	4,079	...	280	94	1,857,426	9,334	...	
	Bunds in do. ...	...	...	7	...	...	...	...	...	...	...	...	...	
	Sind Canal and Bunds ...	1,807,646	8,333	117	191	...	...	...	398	1,459	58,443	286	190	
	Sukkur-Begári Bund ...	...	...	925	...	...	...	...	791	1,226	...	...	...	
	Kásimpur Bund ...	...	...	42	...	...	...	...	38	440	...	...	...	
Ghár Canals.	Ghár Canal ...	5,509,243	24,356	2,528	2,948	...	...	...	1,002	2,266	3,348,103	12,611	...	
	Sukkur Canals ...	1,171,664	7,163	615	2,655	...	...	...	233	865	1,161,489	6,896	...	
	Ghár Bunds ...	...	...	366	...	...	...	...	64	136	...	...	...	
Western Nára.	Western Nára ...	1,668,498	6,781	1,043	1,189	...	...	...	2,280	330	5,134,534	20,829	302	
	Pritchard Canal ...	274,572	1,229	294	361	...	...	...	226	115	3,461,549	9,614	...	
	Damrao Canal ...	296,865	1,187	...	...	...	...	...	10	...	...	...	...	
	Dádú Canal ...	1,573,621	5,165	206	196	...	...	...	120	61	104,404	449	78	
	Phitta Canal ...	347,991	1,177	150	...	...	...	...	...	...	148,058	476	54	
	Marviwah ...	54,000	213	150	...	...	...	...	...	...	...	...	...	
	Wáhurwah ...	44,020	175	57	...	...	...	...	...	...	...	...	...	
	Nára Bunds ...	...	...	52	...	...	...	...	249	1,745	...	...	...	
Eastern Nára District.	Nára Supply Channel ...	...	...	...	...	...	...	...	61	...	...	...	...	
	Eastern Nára ...	109,219	1,638	4,064	...	...	...	...	149	8,193	...	...	...	
	Mithrao Canal ...	237,763	846	1,407	521	...	...	...	1,645	8,073	296,513	1,193	1,941	
	Dimwah ...	859,134	2,792	180	125	...	...	...	...	66	...	1,532	...	
	Herañwah ...	...	...	151	...	...	...	...	...	...	...	...	...	
	Klipra ...	...	...	...	...	...	...	...	134	...	...	...	...	
	Tharwah ...	...	...	361	230	...	...	...	263	336	6,000	18	...	
Hyderabad Canals.	Mehrábwah ...	996,833	3,603	...	235	...	...	...	...	...	137,740	873	...	
	Nasrat ...	1,341,032	5,017	...	889	...	...	...	554	...	553,042	2,127	...	
	Naolákhi ...	2,581,347	9,861	1	491	...	...	...	232	106	295,765	1,207	...	
	Dambro ...	907,472	3,431	...	485	...	...	...	...	...	80,308	296	...	
	Dád ...	2,919,352	11,821	148	6	...	...	...	721	...	1,078,260	4,827	...	
	Renwah ...	406,355	1,994	...	181	...	...	...	...	...	54,732	170	...	
	Albhar Kacheri ...	802,432	3,366	...	437	...	...	...	...	...	5,747	23	...	
	Márák ...	3,321,728	17,326	12	864	...	...	...	...	...	167,115	649	...	
	Gháro Mahmuda ...	4,429,577	22,473	71	1,828	...	...	...	...	...	95,935	403	...	
	Kari Shumáli ...	1,189,142	5,933	21	1,037	...	...	...	...	...	36,561	146	...	
	Nasirwah ...	1,961,909	8,903	...	410	...	...	...	...	...	87,270	221	...	
	Sarfrázwah ...	664,232	3,157	82	476	...	...	...	...	...	417,635	1,132	...	
	Other Canals... ..	2,464,807	9,581	25	148	...	...	...	...	...	149,478	607	...	
Fuleli Canals.	Fuleli Canal ...	22,907,896	84,634	2,900	4,408	...	...	...	1,170	2,814	1,889,693	7,790	449	
	Other Canals... ..	2,153,119	6,579	301	220	...	...	...	...	7	655,874	2,528	...	
Karáchi Canals.	Canals north of Kotri ...	1,116,261	3,919	...	70	...	...	...	...	27	16,782	50	...	
	Shal ...	492,579	2,287	15	...	...	...	...	...	252	148,787	494	...	
	Canals in Táтта, &c... ..	530,389	1,938	336	340	26,000	99	71,471	153	467	621,607	2,275	...	
	Kalri ...	196,162	595	230	459	...	...	...	15	...	845,120	2,569	...	
	Baghar ...	548,136	1,428	28	41	...	...	2,905	9	509	3,252,533	11,246	...	
	Uchitto ...	72,454	247	...	...	...	...	...	15	...	...	...	...	
	Canals in Mirpur ...	309,826	908	...	55	...	...	...	...	4	66,362	183	...	
	Pinyári ...	2,071,989	7,878	1,044	656	...	...	...	170	1,005	3,344	2,496,128	9,517	
	Canals in Sujáwal ...	340,775	1,053	115	115	...	...	...	...	...	...	167,519	797	
	Canals in Jati ...	63,250	185	11	...	...	...	...	...	...	...	275,076	907	
	Sattah... ..	134,050	367	...	12	3,600	10	...	...	...	...	517,875	1,763	
	Canals in Sháhbándar ...	19,665	122	...	...	...	...	...	...	...	...	507,860	1,381	
	Khanto ...	60,664	166	...	...	...	...	...	...	10	...	584,064	2,011	
	Kokawari ...	261,648	773	49	22	...	...	...	...	32	...	409,966	1,117	
	Bunds, Right Bank... ..	...	...	1,278	...	...	...	...	12	1,050	1,232	...	...	
	Bunds Left Bank ...	...	...	88	...	...	...	...	...	304	7,577	...	...	
Begári Canals.		17,408,027	1,04,179	6,336	2,478	...	...	...	5,123	7,793	1,591,244	9,950	3,012	
Shikárpur Canals		3,929,524	18,246	1,401	1,450	780,636	4,079	...	1,507	3,279	1,915,868	9,620	190	
Ghár Canals ...		6,630,907	31,519	3,509	5,603	...	...	...	1,349	3,267	4,509,592	19,507	...	
Western Nára		4,259,567	15,927	1,952	1,746	...	...	...	2,785	2,251	8,848,545	31,368	434	
Eastern Nára...		1,206,116	5,276	6,163	878	...	...	263	2,375	16,801	302,513	2,743	1,941	
Hyderabad Canals		23,986,220	1,06,516	360	7,487	...	...	...	1,507	106	3,159,688	12,182	...	
Fuleli Canals...		25,061,015	91,213	3,201	4,628	...	...	...	1,170	2,871	2,545,567	10,378	449	
Karáchi Canals		6,217,848	21,866	3,194	1,770	29,600	109	74,576	374	2,900	13,528	9,900,629	34,310	
Total		88,749,224	3,94,742	26,116	26,038	810,236	4,188	74,576	637	18,816	49,886	32,773,646	1,29,998	6,023

B.

debitable to the Canal Clearance Grant in 1894-95 in the province of Sind.

REPAIRS TO RIVER EMBANKMENTS.		IMPROVEMENTS TO LOOPS, &c., RIVER EMBANKMENTS.		Protecting slopes of Embankments and Canals.	Miscellaneous.	Contingences.	Advances.	Abkaini Expenditure, breaches, &c.	Total Works.	ESTABLISHMENT.				Total Works and Establish-ment.	Remarks.
Cubic feet.	Cost.	Cubic feet.	Cost.							Abkaini.	Revenue.	Works.	Total.		
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Rs.		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
...	...	...	...	...	3,992	655	...	829	90,716	2,065	1,778	1,477	5,320	96,036	
...	...	...	...	...	2,315	299	...	3,554	24,609	2,398	983	881	4,262	28,871	
...	...	...	...	...	329	184	...	2,088	24,037	3,294	2,217	1,539	7,050	31,087	
1,374,429	9,448	5,129,928	26,528	2,216	4,963	123	...	16,456	73,588	13,000	561	1,176	14,737	88,325	
907,828	4,380	...	...	768	3	560	...	72	26,672	2,705	791	2,390	5,886	32,558	
...	...	...	...	76	...	...	...	...	4,463	670	19	59	748	5,211	* Includes Rs. 39 for land compensation.
...	...	...	...	381	...	48	...	12	11,415	1,521	451	1,559	3,531	14,946	
2,410,313	20,168	3,482,756	33,794	118	*237	914	...	5,666	63,839	6,530	219	689	7,438	71,277	
432,744	2,348	3,046,000	24,226	339	...	135	...	793	28,361	699	85	263	1,047	29,408	
...	...	...	...	...	6,987	207	...	...	52,905	4,135	1,388	4,470	9,993	62,898	† Includes Rs. 37 for refund of revenue.
609,947	2,618	...	...	...	9,707	189	...	...	28,273	2,728	887	2,711	6,326	34,599	
...	...	...	...	...	1,504	39	...	...	4,727	2,680	376	976	4,032	8,769	
...	...	...	...	3	2,295	193	...	1,481	36,761	9,050	3,046	5,630	17,726	54,487	† Includes Rs. 190 for refund of revenue.
...	...	...	...	...	786	...	...	174	12,799	...	...	...	...	12,799	
...	...	...	...	...	6	...	...	...	1,203	2,591	556	597	3,743	4,946	
...	...	...	...	...	144	...	...	...	6,419	292	77	213	582	7,001	
...	...	...	...	...	...	...	...	...	1,857	301	149	294	747	2,604	
...	...	...	...	...	191	...	...	...	654	237	32	63	322	876	
...	...	...	...	...	...	...	...	...	232	118	20	59	197	429	
2,698,822	13,390	...	...	450	802	...	...	6,145	22,830	5,635	297	724	6,656	29,486	
...	...	...	...	...	...	...	...	...	61	...	...	1,525	1,525	1,586	
2,518,347	10,539	...	...	...	*7,046	...	...	467	33,096	5,346	1,439	2,388	9,173	41,269	* This includes Rs 200 for refunds of revenue.
134,974	6,172	...	...	...	1,105	...	...	1,271	24,174	2,583	2,544	2,705	7,612	31,786	
...	...	...	...	...	138	...	...	...	4,833	507	112	329	5,488	5,781	
...	...	...	...	...	90	...	...	...	151	...	...	...	...	799	
...	...	...	...	...	1301	...	...	52	2,080	1,083	1,778	838	3,699	5,779	† Do. Rs. 77 do.
...	...	...	...	...	135	...	...	2	4,348	508	169	380	1,057	5,405	
...	...	...	...	...	118	...	...	1,335	10,040	655	179	563	1,397	11,437	
...	...	...	...	...	302	...	...	1,374	13,574	740	459	1,086	2,285	15,859	
...	...	...	...	...	150	...	...	1	4,362	453	233	615	1,301	5,663	
...	...	...	...	...	391	...	...	177	18,091	1,140	299	969	2,403	20,499	
...	...	...	...	...	264	...	...	102	2,711	821	410	1,069	2,300	5,011	
...	...	...	...	...	259	...	...	...	4,087	246	180	400	826	4,913	
46,409	186	...	...	...	638	...	...	171	19,846	1,105	552	1,489	3,146	22,992	
...	...	...	...	...	597	...	...	562	25,934	1,726	770	2,385	4,881	30,815	
...	...	...	...	...	213	...	...	33	7,433	788	358	1,116	2,262	9,695	
...	...	...	...	...	169	...	...	38	9,741	524	311	742	7,577	11,318	
...	...	...	...	...	175	...	...	110	5,132	659	329	803	1,791	6,923	
...	...	...	...	...	370	...	...	180	10,911	417	176	493	1,086	11,997	
...	...	...	...	832	1,174	5	...	18,598	124,774	6,490	4,844	8,450	19,784	1,44,558	
156,713	636	...	...	1,610	170	...	...	3,371	15,422	1,715	408	1,139	3,257	18,679	
...	...	...	...	...	119	...	...	6	4,191	214	103	330	697	4,888	
...	...	...	...	...	46	...	-700	20	2,414	70	68	122	260	2,674	
...	...	...	...	...	168	...	-380	...	5,396	383	102	358	843	6,239	
...	...	...	...	...	365	...	-702	80	3,611	519	486	912	1,917	5,528	
...	...	...	...	...	405	...	-1,147	426	13,558	3,137	594	1,035	4,766	18,324	
...	...	...	...	...	20	...	...	...	282	...	...	...	...	282	
...	...	...	...	...	217	...	1,023	280	2,670	319	94	311	724	3,394	
...	...	...	...	...	622	...	-1,005	2,213	25,444	2,546	2,328	2,177	7,051	32,495	
...	...	...	...	...	203	...	540	6	2,829	89	37	113	239	3,068	
...	...	...	...	...	24	...	187	4	1,318	35	...	...	35	1,353	
...	...	...	...	...	69	...	1	149	2,371	170	66	139	375	2,746	
...	...	...	...	...	22	...	14	18	1,557	11	...	...	11	1,568	
...	...	...	...	...	161	...	824	9	3,181	237	60	280	577	3,758	
...	...	...	...	...	99	...	73	...	2,165	152	223	103	478	2,643	
5,453,969	20,392	3,28,488	1,533	219	974	...	40	762	27,497	4,403	1,036	1,650	7,092	34,584	
5,555,648	17,842	1,972,343	11,570	1,499	1,016	...	-3,557	2,019	33,358	5,232	1,185	1,885	8,302	46,660	
1,374,429	9,448	5,129,928	26,528	2,216	11,599	1,261	...	22,927	3,12,950	20,757	5,539	5,073	31,369	2,44,319	
3,750,885	26,896	6,528,756	58,020	1,682	240	1,657	...	6,543	1,34,750	12,125	1,565	4,960	18,650	1,53,400	
609,947	2,618	...	...	...	18,195	335	...	...	85,905	9,543	2,651	8,157	20,351	1,06,256	
2,698,822	13,390	...	...	...	488	4,224	193	7,797	89,655	18,227	4,176	7,570	23,973	1,12,628	
2,653,321	16,711	...	...	...	8,680	...	...	1,790	63,619	9,749	5,843	7,940	23,532	87,151	* Exclusive of Rs. 157 on account of contribution for repair to Zamindari sluices.
46,409	186	...	...	...	3,781	...	...	4,085	1,36,210	9,782	4,425	12,110	26,317	1,62,527	
156,713	636	...	...	...	1,344	...	5	21,969	1,40,196	8,205	5,247	9,589	23,041	1,63,237	
11,009,617	38,234	2,300,831	13,103	1,718	4,528	...	-4,789	5,999	1,86,837	17,517	6,385	9,465	33,367	1,70,204	
22,300,143	1,08,119	18,969,515	97,651	8,646	52,594	3,451	-4,789	71,103	9,93,122	1,05,905	35,831	64,864	2,06,600	11,99,722	
As per booked accounts ...									11,19,557	1,05,905	35,831	64,864	2,06,600	11,26,157	† The difference of Rs. 1,26,435 represents expenditure chiefly on special repairs.

APPENDIX C.

Statement showing the Expenditure incurred on Work Establishment employed in the Deccan Districts during the year 1894-95, 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
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1	Mutha Canals ...	42,372	5,405	47,777	23,614	4,370	27,984	75,761	1,632	7,777	9,409	12.42	
2	Poona Water Supply ...	...	614	614	...	10,917	10,917	11,531	273	2,498	2,771	24.03	
3	Nira Canal ...	53,244	...	53,244	33,702	10,810	44,512	97,756	2,802	12,153	14,955	15.20	
4	Other Poona Irrigation Works ...	...	935	935	...	1,671	1,671	2,606	...	1,924	1,924	73.81	
5	Sholapur Irrigation Works ...	...	...	...	14,106	16,356	30,462	30,462	891	1,249	2,140	7.02	
6	Ahmednagar Irrigation Works ...	...	...	...	623	5,769	6,392	6,392	453	2,592	3,045	47.64	
7	Násik Irrigation Works ...	...	...	...	6,223	2,361	8,584	8,584	720	1,503	2,223	25.90	
8	Khándesh Irrigation Works ...	...	...	...	31,990	14,795	46,785	46,785	2,057	3,572	5,629	12.00	
9	Hubli Water Works... ..	...	...	...	5,029	2	5,031	5,031	197	301	498	9.90	
10	Dhárwár Irrigation Works ...	...	...	...	21,653	36,042	57,695	57,695	1,128	2,334	3,462	6.00	
	Total ...	95,616	6,954	1,02,570	1,36,940	1,03,093	2,40,033	3,42,603	10,153	35,903	46,056	13.44	



Statement showing the Results of Run-off from Catchment Areas of Tanks in the Deccan for the year 1894.

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
Khândesh	Mukti Tank ...	1894 ...	34.2	18.47	1,467.50	177.00	.120	Rainfall from 6th June to 27th October 1894. From the time when the tank commenced filling to 27th October the water-level did not reach to full supply capacity.
	Mhasva Tank ...	Do. ...	13.4	18.81	585.57	110.05	.188	The tank was at its lowest water-level on 6th June and filled to overflowing on 10th September 1894. Rainfall taken between these dates.
	Hartála Tank ...	Do. ...	6.8	33.91	535.70	86.76	.162	Tank at its lowest capacity on 10th June and filled on 27th October 1894. Rainfall taken between these dates.
Ahmednagar	Bhatodi Tank	Do. ...	44.0	13.19	1,348.29	115.086	.085	Tank was at its lowest water-level on 8th June and filled up to crest of waste weir on 11th September 1894. Rainfall taken between these dates.
Násik	Pársul Tank ...	Do. ...	17.75	7.61	313.81	106.01	.338	Tank was at its lowest level on 10th June and filled up to overflowing on 8th August 1894. Rainfall taken between these dates.
	Wághad Tank ...	Do. ...	29.0	54.97	3,703.482	3,031.002	.82	Rainfall from 5th July to end of October. Tank filled on 24th July 1894. The highest flood gauged occurred on 21st July = 4,768 c. ft. per second = $\frac{1}{4}$ of rainfall per hour on the catchment area. The rainfall is the average of 3 gauges in the catchment, and columns 6 and 8 are derived accordingly.
Poona	Shirsuphal Tank ...	Do. ...	23.5	15.24	832.02	680.30	.818	This tank was empty on 3rd September and was replenished on 7th September 1894. The tank did not overflow this year. Rainfall, June to October, 5 months.
	Bhádálwádi Tank ...	Do. ...	23.0	14.23	760.36	100.43	.132	This tank did not overflow this year. Rainfall, June to October, 5 months.

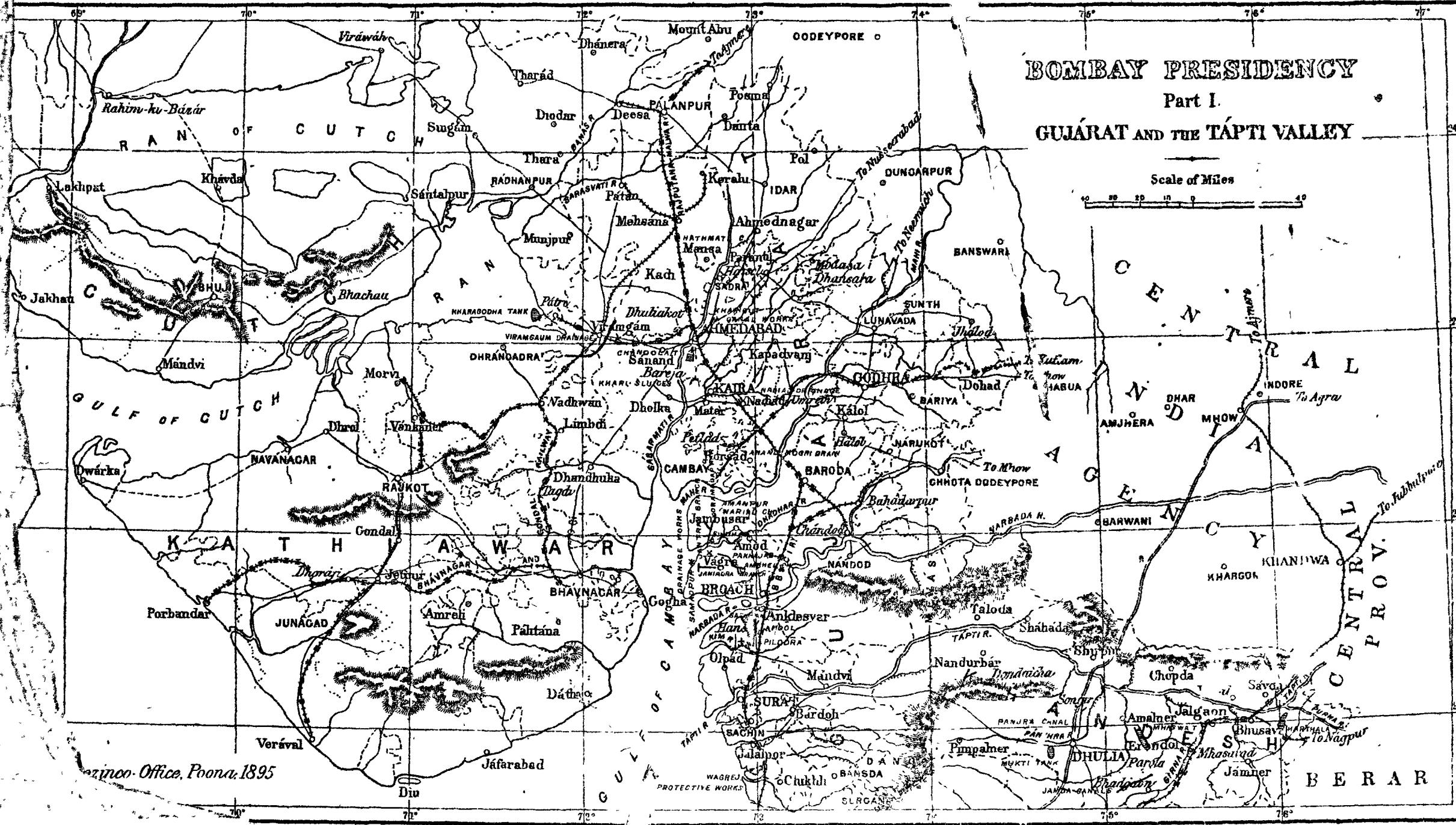
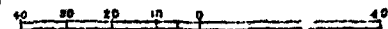
Sholápur	Mhasvad Tank	...	Do.	...	480	18.36	20,473.89	2,009.21	.098	Rainfall from June to October 1894. The waste weir began to overflow on 2nd October 1894, the run-off to that date being .103.
	Ekruk Tank	...	Do.	...	159	18.54	6,848.46	1,403.13	.204	Rainfall from June to October 1894. The waste weir did not overflow this year.
	Ashti Tank	...	Do.	...	92	21.62	4,621.00	543.57	.118	Do. do.
	Koregaon Tank	...	Do.	...	4.40	22.60	231.01	147.73	.639	Rainfall from June to October 1894. The waste weir began to overflow on 13th September 1894, the run-off to that date being 0.496.
Dhárwár	Asundi Tank	...	Do.	...	23	13.29	710.132	22.161	.031	Rainfall from 1st June to end of October 1894. The tank overflowed on the 5th and 6th June and the run-off is 0.353; the tank overflowed for 36 hours, the calculated discharge was 18.44 millions cubic feet; the actual run-off, column 7, was therefore $22.16 + 18.44 = 40.60$ millions cubic feet and the proportion of run-off to rainfall, column 8 = .057.
	Medleri	...	Do.	...	11	8.99	229.741	19.067	.0829	Do. The tank did not fill.
	Dámbal	...	Do.	...	43	12.54	1,252.716	86.381	.0689	Do. do.
Bijápur	Muchkundi Tank	...	Do.	...	26	15.44	932.625	154.066	.165	Do. do.
	Sátára	Nehr Tank	Do.	...	59.50	30.02	4,149.67	637.83	.154	The run-off is calculated from 20th May, <i>i. e.</i> from beginning of replenishment to 18th October. The tank filled on the latter date.
Do.			...	59.50	33.63	4,648.68	794.08	.171	The run-off is calculated from 20th May to 31st October.	
Maini Tank		...	Do.	...	54.00	11.49	1,441.45	143.02	.099	Do. from 1st June to 26th September, <i>i. e.</i> the beginning of replenishment to 26th September. The tank filled on the latter date.

# BOMBAY PRESIDENCY

## Part I.

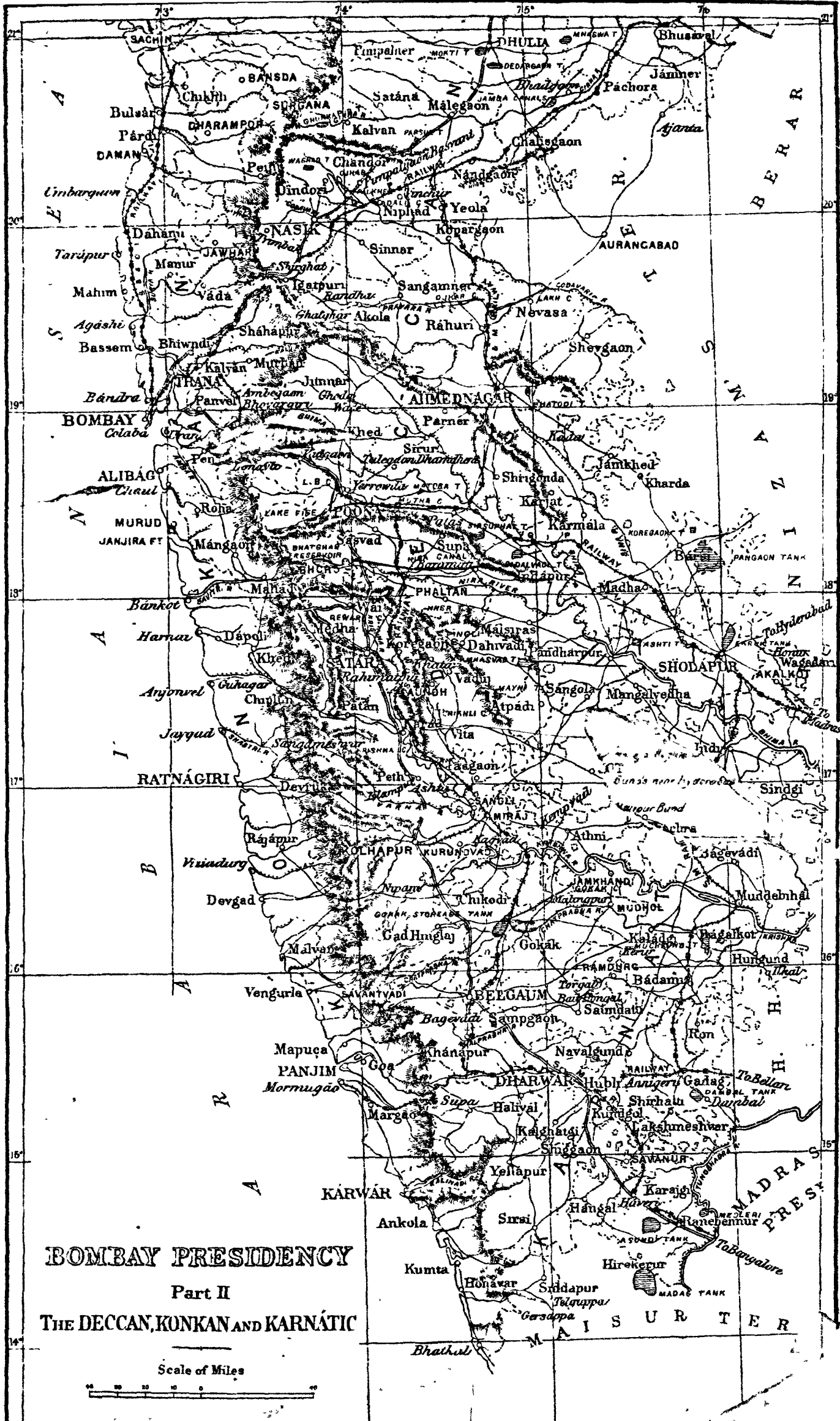
### GUJARAT AND THE TÁPTI VALLEY

Scale of Miles

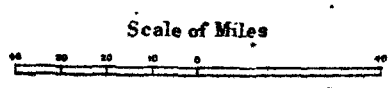


Survey Office, Poona, 1895

- JAMBHATI (1) AMANPUR NARIAD CHANNEL
- TALVA (2) KORA NADI CANAL
- KVADVA (3) SAMADRI KADODIA PANJA RACI NADI
- TANPRESHVAR (4) SATHIYAN ARCOL PILDORA
- KYACRA (5) PAKHILAN MBIKI
- AMBAR (6) SINDHAD

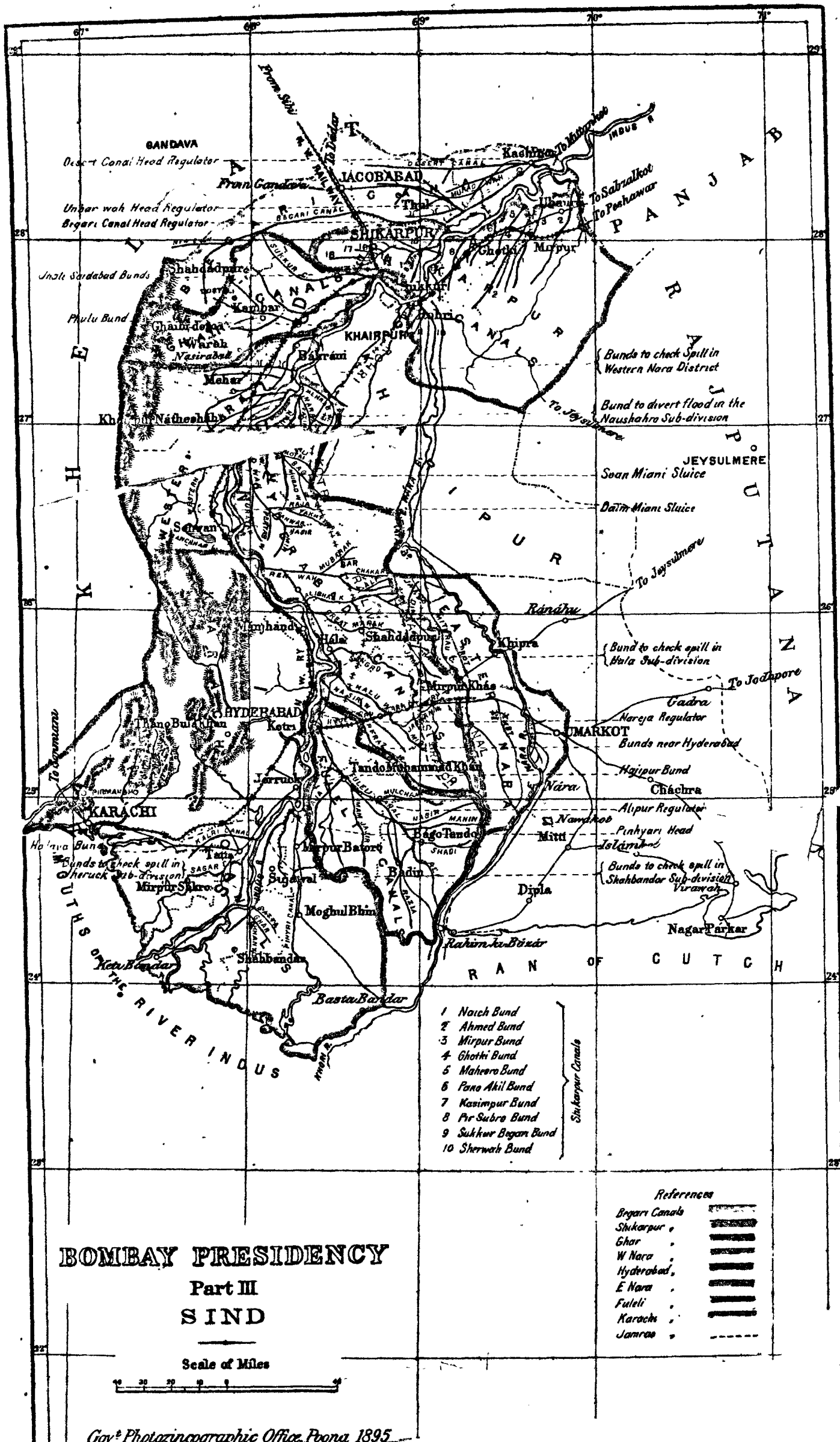


**BOMBAY PRESIDENCY**  
**Part II**  
**THE DECCAN, KONKAN AND KARNATIC**



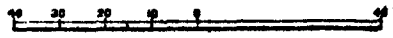
Govt Photoduplco. Office, Poona, 1895

Govt Photoduplco. Office, Poona, 1895



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

Scale of Miles



- 1 Naich Bund
- 2 Ahmed Bund
- 3 Mirpur Bund
- 4 Ghotki Bund
- 5 Maheero Bund
- 6 Pano Ahil Bund
- 7 Kasimpur Bund
- 8 Pir Sabro Bund
- 9 Sukkur Begam Bund
- 10 Sherwah Bund

Sikarpur Canals

**References**

- Begari Canals
- Shikarpur
- Ghor
- W Nara
- Hyderabad
- E Nara
- Fuleli
- Karachi
- Jamrao