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MADRAS RECORD OFFICE

Government of Madras

Public Works

DEPARTMENT

G.O. No.	25754	Press	<i>Original</i>
~~B.P.~~ No.	2575A.	~~Mis~~	
Dated	27. 9.	195	1876

Not to be folded or roughly handled

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Read the following —

No 191-W.

No 445

Note by the Chief Engineer for Irrigation.

With his letter, No 320, of the 9th May, the District Engineer, Godavery, transmitted an estimate* for raising the left bank of the Godavery from Rajahmundry, the anicut, and the same bank of the Gowtami Godavery from the anicut to the sea to a uniform level of 4 feet above the highest recorded level reached by the river, the highest freshes known being those of 1853 and 1861

2. The high freshes in the Kistna, Pennair, and other rivers in 1874 drew attention to the necessity for ascertaining the condition of important river embankments generally, and a warning was accordingly sent to the Godavery as it seemed not improbable that, amidst the numerous pressing demands on the time and attention of the Public Work Officers there, the embankments might not have received as much consideration as is necessary. The warning would have been better had it been sent a year or two sooner, for in July 1875 a fresh, which appears to have equalled the highest of former years within a quarter of a century, occurred, and, as recorded in

the Proceedings as per margin, breached the embankments in several places, but happily the weak points were so situated as to result in no great amount of damage from the ingress of flood water

3. It must be noticed that, although the investigations on which the estimate for rendering this line of embankment safe was prepared appeared to have been carefully conducted, it was not sufficiently clearly explained on what data the flood levels of 1853 and 1861, which are referred to as the highest, had been based, and this office, which has been in existence only about eight years, did not possess the information which would enable an explanation to be given. A reference was therefore made to the District Engineer, and, as a result, the estimate has been slightly revised. The particulars will be found in this office, Nos 58 and 60 G D, of the 31st May and 7th June last, and in the District Engineer's reply, No 1,489, of the 28th ultimo. On one point only is the information still deficient, and that is as to the extent of Government and Zemindari lands respectively protected. The officer in charge of the district states that it is impossible to say how far flood waters might spread were there no banks, but this being a question determinable from flood and land levels, no serious difficulty in solving it should have been experienced. It is believed, however, that in the tract of country affected there is no such extent of Zemindari land as would make any sensible difference in the amount of Imperial expenditure even were Zemindars likely to contribute

4. The part of the embankment above the anicut to be improved under this estimate extends to Rajahmundry a distance of about $4\frac{3}{4}$ miles, beyond this the embankment up to the terminus at Purushottaputnam is under improvement on

M CH 4 62 Proceedings, Madras Government, No 1,251, dated 14th May 1872 Proceedings, Madras Government, No 1,998, dated 4th August 1876 Revised estimate, Rupees 1,48,730.	an estimate sanctioned in the Proceedings as per margin. The arrangements on this side of the river above the anicut will therefore be complete throughout, while for the embankment below the anicut the
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*Proceedings of the Madras Government, Public Works Department,
27th September 1876. No 2,575-A*

estimate provides for raising the entire length to Yanam. In G O of the 27th July 1875, No 2,174, an estimate* for raising these banks from 5 miles above to 5 miles below the anicut was sanctioned as a precautionary measure, in anticipation of the submission of a complete estimate, and the amount so sanctioned has been deducted by the District Engineer, but it will simplify matters to make the sanction for the present estimate supersede that of July 1875. The District Engineer has further made a deduction of Rupees 4,595 on account of the work to the embankments in some parts which can be carried out without additional expense in conjunction with the improvement of the Bank canal now under execution.

5 The following abstract gives a general view of the estimate mile by mile.

Position.	Miles	Amount	Deduction for Bank Canal.	Amount to be sanctioned.	Remarks
Above anicut to Rajah-mundry		RS	RS	RS	
	1	3,920	..	3,920	Top 4 feet above M F L
	2	1,293	..	1,293	Top width 12 feet
	3	2,069	..	2,069	Slopes 1½ to 1
	4	1,970	...	1,970	Length 4 miles 62 chains
	5	2,044	..	2,044	
				11,296	Per mile Rupees 2,366
Below anicut to Yanam	1	1,220	...	1,220	Top 4 feet above M F L
	2	560	..	560	Top width 12 feet
	3	490	..	490	Slopes 1½ to 1
	4	1,550	..	1,550	Length 10 miles
	5	1,170	..	1,170	
	6	1,760	..	1,760	
	7	3,260	...	3,260	
	8	520	..	520	
	9	750	..	750	
	10	1,910	..	1,910	
				13,190	Per mile Rupees 1,319
	11	690	..	690	Top 4 feet above M F L
	12	690	..	690	Top width 9 feet
	13	560	..	560	Slopes 1½ to 1
	14	1,020	..	1,020	Length 28 miles 69 chains
	15	1,250	..	1,250	
	16	1,020	..	1,020	
	17	940	..	940	
	18	2,910	..	2,910	
	19	1,220	..	1,220	
	20	960	..	960	
	21	1,750	..	1,750	
	22	1,720	465	1,255	
	23	2,810	660	2,150	
	24	1,410	430	980	
	25	1,210	170	1,040	
	26	1,170	140	1,030	
	27	1,830	50	1,780	
	28	2,740	15	2,725	
	29	820	115	705	
	30	470	220	250	
	31	620	400	220	

*Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A.*

Position	Miles	Amount	Deduction for Bank Canal	Amount to be sanctioned	Remarks
		RS	RS	RS	
	32	880		880	
	33	920	710	210	
	34	1,510	600	910	
	35	1,940	124	1,816	
	36	1,770	440	1,330	
	37	1,730	56	1,674	
	38	1,010		1,010	
	39	529		529	
		38,099	4,595	33,504	Per mile Rupees 1,161
				57,990	Total length 43 miles 51 ch

6 The sections show clearly the present state of the embankments, their irregularity of level, and the urgent need of reformation, and the figures above given afford a similar indication.

7. The provision* in the Budget of 1876-77 on account of this and other flood embankments was shown under Ordinary† Agricultural Works for which no Capital or Revenue Accounts are kept, and the amount was struck out of the grants as passed by the Government of India in their orders on the Budget Estimates. It would appear to be desirable that one-third of the estimate should be made available for expenditure during the current official year, and that the embankment should be fully completed next year.

8. The area of country protected has not been ascertained. It is probably about 100 square miles. Below the head of the Coringa canal in the 14th mile of the Bank canal the Taku drain would ordinarily be the limit of spill from the river. Before the Coringa and Injeram canals were constructed spill might have extended, and probably did extend, over nearly double the above area.

9 Estimates for other flood embankments will be submitted in due course.

OOTACAMUND, (Signed) JOHN MULLINS, Lt-Col, R E,
19th September 1876. Chief Engineer for Irrigation
To the Secretary to Government, Public Works Department

From Major J BEATTY, R E, District Engineer, Godavery, to Lieutenant-Colonel J MULLINS, R E, Chief Engineer for Irrigation, dated Dowlaishweram, 9th May 1876, No 320

I HAVE the honor to forward herewith an estimate, amounting to Rupees 48,000, of the cost of raising the 41 miles of river embankment of the Godavery, from Rajahmundry to Yanam, to a height of 4 feet above the highest recorded floods, viz, those of 1833 and 1861.

2 The longitudinal section shows how the bank stood in the early part of last official year before any of the raising proposed in the estimate sanctioned in G O, No 2,174, of 27th July 1875, had been carried out.

3 That estimate provided for raising the embankment from Rajahmundry to 5 miles below Dowlaishweram to a height of 3 feet above the highest floods. A deduction of the amount of that estimate, Rupees 7,890, has been made in the present estimate. The average height of the embankment was found to be 5.87 feet, and the estimated raising would make it 7.75 feet.

4 The Executive Engineer has proposed making the width at top 4 yards, because he considers that width the "least that can be adopted for this bank over which there is at all seasons and more especially during the period the canals are closed, a large traffic of men as well as of cattle and bandies." He also observes that "were the bank made 3 yards in width at top, it would in one season dwindle down to 2 yards or less, as it would be impossible to keep cattle from using it as a highway."

5 The estimate provides for raising the walls of the Dowlaishweram lock and the masonry revetment from the lock to the Workshops, but it does not include any raising at the Workshop which was provided for in a separate estimate.

6 Provision is also made for gravelling the top of the embankment from Rajahmundry 1 mile below the anicut, that being the part over which there is the heaviest traffic, and this is considered necessary for the safety of the bank.

7 With regard to the surface slope of the river in the 44 miles now under consideration, this was determined by Captain Brockman from observations taken during the high fresh of July 1875 at Rajahmundry, Dowlaishweram, and Bramhapuri, by adding 2½ feet to raise the level to that of the extraordinary floods of 1853 and 1861. Below the anicut the Divisional Officer had already found by observations taken at different points along the river's margin of the maximum level of the 12 feet fresh of 9th September 1873, that the surface slope along the embankments of the Eastern Delta was very uniform and about 1 foot per mile. Observations were, however, taken at Bramhapuri (33 miles) in the fresh of 1875 to determine this more accurately, and these gave an average slope of 1.1 foot per mile up to that point. Captain Brockman has carried this slope on up to Yanam, but it seems probable that below Bramhapuri as the waters of the Godavery approach the sea the slope would gradually become flatter. I have shown what this flatter slope would probably be by a blue dotted line on the longitudinal section, sheet No 4. But I have not thought it necessary on this account to alter the estimate.

8 No deduction had been made for earthworks of the Bank canal improvements which might be respected to aid in this work, as the Executive Engineer is of opinion that the deduction on this account will be trifling, and considers it impossible to calculate it with any degree of accuracy, along much of the line the embankment is at too great a distance from the canal, in others it is so far off, that extra rates would have to be given if the earth from the canal is to be put into the embankment and the heaviest portion of the canal earthworks had been executed before the embankment. Sections now furnished were prepared. I propose that a deduction of 10 per cent be made from the present estimate on this account, the amount to be sanctioned will then be Rupees 48,000 — 4,800 = Rupees 43,200.

9 I had also an approximate estimate prepared of the cost of raising to 6 feet above maximum flood level, which came to Rupees 99,000. As stated in submitting former estimates of the same nature, I am of opinion that with a sufficient width of bank a height of 4 feet will probably be found ample.

10 In the Irrigation Budget of the present year a sum of Rupees 30,000* has been provided for raising embankments in this district. I beg to suggest that this sum be allotted in equal proportions to the Rajahmundry Division and to the three Delta Divisions to enable the Range Officers to strengthen the lowest and weakest portions of their embankments. The estimates for the right bank of the Gowtami and for the right and left banks of the Vasista are now ready and will be submitted immediately.

* Item No 46, Part III

List of Enclosures

- 1 Plan of longitudinal section of embankment of Godavery below Rajahmundry
- 2 Do of longitudinal section of embankment of Gowtami Godavery left bank from head sluice to 15th mile
- 3 Do of section from 15th to 30th mile
- 4 Do of section from 30th to 39th mile
- 5 Do of cross sections of embankment of Godavery below Rajahmundry
- 6 Do of cross sections of embankment of Godavery from head sluice to 39th mile
- 7 Abstract estimate for raising and widening the embankment of Gowtami Godavery
- 8 Specification for the improvements proposed to be made to the embankment of Gowtami Godavery.

No 58 G D

MEMORANDUM

With reference to the letter, No 320, of the 9th instant, from the District Engineer, Godavery, transmitting an estimate for improving the Godavery embankments from Rajahmundry to Yanam, the undersigned has the honor to request information on the following points —

Rupees 43,200 (balance)

1st — It is noted that the "maximum flood level above anicut in the freshes of 1853 and 1861" was "53.25," and the cost of the anicut being 38.00, the difference is 15.25. The anicut has since those years been raised,* and this

Longitudinal Section, Sheet 1
* 1862-63 to 1864-65

would in some small degree affect the level of the highest fresh before such raising was carried out. Has this been taken into account, and, if so, what is the connection due thereto? Again, the undersigned visited the delta about 1865 or 1866, and he was then told that the highest fresh shown by the registers read "29 feet 8 inches on the gauge, or 15 feet 8 inches above the crest of the anicut," and probably this fresh was that of 1853, as in the District Engineer's No 1,334, of the 30th July 1875, it is said that the fresh of July 1861 "rose to 15 feet 3 inches above the present level of the anicut."

Moreover, if this remark be perfectly correct, it would seem to follow that to the actual level then reached must be added something less than the height added to the anicut after 1861, in order to find the corresponding level for that fresh with the higher anicut. Further, unless the undersigned was misinformed, there was an earlier fresh of 15½ feet on the lower level of the crest, and this would represent a depth somewhat less than 15½ feet on the raised anicut. If the tail water levels are known, the calculation can be made, otherwise the full depth of the maximum fresh, whatever it may be, will have to be taken into account.

2nd — A note on this sheet runs thus — "The difference in the level of maximum flood above and below the anicut is assumed to be 75 feet" what was the actual difference in the flood of 1875?

Sheet 2

3rd — In paragraph 7 of his letter, the District Engineer remarks on the way the probable surface slope of a maximum fresh has been determined, and he concludes that the continuation of the observed slope above the 33rd mile may be flattened as it approaches the sea, and he has shown on the longitudinal section, sheet No 4, by a dotted blue line the flattening he thinks probable, the difference at Yanam being 1.23 feet. He has not, however, recorded the actual flood level at Yanam of the 1875 fresh, and this being accurately ascertainable, and its ascertainment having been directed* in connection with the Polaveram island embankments, it will be much more satisfactory to show conclusively what the surface slope was from Bramhapuri (33 miles) to Yanam than to leave the correctness of the flood section doubtful.

11 00
9 77
1 23

* Procs, Madras Govt, No 698, dated 17th March 1876

*Proceedings of the Madras Government, Public Works Department,
27th September 1876 No. 2,575-A.*

4th —No reference has been made to any revision of the alignment of the embankment, and the undersigned has not with him any survey which would show whether any part of the old line is in need of alteration. Paragraph 8 refers to the embankment work which may be done in connection with the Bank canal, and it should, it is thought, be considered whether, with reference thereto, it will not be desirable to change the line in places, if, by so doing, an improvement would be effected at a not greater or perhaps at a less cost than the raising of the present line would entail. The undersigned has called for the chart surveys, which he believes are in his office at Madras, and, if necessary, further observations on this point will be made, but it will probably save time to request the District Engineer's attention to it at once.

5th —With regard to the deduction of 10 per cent on account of savings under embankment by the utilization of soil from the Bank canal, the undersigned thinks that it may probably be easily settled in what miles this arrangement may be feasible, and that the deduction should be made not by a percentage on the whole estimate, but by one on those parts of the estimate affected. The Bank canal cannot affect the embankments above the anicut and the raising of the lock wall, on the other hand the little raising in the 1st mile can probably be done from the main canal excavations. It seems therefore that it will be better in many respects to show in what miles the embankment work can be wholly or partly done from canal excavations without additional expense, or with merely a change for more careful levelling and sectioning than might otherwise be necessary.

6th —The estimate of Rupees 7,890 sanctioned in G O, No 2,174, of the 27th July 1875, for the length from Rajahmundry to 5 miles below the anicut, of which latter it is to be remarked that the 2nd and 3rd miles require no raising, and the other three but little, has been deducted from the general estimate for the 43½ miles, but, on referring to the Proceedings of the Madras Government, it is noticed that the rate for part of the earthwork is 2 Annas a cubic yard, while that for the whole of the earthwork in the general estimate is 1½ Annas. It has to be remembered that there will be difficulties in the future in the audit of expenditure if the estimate be not a fairly close approximation to the facts. The calculations of quantities have doubtless been made mile by mile, and, if so, it would seem advisable that an abstract should be prepared for the several miles.

7th —Attention, moreover, has not been paid to the requirements of Proceedings of the Madras Government, No 1,968, of the 10th July 1875, and a classified abstract is required of the kind laid down on the 9th page. That classification is not very appropriate, but at any rate the abstract must be made not under—

L —Land
C —Masonry works.
L —Earthworks

It appears further to be necessary to provide for establishment at the rate of 25 per cent on the total for works. Tools and Plant may not be required, but to show that this item has not been overlooked, this class should be exhibited in the estimate.

8th —Throughout the cross sections the additions are shown to be intended to be made entirely behind the present embankments, and it is considered that at any rate where these are now below M F L, it is preferable to place the widening on the river side rather than the inside.

31st May 1876

(Signed) JOHN MULLINS, Lieut-Col, R E,
Chief Engineer for Irrigation.

No 60 G D
MEMORANDUM.

In continuation of the memorandum as per margin on the Godavery river embankment estimates, the undersigned has the honor to request the District Engineer, Godavery, to be good enough to furnish information as to the area of Government and Zemindari lands respectively which will be protected by the embankments.

7th June 1876

(Signed) JOHN MULLINS, Lieut-Col, R E,
Chief Engineer for Irrigation

*Proceedings of the Madras Government, Public Works Department,
27th September 1876 No 2,575-A*

From Lieutenant D McNEIL CAMPBELL, R E, Executive Engineer in charge Godavery District, to Lieutenant-Colonel J MULLINS, R E, Chief Engineer for Irrigation and Joint Secretary to Government, Public Works Department, dated Dowlaishweram, 28th August 1876, No 1,489

With reference to your memoranda, Nos 58 G D and 60 G D, dated 31st May and 7th June 1876, respectively, I have the honor to forward plans and estimates as per margin for improving the Godavery embankment from Rajahmundry to Yanam

17 Sheets, Survey Plans
1 Abstract Estimate
1 Classified Abstract
1 Specification
20

The greatest floods known were in the years 1853 and 1861 when the river rose to 12 feet over the anicut, or to M S L + 53.25, but it appears to be doubtful whether there was a previous fresh that rose to a level of + 53.67, consequently to be on the safe side, this has been assumed to be the level of water above anicut, and the bank is estimated to be 4 feet above this level. The surface fall of river from Rajahmundry to Dowlaishweram during the flood of 1875 was ascertained by Captain Brockman, R E, to be 1.48 a mile, consequently the top of the bank has been given this fall, so as to be throughout 4 feet above highest flood. There is not sufficient data to enable me to ascertain the effect on the river caused by the anicut having been raised.

3 In the flood of 1875 the register gave a difference of level above and below the anicut of 75, and for want of any information on the subject, it is assumed that this difference will hold good with the river 65.67 feet above anicut, therefore, the level of water below has been taken as 52.92 feet, and the bank made 4 feet above this level.

4 The surface fall below the anicut was registered during the floods of July 1875 at the following places with the results given—

Cotipilly + 23.77
Bramhapuri + 16.55
Yanam + 9.84

The bank has been made 4 feet above these levels, for, though at the anicut the water is assumed to be more than 2 feet above the water level of 1875, it is believed that this would cause a very slight rise so low down the river.

5 From Rajahmundry to a distance of 10 miles below Dowlaishweram the bank is made 12 feet, as this portion is much used by bandies, from thence to Yanam it is to be 9 feet wide, this width is considered necessary, as in the dry weather there is a good deal of traffic, the side slopes have been made throughout 1½ to 1.

6 The alignment appears to be generally good, in one or two places the bank approaches nearer the river than is perhaps safe, but I have not thought it advisable to alter this line, till that for the Bank canal is settled, which will probably be done by you during your tour in the district this year. Any throwing back of the bank will cause a very slight difference in an estimate of this large amount.

7 When the bank does not follow the line of the canal, I have allowed cattle crossings at the several villages, it is presumed that the other crossings will be paid for from the canal estimate.

8 The amount of earthwork to be charged to the canal has been estimated in detail, and amounts to Rupees 4,595 out of the total of Rupees 50,080.

9 An abstract estimate, showing the cost of the work, mile by mile, is herewith forwarded, the amount previously sanctioned in G O, No 2,174, of 27th July 1875, being deducted in the manner suggested by you. A classified abstract is also attached.

10 Whether the additions are made behind or on the river side of the embankment will not alter the estimate, and I am of opinion that, if placed on the river side, the new earth will probably be partly washed away, however you appear to think differently, so the alteration can be made in carrying out the work. The amount of Zemindari and Government lands protected cannot be ascertained, as it is impossible to say how far flood water might spread were there no banks.

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A

Mileage Abstract Estimate

Quantity	Description of Work	Rate	Amount	Total
		RS A P	RS A P	RS
RAISING AND WIDENING THE RIVER EMBANKMENT FROM DOWLAISHWERAM HEAD SLUICE TO RAJAHMUNDY				
In 1st Mile				
5,464½ C ft	Rubble masonry 100 C ft	9 5 0	508 14 1	
1,836 S ft	Dressing and pointing with chunam ..	7 0 0	128 8 4	
825½ C ft	Coping stone in chunam ..	22 4 0	183 9 10	
9,347 C yds	Earthwork .. C yd	0 2 0	1,168 6 0	
15,571½ "	Do .. " C yd	0 1 4	1,297 9 10	
10,240 C ft.	Gravelling .. 100 C ft	2 2 0	217 9 7	
7,431 S yds	Turfing ... S yd	0 0 4	154 13 0	
	Contingencies ..	...	3,659 6 8	
			260 9 4	3,920
2nd Mile				
12,595½ C yds	Earthwork .. C yd	0 1 4	1,049 9 9	
8,728½ S yds	Turfing .. S yd	0 0 4	181 13 4	
	Contingencies ..	...	1,231 7 1	
			61 8 11	1,293
3rd Mile				
18,725 C yds	Earthwork ... C yd	0 1 4	1,560 6 8	
14,862½ S yds.	Turfing .. S yd	0 0 4	309 10 0	
	Cattle crossing ..	...	100 0 0	
	Contingencies ..	...	1,970 0 8	
			98 15 4	2,069
4th Mile.				
17,728 C yds	Earthwork .. C yd	0 1 4	1,480 10 8	
14,140 S yds	Turfing .. S yd	0 0 4	294 9 4	
	Cattle crossing ..	...	100 0 0	
	Contingencies ..	...	1,875 4 0	
			94 12 0	1,970
5th Mile.				
20,102½ C yds	Earthwork .. C yd	0 1 4	1,700 3 4	
11,837 S yds.	Turfing .. S yd	0 0 4	246 9 8	
	Contingencies ..	...	1,946 13 0	
			97 3 0	2,044
RAISING AND WIDENING THE RIVER EMBANKMENT FROM HEAD SLUICE TO 39TH MILE NEAR YANAM				
1st Mile				
4,681 C yds	Earthwork ... C yd	0 1 4	390 1 4	
11,338 S yds	Turfing .. S yd	0 0 4	236 3 4	
782½ C yds	Gravelling .. C yd	0 9 0	440 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	1,166 4 8	
			53 11 4	1,220

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Mileage Abstract Estimate—(Continued)

Quantity	Description of Work	Rate	Amount	Total
		RS A P	RS A P	RS
2nd Mile				
12,789 S yds	Turfing .. S yd	0 0 4	266 0 0	
	Cattle crossing ..	...	170 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	24 0 0	560
3rd Mile				
12,789 S yds	Turfing .. S yd	0 0 4	266 7 0	
	Cattle crossing ..	...	100 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	466 7 0	
			23 9 0	490
4th Mile.				
12,900½ C yds	Earthwork ... C yd	0 1 4	1,075 1 0	
14,618 S yds	Turfing .. S yd	0 0 4	304 8 8	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	1,479 9 8	
			70 6 4	1,550
5th Mile				
9,269½ C yds	Earthwork .. C yd	0 1 4	772 7 1	
11,680 S yds	Turfing .. S yd	0 0 4	243 5 4	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	1,115 12 5	
			54 3 7	1,170
6th Mile				
10,880 C yds	Earthwork ... C yd	0 1 4	906 10 8	
23,716½ S yds	Turfing .. S yd	0 0 4	494 1 6	
	Cattle crossing ..	...	170 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	1,670 12 2	
			89 3 10	1,760
7th Mile				
30,042 C yds	Earthwork .. C yd	0 1 4	2,503 8 0	
16,220 S yds	Turfing .. S yd	0 0 4	337 14 8	
	Cattle crossing ..	...	170 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	148 9 4	3,260
8th Mile				
584½ C yds.	Earthwork .. C yd	0 1 4	32 0 10	
12,656½ S yds	Turfing .. S yd	0 0 4	263 10 11	
	Cattle crossing ..	...	100 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	24 4 3	520
9th Mile				
3,088 C yds	Earthwork .. C yd	0 1 4	257 5 4	
9,180 S yds	Turfing .. S yd	0 0 4	191 4 0	
	Cattle crossing ..	...	170 0 0	
	Compensation for land ..	...	100 0 0	
	Contingencies ..	...	718 9 4	
			31 6 8	750

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A.

Mileage Abstract Estimate—(Continued)

Quantity	Description of Work	Rate	Amount.	Total
	10th Mile	RS. A P	RS. A P	RS
14,251 C yds	Earthwork .. C yd	0 1 4	1,187 9 4	
16,983 S yds	Turfing .. S yd	0 0 4	353 13 0	
	Cattle crossing ..		170 0 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		98 9 8	
				1,910
18,421 S yds.	11th Mile			
	Turfing .. S yd	0 0 4	383 12 8	
	Cattle crossing ..		170 0 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		36 3 4	
				690
1,277½ C yds.	12th Mile			
16,867 S yds	Earthwork .. C yd	0 1 4	106 7 8	
	Turfing .. S yd	0 0 4	351 6 4	
	Cattle crossing ..		100 0 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		32 2 0	
				690
2,191 C yds.	13th Mile			
12,013 S yds.	Earthwork .. C yd	0 1 4	182 9 4	
	Turfing .. S yd	0 0 4	250 4 4	
	Compensation for land ..		100 0 0	
	Contingencies ..		27 2 4	
				560
5,241½ C yds	14th Mile			
21,213 S yds	Earthwork .. C yd	0 1 4	436 12 5	
	Turfing .. S yd	0 0 4	441 15 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		41 4 7	
				1,020
9,115½ C yds	15th Mile			
12,375½ S yds.	Earthwork .. C yd	0 1 4	759 9 9	
	Turfing .. S yd	0 0 4	257 13 2	
	Cattle crossing ..		80 0 0	
	Compensation ..		100 0 0	
	Contingencies ..		52 9 1	
				1,250
7,669 C yds	16th Mile			
11,308 S yds	Earthwork .. C yd	0 1 4	639 1 4	
	Turfing .. S yd	0 0 4	235 9 4	
	Compensation for land ..		100 0 0	
	Contingencies ..		45 5 4	
				1,020
6,597½ C yds	17th Mile			
11,740 S yds	Earthwork .. C yd	0 1 4	549 12 11	
	Turfing .. S yd	0 0 4	244 9 4	
	Compensation for land ..		100 0 0	
	Contingencies ..		45 9 9	
				940
23,726½ C yds.	18th Mile			
18,917 S yds	Earthwork .. C yd	0 1 4	1,977 3 7	
	Turfing .. S yd	0 0 4	394 1 8	
	Cattle crossings ..		300 0 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		138 10 9	
				2,910

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A.

Mileage Abstract Estimate—(Continued)

Quantity	Description of Work	Rate	Amount.	Total
	19th Mile	RS. A P	RS. A P	RS
6,479 C yds	Earthwork .. C yd	0 1 4	539 14 8	
24,773 S yds.	Turfing .. S yd	0 0 4	505 1 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		75 0 4	
				1,220
1,910½ C yds	20th Mile			
14,773 S yds	Earthwork .. C yd	0 1 4	505 1 0	
	Turfing .. S yd	0 0 4	307 12 4	
	Compensation for land ..		100 0 0	
	Contingencies ..		47 2 8	
				960
9,778 C yds	21st Mile			
23,902 S yds	Earthwork .. C yd	0 1 4	814 13 4	
	Turfing .. S yd	0 0 4	497 15 4	
	Cattle crossings ..		250 0 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		87 3 4	
				1,750
13,893 C yds	22nd Mile			
17,943 S yds	Earthwork .. C yd	0 1 4	1,157 12 0	
	Turfing .. S yd	0 0 4	373 13 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		88 7 0	
	Deduct for work to be done from Canal Estimate—		1,720 0 0	
5,310 C yds	Earthwork .. C yd	0 1 4	442 8 0	
	Contingencies ..		22 8 0	
			465 0 0	1,255
23,629½ C yds.	23rd Mile			
21,686½ S yds	Earthwork .. C yd	0 1 4	1,969 1 9	
	Turfing .. S yd	0 0 4	451 12 11	
	Cattle crossings ..		160 0 0	
	Compensation for land ..		100 0 0	
	Contingencies ..		129 1 4	
	Deduct—		2,810 0 0	
7,557 C yds	Earthwork .. C yd	0 1 4	629 12 0	
	Contingencies ..		30 4 0	
			660 0 0	2,150
8,242½ C yds.	24th Mile			
18,843½ S yds	Earthwork .. C yd	0 1 4	686 13 9	
	Turfing .. S yd	0 0 4	392 9 1	
	Cattle crossing ..		170 0 0	
	Compensation for land ..		100 0 0	
			1,349 6 10	
	Contingencies ..		60 9 2	
	Deduct—		1,410 0 0	
4,937½ C yds	Earthwork .. C yd	0 1 4	411 7 7	
	Contingencies ..		18 8 5	
			430 0 0	980

Proceedings of the Madras Government, Public Works Department,
27th September 1876 No. 2,575-A

Mileage Abstract Estimate—(Continued)

Quantity	Description of Work	Rate	Amount	Total
5,528 C yds. 20,210 S yds.	25th Mile Earthwork ... C yd Turving ... S yd Cattle crossing Compensation for land	Rs A P 0 1 4 0 0 4	Rs A P 460 10 8 421 0 8 170 0 0 100 0 0	Rs
	Contingencies		1,151 11 4 58 4 8	
1,947 C yds.	Deduct— Earthwork Contingencies	0 1 4	1,210 0 0 162 4 0 7 12 0	
			170 0 0	1,040
6,629 C yds. 14,223 S yds.	26th Mile Earthwork ... C yd Turving ... S yd Cattle crossing Compensation for land	0 1 4 0 0 4	552 7 1 296 5 1 170 0 0 100 0 0	
	Contingencies		1,118 12 2 51 3 10	
1,605 C yds.	Deduct— Earthwork Contingencies	0 1 4	1,170 0 0 133 12 8 6 3 4	
			140 0 0	1,030
15,369 C yds. 17,669 S yds.	27th Mile Earthwork ... C yd Turving ... S yd Compensation for land Contingencies	0 1 4 0 0 4	1,280 12 0 368 1 8 100 0 0 81 2 4	
583 C yds.	Deduct— Earthwork Contingencies	0 1 4	1,830 0 0 48 10 3 1 5 9	
			50 0 0	1,780
23,160 C yds. 19,355 S yds.	28th Mile Earthwork ... C yd Turving ... S yd Cattle crossing Compensation for land	0 1 4 0 0 4	1,930 0 0 403 3 10 180 0 0 100 0 0	
	Contingencies		2,613 3 10 126 12 2	
166 C yds.	Deduct— Earthwork Contingencies	0 1 4	2,740 0 0 13 14 0 1 2 0	
			15 0 0	2,725
5,089 C yds. 12,403 S yds.	29th Mile Earthwork ... C yd Turving ... S yd Compensation for land	0 1 4 0 0 4	424 1 4 258 6 5 100 0 0	
	Contingencies		782 7 9 37 8 3	
			820 0 0	

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A

Mileage Abstract Estimate—(Continued)

Quantity	Description of Work	Rate	Amount	Total
1,309 C yds.	Deduct— Earthwork Contingencies	Rs A P 0 1 4	Rs A P 109 1 4 5 14 8	Rs
			115 0 0	705
1,721 C yds. 9,675 S yds.	30th Mile Earthwork ... C yd Turving ... S yd Compensation for land	0 1 4 0 0 4	143 7 1 201 9 8 100 0 0	
	Contingencies		445 0 9 24 15 3	
1,751 C yds.	Deduct— Earthwork Contingencies	0 1 4	470 0 0 145 14 8 74 1 4	
			220 0 0	250
1,831 C yds. 7,850 S yds.	31st Mile Earthwork ... C yd Turving ... S yd Cattle crossing Compensation for land	0 1 4 0 0 4	152 9 4 163 8 8 180 0 0 100 0 0	
	Contingencies		596 2 0 23 14 0	
4,572 C yds.	Deduct— Earthwork Contingencies	0 1 4	620 0 0 381 0 8 18 15 4	
			400 0 0	220
27,600 S yds.	32nd Mile Turving ... C yd Compensation for land Cattle crossing	0 1 4	575 0 0 100 0 0 160 0 0	
	Contingencies		835 0 0 45 0 0	
			880 0 0	880
7,563 C yds. 6,919 S yds.	33rd Mile Earthwork ... C yd Turving ... S yd Compensation for land	0 1 4 0 1 4	630 0 4 144 2 4 100 0 0	
	Contingencies		874 2 8 45 13 4	
8,088 C yds.	Deduct— Earthwork Contingencies	0 1 4	920 0 0 674 1 0 35 15 0	
			710 0 0	210
11,214 C yds. 12,163 S yds.	34th Mile Earthwork ... C yd Turving ... S yd	0 1 4 0 0 4	934 8 0 253 6 4	

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A.

Mileage Abstract Estimate—(Continued).

Quantity	Description of Work.	Rate.	Amount	Total
	Cattle crossing	Rs. A. P.	Rs. A. P.	Rs.
	Compensation for land	...	150 0 0	
			100 0 0	
	Contingencies...		1,437 14 4	
			72 1 8	
6,845 1/2 C yds	Deduct—			
	Earthwork ... C. yd	0 1 4	1,510 0 0	
	Contingencies ..		570 7 8	
			20 8 4	
			600 0 0	910
15,409 1/2 C yds	35 1/4 Mile			
15,146 1/2 S yds	Earthwork .. C. yd	0 0 4	1,284 1 9	
	Turfing .. S yd	0 0 4	315 8 11	
	Cattle crossing		150 0 0	
	Compensation for land		100 0 0	
			1,849 10 8	
	Contingencies ..		90 5 4	
1,433 1/2 C yds	Deduct—			
	Earthwork .. C yd	0 1 4	1,940 0 0	
	Contingencies ..		119 7 1	
			4 8 11	
			124 0 0	1,816
15,160 1/2 C yds	36 1/4 Mile			
15,407 1/2 S yds	Earthwork .. C. yd	0 1 4	1,263 6 3	
	Turfing .. S yd	0 0 4	322 13 8	
	Compensation for land		100 0 0	
			1,686 3 11	
	Contingencies ..		83 12 1	
5,032 1/2 C yds	Deduct—			
	Earthwork .. C yd	0 1 4	1,770 0 0	
	Contingencies ..		419 6 0	
			20 10 0	
			440 0 0	1,330
13,615 1/2 C yds	37th Mile			
13,512 1/2 S yds	Earthwork .. C yd	0 1 4	1,092 15 8	
	Turfing .. S yd	0 0 4	281 8 6	
	Cattle crossing		170 0 0	
	Compensation for land		100 0 0	
			1,644 8 2	
	Contingencies ..		85 7 10	
6,121 1/2 C yds	Deduct—			
	Earthwork .. C yd	0 1 4	1,730 0 0	
	Contingencies ..		51 0 4	
			4 15 8	
			56 0 0	1,674
6,576 1/2 C yds	38th Mile			
10,336 1/2 S yds	Earthwork .. C yd	0 1 4	548 1 0	
	Turfing .. S yd	0 0 4	215 5 7	
	Cattle crossing		100 0 0	
	Compensation for land		100 0 0	
			963 6 7	
	Contingencies ..		46 9 5	1,010

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No. 2,575-A.

Mileage Abstract Estimate—(Continued)

Quantity	Description of Work	Rate	Amount	Total
		Rs. A. P.	Rs. A. P.	Rs.
649 C yds	39th Mile			
9,750 S yds	Earthwork .. C yd	0 1 4	304 1 4	
	Turfing .. S yd	0 0 4	203 2 0	
	Contingencies ..		507 3 4	
			21 12 8	529
	Grand Total			57,990

Classified Abstract

B.—Compensation for land to be occupied by the embankment	Rs. A. P.	Rs. A. P.
C.—Masonry work	3,800 0 0	
L.—Earthwork	883 0 0	
	53,307 0 0	
Establishment at 25 per cent	57,990 0 0	
Tools and Plant	14,500 0 0	
Total		72,490 0 0

No 446 ORDER THEREON, 27th September 1876, No 2,575

IRRIGATION, No 43

THE estimate of Rupees 57,990 for improving the flood embankments on the left bank of the Godavery and Gowtami Godavery from Rajahmundry to Yanam a distance of 43 1/2 miles is sanctioned for entry in the Budget of 1877-78

2 This sanction has been registered as No 155 I of 1876-77 as follows.—

IRRIGATION

ORDINARY AGRICULTURAL

Original Works

River embankments

Name of Work—Embankment, left bank of Godavery and Gowtami Godavery, Rajahmundry to Yanam

Amount of Estimate.—Rupees 57,990

3 The sanction given in G O, No 2,174, of the 27th July 1875, for part of the work included in the above estimate, will be considered superseded, and is cancelled

Proceedings of the Madras Government, Public Works Department,
27th September 1876. No 2,575-A

4 These Proceedings will be forwarded for the consideration of the Government of India with reference to paragraphs 8 and 11 of letter, No 2,448, dated 13th September 1876.

(True Extract.)

(Signed) G. W. WALKER, Major-General, R.E;
Secretary to Government

No. 446-A.

DOCKET No 2,575-A, dated 27th September 1876.

COPY of the above forwarded to the Government of India

(True Extract)

Colonel,
Offg Under Secy. to Govt, P.W.D.,
for Secretary to Government

N^o 191-W.

Notes by the Chief Engineer for Irrigation

* Impd 43200
(balance)

Encls 24

With his letter No 320 of the 9th May the District Engineer, Godavery, transmitted an estimate for raising the left bank of the Godavery from Rajahmundry to the aricut, and the same bank of the Gunturi Godavery from the aricut to the sea to a uniform level of 4 feet above the highest recorded level reached by the river, the highest freshes known being those of 1853 and 1861.

2. The high freshes in the Krishna Pennair and other rivers in 1874 drew attention to the necessity for ascertaining the condition of important river embankments generally and a warning was accordingly sent to the Godavery as it seemed not improbable that, amidst the numerous pressing demands on the time and attention of the

and kind levels in serious difficulty in solving it should have been experienced. It is believed however that in the tract of country affected there is no such extent of boundary bank as would make any sensible difference in the amount of Imperial expenditure even were boundaries likely to contribute.

4. The part of the Embankment above the aicut to be improved under this estimate extends to Rajahmundry a distance of about $4\frac{3}{4}$ miles. Beyond this the Embankment up to the terminus at Sivinishottapuram is under improvement on an estimate sanctioned in the Proceedings as per margin. The arrangements on this side of the river above the aicut will therefore be complete throughout, while for the Embankment below the aicut the estimate provides for raising the entire length to Ganam.

Only No 1251
dated 14 May 72
No 1998
dated 4 Aug 76
Revised estimate
Rs 1,48,730-

27th July 1895, Rs 2174
17890 in estimate for raising these banks from 5 miles above to 5 miles below the aicut was sanctioned as a precautionary measure in anticipation of the submission of a complete estimate and the amount so sanctioned has been deducted by the District Engineer, but it will simplify matters to make the sanction for the present estimate supersede that of July 1875. The District Engineer has further made a deduction of Rs 4595 on account of the work to the Embankments in some parts which can be carried out without additional expense in conjunction with the improvement of the Bank Canal now under execution.

5. The following abstract gives a general view of the estimate mile by mile.

Position	Miles	Amount	for Bank Canal	to be sanctioned	Remarks
Above monument to Rajahmundry	1	3920	-	3920	Top 4 feet above M.F.L.
	2	1293	-	1293	Top width 12 feet
	3	2069	-	2069	Slopes 1 1/2 to 1
	4	1970	-	1970	Length 4 m. ch.
	5	2044	-	2044	Per mile Dupes 2366.
Below monument to Yannam -				11,296	
	1	1220	-	1220	Top 4 feet above M.F.L.
	2	560	-	560	Top width 12 feet
	3	490	-	490	Slopes 1 1/2 to 1
	4	1550	-	1550	Length 10 miles.
	5	1170	-	1170	
	6	1760	-	1760	
	7	3260	-	3260	
	8	520	-	520	
	9	750	-	750	
	10	1910	-	1910	
				13190	Per mile Dupes 1319
	11	690	-	690	Top 4 feet above M.F.L.
	12	690	-	690	Top width 9 feet
	13	560	-	560	Slopes 1 1/2 to 1
	14	1020	-	1020	Length 28 miles by chains
	15	1250	-	1250	
	16	1020	-	1020	
	17	940	-	940	
	18	2910	-	2910	
	19	1220	-	1220	
	20	960	-	960	
	21	1750	-	1750	
	22	1720	465	1255	
	23	2810	660	2150	
	24	1410	430	980	
	25	1210	170	1040	
	26	1170	140	1030	
	27	1830	50	1780	
	28	2740	15	2725	
	29	820	115	705	
	30	470	220	250	
	31	620	400	220	
	32	880	-	880	
	33	920	710	210	
	34	1570	600	970	
	35	1940	124	1816	
	36	1770	440	1330	

Position	Miles	Amount	for Bank Canal	to be sanctioned	Remarks
	37	1730	36	1694	
	38	1010	-	1010	
	39	529	-	529	
		38099	4595	33504	Per mile Dupes 1161
				57990	Total length 43.57 m. ch.

b. The sections show clearly the present state of the embankments, their irregularity of level and the urgent need of reformation, and the figures above given afford a similar indication.

* Dupes 30,000

For the term this
cellaneous than
need.

The provision in the Budget of 1876-77 on account of this and other flood embankments was shown under Ordinary Agricultural works for which no Capital or Revenue Accounts are kept, and the amount was struck out of the grants as passed by the Government of India on their orders on the Budget estimates. It would appear to be desirable that one-third of the estimate should be made available for expenditure during

the current fiscal year and that the embankment should be fully completed next year.

8. The area of country protected has not been ascertained. It is probably about 100 square miles. Below the head of the Coringa Canal in the 14th mile of the Bank Canal the Lake drain would ordinarily be the limit of spill from the river. Before the Coringa and Injeram Canals were constructed spill might have extended, and probably did extend, over nearly double the above area.

9. Estimates for other flood embankments will be submitted in due course.

Wendell L. Colver Lt.
Chief Engineer for Large

Ostacumund
19th Sept. 1876

To The Secretary to Govt. W. V.

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1. *Handwritten text, likely bleed-through from the reverse side of the page.*

P.W.D.
292576

From No. 7007

The Ch. Eng. for Irrig.
The Secy. to Govt. P.W.D.

Dated 19 Sept. 76.

Encls 24

N: 191- W.

* D.S. No 320 19/9/76.
S.S. No 58-60/76
S.S. No 60-62/76
D.S. No 1489 28/9/76.
1 Abt. Sd.
1 Specimen
✓ Clipped Abstract
17 Plans

Godavery River Embankments.
— from Rajahmundry to Gaur.
— In the submitting for sanction,
estimate for Rs. 57,990 for im-
provements to the —, with remarks.

N: 445

10, 28.

No 2575

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

UNDER date the

27 Sept 76

Read the following:—

to be by the Ch. Eng.
for Irrig. No 191 W of 19 September 76

The estimate
of Rupees 57,990 for
improving the flood
embankments on the
left bank of the Godavery
and Sivtani Godavery
from Rajahmundry to
Gaur a distance of
43 7/8 miles is sanctioned
for entry in the Budget
of 1877-78.

2 This sanction
has been registered
as No. 155.I of 1876-77
as follows. —

Irrigation
Ordinary Agricultural
Original works.

River Embankments.

Name of work. Embankment, left bank of
Godavery and Gowlāmi
Godavery, Rajahmundry to
Yanam.

Amount of estimate - Rupees 57,990.

3. The sanction given
in G.O. No. 2174 of the 27th
July 1875 for part of the
work included in the
above estimate will be
considered superseded
and is cancelled.

4. These Proceedings
will be forwarded for the
consideration of the
Government of India with
reference to paras 8 and
11 of letter No. 2448 dated
13th September 1876.

W. 21/9

Amr

J. E. Sadanay
Collector do
C. E. S. with 24th Enclat sent on the 23/10/76
Plus
Receipts

Detd 21/10/76

Wicket No. 2575 A of 27 Sept 76
Copy of the above
forwarded to the Govt of
India

20. No 1257 d/14 May/72
" " 1286 d/14 May/72
" " 2133 d/7 Sept/72
" " 2853 d/21 Aug/74
" " 2174 d/27 July/75
" " 2611 d/10 Sept/75
" " 94 d/15 Jan/76.
" " 708 d/15 March/76.
" " 560 d/29 Feb/76
" " 1998 d/4 Aug/76.

Book 1257-1286

[Faint handwritten notes]

no 445-446a

7007

Gobt. of 1876 Madras.
PUBLIC WORKS.

To

Mr P. B. Godavery

10000

Dated

Issued

Recd

Encl

G. O. 27th Sept 1876, No. 2575
25754

Nos. 445/10

Forwarding copy of
Proceedings sanctioned
an Estimate of Rs. 57,900
for improving the flood
embankments on the left
bank of the Godavery &
Gowtami Godavery
Godavery from Rajahmundry to Yanam
entry in the Budget of
1877-78 -

Flood embankments on the
left bank of the Godavery
and Gowtami Godavery
from Rajahmundry to Yanam

The Estimate for improving
the ———— sanctioned for
entry in the Budget of 1877-78.

20-10-76
20-10-76
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