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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	698	(2)	Press
B.P. No.			Mis. —
Dated	17.3		18 76

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
17th March 1876.*

Read the following papers :—

No. 274. Endorsement of the Chief Engineer for Irrigation, dated 16th December 1875, No. 1,462-A.

From Major J. BEATTY, R.E., Officiating Superintending Engineer, Godavery District, to Major-General G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Dowlaishweram, 4th December 1875, No. 2,652.

As directed in G.O., No. 2,765, of 24th September 1875, I have the honor to

furnish a map showing the boundaries of the Government land and the Kesanakurru and Guttinadivi Estates in the Polaveram Island. It also shows the position of the work done under the sanctioned estimate, which is indicated by a yellow line with a black dotted line on either side of it.

2. Seventeen miles have been completed according to the estimate, but as the fresh of July 1875 rose to within 18 inches of the top of that embankment, I am of opinion that it should be raised 4 feet more to put it in a condition of safety. The embankment on those 17 miles as it now stands is 7 feet high, to raise it 4 feet will cost approximately Rupees 44,000.

3. The expenditure against the estimate of Rupees 62,000, sanctioned in G.O., No. 477, of 25th February 1874, was Rupees 12,040-1-1 in 1874-75, and it has been Rupees 7,544-11-1 in 1875-76 up to the stoppage of work under the Government Order now being replied to. The total expenditure up to date has therefore been Rupees 19,584-12-2, and work has been stopped pending further orders.

4. In addition to the raising required to the embankment the ten sluices provided in the estimate should be built. The sluices were proposed at points where a supply of water was formerly drawn from the river in moderately high freshes. The sites for the sluices are all within the line of the work already done. One of the sluices, the largest, is to have a vent 6 feet wide by $4\frac{1}{2}$ feet high and would cost Rupees 730; the other nine sluices are to be of the same dimensions, 3 feet wide by $4\frac{1}{2}$ feet high, and would cost Rupees 600 each. The total sum required for sluices is therefore Rupees 6,130. The Collector is of opinion that these sluices should be built.

5. Eventually, when the completion project of the Central Delta is worked out, an aqueduct will no doubt be built over the head of the Vrida Gowtami, and the whole island brought under the anicut as has already been done in the case of the Nagaram Island; the sluices mentioned above would then cease to be used, but until then the villagers should be allowed to draw water from the river when they can. In some years, as in 1874, when the highest fresh was only $7\frac{1}{4}$ feet on the anicut, no water would pass down their channels, but in ordinary years the sluices would be of some use to them.

6. With regard to so modifying the work as to protect principally Government lands and the Kesanakurru Estate, the map will show that such modification is hardly practicable except by leaving a large tract of Government land unprotected. Pusoorlunka (or Passuvullanka as it is shown on the map now sent) is the head of the

island, and from that the new work has now been carried $7\frac{1}{2}$ miles along the right bank of the Gowtami, and $9\frac{1}{2}$ along the left bank of the Vrida Gowtami. The new work lately done should first be put in a condition of safety, which it certainly is not now, because there is little doubt that a maximum fresh would overtop the whole of it. The sluices should also be built.

7. I send also a tabular statement showing the areas of land in the island. From this it will be seen that the total extent of land that would be protected by the new embankment is 21,116.18 acres, of which 13,426.35 acres are Government land; 6,312.33 belong to the Kesanakurru Estate, which is under the Court of Wards, and only 1,377.50 acres in the Guttinadivi Estate; so that the land which will not contribute towards the expense of embanking is only about $6\frac{1}{2}$ per cent. of the whole area protected. It is here assumed that the Court of Wards will make no difficulty about the payment of the share of the cost due from the Kesanakurru Estate, because these embankments appear to have been begun at the instance of the Court of Wards, who stated that "the ruin of the Kesanakurru Estate was clearly traceable to the neglect of the river embankments, and the consequent impoverishment of the ryots."

8. I beg therefore to suggest that when the work already done has been fully completed, and the new sluices built, the remainder of the new embankment be carried out. When anicut water is supplied to the island it may be made a condition of the Guttinadivi Proprietor receiving a supply that he shall first pay up his share of the cost of the embankments.

Statement of Lands protected by the new Embankment around the Polaveram Island.

Name of Village.	Land outside of bank in river margin.	Land occupied by bank and excavations.	Land enclosed.	Area of Village.	Remarks.
Yedurlunka	277	68	518	814	Lands situated in the Polaveram large island now being embanked.
Konharagiri	102	8	1,859	1,969	
Pata Injaram	102	12	1,938	2,041	
Passuvullanka	234	81	575	832	
Chintapallilunka	88	95	...	88	
Polaveram	...	...	...	2,153	
Kottapalli	156	10	3,100	3,262	
Guttinadivi Vemaveram	608	61	3,280	3,979	
Total, Government Villages...	1,630	41	13,426	15,153	
Kesanakurru Estate	556	81	6,312	6,940	
Guttinadivi do.	233	25	1,377	1,635	
Total, Proprietary Villages...	790	6	7,689	8,575	
Grand Total ...	2,420	47	21,116	23,729	

(Signed) J. BEATTY, Major, R.E.,
Offg. Superintending Engineer, Godavery District.

*Proceedings of the Madras Government, Public Works Department,
17th March 1876.*

SUBMITTED for the consideration of Government.

2. Major Beatty's letter shows that 17 miles of the Polaveram Island embankment have been completed on the estimate of Rupees 62,000, sanctioned in G.O., of the 25th February 1874, No. 477; that the expenditure has amounted to Rupees 19,585, of which Rupees 12,040 were expended last year, and Rupees 7,545 have been spent this year; that the fresh of July 1875 rose to within 18 inches of the top of the embankments which are about 7 feet high, and as this was certainly not a maximum fresh it will be requisite to add 4 feet to the height of the flood-banks, and the approximate cost of the addition is stated to be Rupees 44,000, thus raising the total cost of earth-works to Rupees 1,06,000; and that the cost of the ten sluices which are necessary for regulating the admission of water to the lands of the island, and all of which will be situated in the 17 miles of flood-bank already constructed, will cost Rupees 6,130. It will be well to reverse the dimensions of the vents of the smaller sluices, a greater depth than 3 feet of water in inundation channels being unnecessary, and width of opening in comparatively low freshes being an advantage.

3. The Acting Superintending Engineer does not refer to drainage* sluices, of which several will certainly be needed. The embankments will enclose an area of 33 square miles, and even supposing the quantity of water admitted from the river to be inconsiderable the rainfall drainage will need special provision. The maximum quantity of drainage water to be disposed of may be taken as 4,150 cubic feet a second, and supposing 415 square feet of vent to be needed, the cost may be approximately taken to be one-half more than a similar area of head sluice opening, which is about 41 Rupees a square foot, or, say, $415 \times 60 = 24,900$ Rupees.

It appears therefore that the total cost of the protection of Polaveram Island will be about as follows:—

	Estimate already sanctioned	RS.
Do. for raising flood-banks	...	62,000
Head Sluices	...	44,000
Drainage Sluices	...	6,130*
	...	24,900
		1,37,630

or, it may be assumed that in round numbers not less than 7 Rupees an acre will have to be spent for the protection of 21,116 acres, an outlay not excessive apparently if the objects to be attained be fully secured.

4. In submitting the estimate of Rupees 62,000 it was pointed out that there could not be 30,774 acres in this one island, and the statement submitted by Major Beatty shows that the total area of the island is acres 23,729, of which 21,116 are within the embankment alignment. Also that of this latter area the distribution is as follows:—

	Acres
Government Villages...	13,426
Kesanakurru Estate ...	6,312
Guttinadivi ...	1,378

thus maintaining approximately the proportion of relative areas on which it was decided that two-thirds of the cost of the protective works should be borne by Government

G.O., No. 477, 25th February 1874.

*Proceedings of the Madras Government, Public Works Department,
17th March 1876.*

and one-third by the proprietary estates. On the other hand, the statement of areas does not agree with the Acting Sub-Collector's letter of the 19th June 1875, in which the area of Guttinadivi is put down as more than three times that of Kesanakurru, whereas the latter appears to be more than four times as large as the former.

* Proceedings, Madras Government, Revenue Department, 30th July 1875, No. 1,153, paragraph 3.

5. It appears to the undersigned that a more detailed examination of the question of the probable maximum flood-level may with advantage be made, and that if 3 feet margin there above be allowed this will suffice, seeing that near the coast the proportionate rise of water level for each increase higher up the river is comparatively small. Possibly some reduction of the estimate may then be found practicable.

6. The portion of the flood-banks already constructed protect the island from being swept, though not from inundation, by backwater, and they must in the current year have been of essential service. The determination of the question, whether it is desirable or necessary to lay out a considerable sum in protecting this island, depends more upon administrative considerations than upon the exact money value of the interests to be protected. If the people of this country are to be fed in time of famine and their lives thus preserved, it would seem to follow that they should be protected both in person and property from floods. On the other hand, it may be advanced, with considerable truth, that the inhabitants of tracts situated like this island in the Godavery Delta and Divi in the Kistna, do manage to live without undergoing undue suffering, though their condition is not *prima facie* an enviable one.

7. In applying to the Government of India for an additional grant under Agricultural, Ordinary, a sum of Rupees 15,000 has been asked for on account of these flood-banks to cover the expenditure already incurred this year, and to meet further outlay on work, such as building sluices, which must be constructed to enable the 17 miles of bank to shut out floods.

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

P.S.—The land-sluices mentioned in paragraph 3 above should not have been shown separately. They are included in the estimate of Rupees 62,000.

No. 275. Endorsement of the Chief Engineer for Irrigation, dated 31st December 1875, No. 1,496.

From Major J. BEATTY, R.E., Officiating Superintending Engineer, Godavery District, to Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, dated Dowlaishweram, 18th December 1875, No. 2,844.

With reference to your letter, No. 1,258, of the 1st ultimo, I have the honor to inform you that the expenditure on the Polaveram Island embankments in the current official year was Rupees 7,544-11-1 up to the stoppage of work under G.O., No. 2,765, of 24th September 1875.

2. A reply to that order was sent to the Secretary to Government on the 4th instant.

Proceedings of the Madras Government, Public Works Department,
17th March 1876.

3. If sanction be given immediately a further sum of Rupees 4,000 can advantageously be expended on the work during the remaining portion of the year.

SUBMITTED to Government in continuation of this office No. 1,462-A, of the 16th instant. Major Beatty's sum of Rupees 4,000 does not apparently provide for any masonry works.

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

No. 276.

No. 217.

MEMORANDUM.

Polavaram Island Embankments.

SINCE Major Beatty's letter No. 2,652, of the 4th December last, was submitted to Government with this office endorsement No. 1,462-A, the longitudinal section and surveys which accompanied the estimate of Rupees 62,000, sanctioned in G.O. No. 477, of the 25th February 1874, have been referred to, and they indicate that the more detailed examination of the circumstances referred to in paragraph 5 of the above endorsement is certainly necessary.

2. The longitudinal section is dated 16th September 1873, and thereon it is noted that flood-level rises to 10.5 feet above datum, which latter, though not noted, is doubtless H.W.L. at the head of the island, while the lowest point in the flood line is 3 feet above H.W., and is shown to be at 15 miles on the section. Judging from the survey, the lowest level would be at 13-14 miles, these points being nearer to, and about equidistant from, the sea. The whole length of the section on the line of the embankments is a little over 25 miles, and the starting point is somewhat more than 1 mile from the head of the island on the southern branch of the river. It appears also from the tracing, dated 5th November 1875, that the part of the embankment completed is from 17½ miles on the south side, round by the head of the island, to 7 miles on the north side; consequently 10½ out of rather more than 25 miles remain to be completed. The part left undone is the eastern two-fifths of the ring, and the longitudinal section shows that much of the ground here is low, while of this part the estimate of 1873 was Rupees 52,226, and, as three-fifths of the embankment have been completed for 29,000 Rupees, it seems unlikely that the remaining two-fifths would cost the balance of 32,000 odd Rupees, although the ground on which they have to be thrown up is decidedly lower, the direct proportion being only Rupees 13,000 to 14,000. This may have been taken into account in estimating the cost of raising the flood-banks 4 feet, but as no sections have been transmitted showing the work done and to be done, with an estimate of the cost of such work in the several miles, the information is insufficient to determine this.

3. In the next place, the flood-levels of the longitudinal section of September 1873 appear to be incorrect for any fresh. Starting from the highest point at 1 mile, the

Surface fall from 1 to 3 miles	is 0.5 or 0.25 a mile.
" " 3 to 5 "	is 0.5 or 0.25 "
" " 5 to 7 "	is 2.0 or 1.00 "
" " 7 to 9 "	is 1.0 or 0.50 "
" " 9 to 13 "	is 2.5 or 0.62 "

Proceedings of the Madras Government, Public Works Department,
17th March 1876.

the above are along the northern side, then for the south side the

Surface fall is 1 to 23

(3½ miles)	1.5 or 0.38 a mile.
23 to 21	1.0 or 0.50 "
21 to 19	1.0 or 0.50 "
19 to 17	1.5 or 0.75 "
17 to 15	2.5 or 1.25 "
15 to 13	1.0 or 0.50 "

The variations are much wider than is probable, and, moreover, the surface fall increases towards the sea, which is contrary to the usual experience. Again, from 7 to 13 miles the fall is 3.5 feet, while from 19 to 13, a similar distance on the other side or, indeed, practically a distance of only 5 instead of 6 miles as flood-level at 13 and 14 miles is probably about equal the fall, is 5.0 feet.

4. No information, moreover, has been given as to whether the alignment of the banks shown on the Survey of September 1873 has been in any part altered with reference to the remarks repeated in paragraph 5 of the Note printed in Proceedings of the Madras Government of the 25th February 1874, No. 477.

5. As mean sea level has been determined since 1873, an additional line showing this level may be shown with advantage as a dotted line, as it is of importance in connection with the relief of the low-lying lands from rainfall drainage. The levels should be connected with a bench-mark of which the value has been accurately determined. The old H.W.L. used as datum was not, it is believed, a very correct representation of that level.

6. What is now required therefore is—

1st.—A reliable set of levels.

2nd.—Information as to the actual flood levels of July 1875, at as many points as possible, so as to give the surface fall with reasonable exactness.

3rd.—Information on the Survey as to the line actually adapted for the banks. If that shown on the Survey of the 5th November 1875 is the one chosen, it is certainly more or less faulty.

4th.—A deduction from the actual flood-levels and surface fall compared with those of some miles higher up the river of the probable surface levels in a maximum fresh.

5th.—An estimate for a flood-bank with its top 3 feet above the maximum flood level thus deduced, with provision for sluices to admit water to the inundation channels and for outlet sluices to allow drainage to reach the river, the latter sluices should have swing shutters.

7. The Survey of 1873 has some lines of level marked across the island. The levels of the village sites are not shown, but those on the western portion of the island are generally on ground several feet above H.W.L., and the fall of the ground is from west and north towards the centre. The southern part is low with a fall eastwards.

8. The embankment which has been thrown up probably did in the recent high fresh prevent the island from being swept, but the flood-levels must be very quickly ascertained, the proper level of the embankments determined, and the irrigation sluices designed and built, or temporary arrangements for the admission of water must be made, for otherwise the villagers will most probably cut the banks on the lines of the channels and then, should a high fresh occur, there will be much damage done.

*Proceedings of the Madras Government, Public Works Department,
17th March 1876.*

9. His Grace the Governor, in his remarks on the papers, points out that information is required on the following points:—

1st.—The levels of existing village sites. This information can readily be obtained.

2nd.—The probable effect on adjacent lands of embanking Polaveram and other similar tracts, so as entirely to exclude flood-water.

The District Engineer should take this into consideration, but it may be noticed that the Central Delta on the one side and the Eastern Delta on the other are already embanked, and the unembanked lands lie to the eastward and form the less advanced portion of the delta. The adjustment of water-way will probably be made by the deepening and levelling of the beds of the two branches of the river, and the sending out to sea of much of the material which now tends to obstruct the water-way.

3rd.—The reason why one portion should be so embanked and not others.

This question is supposed to refer to the intimation given in the Note on the sanctioned estimate, in which it is mentioned that the group of islands known as Polaveram is about 80 square miles in area, of which the principal island and that to be embanked has an area of 38 square miles. Information can readily be given on this point. The reasons probably are that the other islands are less advanced; that further deposits from flood-waters are desirable; and possibly also that some of the other islands are neither inhabited nor regularly cultivated.

4th.—The section of channels (river) which are now available around Polaveram, which will be available after the proposed embankment, and all the area over which flood-waters rising above channel margin can now escape, and area available when island (is or shall have been) embanked.

This information can be obtained from sections of the two branches being carried right across the island. Sections of the Gowtami Godavery, above the head of the island, should likewise be taken, if not already available, at intervals of about 1 mile and for a distance of 5 miles, in order that from the area of water-way there, with the surface fall and similar information for the branches, a comparison may be made of the discharging capacities. The information recently obtained at Yanam of the flood-level there during the last high fresh should be connected with the levels.

5th.—The mode and cost of irrigating these lands and fall available for draining the soil during and after irrigation.

The irrigation at present is by inundation canals, which come into play only when the river rises considerably above tidal H.W.L. Information as to the cost is probably not available. Probably, within ten or fifteen years at most, proposals will be made for conveying anicut water across from the east bank canal of the Central Delta to the island. The fall available for draining the soil is shown on the Survey of 1873. It varies considerably in different parts of the island, and the drainage of the very low-lying lands is certainly indifferent at the best of times.

10. It is questionable whether it will really be advantageous to embank the island on the east side. If this be done there will be no further elevation of the lower lands from silt deposit. If the island be protected from sweep and if only backwater be possible, the lands submerged may be benefited rather than injured. This point may be inquired into and the views of the villagers holding lands in the southern and eastern parts of the island ascertained.

*Proceedings of the Madras Government, Public Works Department,
17th March 1876.*

11. On a tracing, dated 17th December 1873, the changes in the boundaries of the island between 1859-60, when the Revenue Survey was made, and 1873 have been indicated. It will be well to see whether the lines laid down are correct, as that of 1873 extend in some places right across what was the bed of the river at the earlier date. Information of this kind to be of any use must be exact.

FORT ST. GEORGE,
17th February 1876.

(Signed) A. DEC. SCOTT, Major, R.E.,
for Chief Engineer for Irrigation.

To the Secretary to Government, Public Works Department.

No. 276-A.

Note by His Grace the Governor.

No. 276-B.

Note by the Hon. R. S. ELLIS, C.B.

No. 277.

ORDER THEREON, 17th March 1876, No. 698.

IRRIGATION, No. 23-D.

His Grace the Governor in Council observes that it is evident from the foregoing papers that the sanctioned estimate for the Polaveram Island embankments was prepared on incomplete data, while it would seem from the remarks in the endorsement of the Chief Engineer for Irrigation and from that officer's memorandum of the 17th February 1876, that the flood-levels in the river and the consequent necessary dimensions of the embankments have not yet been determined on definite information, such as would alone justify the sanction of further expenditure on the completion of the flood-banks, and the construction of the irrigation and surplus sluices required.

2. A full investigation, all the principal points of which requiring attention have been indicated, should now be made and the results reported as soon as possible, a revised estimate being at the same time forwarded.

3. Special attention should be given to the question of the extent of embankments which will be most advantageous.

4. The Board of Revenue will be requested to verify the area of the Guttinadivi Estate.

5. The District Engineer will forward an estimate of the cost of the Survey Establishment necessary to carry out the investigations now ordered, and pending its sanction he will lose no time in taking the required levels. One of the young Assistant Engineers may, it is considered, be usefully employed on this work.

(True Extract.)

To the District Engineer, Godavery. ✓

„ Chief Engineer for Irrigation.

„ Board of Revenue.

„ Revenue Department.

Exd. S. T. Austin.

8 Spare Copies

Major-General, R.E.,
Secretary to Government.

Memorandum No. 1462. It dated 16
December 1875 from the
Chief Engineer for Irrigation

Circulated for orders.

Complete.

Major R.E.

For Joint Secretary to Govt.

12
No 17 March 76 - BV 274

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No 17 March 76 BV 275

R-210-3-7011
Date 3/1/76

M. 7962/75 51

Statement of lands protected by the new embankment around the Polaveram Island.

Name of villagers.	Land out side of bank in river margin.	Land occupied by bank and excursions.	Land enclosed.	Area of village.	Remarks.
Yedurlunka	277.68	18.68	578.26	814.62	
Komaragiri	102.11	8.28	1859.22	1969.61	Lands situated in the Polaveram
Pata Sujaram	102.12	10.36	1938.93	2051.41	large Island now being embanked
Passuvullanka	234.81	22.50	575.62	832.93	
Chintapallilunka	88.95	"	"	88.95	
Polaveram	"	"	2153.32	2153.32	
Kottapalli	156.10	5.21	3100.60	3262.91	
Guttinadini Temaveram	668.64	30.74	3280.40	3979.78	
Total Government villages	1630.41	96.77	13,426.35	15,153.53	
Kesenakurru Estate	556.81	71	6,312.33	6,940.14	
Guttinadini Do	233.25	25	1,377.50	1,635.75	
Total Proprietary villages	790.6	96	7,689.83	8,575.89	
Grand Total	2,420.47	192.77	21,116.18	23,729.42	

SI
Compd. S.

J. Beatty. Major R.E.
Offr. Supr. Engineer Godavery Dt.

JP/

No 2652 Sup^r Engineer's Office Godavery.
Dowlaishuvaram 4th December 1875

From,

Major J. Beatty R.E.
Off^r Superintending Engineer G.O.

To,

Major General G. W. Walker R.E.
Secretary to Government D.P.W.
Madras.

Sir,

As directed in G.O. No 2765 of
24th September 1875, I have the honor to
furnish a map shewing the bounda-
ries of the Government land and the
Kesanakurru and Guttinadivi estates
in the Polaveram island. It also
shows the position of the work done
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Statement of land
protected by the
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Island.
M 2962/15

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5. Eventually when the completion project of the Central Delta is worked out, an aqueduct will no doubt be built over the head of the Trida Con. tami and the whole island brought under the annicut as has already been done in the case of the Nagaram Island; the sluices mentioned above would then cease to be used, but until then the villagers should be allowed to

to draw water from the river when they can. In some years as in 1874 when the highest fresh was only $7\frac{1}{2}$ feet on the annicut no water would pass down their channels, but in ordinary years the sluices would be of some use to them.

6. With regard to so modifying the work as to protect principally Government lands and the Kesanakurru estate, the map will show that such modification is hardly practicable except by leaving a large tract of Government land unprotected. Passoorunka (or Passuvullanka as it is shown on the map now sent) is the head of the island, and from that the new work has now been carried $7\frac{1}{2}$ miles along the right bank of the Gowtami, and $9\frac{1}{2}$ along the left bank of the Vrida Gowtami. The new work lately done should first be put in a condition of safety which it certainly is not now, because there is little doubt

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7. I send also a tabular statement showing the areas of land in the island. From this it will be seen that the total extent of land that would be protected by the new embankment is 21,116.18 acres, of which 13,426.35 acres are Government land, 6,312.33 belong to the Kesanakurru estate which is under the Court of Wards, and only 1,377.50 acres in the Guttinadi estate; so that the land which will not contribute towards the expense of embanking is only about $6\frac{1}{2}$ per cent of the whole area protected. It is here assumed that the Court of Wards will make no difficulty about the payment of the share of the cost due from the Kesanakurru estate because these embankments appear to have been begun at the instance of the Court of Wards who stated that "the ruin of the Kesakurru

estate was clearly traceable to the neglect of the river embankments, and the consequent impoverishment of the ryots."

8. I beg therefore to suggest that when the work already done has been fully completed and the new sluices built the remainder of the new embankment be carried out. When annual cut water is supplied to the island it may be made a condition of the Guttinadini proprietor receiving a supply that he shall first pay up his share of the cost of the embankments.

I have the honor to be,
Sir,

Your Most obedient Serv^t
L. Beatty. Major R.E.
Off^r Sup^r Engineer Godavery.

Comp^d Mrs

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Submitted for the consideration
of Government.

Major Brattys letter shows that
17 miles of the Polaveram island mu-
-bankment have been completed on the
estimate of Rupees 62,000, sanctioned in
L.O. of the 25th February 1874, or 477; that
the expenditure has amounted to Rupees
17,505 of which Rupees 12,040 were expended
last year, and Rupees 7,545 have been spent
this year; that the fresh of July 1875 rose
to within 18 inches of the top of the mu-
-bankments which are about 7 feet high,
and as this was certainly not a maximum
fresh it will be requisite to add 4 feet to the
height of the flood banks and the
approximate cost of the addition is
stated to be 44,000 Rupees, thus raising the
total cost of earth works to Rupees 106,000;
and that the cost of the 10 sluices which
are necessary for regulating the admission
of water to the lands of the island and
all of which will be situated in the 17
miles

906-561-582-9 24 Sept 75
112-3 1/2 1/2 1/2 1/2 1/2
23-3 1/2 1/2 1/2 1/2 1/2
21-22-3 1/2 1/2 1/2 1/2 1/2
103-504-3 25/2/74

P.M. 1875 Sept
From No 7962
The Cyls Dept Sargum
Godavery Dist
To The Secretary to Govt
Government of Mysore

Madras.

Dated 4th December 75
Recd 11/12/75
No 2652 (11)
Enclosures 3

As directed in L.O.
No 2765 of 24th Septem-
-ber 1875 provides
information regard-
ing the lands protect-
ed by the Polaveram
island embank-
ments.

Dec 3/1/76

No 17 March 76 B.V. 274

miles of flood bank already constructed will cost Rupees 6130. It will be well to reverse the dimensions of the vents of the smaller sluices, a greater depth than 3 feet of water in inundation channels being unnecessary and width of opening in comparatively low freshes being an advantage.

3. The Acting Superintending Engineer does not refer to drainage sluices of which + Para 6 of Note in M.S. 25 July/74 several will certainly be needed. The embankments will enclose an area of 33 square miles and even supposing the quantity of water admitted from the river to be inconsiderable the rainfall drainage will need special provision. The maximum quantity of drainage water to be disposed of may be taken as 4150 Cubic feet a second and supposing 415 square feet of vent to be needed, the cost may be approximately taken to be one half more than a similar area of head sluice opening which is about 41 Rupees a square foot or say $415 \times 60 = 24,900$ Rupees.

No 17 It appears therefore that the total cost of the protection of Polavaram island

* entered separately by mistake, is included in the gross above

island will be about as follows

Estimate already sanctioned	62,000	rupees
do. for raising flood banks	44,000	do
Head sluices	* 6,130	do
Drainage sluices	24,900	do
	<u>1,37,030</u>	

or it may be assumed that in round numbers not less than seven Rupees an acre will have to be spent for the protection of 21,116 acres, an outlay not excessive apparently if the objects to be attained be fully secured.

4. In submitting the estimate of Rupees 62,000 it was pointed out that there could not be 30,774 acres in this one island, and the statement submitted by Major Beatty shows that the total area of the island is acres 23,729 of which 21,116 are within the embankment alignment. Also that of this latter area the distribution is as follows

Government Villages	acres	13,426
Theruvu Kurri Estate	"	8,312
Entharadi	"	1,378

thus maintaining approximately the proportion of relative areas on which it was decided that $\frac{2}{3}$ of the cost of the protective the

20.25 July/74
477

protective works should be borne by Government, and one third by the Proprietary states. On the other hand the statement of areas does not agree with the Acting Subcollector's letter of the 19th June 1875 in which the area of Kuttinadi is put down as more than 3 times that of Kasmakurri, whereas the latter appears to be more than 4 times as large as the former. P.M. 4. 1830, 14/7/75 N. 1153, para 3

5. It appears to the undersigned that a more detailed examination of the question of the probable maximum flood level may with advantage be made, and that if 3 feet margin there above be allowed this will suffice, seeing that near the Coast the proportionate rise of water level for each increase higher up the river is comparatively small. Possibly some reduction of the estimate may then be found practicable.

6. The portion of the flood banks already constructed protect the island from being swept, though not from inundation by backwater, and they must in the current year have been of

of essential services. The determination of the question whether it is desirable or necessary to lay out a considerable sum in protecting this island depends more upon administrative considerations than upon the exact money value of the interests to be protected. If the people of this country are to be fed in time of famine and their lives thus preserved, it would seem to follow that they should be protected both in person and property from floods. On the other hand it may be advanced with considerable truth that the inhabitants of tracts situated like this island in the Kodavery Delta, and Sivi in the Krishna, do manage to live without undergoing undue suffering though their condition is not prima facie an enviable one.

7. In applying to the Govt. of India for an additional grant under Agricultural. Ordinary. a sum of Rupees 15,000 has been asked for on account of these flood banks to cover the

expenditure already incurred this
year, and to meet further outlay on
work, such as building sluices, which
must be constructed to enable the
miles of bank to shut out floods.

San Francisco
December 1875
Wm. L. R. R.
Chief Engineer for Irrigation

P.S. The least sluices mentioned in
para 3 above should not have been
shown separately. They are included
in the estimate. Ruben 62000

Jan. 15/2/76

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D. P. H. 1876 Sept
No 1724

From
The Chief Eng. for
Irrigation

Dated 16 Decr 1875
Recd 9 March 1876

No 1462 A

Submits for consideration
of Govt a note on the
Polaveram Island embank-
ment

17 March 1876

No 2844

Offg. Superintending Engineer's Office
Dowlaishieramb 8 December 1875

From

Major J. Beatty R.E.

Offg. Superintending Engineer R.E.

Lieutenant Colonel J. Mullins R.E.

Chief Engineer for Irrigation

Madras.

Sir,

In reference to your letter No 1258
of the 1st ultimo, I have the honor to inform you
that the expenditure on the Polaveram Island
embankments in the current official year

was Rs. 7544-11-1 up to the stoppage of work

on 27th September 1875.

2. In reply to that order was sent to the
Secretary to Government on the 4th instant.

3. If sanction be given immediately a fur-
ther sum of Rs. 4000 can advantageously be
expended on the work during the remaining
portion

2. mid. The longitudinal section is dated
18 September 1873 and thereon it is noted
that flood level rises to 10.5 feet above datum,
which latter, though not noted, is doubtless
H.W.L. at the head of the island, while the
lowest point in the flood line is 3 feet above
H.W. and is shown to be at 15 miles on this
section. Judging from the survey, the lowest
level

level would be at 13-14 miles, these points being nearer to, and about equidistant from the sea. The whole length of the section on the line of the embankments is a little over 25 miles and the starting point is some what more than 1 mile from the head of the island on the Southern branch of the river. It appears also from the tracing dated 5 November 1875 that the part of the embankment completed is from $17\frac{1}{2}$ miles on the South side round by the head of the island to 7 miles on the North side - consequently $40\frac{1}{2}$ out of rather more than 25 miles remain to be completed. The part left undone is the Eastern two-fifths of the ring and the longitudinal section shows that much of the ground here is low, while ^{of this} part 4 or 5 miles to the Eastwards are below H.W.L. The provision for earthworks in the estimate of 1873 was Rupees 52226 and as $\frac{3}{5}$ of the embankment have been completed for 20,000 Rupees, it seems unlikely that the remaining $\frac{2}{5}$ would cost the balance of 32,000 odd Rupees, although the ground on which

39 12 3
which they have to be thrown up is decidedly lower the direct proportion being only Rupees 13 to 14 thousands. This may have been taken into account in estimating the cost of raising the flood banks 4 feet, but no sections have been transmitted showing the work done and to be done with an estimate of the cost of such work in the several miles, the information is insufficient to determine this.

3. In the next place the flood levels of the longitudinal section of September 1873 appear to be incorrect for any fresh starting from the highest point at 1 mile the

miles				
Surface fall from 1 to 3	is 0.5	or	0.25	a mile
3 to 5	" 0.5	or	0.25	" "
5 to 7	" 2.0	or	1.00	" "
7 to 9	" 1.0	or	0.50	" "
9 to 13	" 2.5	or	0.62	" "

The chine are along the Northern side, then for the South side the

Surface fall is 1 to 23	(3 1/2 miles)	1.5	or	0.38	a mile
23 to 21		1.0	or	0.50	" "
21 to 19		1.0	or	0.50	" "
19 to 17		1.5	or	0.75	" "
17 to 15		2.5	or	1.25	" "
15 to 13		1.0	or	0.50	" "

The variations are much wider than is probable and moreover the surface fall increases towards the sea which is contrary to the usual experience. Again from 7 to 13 miles the fall is 3.5 feet whereas from 19 to 13, a similar distance on the other side or indeed practically a distance of only 5 instead of 6 miles as flood level at 13 and 14 miles is probably about equal the fall is 5.0 feet.

4. No information moreover has been given as to whether the alignment of the banks shown in the survey of September 1873 has been in any part altered with reference to the pier as repeated in para 5 of the note printed in Proceedings of the Madras Government of the 25th February 1874, No 477.

5. No mean sea level has been determined since 1873, an additional line showing this level may be shown without an advantage as a dotted line as it is of importance in connection with the relief of

of the low lying lands from rainfall drainage. The level should be connected with a bench mark of which the value has been accurately determined. The old H.W.L. used as datum was not it is believed a very correct representation of that level.

6. What is now required, therefore, is

- 1st a reliable set of levels.
- 2nd information as to the actual flood levels of July 1875, at as many points as possible, so as to give the surface fall with reasonable exactness.
- 3rd information on the survey as to the line actually adopted for the banks. If that shown on the survey of the 5th November 1875 is the one chosen, it is certainly more or less faulty.
- 4th a deduction from the actual flood levels and surface fall compared with those of some miles higher up the river of the probable surface levels in a maximum fresh.
- 5th an estimate for a flood bank with its top 3 feet above the maximum flood level.

to level thus deduced, with provision for sluices to
for admit water to the inundation channels and
in for outlet sluices, to allow drainage to reach the
to river: the latter sluices should have wing
in shutters.

a 7 The survey of 1873 has some lines of
for level marked across the island. The levels
6 of the village sites are not shown but those
on the Western portion of the island are
for generally on ground several feet above H.W.L.,
4 and the fall of the ground is from West and North
to towards the centre. The Southern part is low with
a fall Eastwards.

5 D. The embankment which has been
in thrown up, probably, since the recent high
fresh, prevent the island from being swept,
of but either the flood levels must be very quickly
10 ascertained, the proper level of the embank-
ments determined and the irrigation sluices
5 designed and built or temporary arrangements
for the admission of water must be made,
for otherwise the villagers will most probably
cut the banks on the lines of the channels
in and then, should a high fresh occur, there
will

will be much damage done.

9 His Grace the Governor, in his remarks
on the papers, points out that information is
required on the following points:

1st the levels of existing village sites, this
information can readily be obtained
2nd the probable effect in adjacent lands
of unbanking, Polaveram and other
similar tracts, is so entirely to exclude
flood water.

the District Engineer should take this
into consideration but it may be noticed
that the Central Delta on the one side
and the Eastern Delta on the other, are
already unbanked and the unbanked
lands lie to the Eastward and form the
the advanced portion of the Delta. The
adjustment of waterway will probably
be made by the deepening and levelling
of the beds of the two branches of the river
and the existing out to sea of much of
the material which now tends to obstruct
the waterway.

3rd the reason why one portion should be re-
embanked and not others -
this question is supposed to refer to the
information given in the note on the
sanctioned estimate in which it is men-
tioned that the group of islands known
as Poluvarani is about 80 square miles
in area, of which the principal island
and that to be re-embanked has an area
of 30 square miles. Information can readily
be given on this point. The reasons pro-
bably are that the other islands are less
advanced; that further deposits from flood
waters are desirable; and possibly also that
some of the other islands are neither inhabited
nor regularly cultivated.

the section of channels (ditches) which are
now available around Poluvarani which
will be available after the proposed
re-embankment and shall the area over
which flood waters passing about channel
margin can now escape, and area
available when island (is or shall have
been) re-embanked.

This information can be obtained from
sections

sections of the two branches from the un-
-bankments of the central to those of
the Eastern Delta, these sections being car-
ried right across the island. Sections of
the Kottam Kodavery above the head of
the island should likewise be taken, if
not already available, at intervals of
about one mile and for a distance of 5
miles in order that from the area of
watering there, with the surface fall
and similar information for the branches,
an comparison may be made of the
discharge capacities. The information
recently obtained at Ganam of the
flood level there during the last high
flood should be connected with the
level of the river.

the mode and cost of irrigating these
lands and fall available for draining
the soil during and after irrigation.

The irrigation at present is by inundation
canals which come into play only when the
river rises considerably above tidal H.W.L.
Information as to the cost is probably not
available

available. Probably within 10 or 15 years
at most proposals will be made for conveying
ancient water across from the East bank canal
of the Central Delta to the island. The fall
available for draining the soil is shown on
the survey of 1873. It varies considerably in
different parts of the island and the drain-
age of the very low lying lands is certainly
indifferent at the best of times.

10 It is questionable whether it will really
be advantageous to embank the island
on the East side. If this be done there will
be no further elevation of the lower lands
from silt deposit. If the island be protected
from sweep and if only backwater be pos-
sible the lands submerged may be
benefitted rather than injured. This
point may be required into and the views
of the villagers holding lands in the
Southern and Eastern parts of the island
ascertained.

11 On a tracing dated 17th December 1873
the changes in the boundaries of the island
between 1859-60, when the Revenue Survey
was made, and 1873 have been indicated.

It

Comp. S.R.

It will be well to see whether the lines laid
down are correct, as that of 1873 extend in
some places right across what was the bed
of the river at the earlier date. Information
of this kind to be of any use must be exact.

Lakshmi George
17th February 1876

Ans. Secy.
Major R.E.

For Chief Engineer for Irrigation

The Secretary to Govt.
M.D.

P. W. 1876 Dept
No 1723

From

The Chief Regt for
Irrigation

Dated 17 Feb. 1876
Recd 9 March 1876
No 217

Memorandum on
the Polaveram island in
embankments.

No 17 March 6 B. W. 276

No 698 Public Works Dept
Proceedings of the S. C. C.

Polaveram

From the enquiries made while
in the Godavari district - I was
unable to learn that there was any
danger to the inhabitants of the
villages being washed away -
I could not obtain from the Officers
actual facts as to level at the
moment of my visit. But Major Batty
considered that the actual village
sites were above flood level -
many villages and the old temple had any
damage and it would have been known
then seems therefore no necessity
in entering upon this large

1876, that the flood levels in the
river and the consequent
necessary

P. W. 1876 Dy
No 172

No 698 Public Works Dept
Proceedings of the Board of
the 17th February
1876, that the flood levels in the
river and the consequent
necessary

Expenditure the present season -
I think much more information is
needed -

It is I think pretty clear that if
the embankment be completed as it
has been begun without sluices to admit
the flood water to ~~the~~ water the inland
lands - the benefit will be doubtful & the
people discontented -

It seems to me very doubtful whether
the ~~the~~ farming of these islands or
tracts into large Polders with high
dykes around them will ultimately
be advantageous -

I think there is danger that such

works will necessitate similar works
on adjacent lands - confining the flood
waters of this large river to comparatively
narrow & indirect channels - instead
of allowing the water to spread over a
large area - I do fear ^{ultimately} the
danger to the dykes ^{and the} ~~the~~ ^{the}
protected lands in the power can
a much more serious state than ^{will arise from} the
now covering for a time unimpaired
land with water highly charged with
silt - to some extent enriching the soil -
It may be necessary very probably
to protect the head points of
islands & their upper parts from being
swept by currents - I suggest that

No 17 March 6 P. W. 276

the 17th February
1876, that the flood levels in the
river and the consequent
necessary

P. W. 1876 Dy
No 172

before this work be proceeded & in case
expedition sanctioned. The Engineer Officer
be called on to examine report upon
the whole of the lower lands.

- 1st the levels of existing village sites.
- 2nd the probable effect on adjacent lands
of embanking Potomac - or other similar
tracts so as entering & exclude the
flood water.
3. The reason why one portion should be
embanked & not the other.
4. The section of channels which are now
available around Potomac - which
will be available after the proposed embankment
& also the area over which flood
waters - rising above channel margin
can now escape & area available
when island embanked -

No 17 March 76 B. W. 270

No 698 Public Works Dept
Proceedings of the Board of Commissioners

5th The mode & cost of irrigating
the land - and fall available
for draining the soil during
after irrigation.

Per

Memorandum of the 17th February
1876, that the flood levels in the
river and the consequent
necessary

W. 1876 24
No 172

... ..
... ..
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No 17 March 76 B.N. 270

No 698 Public Works Dept
Proceedings of the Madras Government

The original estimate for
the protection of the Polonnaruwa
Island was 62,000 Rs
of which amount about
20,000 Rs has been spent
It now appears that to
make this work really
efficient, ~~and~~ Rs
in the total expenditure
of 1,37,030. will be necessary
For this amount 21,116
acres will be ~~completely~~
protected. - The cost being
about 7 Rs per acre
for the protective work.

1876, that the flood levels in the
river and the consequent
necessary

P. W. 1876 G. 4
No 172

No 698 Public Works Dept
Proceedings of the Madras Government
the 17th March 1876

The outlay will be shared
in the proportions of 2/3 and
1/3, between the Govt &
the Kesavakurum estate.

The other estate benefitted
Guthinadi ^{referred to}
contribute & cannot be
legally compelled, the
work having been com-
menced without their
consent of the proprietors.
It is however satisfactory
to find that the portion
of land of the reusant
estate, to be benefitted
by the work, is much

* Govt villages a. a. 13426
Kesavakurum 6,312
Guthinadi 1,378.

smaller than was originally
supposed.

Mr Mullins in para 5
of his Memo. raises the
question of the policy of
the undertaking - but it
seems unnecessary to enter
into this question. The
prosperity & safety of a
considerable tract of
land depends upon this
work - the Govt have
repeatedly affirmed the
necessity of the work -
& recommended it for
the sanction of the Govt

the following -
(52 d/s Decr/75)

62 A d/16 -

96 - 21 -

217 - 1 - 17th Feb/76

the Governor
observes that it
in the foregoing
the sanctioned
the Polavaram island
to was prepared
to state, while
in from the remarks
renewal of the
for irrigation
but officer's memo.

of the 17th February
1876, that the flood levels in the
river and the consequent
necessary

No 17 March 6 B. N. 275

1876 Dec
No 172

of India - and it seems un-
-necessary at this stage of the
undertaking to question the
policy of the Govt. What is
really to be regretted is that
we should not have originally
had a correct estimate of
the cost of the work - & that
when $\frac{1}{3}$ of the original estimate
has been expended, ^{we should discover} ~~discovered~~
that the estimate is wrong &
that more than twice the amount
of money sanctioned will be
required.

I would order the further
enquiry, suggested in para-
5 to be made with a view
to the reduction of this second
estimate, & I would ask the
No 276 A + 276 B.

Board of Revenue to verify the
area of the cess of Guttenadi in
Estate.

The final revised estimate must
be sent to the Govt of India
(with the best explanation
that can be ^{made out} given) with
a view to ^{additional} grant being
given under Agricultural
ordinary - for this work

RH

No 17 March 76 B.N. 276

No 698 Public Works Dept
Proceedings of the Trade Government
under date the 17th March/76.

Read the following:-

2. Papers put up with Chas
7962/75, 24, 1723 & 1724 of 1876-

Q 22 Aug 72 #1825

.. 27: Jan 27/73 .. 254

.. 22^d Oct^r .. 2588.

.. 5th Dec .. 24

.. 25th Feb^y / 74 .. 477

.. 14c May 1975 .. 1227 & 1228.

.. 14: Augst .. 112

.. 24: Sept^r .. 2765-

Ch₂6243 + 4 plane $\approx$ 61, 62, 63 + 64 -

} (A.R. No. 2652 d/4 Decr/75)
 " (--- 1462 A d/16 ---)
 (--- 1496 --- 21 ---)
 • (--- 217 --- 17th Feb/76)

His Grace the Governor
Council observes that it
evident from the foregoing,
here that the sanctioned
estimate for the Polairin island
bankments was prepared
incomplete data, while
it would seem from the remarks
in the endorsement of the
Chief Engineer for irrigation
and from that officer's memo-
-randum of the 17th February
1876, that the flood levels in the
river and the consequent
necessary

P. W. 1876 Gg
No 172

of India - and it seems ~~un-
advisable~~ at this stage of the
undertaking to question the
policy of the Govt. What is
really to be regretted is that
we should not have originally
had a correct estimate
the cost of the work - & that
when 1/3 of the original estimate
has been expended, ~~it is found~~
that the estimate is wrong &
that more than twice the amount
of money sanctioned will
be required.

I would order the further
enquiry, suggested in para
5 to be made with a view
to the reduction of this second
estimate, & I would ask the
N 276 A + 276 B.

given under Agricultural
Ordinary - for this work
RM

No 17 March 76 BM 276

b. 1000

No 698 Public Works Dept
Proceedings of the Madras Government
under date the 17th March 76.

Read the following:-

From
The Chief Engineer } (N. No 2652 d/16 Decr 75)
Godavary }
The Chief Engineer for Irrigation } (N. No 1462 A d/16 ---)
Do } (N. No 1496 d/16 ---)
Do } (N. No 217 d/17 Feb 76)

note by His Grace the Governor
do by the Hon. R. S. Ellis, C.B.

His Grace the Governor
in Council observes that it
is evident from the foregoing
papers that the sanctioned
estimate for the Polavaram re-
embankment was prepared
on incomplete data, while
it would seem from the remarks
in the endorsement of the
Chief Engineer for Irrigation
and from that officer's memo-
randum of the 17th February
1876, that the flood levels in the
river and the consequent
necessary

necessary dimensions of the
embankments have not yet
been determined on definite
information, such as would
alone justify the sanction of
further expenditure on the
completion of the flood banks,
and the construction of the
irrigation and surplus sluices
required.

2. A full investigation, all
the principal points of which
requiring attention have been
indicated, should now be made
and the results reported as soon
as possible, a revised estimate
being at the same time forwarded.

3. Special attention should
be given to the question of the
extent of embankments which
will be most advantageous.

4. The Board of Revenue
will be requested to verify the
area of the Kuttanadi estate.

5. The District Engineer will
forward an estimate of the
cost

cost of the survey establishment
necessary to carry out the
investigations now ordered and
pending its sanction, he will
lose no time in taking the
required levels. One of the
young Assistant Engineers may
it is considered, be usefully
employed on this work.

Chas. S.
23-2-76

MM

Four Plans

Connected with Kuttanadi
Survey & put up with the
7760 made up to 100

D. E. Sadanay
C. E. for J.
S. of Ren.
Ren. - Sept.

Propd - 24/9/76

Comp. 2/2/76

1990

" Sir W. Robinson M.C.
 His home in the house

274 @ 277

1796a
1724
24
1723

Gobt. of Madras.
PUBLIC WORKS.

Mr. C. J. Godavery

Dated

Issued

Recd.

File

G. O. 17th Mar 1876. No. 698

No. 294-297.

Sub. in Reg. 6/4.

Polavarraam Island Embankment
Mr. C. J. Godavery Esq.
Directing the submission of a
revised Estimate for the
agencies of Revenue
and the Board of Revenue
to verify the area of the latter
Radivi Estate & the Embankment
to submit an Estimate of the
necessary Expenditure to

Carry out certain im-
provements.