

*Proceedings of the Madras Government, Public Works Department,
16th May 1862.*

No. 342. Read the following Endorsement of the Deputy Chief Engineer, Southern Circle, dated Chepauk, 24th February 1862, No. 10,889.

Read the following letter from Captain J. G. RYVES, District Engineer Madura, to Colonel W. I. BIRDWOOD, Deputy Chief Engineer, Southern Circle, dated Madura, 12th February 1862, No. 1,552 :—

SIR,

1. As required by your orders No. 8,904, 24th December 1861, I have the honor to report that the depths obtained up to the end of 1859 (when the dredge was sent to Jaffna) were as follows :—

	Average of mean depths below low water neaptides.		Minimum, greatest or mid-channel, depth regulating the draught of vessels which can pass through.	
Reef Channel.....	12'	7"	11'	10"
Sand bank channel.....	11'	8"	10'	6"

Vessels drawing 11 feet could and did then pass through the two channels at high water ; and those drawing 10 feet at half tide.

2. From soundings taken by Captain Hankin on the 20th December last, it appears that during the last two years the silting up of the Sand bank Channel has not been kept under, but has gained on us very seriously. We appear to have lost* 1 foot 2 inches on the mean depth, and 9 inches on the minimum mid-channel depth. There is no tendency to silt up in the Reef channel ; but silt and sand is deposited a few hundred yards outside the northern entrance.

* Nett loss since 1858 when Lieutenant Campbell's 15,700 Rupees' estimate was submitted, is 04 feet on the mean depth of the Sand bank Channel.

3. The charts of 1859 were forwarded by me on the 24th November 1859 to the Central Office and to the Superintendent of Marine, and I now forward a copy of the Chart of soundings taken on the 20th December last.

4. I take this opportunity to report that the shoal at the eastern entrance of the Sand bank Channel has not yet been touched, this shoal is 1,200 feet across with only from 10 to 11 feet of water ; there is also a similar shoal 150 feet across at the other end of the channel.

5. I think we ought to dredge out a mid-channel at least 12 feet deep throughout the whole length of 3,450 feet before we do any thing more towards widening the old channel, and for this purpose I would propose an annual allowance for so many working months for the steam dredge and hand dredge.

1. Submitted for the information of Government, with reference to a copy of reports and information respecting the deepening of the Paumben Passage, &c., dated 12th August 1859, received in this Office on the 19th December 1861, from the Public Department.

2. As the District Engineer has not named the amount which would be required as an annual allowance, for working both the steam and hand dredges, for opening out a mid-channel 12 feet deep, alluded to in paragraph 5 of the above letter, he will be called upon to supply the omission, which will be submitted to Government immediately on receipt.

(Signed) W. I. BIRDWOOD, Colonel,
Deputy Chief Engineer, Southern Circle.

No. 343. ORDER THEREON, 16th May 1862, No. 1,061.

1. With the above Endorsement the Deputy Chief Engineer, Southern Circle, submits a letter from the District Engineer Madura, No. 1,552, dated 12th February 1862, accompanied by

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a Chart of the Paumben Channel, showing the result of soundings taken on the 20th December 1861. The District Engineer reports that the average of mean depths below low water neaptides at the end of 1859, when the Dredge was sent to Jaffna, were as follows:—

	feet.	inches.
Reef Channel	12	7
Sand Bank do.	11	8

and the minimum greatest or mid-channel depth, regulating the draught of vessels which can pass through the channel as follows:—

	feet.	inches.
Reef Channel	11	10
Sand Bank do.	10	6

He further states that vessels drawing 11 feet could and did then pass through both channels at high water, and those drawing 10 feet at half tide. Since the above date, for want of the Steam Dredge, the silting up of the Sand bank Channel has increased very seriously, the loss being 1 foot 2 inches on the mean depth and 9 inches on minimum mid-channel depth. The Reef Channel it appears has no tendency to silt up, but sand is deposited a few hundred yards from the northern entrance of it. Shoals are reported to exist at both entrances to the Sand bank Channel, the depth of water over them being from 10 to 11 feet.

2. Captain Ryves recommends that a mid-channel should be dredged to the depth of 12 feet throughout its entire length 3,450 feet before any thing farther is done towards widening the old Channel; and he proposes that an annual allowance should be granted for this purpose, but to what amount is not stated. The Government approve of this course, but before passing final orders they will await the information which it is observed has been called for by the Deputy Chief Engineer, Southern Circle. They also wish to know how much of the Supplemental Estimate of Rupees 5,680, sanctioned in Proceedings No. 454, dated 6th March 1861, has been spent. A copy of the Chart referred to above will be forwarded to the Superintendent of Marine through the Marine Department for information.

(Signed) W. H. HORSLEY, Lieut.-Colonel,
Secretary to Government.

*Proceedings of the Madras Government, Public Works Department,
30th September 1862.*

No. 538. Read the following Despatch from the Right Honorable Sir C. WOOD, Bart., Secretary of State for India (Public Works), to His Excellency the Honorable the Governor in Council, Fort Saint George, dated India Office, London, 14th August 1862, No. 19:—

SIR,

1. Herewith are forwarded six copies of the Report (with evidence) of the Select Committee appointed to enquire into the practicability of facilitating communication with India, by improving the passage through Adam's bridge.

2. The inadequate depth of water on the approaches to the Paumben passage, on both sides, appears to preclude the possibility of opening, at any reasonable cost, a channel between Ceylon and the mainland, which would be available for vessels drawing much more than 16 or 17 feet of water, but I should be glad to receive a special report from the District Engineer on the actual condition of the Paumben passage together with his opinion on the question generally.

No. 539. ORDER THEREON, 30th September 1862, No. 2,342.

Communicated to the Deputy Chief Engineer, Southern Circle, who will be good enough to obtain and submit the information required.

(Signed) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

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15th December 1862.*

No. 298. Read the following Endorsement of the Deputy Chief Engineer, Southern Circle, dated 24th November 1862, No. 153:—

Read the following letter from Captain G. M. PAYNE, Acting District Engineer of Madura, to Lieutenant-Colonel J. OUCHTERLONY, R. E., Deputy Chief Engineer, Southern Circle, dated Madura, 20th November 1862, No. 1,004.

SIR,

1. With reference to your Memorandum No. 113 of 6th October 1862, appended to Proceedings of Madras Government No. 2,342 of the 30th September 1862, I have the honor to forward herewith a special report on the Paumben Channel drawn up by Captain Hankin, the Officer superintending operations.

2. I beg to state that the copy of Report of Select Committee of the House of Commons will be returned to you as soon as received from Captain Hankin.

2 Reports from Captain Hankin, dated 18th October and 10th November 1862, with two enclosures.

Submitted to Government with reference to their Orders, Nos. 2,126 and 2,342, dated 5th and 30th September 1862.

(Signed.) J. OUCHTERLONY, Lieut.-Colonel, R. E.,
Deputy Chief Engineer, Southern Circle.

No. 299. ORDER THEREON, 15th December 1862, No. 3,007.

The Government will avail the reports and estimate called for in Proceedings dated 6th November 1862, No. 2,668.

(Signed.) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

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No. 305. Read the following letter from Lieutenant-Colonel J. OUCHTERLONY, R. E., Deputy Chief Engineer, Southern Circle, to Colonel W. I. BIRDWOOD, R. E., Secretary to Government, Public Works Department, dated Madras, 23rd January 1863, No. 177:—

SIR,

1. I have the honor to submit herewith the Estimate and reports called for in Proceedings of Government under date 6th and 14th November 1862, Nos. 2,668 and 2,739, by which it will be seen that the cost of dredging out the existing channel at Paumben so as to carry 14 feet throughout at low water, is calculated to amount to Rupees 68,000; and that of maintaining it at that depth is estimated at Rupees 12,318 annually.

2. As His Excellency the Governor has enjoyed a recent opportunity of visiting the locality and of forming a matured opinion as to the advisability of increasing the capacity of the Channel to the extent indicated, any expression of my own views seems scarcely called for; the more especially as I have never visited that part of the country.

3. I would however submit that the considerations involved are apparently more of a mercantile than a professional character; and hence it would seem advisable to remit the question to the Chamber of Commerce and to the Superintendent of Marine, with a view to their opinion being elicited as to the extent of increased resort of shipping and the ultimate benefit to the coasting trade which would be likely to ensue from so large a capital expenditure, and from incurring so great an annual charge as would be requisite to increase the ship channel at Paumben from a practical depth of twelve to one of fourteen feet, and to maintain it at the latter rate of soundings.

From Captain G. M. PAYNE, Acting District Engineer of Madura, to Lieutenant-Colonel J. OUCHTERLONY, R. E., Deputy Chief Engineer, Southern Circle, dated Madura, 20th November 1862, No. 1,005.

SIR,

Adverting to your Memorandum No. 144 of the 11th instant, appended, to G. O. No. 2,663 of the 6th idem, I have the honor to forward to you herewith the following papers drawn up by Captain Hankin in accordance with the instructions conveyed in the 5th paragraph of His Excellency the Governor's Minute of the 17th October 1862:—

- No. 1.—Estimate of Rupees 68,000 for deepening the Paumben Channel to 14 feet.
- No. 2.—Report upon do.
- No. 3.—Estimate of Rupees 12,318 for the annual maintenance of the Channel at this depth.
- No. 4.—Report upon the relative value of steam and hand Dredges.

From Captain G. M. PAYNE, Acting District Engineer, Madura, to Lieutenant-Colonel J. OUCHTERLONY, R. E., Deputy Chief Engineer, Southern Circle, dated Madura, 21st November 1862, No. 1,015.

SIR,

With reference to my letter of the 20th instant, No. 1,005, I have the honor to forward to you herewith an original letter No. 67, dated 19th instant, from the Officer in charge of Operations Paumben, on the subject of the deepening of the Paumben Channel to 14 feet, in which that Officer points out the necessity for early sanction being given to the estimate, supposing the Government are desirous of having the work commenced during the current official year.

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From Captain F. G. HANKIN, Superintending Operations, Paumben Channel, to Captain G. M. PAYNE, Acting District Engineer, Madura, dated Paumben, 12th November 1862, No. 57.

SIR,

1. I have the honor to submit the following, showing the relative cost of working by Hand and Steam Dredges.

2. The pay and allowances of the Engineer and pay of the crew of Steam Dredge are passed on monthly abstracts by the Civil Auditor, so that they do not appear in our estimates, and while this causes the work done by the Steam Dredge to appear cheaper, it is not so in reality. The average monthly amount of pay and allowances of the Mechanical Engineer for the past year has been 180 Rupees, the pay of the crew is Rupees 129, these sums are paid whether the Dredge works or not, we thus have—

	RS.
Drawn from Civil Auditor Rupees $309 \times 12 =$	3,708
Expenses for five working months at	
500 Rupees as per annexed Statement A ...	2,500
Rent of jungle from which we cut firewood.....	57
Total for a year...	6,265

I have only put down actual working expenses, but we should take into consideration the prime cost of a Steam Dredge and the very expensive repairs that are often required to be executed (last year 4,500 Rupees was sanctioned for the repairs of our Dredge), I do not know the exact cost of a Steam Dredge, but I see that Colonel Cotton in his report on the Paumben Channel estimates it at 50,000 Rupees, and ten per cent. per annum on this amount for depreciation, wear and tear and repairs, gives 5,000 Rupees to add to the sum of 6,265 or a total of 11,265.

3. Our present Dredge will do 8,000 feet a day for twenty days in the month, and we cannot be certain of more than five months work in the year, then the work done will be $8,000 \times 20 \times 5 = 800,000 = 29,629$ cubic yards in the year, which calculated on the actual working expenses as above, gives Rupees 0-3-4½ per cubic yard, and after the additions of Rupees 5,000-0-6 1 per cubic yard. No doubt that with a more efficient Dredge than the old one we have here, more work might be done, even say ¼th more each day the cost would then be Rupees 0-4-10¾ per cubic yard.

4. The expenses of working the Hand Dredge are:—

	RS.
1 Syrang at 14 Rupees a month = for one year.....	168
Monthly expenses when working at 243 Rs.	
as per Statement B, for five months.....	1,215
	1,383 Rupees for 1 year.

The Dredge in soft sand will do 2,000 feet a day, and if she works twenty days a month for five months in the year will do 20,000 cubic feet or 7,407 cubic yards, costing therefore Rupees 0-2-11 per cubic yard, but as we have added for wear and tear of Steam Dredge we must add 600 Rupees or 10 per cent. on 6,000 Rupees to 1,383 Rupees which gives the cost per cubic yard at Rupees 0-4-3¾.

5. We then have these comparisons—

	RS.	A.	P.
I. Cost of present Steam Dredge on actual working expenses	0	3	4½
II. Do. after adding for depreciation, &c.....	0	6	1
III. Do. new Dredge capable of doing ¼th more more work.....	0	4	10¾
IV. Do. on present Hand Dredge on actual working expenses.....	0	2	11
V. Do. after adding for depreciation, &c.....	0	4	3¾

which comparisons show much in favor of the Hand Dredge.

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6. Last year our Engineer was sick for two months of our best season, and having no one capable of working the engine, the Steam Dredge was idle, the pay of Engineers and crew going on, this is a contingency that could never happen with the Hand Dredge.

7. Working where there is a chance of coming across stones or coral boulders, for instance near the reef channel, Hand Dredges are preferable because if the buckets meet with any such obstruction the Convicts simply cease turning the crank and no damage is done, with the steam Dredge buckets however it is different, if they come across an obstruction something must go before the engine can be stopped, and the buckets are either thrown off the ladder or some links and shoes are broken and a long time is lost in replacing them.

8. But there is another point I venture to submit with reference to the employment of Convicts and Hand Dredges in the channel work. A hulk might be moored in the basin to the south of the reefs, there is a deep water and never any heavy sea on, such a hulk might be purchased and fitted up I should imagine very cheaply, at all events for a far less sum than a jail could be built at any station. I would submit that about 500 prisoners might be kept on board, we could employ this number (allowing for sick, cooks, &c., &c.) on Hand Dredges and in Dhonies and rafts in the channel work. Each prisoner in jail costs Government certainly 1 Rupee a month for constables to guard him, as I would propose that the prisoners from the hulk should never land but be taken at once from the hulk to Dredges, &c., a very great proportion of this guarding expense could be saved. Paumben is a healthy place as is shown by the return of the present jail. Although the value of the labor of these prisoners would enter into our estimates as a matter of account their labor thus utilized would be really a gain to Government. I would add in conclusion that there is no doubt that work on the Dredges is very hard work, and thus prisoners sentenced to hard labor would really get it.

From Captain F. G. HANKIN, Superintending Operations Paumben Channel, to Captain G. M. PAYNE, Acting District Engineer, Madura, dated Paumben, 12th November 1862, No. 58.

SIR,

1. I have the honor to submit the following estimate of the probable annual cost that will be incurred in maintaining the pass at the proposed increased depth of 14 feet after that depth has been attained.

2. The Sand Bank Channel silts up at the rate of 1¾ feet per year, so the amount to be excavated will be $6,450 \times 100 \times 1\frac{3}{4} = 1,128,750$. The entrances to reef channel require dredging at the end of each monsoon, at the end of the south-west monsoon we always find a little sand and shingle deposited for about 250 feet inside the buoy, the same happens at the other end at the end of the north-east monsoon, the work to be done here will then be $(250 \times 2) = 500 \times 80 \times 1 = 40,000$, giving as a total—

Sand Bank Channel.....	1,128,750
Reef Channel.....	40,000
	1,168,750

3. We can only be sure with our present Steam Dredge of doing 8,000 feet a day, but with a better Dredge we may look, even with the increased depth, for 10,000 feet a day for five months of 20 days or a 100 days a year, and we cannot be sure of more on account of wind and current.

4. The Steam Dredge working as above will do $10,000 \times 20 \times 5 = 1,000,000$, which deducted from the total of 1,168,750 leaves 168,750 to be done by the Hand Dredge, which at 2,000 feet

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a day for twenty days will do 40,000, or we may safely put down that five months work will be required, our estimate then becomes :—

	RS.
5 months of Steam Dredge at 500	2,500
Do. Hand Dredge at Rupees 243 for five working months expenses and Syrang's pay at 14 Rupees a month for twelve months.....	1,383
Rent for jungle to cut firewood.	57
Requiring sanction.....	3,940
Add pay of crew as per margin* paid by Civil Auditor.....	3,708
Depreciation at 10 per cent. for wear and tear of Steam Dredge, repairs, &c	5,000
Do. Hand Dredge.....	600
True annual cost.....	13,248

* Monthly average of pay Rs.
and allowances of Engineer 180
Crew..... 129

309
12
3,708

N. B.—The items in the outer
column will not appear in esti-
mates but are entered to show
true cost.

5. If it is decided to keep the Channel clear entirely by Hand Dredges we shall require, supposing each Dredge to do 2,000 feet a day, 584 days' work or six Dredges nearly for 100 days in each year, our estimate then is—

	RS.
Cost of one Dredge for a year.....	1,383
Do. for	6
Total requiring sanction.....	8,298
Add for depreciation, wear and tear, &c., on Dredges	3,600
Do. on Spoil Boats.....	420
True annual cost.....	12,318

as we should also require to have twelve dhonies as spoil boats, two for each Dredge, which can be purchased for about 350 each or Rupees 4,200, 10 per cent. on this sum or Rupees 420 is added above.

6. Last year our Engineer fell sick during our working season, and having no one capable of working the engine work was stopped, as in the estimate above I have supposed the Dredge to work every day that the current would probably admit of, a contingency of this sort would throw the work back very much, and as we could not afford to run the risk of the loss of a day an Assistant on board the Dredge would be necessary, whose pay must be added to the estimate, the impossibility of a contingency of this sort happening with Hand Dredges is, I submit, an argument in their favor.

7. As we only have one Hand Dredge, five more would have to be built if Government decide on this method of keeping up the pass at the proposed depth of 14 feet, I have assumed that if the work is to be done by a Steam Dredge the one that is supplied shall be capable of doing $\frac{1}{4}$ th more work than our present Dredge or 10,000 feet a day.

From Captain F. G. HANKIN, Officer Superintending Operations Paumben Channel, to the District Engineer, Madura, dated Paumben, 12th November 1862, No. 59.

SIR,

1. I have the honor to forward an Estimate for deepening the Paumben pass to 14 feet at low water; regarding a few items in the Estimate I would offer the following explanation.

2. I have supposed that to carry out the work I am to be furnished with a Steam Dredge capable of working at the required depth at any state of tide, an Engineer and crew to be paid as at present on monthly abstracts passed by Civil Auditor and not paid from the Estimate. I have also supposed that the Dredge will excavate in sand and mud 10,000 feet a day, which is a $\frac{1}{4}$ th more than we can depend on from our present Dredge, where we have shingle, and where perhaps a few coral boulders will have to be removed by divers, thus delaying the work. I have only supposed the Dredge to do 5,000 feet a day.

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3. The heaviest part of the estimate is of course blasting through the reef, for this work I have proposed to purchase dhonies and canoes which will be likely to realise half their price when the work is finished; we cannot hire a dhony now under Rupees 25 a month; with our dhonies and canoes and divers always present we can seize a few days calm at any time of the year to do a little work. I have seen on several occasions out of our regular working season (from middle of December to middle of March) a week at a time when work might have been done, but before dhonies and canoes could be hired, rafts prepared, divers engaged, it began to blow again. Regular divers will not come to work just for two or three months as they earn such large pay at the pearl fisheries, which generally take place about our working season; the people about here are merely fishermen and cannot work at all satisfactory in as deep water as our estimates provides for—to do the work, therefore, we must have good divers.

4. We now pay our raft divers, who do the blasting, 5 Rupees a month when they are employed in addition to pay for sinking holes, but to stone raising divers we pay nothing except so much a cubic foot for work done, the consequence is they come and go as they please and are very troublesome. I have proposed therefore to pay the raft divers Rupees 10 a month all the year round as retaining fee, and for blasting and stone dhony divers who have no blasting Rupees 5, of course in addition to what they will earn when working, for sinking holes and raising stones respectively. This may seem at first glance a very extravagant proposal, but after careful consideration I have entered it as the best and cheapest plan as well as the only one to get the work done at all rapidly, these divers earn Rupees 50 a month when employed in pearl fishing, and if we are to make this up to them we may as well spread it over the whole year so as always to have them present to work every day that is possible, and thus I hope we may get 120 days work a year. This was the plan that was always adopted in previous years when the Channel work was being vigorously carried on; when not employed diving these men would do any other work we had, poling dhonies for the steam Dredge, &c., &c., and thus save cooly hire.

5. I have entered the pay of an Overseer because it is quite impossible that an Officer can without any assistance look after this work during the working season; there used to be two Overseers here, one was withdrawn sometime ago and the other last year, when I went through the working season all alone, this obliged me to be out in the sun every day from 7 A. M. till 3 P. M., to see the powder measured out, to place raft and dhonies at their work, to be present in the Channel to see the holes are sunk to the proper depth and to superintend the blasting, and to measure the contents of the stone dhonies as they return to shore, besides occasional visits to the Steam and Hand Dredges at work two miles distant. I am sure therefore the pay of an Overseer will be well spent in more effective superintendence if this large estimate is carried out.

From Captain F. G. HANKIN, Officer Superintending Operations Paumben, to the District Engineer, Madura, dated Paumben, 19th November 1862, No. 67.

SIR,

I have the honor to bring to your notice that my best and only certain season for work begins towards the end of next month, and if it is intended to have any work towards deepening the pass to fourteen feet at low water done this year, it would be very desirable that I should receive instructions as soon as possible to enable me to collect and enter into engagements with divers, as these men will soon be making engagements for the pearl fishery that is to take place at Menaee when they will not be procurable, and thus as far as the estimate provides for blasting in the reef channel, a year will be lost in the completion of the work.

No. 306.

ORDER THEREON, 17th February 1863, No. 417.

1. The question as to the *minimum* depth to be maintained at the Channel will be referred for the report of the Superintendent of Marine, to whom copy of the Proceedings of Government dated 6th November 1862, No. 2,668, will now be communicated.

2. The estimate submitted does not seem to have been prepared with due regard to economy. The mode of working indicated in paragraph 4 of Captain Hankin's letter No. 59,

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dated 12th November 1862, seems extravagant. The Government are of opinion that it would be a far better plan to sink a few chatties filled with powder, to discharge these at high water by means of a Galvanic Battery and to bring up the debris by the Dredge. This is a quick and easy as well as an efficacious plan of obtaining additional depth on a rocky reef. It has answered well on a compact limestone and would therefore succeed on a soft coral.

(Signed.) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

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31st March 1863.

No. 564. Read the following letter from J. J. FRANKLIN, Esq., Superintendent of Marine, to Colonel, W. I. BIRDWOOD, R. E., Secretary to Government, Public Works Department Fort Saint George, dated Madras, 14th March 1863, No. 760 :—

SIR,

1. I have the honor to acknowledge receipt of the Order of Government of the 17th ultimo, No. 417, forwarding correspondence relative to the estimated expenses of deepening the Paumben channels to fourteen feet throughout, and directing me to report on the minimum depth to be maintained there.

2. The opinion I expressed in my letter to Government of the 12th May 1854, (published in Selections from the Records No. IV of 1854), has undergone no change. The approaches to Paumben on either side are so beset with dangers, that even if a channel were excavated sufficiently deep for the passage of large ships and steamers, they would not take that route.

3. The great use of the Paumben channels is to facilitate the passage of coasting craft, which being commanded and navigated by men minutely familiar with every land mark and danger on and near the adjacent shores, obtain an advantage which vessels of heavy draft would not possess.

4. As the depth has been increased, so has the tonnage and draft of the craft built expressly for passing through likewise become greater. At present few if any vessels pass through drawing eleven feet. Were the depth increased to fourteen, many more, including steamers, would avail themselves of these channels, for the approaches would admit of their doing so without unusual risk. I would not however recommend that any increase on that depth should be attempted; for the present at any rate. When fourteen feet throughout have been attained, and a gradual increase in the size and draft of vessels using the channels has, as a natural sequence, taken place, it will be time enough to consider the question of further operations.

No. 565. ORDER THEREON, 31st March 1863, No. 801.

1. Communicated to the Deputy Chief Engineer, Southern Circle, with reference to Proceedings dated 17th February 1863, No. 417.

2. It will be observed that the Superintendent of Marine considers it sufficient for the present to maintain a depth of fourteen feet at the Paumben channel. The estimate which was considered in the Proceedings quoted above, provided for that depth; but it did not appear to the Government to have been prepared with due regard to economy. An efficacious plan for obtaining additional depth has been suggested, and the Government will await the receipt of a report thereon together with a revised estimate.

(Signed.) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

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18th April 1863.*

No. 294. Read the following Endorsement of Lieutenant-Colonel S. O. E. LUDLOW, R. E., for Deputy Chief Engineer, Southern Circle, dated Madras, 1st April 1863, No. 209:—

Read the following letter from Captain G. M. PAYNE, Acting District Engineer, Madura, to Lieutenant-Colonel S. O. E. LUDLOW, R. E., Deputy Chief Engineer, Southern Circle, dated Camp Ooppoor, 21st March 1863, No. 1,448.

SIR,

1. In reply to your Memorandum of the 4th instant, No. 180, communicating Government Order No. 528 of 2nd idem, I have the honor to state that a Steam Tug could not, under existing circumstances, be profitably employed at Paumben.

2. The class of vessels at present making use of the Paumben passage is one whose owners would not, it is considered, be willing to pay the fee that it would be necessary to charge in order to ensure the Tug being worked without loss.

3. So very averse are the Native Captains of vessels to spend their money, with the object of saving time (*vide* an instance recorded by Captain Hankin, in the 5th paragraph of his report, which I have the honor to forward herewith in extenso) that, independently of other unfavorable circumstances, this alone would deter a private Company from an enterprize which could scarcely be attempted without heavy loss.

4. Should the Paumben Channel be deepened sufficiently to admit of the passage of foreign vessels of large tonnage and valuable freight, a Tug would, doubtless be of much service, if not indispensable, and would probably pay; but at present it could not be expected to return even its working expenses.

From Captain F. G. HANKIN, Superintendent of Operations, Paumben, to Captain G. M. PAYNE, Acting District Engineer, Madura, dated Paumben, 16th March 1863, No. 93.

SIR,

1. In acknowledging the receipt of your letter No. 1,420, dated 9th March 1863, forwarding O. G. No. 528 of 2nd March 1863, calling for information as to whether a Steam Tug could be profitably employed at Paumben, I have the honor to report as follows.

2. It has always been considered that a Tug was much required here, it was thought that by delay to vessels being saved the trade would become a more profitable one to the owners; that the Channel revenue would increase by getting each vessel once or twice often through the channel, each year; but I venture to differ from the above, and doubt of the profit derivable directly or indirectly from a Tug here would be at all commensurate with the cost of maintaining her (*viz.*, pay of Engineer, crew and firewood) added to the interest on her cost.

3. Except for about six weeks at the end of each monsoon, when the current and wind are irregular and vessels can generally get a slant sometime during the day to take them through either way, ships resorting to this pass have always to warp through against wind and current one way, the expenses of so doing vary very much of course depending on the size of the vessel and strength of current, but taking the present and two past years we get an average of 492 vessels warping each year paying for coolies, hire of warps and grapnels 6,074 Rupees, or an average of Rupees 12-5-0 each vessel.

4. Vessels are very often on account of the strength of the wind and current detained many, days or even sometime weeks, before they can warp through; but if the strength of the wind is such that they cannot warp it is very certain that even if vessels of the class now using the channel were tugged through to the weather side of the reef they would not continue their voyage, but would wait for the wind to moderate, and having to wait, would of course prefer to do so on the lee side of the reef, till the weather allowed them to pass through at a little expense, and continue their voyage without again anchoring; whenever the weather was so moderate that the cost of warping would be under the average these Native vessels would not, unless the use of warp and grapnels be absolutely prohibited in the channel, pay the Tug's charge, which of course would be a fixed one calculated on the average cost of warping, they would rather generally wait a day or two if they thought by so doing they could save a Rupee.

*Do. of the District Engineer
of 31 March 1863
Do. of the District Engineer
of 31 March 1863*

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18th April 1863.*

5. As an instance: at the present moment there are at anchor here four vessels bound to Colombo with rice; they have been here four days, it being nearly a calm and very little current, the expense of coolies, &c., for warping would only be 4 Rupees as the head Pilot assured the Tindals this morning, yet they refused to pay this as they hope to get a slant of wind to take them about new-moon, four days hence, and there are no light house, port or anchorage dues charged here. Could we expect Sailors who show so little appreciation of the value of time to pay one Anna more (if they can help it) to be tugged through in hope of saving a day.

6. Of course if the channel is deepened sufficiently for a better class of vessels that would not be afraid to beat out in tolerably fresh weather, to use it, a Tug would be almost indispensable, but she must be capable of steaming at least 9 knots, for I have been on board the Ceylon Government Steamer "Pearl" 60-horse power, going 7 knots, and yet on account of the current not advancing 50 feet an hour.

¹ Original letter No. 1,448, dated 21st March 1863, with one enclosure.

Submitted for the information of Government with reference to their Proceedings No. 528, dated 2nd March 1863.

(Signed) S. O. E. LUDLOW, Lieut.-Colonel, R. E.,
For Deputy Chief Engineer, Southern Circle.

No. 295. ORDER THEREON, 18th April 1863, No. 955.

Ordered to be recorded. The Government will await the receipt of the two estimates called for in paragraph 2 of Proceedings dated 2nd March 1863, No. 523, and in Proceedings dated 31st March 1863, No. 801, the one for improving the Steam Tug and the other for deepening the Paumben Channel.

(Signed) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

*Proceedings of the Madras Government, Public Works Department,
22nd July 1863.*

No. 559. Read the following letter from Captain F. J. MOBERLY, R. E., Superintending Engineer 8th Division, to Colonel W. I. BIRDWOOD, R. E., Secretary to Government, Public Works Department, dated Madura, 30th June 1863, No. 37:—

SIR,

No. 159, dated 26th June 1863,
from Captain Payne.
No. 12, dated 27th May 1863,
from Captain Hankin.
¹ Abstract Estimate.

1. I have the honor to forward letter and papers as per margin from the Acting District Engineer Madura, regarding the deepening of the Channel at Paumben.

2. I trust that the Government will be pleased to sanction the Estimate accompanying. The method proposed by His Excellency the Governor shall be tried as soon as the weather will allow of the execution of work, and if it be economical, there will be so much money to the credit of the work.

3. But if an Estimate be submitted now for the smaller amount, drawn up at a guess, there is great fear that a supplemental Estimate may at some future date be required.

No. 560. ORDER THEREON, 22nd July 1863, No. 1,998.

1. The Government in their Proceedings, dated 17th February 1863, No. 417, objected to an Estimate, amounting to Rupees 68,000, for deepening the Paumben Channel, as it did not appear to have been prepared with due regard to economy. A revised Estimate of Rupees 36,000 is now submitted by the Superintending Engineer 8th Division; but without the expression of his own opinion on the work to be executed. In his letter* of the 26th June 1863, the Acting District Engineer adverts to the necessity of an additional Dredge being supplied, as also to the expediency of the relative advantages of Hand and Steam Dredges being thoroughly investigated before operations are commenced, but on these points the Superintending Engineer offers no comments.

2. The Estimate of Rupees 68,000 having been returned to the late Deputy Chief Engineer, Southern Circle, should be re-transmitted to admit of its being compared with the present Estimate, and a full report should be submitted by the Superintending Engineer of the expediency of the work proposed to be executed. The report should enter fully into the different methods suggested for deepening the Channel, and should specify distinctly the grounds on which the Superintending Engineer's recommendations are based.

3. The Estimate of Rupees 36,000 now submitted is not sufficiently intelligible, and should therefore be carefully scrutinized.

(Signed) W. I. BIRDWOOD, Colonel, R. E.,
Secretary to Government.

*Proceedings of the Madras Government, Public Works Department,
18th September 1863*

No. 404. Read the following Despatch from the Right Honorable Sir C. WOOD, Bart., Secretary of State for India (Public Works), to His Excellency the Honorable the Governor in Council, Fort Saint George, dated India Office, London, 8th August 1863, No. 11:—

SIR,

No. 2, dated 10th Jan, 1863.	No. 31, dated 29th April 1863.
" 3, " 22nd " "	" 32, " 21st May "
" 26, " 24th March "	" 33, " 21st " "
" 27, " 31st " "	" 34, " 21st " "
" 28, " 15th April "	" 35, " 21st " "
" 29, " 21st " "	" 36, " 21st " "
" 30, " 21st " "	

1. I have received your Despatches of the numbers and dates noted in the margin, and proceed to notice such of them as appear to call for remark.

No. 2. Special leave of absence for six months to Lieutenant-Colonel Ouchterlony, with retention of appointment and English rate of regimental pay.

2. The lamented decease of Lieutenant-Colonel Ouchterlony prevented his availing himself of this leave of absence, but, I must, nevertheless, mention that I should, in any case, have had great difficulty in confirming it. The circumstance of an Officer's desiring to come to England with the view of endeavouring to form a company for the prosecution of public works, would not be a sufficient reason for allowing him to draw regimental pay during his absence from India, if not otherwise entitled to it by the furlough rules.

3. I concur, however, entirely in the views expressed by your Government in the 1st and 2nd paragraphs of your Order of 26th November 1862, No. 2,831, and shall view with gratification any steps taken in the direction of the scheme devised by Colonel Ouchterlony, or in one tending to the extension on a sound basis of the contract system, and to the introduction of lump contracts into the Public Works Department.

No. 3. Application from Mr. Agnew, Agent of the Madras Irrigation and Canal Company, for an increase of salary.

4. Mr. Agnew's subsequent resignation of the Agency disposes of this question as far as he is personally concerned. In the event of the Directors nominating as his successor a gentleman who shall engage to devote his whole time to the Company's business, any proposals which they may make for increasing the salary of the office shall receive due attention.

No. 26. Over-payments made to Mechanical Engineer Pye.

5. Transferred to the Marine Department.

No. 27. On the subject of the Paumben Channel.

6. The additional information furnished with respect to the Paumben Passage, shows clearly that to deepen the existing channel to fourteen feet is the utmost that can advisably be done.

7. If this depth can be attained at a moderate expense, by means of the economical expedient suggested in Government Order of 17th February last, the sooner the improvement is carried into effect the better.

No. 28. Luckavully Reservoir project.

8. I am anxious to know what success has attended the operations of the survey party which, in consequence of the disappointment experienced at Luckavully, has been employed by the Chief Engineer of the Madras Irrigation Company in searching for more favorable sites for reservoirs.

9. An additional supply of water, sufficient to make up for the deficiency of the Toombuddra, is an object of vital importance to the Company, and the Mysore Government, equally with your own, will no doubt afford them every reasonable facility for obtaining it.

No. 31. Result of the experiment of laying a toll on the Pennar Anicut at Nellore.

10. The system of renting such tolls as those which are levied on the roadway over the Anicut at Nellore is preferable to that of leaving the management with the Collector's Office, but, in calculating an upset price at which the tolls should be put to auction, an allowance should be made for the days during which the road might be closed, so as to avoid the necessity of entertaining subsequent applications for remissions.

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11. The Agent's attention was properly drawn to the extraordinary difference, in some cases more than 1,000 per cent., between the prices entered in Indents sent to England, and those at which the articles indented for were purchased. The occasional sale of stores to private parties is another point on which explanation was properly called for.

No. 34. Account Current of Stores purchased and issued by the Madras Irrigation and Canal Company, for the quarter ending 30th July 1862.

No. 405.

ORDER THEREON, 18th September 1863, No. 2,711.

1. Paragraph 3 of the foregoing Despatch will be communicated to Superintending Engineers of Divisions for information.

2. Paragraph 4 will be communicated to the Consulting Engineer Irrigation and Canal Company with reference to his letter of the 18th December 1862, No. 104.

3. Paragraphs 6 and 7 will be communicated to the Superintending Engineer, 8th Division, and the Superintendent of Marine for information. The attention of the former Officer will be drawn to Proceedings No. 1,998, dated 22nd July 1863.

4. Paragraphs 8, 9 and 11 will be communicated to the Consulting Engineer Irrigation and Canal Company for information and guidance.

5. Paragraph 10 will be communicated to the Revenue Department, the Board of Revenue, and the Superintending Engineers of Divisions for information.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineers of Divisions.

- „ Revenue Department.
- „ Board of Revenue.
- „ Consulting Engineer Irrigation and Canal Company.
- „ Superintendent of Marine.
- „ Superintending Engineer, 8th Division.

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3rd November 1863.*

No. 46. Read the following letter from Captain F. J. MOBERLY, R. E. Superintending Engineer, 8th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Department Public Works, dated Madura, 7th October 1863, No. 800:—

SIR,

No. 417, 17th February 1863.
„ 1,998, 22nd July „
„ 2,711, 18th September „
„ 2,784, 25th September „
1 Extract.

1. I have the honor to submit a report on the Paumben works referring to Orders as per margin.

2. The first of these calls on the local Officers to revise an Estimate of Rupees 68,000, which had been submitted for deepening the Paumben channel to fourteen feet, and pointing out a better system of work.

3. A fresh Estimate was submitted for Rupees 36,000 drawn up without any experience of the new method of working, viz., by sinking chatties full of powder, on the rock, instead of boring and filling mines, the Estimate otherwise is drawn up from the average experience of previous years' work by the Dredge; the only Officer who really has studied the matter, Captain Hankin, is away on sick leave, and I have no better data than those that he has supplied.

4. Meanwhile, we have incomplete an Estimate of Rupees 43,340* for work at Paumben, of which up to May next only 23,146 can be expended, and the estimated amount of work cannot be executed as the pay of the Superintendent is now disbursed from the Estimate.*

5. There appears therefore very little necessity for immediate preparation of the Estimate for further deepening the channel, since it cannot be carried out for another year, and meantime better data may be procured.

6. I beg to call the attention of Government to the arguments of letters Nos. 57 and 58 from Captain Hankin, printed with G. O. No. 417 of the 17th February, to my mind showing the bad economy of working by steam at a place like Paumben where firewood is expensive, where means of mending any but the most petty damage are not procurable, and whence there appears to be great difficulty in conveying any machinery that requires repair.

7. A part of the old Dredge that was broken in February last, has been lying packed ready for transmission to Madras ever since, but no opportunity of sending it has been found.

8. On the other hand the simple machinery of a Hand Dredge can be easily repaired, no loss would be caused, as was lately, by the illness of the Mechanical Engineer, and the motive power may be easily doubled if necessary by increasing the supply of Convicts from Madura or other Districts.

9. Under Captain Hankin's very able management, the Convicts appear really to have been kept to hard work, which they certainly do not do elsewhere; I trust that the Government will take into consideration the advisability of mooring a hulk or two, and sending down to it prisoners under long sentence or refractory Convicts from the Jails of other Districts.

10. If this were done, more Hand Dredges would be required, but the Steam Dredge might be removed to some other place, where perhaps the alterations now considered necessary might not be required.

11. In conclusion, I beg to enclose an extract from the "Colombo Observer," I know not what authority the writer has for his assertion that the Jaffna peninsula is rising, but this place is so near to Paumben that it may be well to take measures to verify the statement.

No. 47. ORDER THEREON, 3rd November 1863, No. 3,194.

1. The Superintending Engineer, 8th Division, is requested to re-transmit both the Estimates referred to in G. O. No. 1,998, 22nd July 1863, together with the Statements A and B referred to by Captain Hankin in his report of the 12th November 1862, No. 57.

2. It is observed that the Superintending Engineer considers that there are sufficient sanctioned funds to continue operations till May 1865.

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3rd November 1863.*

3. The Estimate alluded to in paragraph 3 of the Superintending Engineer's letter relates solely to the Reef Channel, but it is very desirable that dredging operations should be resumed without delay on the sand bank channel, were it only to regain the depth which has been lost in the last three years, and Captain Moberly should take care that sufficient sanctioned funds be provided in time, the small annual maintenance allowance being barely sufficient (if it is sufficient) to prevent further deterioration.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineer, 8th Division.

Exd. S. T. Augustin.

*Proceedings of the Madras Government, Public Works Department,
21st November 1863.*

No. 500. Read the following Endorsement of the Superintending Engineer, 8th Division, dated Madura, 11th November 1863, No. 1,128:—
Read the following letter from Major W. SYME, Acting Superintendent of Operations at Paumben, to Captain F. J. MOBERLY, R. E., Superintending Engineer, 8th Division, dated Paumben, 7th November 1863, No. 58.

SIR,

In reply to your Memorandum No. 1,032, dated 2nd November 1863, I have the honor to state that it is impossible for me to say when the angle of the Reef Channel will be removed as the present Steam Dredge is not in a working state, but certainly not for another working season, and without the Sappers to prepare the bags for the powder and blasting it would be impossible to carry on the works with the labour procurable at this place, so I trust they may be allowed to stay on. The Hand Dredge I hope to get at work in a few days.

Submitted for the information of Government, with reference to paragraph 6 of G. O. No. 371, dated 7th March 1862:

(Signed) F. J. MOBERLY, Captain, R. E.,
Superintending Engineer, 8th Division.

No. 501. ORDER THEREON, 21st November 1863, No. 3,410.

1. Communicated to the Military Department.
2. The Order marginally noted should continue in the Superintending Engineer's unanswered Reference List.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Military Department.
„ Superintending Engineer, 8th Division.

Exd. S. T. Augustin.

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*Proceedings of the Madras Government, Public Works Department,
24th August 1864.*

Read the following letters :—

No. 515. From Captain F. J. MOBERLY, R. E., Superintending Engineer, 8th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Department Public Works, dated Madura, 30th May 1864, No. 336 :—

SIR,

1. I have the honor to enclose a Comparative Statement showing probable sum required in addition to Estimate already sanctioned* for cutting the inner angle of the reef at Paumbum.

1 Comparative Statement.
1 Copy of Estimate.

* No. 2,126, dated 5th September 1862.

2. Soundings have been taken very carefully by Major Syme over the whole area, and he calculates that there are really 6,145 cubic yards more to be removed than was originally allowed for, he has allowed also in his Estimate for a slightly higher rate which is rendered necessary by the increased demand for Divers and the rise in price of provisions, &c.

3. I enclose copy of Major Syme's Estimate for the information of Government.

No. 516. From Captain F. J. MOBERLY, R. E., Superintending Engineer, 8th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Kodacanel, 26th July 1864, No. 719.

SIR,

1. In returning the enclosed Plan, I have the honor to report that it shows the actual amount of work remaining to be executed on the 13th April last. It is impossible to show

1 Plan.

what had been previously done as the soundings do not exist.

2. It is most difficult to exhibit work in detail in such a place as Paumbum, the rocks are very uneven, and operations are obliged to be varied according to the weather, amount of obstruction, &c., to add to all Major Syme who could have afforded some slight information from his personal knowledge of the reef, &c., is lying utterly insensible at Paumbum from paralysis.

No. 517. ORDER THEREON, 24th August 1864, No. 2,442.

1. These papers refer to a supplemental Estimate submitted by the Superintending Engineer, 8th Division, for removing the inner angle of the reef at Paumbum.

2. The original Estimate for this work, amounting to Rupees 15,080, was sanctioned upon the 12th June 1860;† but, owing to errors in arithmetical calculations, this Estimate had to be replaced by a revised one, amounting to Rupees 43,340, which received the sanction of Government upon the 5th September 1862.‡

† In G. O. No. 215, Marine Department.

‡ In G. O. No. 2,126.

3. The Superintending Engineer now reports that, from soundings carefully taken by the late Major Syme, it appears that the amount of rock to be removed exceeds that allowed for in the Estimate by more than 6,000 cubic yards. Captain Moberly also states that the great demand for Divers and the rise in prices have caused a slight increase in the rates. These causes together have necessitated the submission of a supplemental Estimate amounting to Rupees 19,460.

4. Upon consideration of these papers, and the Plan which accompanied them, the Governor in Council doubts whether the object to be gained is of sufficient importance to justify the large additional outlay now applied for. At all events funds are not now available for the purpose. The work at the inner angle of the reef will accordingly be stopped when the Estimate§ now sanctioned shall have been exhausted.

§ Rupees 43,340.

(True Extract)

(Signed) J. H. M. SHAW STEWART, Major, R. E.,
Deputy Secretary to Government.

To the Superintending Engineer, 8th Division.
" Controller of Public Works Accounts.
Exd. S. T. Augustin.

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*Proceedings of the Madras Government, Public Works Department,
1st November 1864.*

No. 24. Read the following letter from Captain F. J. MOBERLY, R. E., Superintending Engineer, 8th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Palamcottah, 30th September 1864, No. 1,210:—

SIR,

1. Referring to G. O. No. 2,431, 24th ultimo, I have the honor to report that the work during the past year has been so interrupted that we have very little data on which to frame an estimate. Captain Payne reports that no fair trial has as yet been made of the method of blasting proposed by His Excellency the Governor.

* No. 417, dated 17th February 1863.

See G. O.,* nor is there any satisfactory evidence

as to the superiority of large over small charges.

2. On these accounts Captain Payne urges the postponement of the call for an estimate for deepening the channel at Paumben until better data are procurable.

3. He further points out that the estimate for cutting the angle of the Reef Channel only allowed for a depth of 12 feet, this must also, I presume, be cut so as to afford 14 feet; all the arrangements of the sand channels south of Paumben have been made with reference to 12 feet depth, a larger sum will be required for maintenance if we are to keep 14 feet depth; and the two channels east and west, after passing through the main line, will require to be dredged for lengths of 3,000 and 1,350 feet respectively; the bottom is soft, sandy silt, the maintenance of a channel in which Captain Payne fears will cost a large sum of money annually.

4. I cannot find that these points were considered before the orders were issued regarding the deepening of the channel. I beg that I may be supplied with further instructions.

No. 25. ORDER THEREON, 1st November 1864, No. 3,142.

1. The Government will not object to the submission of the estimate for deepening the Paumben channel being deferred until more reliable data are procurable. They request that two estimates may be framed providing for a depth of 12 and 14 feet respectively, the cost of maintaining the channels at both levels being also reported.

2. Captain Moberly will make provision in his Budget for 1865-66 for such a sum as he may consider it advisable to have at his disposal during that year for deepening the channel.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineer, 8th Division.

Exd. S. T. Augustin.

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24th August 1864.*

No. 492. Read again letter from the Superintending Engineer, 8th Division, dated 30th June, No. 37, and recorded in Proceedings of Government, dated 22nd July 1863, No. 1,998.

No. 493. ORDER THEREON, 24th August 1864 No. 2,431.

The calculations in the Estimate submitted with the letter from the Superintending Engineer, No. 37, dated 30th June 1863, have been based upon the supposition that the deepening of the Paumbam Pass would be carried out by means of a Steam Dredge ; but as it is more than probable that Hand Dredges only will be employed upon the work, the Government request that the Superintending Engineer will revise the Estimate accordingly, and submit it at an early date, with a view to its entry in the Budget for 1865-66.

(True Extract.)

(Signed) J. H. M. SHAW STEWART, Major, R. E.,
Deputy Secretary to Government.

To the Superintending Engineer, 8th Division, with Estimate for Rupees 36,000.

Exd. S. T. Augustin.

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*Proceedings of the Madras Government, Public Works Department,
18th July 1865.*

Read the following letters :—

No. 461. From Lieutenant-Colonel F. J. MOBERLY, R. E., Superintending Engineer, 8th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Madura, 24th June 1865, No. 432.

SIR,

G. O. Nos. 2,437 and 3,142, dated 24th August and 1st November 1864.

Enclosures 3.

2 Abstract estimates.

1 Letter No. 8, dated 18th May 1865.

1. Referring to G. O. numbers and dates as per margin, I have the honor to enclose two estimates, viz. :—

One for deepening Paumbem Channel from 12 feet to 14 feet depth at low-water, Rupees 33,760.

One for maintaining do. do. at a depth of 14 feet at low-water, Rupees 7,00.

2. A report on the subject by the Superintendent of Operations at Paumbem is also sent.

No. 462. From Lieutenant-Colonel F. J. MOBERLY, R. E., Superintending Engineer, 8th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Madura, 24th June 1865, No. 429.

SIR,

G. O. Nos. 650, 907, and 90, dated 4th March, 1st April and 25th October 1864.

Enclosures 2.

1 Abstract estimate.

1 Letter No. 14, dated 3rd June 1865.

Referring to G. O. numbers and dates as per margin, I have the honor to submit an estimate of Rupees 1,450, for converting four mud boats into two hand dredges at Paumbem in the District of Madura, together with a report on

the subject by the Superintendent of Operations at Paumbem.

No. 463.

ORDER THEREON, 18th July 1865, No. 2,058.

CIVIL WORKS, No. 61.

maintaining it at that depth, were called for so long ago as the 6th November 1862, in G. O. No. 2,668, after a personal inspection of the works at Paumbem by the Honorable the President, the result of which inspection was recorded in a Minute, dated the 17th October 1862.

2. The estimate now before Government for deepening the Channel is the third which has been submitted in compliance with the Order above quoted. The first amounted to Rupees 68,000, and was

* G. O. No. 417, 17th February 1863.

returned,* having been prepared without due regard to economy. The second estimate, amounting to Rupees 36,000, was also returned for revision, with reference to the substitution of manual for steam power in dredging out the Channel, which substitution, on the strong recommendation of the Superintending Engineer, was adopted under the peculiar circumstances of the case.

3. The estimate now submitted for deepening the Channel amounts to Rupees 33,760, and that for the annual maintenance charges to Rupees 7,000.

4. The Government regret that they are again obliged to remark upon the very unsatisfactory manner in which these estimates have been laid before them by the Superintending Engineer. He has not furnished the slightest expression of his own opinion as to their suitability or sufficiency, but has contented himself with passing on Lieutenant Coningham's report without any remark. Colonel Moberly must remember that in the responsible position which he holds, the Government

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are necessarily dependent, to a great extent, upon his opinion and advice; and that they expect, especially in the case of important works, that all proposals involving expenditure should be thoroughly and carefully weighed by him, and should be laid before them with a full and clear statement of the grounds upon which his recommendations are based.

5. There are portions of Lieutenant Coningham's report, now before Government, which especially demand explanation. In paragraph 10 he states that the

† G. O. No. 2,126, 5th September 1862.

the cost of removing 14 feet. This is barely a year after the Superintending Engineer had laid before the Government a

‡ Vide G. O. No. 2,442, 24th August 1864.

6. It is also observed that Lieutenant Coningham has treated the work in the Reef Channel as consisting of rock to the extent of only one-sixth of the excavation, whereas in the previous estimates the whole was assumed to be solid rock.

7. Upon these and other points, full explanation and a clear expression of his opinion will be furnished by the Superintending Engineer, to whom the papers will be returned for the purpose. The delay will not interfere with the progress of the work, as under no circumstances is it likely that any allotment of funds could be

§ Rupees 3,500. Vide G. O. No. 1975 July 12th 1865. made during the current year, beyond the small balance which remains from the original Budget grant.

8. With the second of the papers recorded at the head of these Proceedings is submitted an estimate for converting four mud boats at Paumbem into two hand dredges. This estimate, amounting to Rupees 1,450, is now sanctioned; but the Government again desire Colonel Moberly's attention to be called to the unsatisfactory manner in which this also has been laid before them, and to the entire absence of any recommendation, or even expression of opinion, from him upon the subject. The cost of the work is chargeable to the allotment for "Tools and Plant," but as no provision is made under that head in Part V. of the Budget for the Madura District, the Superintending Engineer will report from what source the requisite funds can be provided.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineer, 8th Division, with four Enclosures.

„ Accountant General.

„ Controller of Public Works Accounts.

Exd. S. T. Augustin.

*Proceedings of the Madras Government, Public Works Department,
3rd February 1866.*

No. 123. Read the following Proceedings of the Madras Government in the Public Department:—

Directing the Board of Revenue to instruct the Collector of Madura to place at Paumbem one of his European Assistants, who may be entrusted with the charge of the Jail at that Station. (Here enter 1st February 1866, No. 111.)

No. 124. ORDER THEREON, 3rd February 1866, No. 434.

ESTABLISHMENT, No. 5.

Communicated to the Superintending Engineer of the 8th Division, who will make arrangements for deputing one of his extra Overseers to take charge of the executive operations at Paumbem from Lieutenant Coningham, who will be transferred to another District.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineer of the 8th Division.

„ Controller of Public Works Accounts.

Exd. S. T. Augustin.

*Proceedings of the Madras Government, Public Department,
1st February 1866.*

No. 1. Proceedings of Government, dated 1st February 1866, No. 111.

The attention of the Government having been drawn to the expediency of removing the Officer of the Public Works Department located at Paumben to some other locality where his services are more required, the Governor in Council directs that the Board of Revenue will instruct the Collector and Magistrate of Madura to place at that station one of his European Assistants, who may be entrusted with the charge of the Jail.

(True Extract).

Chief Secretary.

To the Board of Revenue.

" Public Works Department.
" Revenue Department.
" Inspector General of Jails.

Erd. J. H. Burns

Proceedings of the Madras Government, Public Works Department.
2nd March 1866.

No. 52. Read the following letter from the Officiating Superintending Engineer, 8th Division, to the Secretary to Government, Department Public Works, dated Paumben, 9th February 1866, No. 2,216 :—

1 Letter.

2 Abstract Estimates.

1. With reference to G. O. No. 2,058, of the 18th July 1865, I have the honor to

submit again the two estimates therewith returned, viz. :—

For deepening Paumben channel from 12 feet to 14 feet at	rs.
low-water... ..	33,760
For maintaining do. at a depth of 14 feet at low-water ...	7,000

2. The first point on which Government require explanation is, that Lieutenant Coningham states in paragraph 10 of his report, that the sum of Rupees 43,340, sanctioned for removing 12 feet of the inner angle of the Reef Channel, will cover the cost of removing 14 feet; while barely a year before, a supplemental estimate of Rupees 19,460, for the former work alone, was laid before the Government. The principal cause of this is, that the estimate of Rupees 43,340 includes the large item of Rupees 17,298 under the heads of Convicts and gunpowder; up to the year 1864-65 the labor of the Convicts, and the cost of powder, were charged to the work, but after May 1864 these charges were discontinued. The expenditure up to May 1864 was Rupees 23,469, and during the following year the outlay was Rupees 4,866, now the charge for Convicts and powder is about $\frac{1}{4}$ of the estimate, Rupees 43,342; so that the remaining charge for work is $\frac{3}{4}$ of that sum.

If the amount of the supplemental estimate, Rupees 19,460, be added to the original, the total becomes Rupees 62,902; now the expenditure in 1864-65 would have been proportionately $(\frac{4866}{23469}) \times 8,110$ Rupees if Convicts and powder had been charged, or adding the previous expenditure, Rupees 23,469, the total is Rupees 31,579, which is just about one-half of the total quoted above.

3. I think, therefore, that Lieutenant Coningham was correct in assuming that by the saving in powder and Convicts, the deepening to 14 feet can be effected out of the sanctioned amount; considering that more than half of the work is already done, at the time of his writing, viz., in May 1865. But there are also other causes from which the work is being carried out at a less cost than was anticipated, which I have been able to look into during my visit here; as the work has progressed the quantity of hard rock has been found to be less than was expected; the upper portion of the rock has also been found to be much harder than that below, and in fact generally at a depth of 13 feet mud is found instead of stone; as then the upper rock was blasted, and the hand-dredge worked in clearing away the broken stone, shingle, &c., the scour in the channel itself has helped to clear it out, and the hand-dredge has thus been deepening the channel, in parts, to the full depth of 14 feet. When blasting was commenced the stone being found to be hard, blasting was generally practised, but as the lower stone is much softer, blasting to the same extent became unnecessary, and the hand-dredge did the work: so that as the blasting is the more expensive operation, the work became cheaper. Up to the year 1864-65 the proportion of stone raised by the hand-dredge to that raised by divers after blasting, was as 2.1 to 1; in the present year the proportion has been as 8 to 1. The hand-dredge has been employed in working, where it could,

*gives 2 Copies for
Despatch*

round the rock, and the rock being then exposed, the charges are placed so as to have good effect in removing it. When the holes were previously bored more at random, the charge would perhaps be placed near the edge of a hard block and the explosion would therefore lose much of its force.

4. The Government have already marked their approval of the new method of laying the charges, by the substitution of baskets and cylindrical boxes of aloë, for the former leather bags, from which there results a saving in the cost of the charges; and I have no doubt more effect has been produced by the present system of tamping with fragments of the sand stone, instead of with pure sand, as was the former practice: when the tamping was only sand the charge could be removed by pulling it up by the bamboo attached, but with the present system of tamping the charge is more firmly fixed, and cannot be pulled up. I learn further that, formerly, when common hose was used to fire the charges many of them missed fire, whereas by the use of the Bickford's fuse, that very seldom happens.

5. Secondly, Lieutenant Coningham has treated the work in the reef channel as consisting of rock to the extent of only one-sixth of the excavation, whereas in the previous estimates the whole was assumed to be solid rock. In the first estimate of 1862, Rupees 68,000, the whole of the excavation is treated as solid rock, to be blasted with powder, and the total cubical content of rock is to be raised by divers and boat-men, without the use of the steam dredge.

In the second estimate of 1863, Rupees 36,000 (which differs from the former one in striking out the pay of a Mechanical Engineer and crew for the steam dredge for two years), the whole bed of the channel again is treated as rock to be blasted; but one-ninth only of the cubical content is supposed to be raised as stone by divers, and the remaining eight-ninths to be taken up by the steam dredge.

In the last estimate of 1865, Rupees 33,760, only one-sixth of the bed of the channel is assumed to be rock to be blasted, and the whole is intended to be raised by the hand-dredge; it being calculated that the amount of hard stone that would require to be raised by divers is so small that the difference of cost in removing by that means will be met from the charge for sundries.

It will be observed, that the second and third estimates do not differ much in amount; in the former a much greater quantity of blasting is provided, but nine-tenths of the debris is to be removed by the steam dredge; whereas, in the latter, the hand-dredge is intended to remove the whole of the debris, while the proportion of blasting is only one-sixth.

6. The latest estimate has been drawn up from a better knowledge of the existing state of the channel; the bed of the channel is also altered from the condition it was in three years ago, and especially experience has been gained from the work of the inner angle in judging of the state of the channel itself.

I have seen soundings taken in the channel which, at parts, gave 14 and 15 feet of water, and allowing for the state of the tide at the time, it is evident that there is now as much as 13 and 14 feet of water at low-water. The scour in the channel is very considerable, in the monsoon time the current runs through at a rate that reaches seven miles an hour, and the width of the channel at bottom being only 80 feet it follows that the loose sand and light fragments of stone have been

carried away by the force of the water alone; again, as in the inner angle mud was arrived at thirteen feet below the surface under the stone, and the lower part of the stone was uniformly found to be softer than the upper crust, we may reasonably expect that the same condition of stone and bed may be found in the main channel; at present the divers are unwilling to come to the work at the inner angle, as they say it is not worth their while to do so, they are paid by the cubic content of stone they raise, as measured on the shore afterwards, and they find that the stone blasted at the greater depths is so soft, and breaks up into such scattered fragments, that they cannot get hold at the bottom of any large blocks, so that it does not pay them to bring up repeatedly nothing but small pieces of stone. As the divers' work thus comes to an end, the hand-dredge is able to do the whole work of clearing, and as the hand-dredge has been employed in the inner angle, clearing away the broken and soft stone, mud, &c., thereby laying bare the solid stone, so it will also be used in the main channel. While then it is impossible that an estimate can be made beforehand with any accuracy as to the quantity of rock that will be found, it is now a matter of certainty, as shown by the soundings, that one and two feet below what is supposed to be the depth of the channel, viz., 12 feet at low-water, there is at parts no rock at all; there is every probability of the hand-dredge being able to remove a great portion of the bed at other parts where blasting will not be required, and I am of opinion that the estimated proportion of the bed of the channel that will have to be blasted, viz., one-sixth, is reasonable, and as near to accuracy as we can attain. After the hand-dredge has been working for some time, the quantity of rock will become more clearly defined; but this estimate cannot be drawn, up as the legitimate cost of a certain amount of work, for the amount is an unknown quantity, and I can find no cause for taking any other proportion than that which is assumed by Lieutenant Coningham, from his general experience of the works.

7. In Order No. 3,142 of the 1st November 1864, the Government require estimates for deepening the Paumben Channel to 12 and 14 feet respectively, and to know the cost of maintenance at both levels. As the channel has already a depth of 12 feet at low-water, the former estimate is not needed. Lieutenant Coningham states in paragraphs 2 and 3 of his report that he has not estimated for maintenance at the depth of 12 feet, because the expenditure on maintenance depends on the number of dredges, and that the amount of work for maintaining the channel at 12 feet, being nearly one-third of the work required for 14 feet depth, the expenditure will be about one-third, hence it is inferred that the cost of maintenance at 12 feet will be one-third of Rupees 7,000 (the estimate for maintenance at 14 feet) or Rupees 2,333.

8. Now, the maintenance allowance is principally required for the clearance of what is called the sand bank channel, about $1\frac{1}{2}$ miles to the south of the reef; the reef channel is subject to not much silting, and that chiefly at the extremities, at the change of the monsoons. To maintain the passage at 12 feet through the sand bank involves the removal of 1,80,000*

* In round numbers.

cubic feet of sand in the year, while to keep the passage open to a depth of 14 feet requires the clearance of 4,50,000* cubic feet of sand. To maintain the greater

depth, dredging is necessary to a distance of 1,350 feet at the north end of the sand bank channel, and to a length of 3,000 feet from the south end, in addition to the length of the sand bank channel itself, 2,100 feet. The proportion of cost of maintenance at the two levels is thus nearly as 2 to 5, rather than as 1, 2, 3, or, if the maintenance charge for 14 feet costs Rupees 7,000 per annum, that for 12 feet will cost Rupees 2,800. The accumulation of silt has been found, from observations in past years, to be only seven-eighths of a foot and half a foot in the year. A separate estimate is thus not made for the maintenance at the lower level of 12 feet, because it does not appear to be required, for if the reef channel is deepened throughout to 14 feet, it is necessary that the sand bank channel should have a corresponding depth.

9. In paragraphs 4, 6, and 7 of his report, Lieutenant Coningham adverts to the charges used in blasting; the proposition to use large charges resting on the rock is, I think, not applicable to the present circumstances; for though the labor of boring would be dispensed with, the current is so strong that divers would be required to fix the charge in position, and from there being comparatively so little hard stone to be dealt with, the powder would be thrown away in acting on an under surface of broken stone, sand, and mud. As noticed above, pains are now taken to isolate the blocks of hard stone, and small charges are found to be the most economical.

10. I think I have now referred to the different points in Lieutenant Coningham's report; the provision for a Maistry, that he refers to in paragraph 11, is struck out of the estimate, as that charge will come under the head Petty Establishment.

11. But while the estimates for deepening the Paumben Channel to 14 feet, and for maintenance at that level, have been framed to the amounts of Rs. 33,760 and Rupees 7,000, respectively, by the present system of treating the charges for Convict labor and gunpowder the actual sums to be provided in the Public Works Budget become much reduced.

Thus the sub-divisions of the estimates are:—

	For deepening Paumben Channel to 14 feet.	For maintenance at 14 feet.
1. Actual charge to estimate	10,060	1,080
2. Petty Establishment	*	504
3. Tools and Stores	13,500	3,360
4. Convicts and Gunpowder	10,200	2,056
Total Rupees	33,760	7,000

* Rupees 1,440 for Petty Establishment already struck out.

The addition of items Nos. 1 and 3 will then give the reduced sums of Rupees 23,560 and Rupees 4,440. In dealing with estimates of an ordinary nature, item No. 3 should also be struck out, as tools and stores now form a main head of the Budget allotment; but as in the operations here these charges form such a large portion of the work, and no separate provision is made for them, I think they ought properly to be included in the estimates.

12. While then I submit the estimates again, in the same form as they were previously submitted in last June, I would recommend for the approval of Government

Estimate for deepening Paumben Channel to 14 feet...	Rs. 23,560
Maintenance do. at do...	4,440

13. Referring to paragraph 8 of the Government Order under reply, the amount of estimate Rupees 1,450 for two hand dredges is provided from the sum of Rupees 2,750, allotted in G. O. No. 2,815 of the 22nd September 1865, or rather I propose an expenditure of Rupees 725 for one dredge during the current official year; the machinery is being made at Madras, and if one dredge is fitted up now, the other can be put in hand at the beginning of the coming official year so as to be ready by August, when the working season again begins.

No. 53. ORDER THEREON, 2nd March 1866, No. 721.

CIVIL WORKS, No. 9.

6th November 1862, No. 2,668.
1st do. 1864, ,, 3,142.

1. In his letter of the 24th June 1865, No. 432, the Superintending Engineer of the 8th Division, in pursuance of the Orders as per margin, submitted two estimates of Rupees 33,760 and

Rupees 7,000, respectively, for deepening the Paumben Channel from 12 to 14 feet at low-water, and for annually maintaining it at that depth. As, however, these estimates were unaccompanied by any expression of the Superintending Engineer's opinion of their suitability or sufficiency, and were, moreover, submitted in a very incomplete form, the Government were under the necessity of returning them, and in doing so they noticed the following discrepancies in Lieutenant Coningham's report which gave cover to the estimates:—

(1.) The sum of Rupees 43,340, which was sanctioned for the removal of the inner angle of the reef channel to 12 feet in depth was alleged to be sufficient to cover the cost of deepening it to 14 feet, although a supplemental estimate of Rupees 19,460 had been submitted some time previously for the former work alone.

(2.) The work in the reef channel was treated as consisting of rock to the extent of only one-sixth of the excavation, whereas in former estimates the whole was assumed to be solid rock.

2. In his letter above recorded Captain Prendergast re-submits the estimates under notice with the required explanations. He states that the estimate of Rupees 43,340 includes no less a sum than Rupees 17,298 for Convict labor and gunpowder; but that as, since the year 1864-65, the charges under these heads do not involve an actual money outlay, the amount of the estimate will suffice to meet the cost of securing the required depth of 14 feet. Captain Prendergast further explains that as the work has progressed it has been found that the quantity of hard rock requiring removal is less than was anticipated, and the expensive operation of blasting has been in consequence, in a great measure, dispensed with.

3. The experience which has been gained on the work in progress at the inner angle has afforded some data upon which the estimate of Rupees 33,760 for deepening the main channel has been prepared; and as the result of the soundings taken in the channel (which in certain parts is believed to be as much as 13 and

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Proceedings of the Madras Government, Public Works Department.
2nd March 1866.

14 feet deep at low-water) shows that one and two feet below the supposed depth of 12 feet at low-water there is no rock at all in parts, and that in others the hand-dredges, which have been employed at the inner angle with great advantage, can be used in removing a great portion of the bed, Captain Prendergast is of opinion that one-sixth may reasonably be supposed to be the proportion of the channel bed that will have to be blasted.

4. With regard to the estimate of Rupees 7,000 for maintaining the channel at a depth of 14 feet, Captain Prendergast explains that that allowance is principally required for the clearance of what is called the sand bank channel, which is about a mile and a half to the south of the reef, and that to maintain the required depth a clearance of 4,50,000 cubic feet of sand will be necessary.

5. The Government consider these explanations to be satisfactory.

6. His Excellency in Council cannot, however, approve of the manner in which the Officiating Superintending Engineer proposes in paragraph 11 to deal with the charges in the estimates. He has no objection to such portion of the provision under "Tools and Stores," as relates to repairs, &c., to boats and canoes being allowed to stand in the estimates; but the balance must be omitted, and the charges met in the usual manner from the specific allotment under "Tools and Stores." These alterations will reduce the estimate for deepening the channel to Rupees 22,810, and that for maintaining it to Rupees 1,860, exclusive of the cost of Convict labor and gunpowder, for which no cash payments are necessary. These estimates are sanctioned, and the question of providing funds for the works, in addition to the grant of Rupees 7,000 in the Budget for 1866-67 for cutting the inner angle of the reef channel, will be considered after 1st May next.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineer, 8th Division.
,, Controller of Public Works Accounts.
,, Accountant General.

Exd. S. T. Augustin.

Proceedings of the Madras Government, Public Works Department,
29th July 1867.

No. 683. Read the following letter from the Superintendent of Marine, to the Secretary to Government, Public Works Department, dated Madras, 18th July 1867, No. 2,528 :—

1. I have the honor to inform you that, in accordance with the instructions conveyed in the Proceedings of Government of the 16th April last, No. 23, the Superintending Engineer of the 8th Division has furnished me with copy of the last soundings taken in the Paumben reef channel, which are, however, too imperfect to show the present state of the passage.

2. The depths in the centre of the channel were taken as far back as 1859, and those over the rocky angle in April last. Some progress appears to have been made in the removal of this impediment to the navigation, but there is in the plan, which is herewith forwarded for your inspection (to be returned), a break of 50 feet between the centre channel and the edge of the angle, without any soundings set down, and if the excavations have been made where the last soundings are shewn, without at the same time deepening the 50 feet alluded to, the work accomplished cannot as yet have improved the navigation.

3. The Government in Proceedings of the 12th June 1860, No. 215, sanctioned an estimate for cutting away this angle at a total cost of Rupees 15,080; the work to be completed in two years. Subsequently, in Proceedings of the 5th September 1862, No. 2,126, a revised estimate of Rupees 43,340 was sanctioned; the former one having been prepared on erroneous data.

4. I would solicit information as to whether the sanctioned amount has been expended, and whether there is any intention of continuing the operation of blasting, with a view to the removal of the angle.

5. The Superintending Engineer of the Division states, that owing to the rapidity of the currents it has been impracticable to take trustworthy soundings of late, but that he hopes to have soundings of the whole channel taken at the next calm season. It is of course of much importance that these soundings should be carefully made; not only as a guide for vessels using the channels, but to show where silting has taken place. They ought also not to be confined to the mere centre of the channels, but should be taken over the full breadth of 200 feet, and I think no pains should be spared in furnishing a correct delineation of them.

No. 684. ORDER THEREON, 29th July 1867, No. 2,280.

CIVIL WORKS, No. 97.

1. Communicated to the Superintending Engineer of the 8th Division, who will be guided by the suggestions

made in this letter when soundings of the Paumben reef channel are taken at the next calm season.

2. Captain Prendergast is requested to furnish the information applied for in paragraph 4, and he will report what progress has been made with the work up to the present time, and what arrangements he has adopted with reference to G. O. of the 15th September 1866, No. 2,957, for pushing on its completion.

(True Extract.)

(Signed) J. H. M. SHAW STEWART, Major, R. E.,
Under Secretary to Government.

To the Superintending Engineer, 8th Division.
,, Marine Department.
,, Superintendent of Marine, with one Plan.
Exd. S. T. Augustin.

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*Proceedings of the Madras Government, Public Works Department,
3rd September 1867.*

No. 39. Read the following letter from the Officiating Superintending Engineer, 8th Division, to the Secretary to Government, Department Public Works, dated Courtallum, 21st August 1867, No. 1,031:—

1. With reference to G. O. No. 2,280 of the 29th July 1867, I have the honor to state that the amount sanctioned for cutting away the inner angle of the Paumben Reef Channel, Rupees 43,340, has not yet been expended, the total expenditure up to the end of the past official year having been Rupees 27,635, and up to the 31st July 1867, Rupees 29,385. There is, therefore, a good deal of work still remaining to be done, before the projecting angle is cleared away. The work is now being carried on; blasting was commenced on the 7th instant, after an interval of rough weather, but difficulty was then still experienced on account of the strength of the current. The removal of the angle will of course facilitate the passage of vessels; but it does not cause an actual obstruction, as vessels drawing 11 feet of water are shown to pass through the channel.

2. With reference to the arrangements for pushing on the works, adverted to in G. O. No. 2,957 of the 15th September 1866, the machinery for another hand-dredge has been indented for, from Madras, and when this is ready, faster progress will be made. The upper crust of the sand-stone is found to be generally very hard, and requires to be blasted; the divers then bring up the broken fragments, which are carried away in boats to the shore, but in getting deeper down, the sand-stone is softer, and a good deal is taken up by dredging. The process of dredging is, by the employment of convict labor, much less expensive than that of blasting; and, as it effects the greater part of the clearance, at the lower depths, only the hard blocks of stone being blasted, we depend a great deal on the dredging work, and the additional dredge will prove of much service.

3. The suggestions of the Superintendent of Marine will be attended to in taking the soundings, and the Head Pilot at Paumben has promised to give his assistance to the Overseer in charge. As to silting taking place, this is found to occur only at the extremities of the channels, when the current is variable about the change of the monsoons, (I have seen the current change its direction several times in one day through the reef); but in the main channel itself no deposit of silt remains, for the strength of the current is sufficient to sweep it away entirely.

No. 40. ORDER THEREON, 3rd September 1867, No. 2,694.

CIVIL WORKS, No. 5.

Communicated to the Superintendent of Marine with reference to his letter of the 18th July 1867, No. 2,528.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintendent of Marine.

„ Marine Department.

„ Superintending Engineer, 8th Division.

Exd. F. R. Bantleman.

10/6/84

X.

REPORT

ON THE

PAUMBEN CHANNEL.

BY

R. TOWNSHEND, ESQ., M. INST. C. E.,
SUPERINTENDENT OF PLYMOUTH BREAKWATER.

Ordered by the Legislative Council to be Printed.



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1871.

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REPORT

ON THE

PAUMBEN CHANNEL.

From Mr. TOWNSHEND to the Hon'ble the COLONIAL SECRETARY.

Colombo, Ceylon,
20th November, 1871.

PAUMBEN CHANNEL.

PAUMBEN
CHANNEL.
Report.

SIR,

In the last paragraph of my letter of the 4th instant, I stated that a Report on the Paumben Channel would be submitted for His Excellency the Governor's information, on the completion of the Survey and Borings then in progress.

This task having been satisfactorily accomplished, and the plans forwarded to me by Captain Fyers, R.E., I am now in a position to report as to the feasibility of the several schemes put forward by various persons, at various times, for the establishment of a short route to India.

In studying this important subject, I beg to say I have carefully perused the following Reports bearing on this great question:—

- | | |
|--|-------------|
| 1.—Memoir on the Survey of Paumben Pass and Adam's Bridge, by Captains Powell and Ethersey, 1837. | Appendix C. |
| 2.—Copies of all Reports and Information respecting the Deepening of the Paumben Passage, the Navigation of Palk's Straits and the Gulf of Mannár.—Published by order of the House of Commons, 13th August, 1859. | Appendix A. |
| 3.—Copy of all papers existing in continuation of the last Reports presented to the House of Commons, shewing the progress of the works of deepening the Paumben Channel; the minimum depth in the Pass at low-water spring tides; the number of Vessels, square-rigged or otherwise, and the amount of tonnage which have passed through annually since the last Returns were presented.—Published by order of the House of Commons, 22nd July, 1869. | Appendix B. |

Of these Reports, those signed by A. T. Cotton, Lt.-Col., convey the greatest amount of detailed information; in fact, they almost exhaust the subject up to that date.

Captain C. Biden, Master Attendant, Madras, in his Report No. 212, 20th May, 1854, enters fully into the whole question of navigation through Palk's Straits to the northern entrance of the Paumben Channel, and from Cape Comorin along the Coast of Tinnevely to the southern entrance of the Paumben Channel.

It would be presumption on my part to criticise the argument advanced by Captain Biden on the intricacy of the navigation on each coast; but with Lighthouses erected at the several points mentioned by him, and with good reliable charts, surely any efficient Captain would carry his ship safely through a channel infinitely less dangerous than the entrance to Calcutta, and to several rivers on the coast of England.

The effect of the North-east monsoon at the northern entrance to the Paumben Channel may at times interfere with ships entering; but with a wide, deep, funnel-shaped entrance converging inwards, it is supposed that the difficulties referred to will be mitigated, and that the construction of a costly Breakwater in 6-fathom water will not be required.

As for the west entrance, which I shall more fully refer to hereafter, Captain Biden admits, that the coral reefs, shingle islets, and banks, serve to protect the western channel during the South-west monsoon, and that ships may anchor in safety in smooth water under their lee. This is an important fact, and it is well to remember that not one of the many schemes put forward possesses such a natural Breakwater.

The Hon'ble
The Colonial Secretary,
&c., &c., &c.

Col. Cotton's Report, 16th January, 1854.

Capt. C. Biden's Report, 20th May, 1854.

N.E. Monsoon.
Northern entrance.

S.W. Monsoon.
Western entrance.

PAUMBEN
CHANNEL.

Report.

67 Miles.

50 Miles.

75 Miles.

10 Miles.

202 Miles.

Making due allowance for lapse of time since Captain Biden wrote his Report, and for improvements made in steam navigation, I think the remarks in the 13th and 14th paragraphs are so pertinent to the present question, that I do not hesitate to transcribe a great portion of them.

"The distance from the middle banks, which intercept the safety of navigation in Palk's Straits to a safe anchorage off the northern entrance to the Paumben Pass, is, on a south-west course, 67 miles.

"And the course and distance from Cape Comorin to a safe anchorage, under the shelter of islets in the vicinity of the eastern entrance to the Paumben Channel, would be, first, to clear the dangers off the coast of Tinnevely and Tutacoreen, as will be seen on the Chart E. by N. $\frac{1}{2}$ N., 50 miles.

"Thence to a safe anchorage under the lee of the above-mentioned islets and shoals, 75 miles. And the distance through the Paumben Pass, and to a safe anchorage on either side of it, is about 10 miles. Thus, the whole distance from the entrance to Palk's Straits adjacent to the Bay of Bengal, to Cape Comorin, is 202 miles."

"A light on Cape Comorin would, however, enable Steamers to enter the Gulf of Mannár at any hour of the night; and as their approach to the dangers off the eastern entrance of the Paumben Channel would be indicated by regular soundings of from 12 to 7 fathoms, and as the light I have recommended on the Island Ramissaram would be another guide, it may so happen that a safe anchorage could be reached before daylight, and then, if the state of the weather and the set of the current would allow immediate operations for the passage of the Channel, Steamers could (with only the loss of a few hours) get through Palk's Bay and Straits before sunset, and proceed on to Madras and Calcutta."

I have made it my business to consult some of the P. and O. Company's Officers on the foregoing subject; and they do not hesitate to say, that if the coast voyage thus described be systematically lighted, and the proposed narrow passage and channel at Paumben well buoyed, in conjunction with prominent and well-defined landmarks, the navigation from Cape Comorin through Paumben Channel into Palk's Straits would not be attended with unusual difficulties.

With these preliminary remarks on the sea approaches to Paumben Channel, I now proceed to explain briefly the course taken in the performance of the duty assigned to me,—namely, examining and reporting on the best site for a canal between Palk's Bay and the Gulf of Mannár.

On the 24th August, 1871, in accordance with arrangements made by His Excellency the Governor, I had the honor of accompanying him, with other scientific gentlemen, in the Ceylon Steam vessel "Serendib" to Paumben, from whence various excursions were made to Tonitory Point on the Coast of Madura, to the Paumben Channel, to the Island of Ramissaram, to Adam's Bridge, Talaimanāru, and the Mannár Channel; the three first named places being on Indian territory.

Of Paumben Pass and Adam's Bridge, the description given by Captains Powell and Ethersey in 1837 (a copy of which is attached to this Report) is so clear, that to go over the same ground would be an act of supererogation, excepting so far as may be necessary to explain the changes made in the improvements of Paumben Channel since 1837.—Not less instructive is the description of Paumben Channel given by Lieut.-Colonel A. T. Cotton, Chief Engineer, in his Report of the 16th January, 1854.

On the accompanying Chart of Adam's Bridge, lettered I., I have indicated, by blue, red, and yellow lines, the sites selected at various times for a deep navigable channel between the Gulf of Mannár and Palk's Bay, with a view to shorten the sea voyage between Aden and Madras by about 360 miles.

This remarkable strip of land is well known in the nautical world through the improvements made of late years to the Paumben Channel. It is situated in Latitude $9^{\circ} 15' 30''$ N. and Longitude $79^{\circ} 14' 11''$ E. On the south and south-west side, the Gulf of Mannár spreads its broad oceanic waves from Point Comorin skirting the shores of Madura, Adam's Bridge, and terminating on the north-west shore of Ceylon. Palk's Straits is on the north-west side, that is from Point Calimere on the mainland of Madura and Tanjore, and on the east by numerous Islands dotted along the shores of northern Ceylon, that is, from Point Pedro to Mannár.

The total distance between the mainland and Ceylon is divided as follows:—

"From Point Ramea in the Ramnad Province, to Paumben, at the west end of the Island of Ramissaram	...	...	14 miles.
"Across the Island of Ramissaram	...	...	13 "
"Adam's Bridge	...	...	25 "
"Across the Island of Mannár	...	...	16½ "
"From the Island of Mannár to Ceylon"	...	...	0½ "
TOTAL—56			

The following is the programme of inspection approved by His Excellency the Governor, who accompanied us in the "Serendib," to the sites indicated on the Charts, and I need hardly add, that his presence and advice very much facilitated my enquiries, viz:—

1. Indian Ship Canal across Tonitory Point, with a Harbour of 16 square miles—to cost only £90,000! Site known as the Single Brab.

Suggested by Sir James Elphinstone and Capt. Donnan. Tinted blue on Chart I.

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PAUMBEN
CHANNEL.

Report.

2. Original selection.
3. Sir W. Dennison,
17th October, 1862.

25th August, 1871.

2. Paumben Channel.
3. Line suggested by Sir William Dennison across Ramissaram Island.
4. Near Godunder Rama pagoda, about nine miles south of Paumben, near a Lagoon.
5. Across west shore of Talaimanāru, Mannár Island.
6. The Mannár Channel.

No. 1.—Site.

Under the guidance of Captain Donnan, Master Attendant, Colombo, I landed in company with Mr. Harrison and Captain Phipps, on Tonitory Point, some nine miles west of Paumben Pass, and carefully inspected the ground in the line of the Single Brab, the latter being in the line of proposed canal.

The general feature of the coast is low and sandy, with occasional layers of sandstone cropping up on the beach. The surf, at the time of our landing, was sufficiently high to create a difficulty in leaving.

From the beach the land gradually rises, with undulating sandy surface, to a height of probably thirty-five feet vertical above mean sea-level. Sand-hills abound, between which patches of jungle, scrub, &c., are met with. The distance across from shore to shore is about two-and-a-half miles, and is, so far as the eye can see, covered with sand. But whether there is beneath this surface a stratum of rock or coral, I know not.

The total distance across the peninsula, starting from five-fathom water on the south-west side to five-fathom water on the north-east, terminating in Palk's Bay, measures on the Chart about seven miles. The latter entrance would be fully exposed to all the fury of a North-east monsoon. But the south-west entrance, from being within sand banks, and the small islets of Moosel, Moolee, Kittoriummen, and others situated some six miles seaward, is in a lesser degree affected by the South-west monsoon.

Between these sand-banks and the shore there is a sheet of water with varying depth of from $3\frac{1}{2}$ to 5 and 6 fathom water, and which Captain Donnan pointed out as the completely protected harbour of sixteen square miles in extent. But to reach this, it would be necessary to dredge through one of the lowest of the sand-banks barring the entrance, and over which there is at present about twelve feet water. The cost for the whole of this great scheme has been estimated at £90,000; but it is incomprehensible to me how such a small sum has been arrived at.

I fear very great misconception exists in the Colony as regards the real cost of Harbour Works. The greatest mischief is often done, through such misapprehension, to a really promising scheme.

In the "Engineering Journal," Vol. XI., No. 279, May 5, 1871, page 325, there is an article headed "An Indian Ship Canal." "The proposition to construct a ship canal, connecting the Gulf of Mannár with Palk's Strait," &c., had "been brought under the notice of the Secretary of State for India, by a deputation from the East India Association." "The estimated cost for the work is £90,000."

I therefore infer that Captain Donnan's scheme is, in fact, that said to have been brought under the notice of the Indian Government.

Having personally visited the site, and noted the immensity of its proportions,—the difficulties to be encountered in carrying out all the works to a final conclusion,—I can without much hesitation assert, that the estimate of £90,000 is wholly inadequate even to meet the expenses of one-tenth of the contemplated work. Dredging and clearing an entrance through the sand-bank alone, would cost one-third of the estimated amount. Without a correct survey of the ground, and levels, borings, and soundings, no estimate can be safely compiled.

It is a question with me, looking at the singularly exposed position of the outer sand-bank, whether deepening a channel by steam dredge is practicable. The perpetual motion of a ground swell would, I fear, seriously interfere with the safe action of the ladder and buckets of the length necessary for securing a deep entrance, say of 30 feet below low-water. Further, unless this sea entrance can be perfectly made in width and depth, the whole scheme must fall to the ground. With such unfavourable impressions on my mind, and believing that if an estimate were carefully compiled, the cost would be near £1,750,000, it appears to me a waste of time to pursue this project further.

No. 2.—Paumben Channel.

For the present, I pass over No 2., which will be fully dealt with hereafter, and form the principal subject of more lengthened explanation, shewing the superiority of this over other sites.

No. 3.

This line across Ramissaram Island was selected, I am informed, by the late Sir William Dennison in 1862, as offering many advantages not possessed by other schemes.

[CXCIX]

PAUMBEN
CHANNEL.

Report.

16th November,
1871. See Mr.
Stoddart's Report,
Appendix F.

See drawing J.

Breakwater.

See Appendix E.

Drawing,
No. 6, I.

On reference to accompanying drawing J., recently surveyed by Mr. Stoddart and Assistants from the Surveyor-General's Department, the site so selected is shewn by dotted lines from I. to J.; it is situated about $2\frac{1}{4}$ miles from Coonducam Point, or $3\frac{1}{4}$ miles east of Paumben.

The distance across, measuring from high-water line on each shore, is only $2\frac{1}{4}$ miles, and the five-fathom, or thirty-foot soundings on the north and south extremities of the proposed channel, are but three miles apart.

The soundings recently taken shew that the five-fathom line runs somewhat in a parallel line with the south shore. The soundings in Palk's Bay regularly increase as you leave the shore—that is, from five to seven-fathoms, and so on.

I am informed, that during the North-east monsoon there is less sea on this part of the north shore than at other sites more to the westward, in consequence of the protection gained through the conformation of the land and high ground at "Paroovadam," on which the Temple of Ramissaram stands.

I believe this assertion to be in a great measure true, and that one of the great difficulties attending a sea entrance on the north side would be so far reduced as to give hopes of establishing an easy access to the Canal at this point. But, as regards the southern entrance leading in from the Gulf of Mannár, the case is very different. Immediately in front of the southern entrance the soundings taken shew, if any thing, a decrease, varying from 30, to 27-foot water. Here the heavy rollers from the sea, under the influence of the South-west monsoon, are thrown on the coast with destructive effect, leaving but slight hopes of constructing a permanent entrance into the proposed channel, on so exposed a coast, unless an expensive stone Breakwater, of about a mile in length, were constructed, so as to interpose between the entrance and the South-west monsoon, and yet leave sufficient space between the two for an anchorage, as shewn on the annexed drawing. This artificial sea defence is unavoidable, and its cost of construction would not be far short of a million of money.

The cost of this channel, *i. e.*, from the Gulf of Mannár to Palk's Bay, has been estimated on the same conditions as those laid down for the Paumben passage, namely, with entrances 500 yards wide, converging landwards to 70 yards, with a depth of water in mid-channel, of 26 feet, and at the entrances of 30 feet.

I must not omit to draw attention to the cogent arguments adduced by Captain Donnan in the concluding part of his letter directed to F. W. Bois, Esquire, Honorary Secretary, Chamber of Commerce, Colombo, under date 20th April, 1870.

I willingly endorse his opinion as to the probable filling up of any exposed entrance on the south-west coast of Ramissaram. The wash from a south-west gale would cause the sandy banks to fall in and with other silting up tendencies, which would seriously interfere with the passage of large ships, even when protected by a Breakwater. The idea looks well on paper, but I fear, for reasons already stated, that its adoption in preference to the old Paumben Channel, would in the end prove an expensive mistake.

No. 4 Site.—See Chart II.

The line across Ramissaram Island near Godunder Rama pagoda, 13 miles east of Paumben, has been surveyed, and borings taken with soundings of the shores into five-fathom water. Although the distance across the strip of land (but a few feet above high-water level) is only some twelve hundred yards, the peculiar formation of the coast on the south-west side, with a heavy surf ever breaking on its exposed shore, and the shallowness of the sea coast along Palk's Bay for five to six miles seaward, opposite the proposed north-east entrance, must destroy all hopes of ever adopting this site for a canal. Besides, the south-west entrance, unless protected by a Breakwater, built in seven-fathom water, could not be entered during the South-west monsoon.

No. 5 Site.

A ship canal at Talaimanárú is also impracticable, in consequence of the extent to which shallow water extends on either side, and the danger which would be run by any ship making its entrance during a South-west monsoon. Even then the protection of an expensive Breakwater would be required.

No. 6 Site.

Mannár Channel is only mentioned, to record the utter impracticability of cutting a ship canal through its long tortuous and narrow course, terminating at each extremity in a shallow sea-board. The length in all would be 18 miles, between the Pearl Bank on the south-west and the Maldivé Bank on the north-east, over which there is but two-fathom water for a long distance.

Having now described the several sites at which it has been proposed to form a Ship Canal from the "Gulf of Mannár to Palk's Bay," and having briefly dealt with the causes that render most of them totally unfit for such a great work, I will proceed to describe the probable advantages to be gained by adopting the line of the present Paumben Channel No. 2, as herein before mentioned.

No. 2, Paumben
Channel selected:
reason for.

[cc]

PAUMBEN
CHANNEL.

Report.

Mr. Stoddart to
survey, &c.

It having been deemed advisable to obtain a series of levels, borings, and soundings in the direction of the proposed new canal, with such other reliable information as will materially assist in giving value to this Report, an application was made to His Excellency the Governor, to sanction the necessary outlay, which was promptly conceded. Accordingly, early in September last, Mr. Stoddart, from the Surveyor-General's Office, with an efficient staff of assistants, proceeded to Paumben in the Colonial Steam Ship "Serendib," and there carefully fulfilled his instructions, wisely collecting such other particulars of the coast as he thought were likely to prove beneficial to this enquiry. To his zeal and ability I am greatly indebted, as also to Mr. Riedy, local resident Agent at Paumben. The information so collected, and the drawings correctly laid down, are at the present moment invaluable. The position and depths of the old channel are carefully recorded.

The various elaborate calculations hitherto made of the cost of blasting, dredging, and removing rock by convict labour in the old channel, to the depth of twelve feet, have been, I fear, the source of much misconception as to the relative expense of similar work executed in thirty-foot water.

The difference between the work performed by steam power and hand labour is explained in a letter from Captain F. G. Hankin, Superintending operations Paumben Channel, to Captain G. M. Payal, Acting District Engineer, Madura, dated Paumben, 12th November, 1862. At first, I confess, the result of his calculations surprised me; but when I found that the steam dredge employed was old, and ill-calculated for the task, even under the most favourable circumstances, and was also idle for two months, during which time the pay of the sick engineer and crew went on, the cause for surprise ceased, and the comparison of cost became of doubtful value.

Dredging by engine-power cost 3s. 4½d. per cubic yard, as against 2s. 11d., the stated cost of convict labour. My experience of works of this class goes to prove the contrary. But as it is not now a question of dredging in 12-foot water, but in 30-foot, I shall for the future adopt such figures as experience dictates, and these shall be from actual work performed removing rock in over 30-foot water, making due allowance for a current running, it is said, at the rate of six miles per hour.

The currents in the Gulf of Mannár are stated, according to the West Coast of Hindostan Pilot, to be subject to considerable variation, particularly about the changes of the monsoon, when the current is the strongest; but, generally speaking, they set with the monsoon.

The height of tides at and about Paumben Passage ranges from sixteen to thirty inches, or about two feet vertical on the average.

It is well understood that in a certain depth of water the Helmet divers perform more and better work than men working in a Diving Bell, but for the lower portion of the proposed channel the Diving Bell in a strong current would, from its greater weight, produce better results. The precarious mode of clearing and charging holes, blasting rocks, &c., by native divers in 12-foot water, must give way for the more effective manipulation of the Helmet divers. I only wonder so much has been accomplished by this means.

In determining the proportion of the proposed canal, I have assumed that the width should not be less than 210 feet at high-water level, and the depth of water in the main channel 26 feet, as in the Suez Canal, deepening to 30 feet at each sea entrance. The width of these embouchures to be 500 yards, gradually contracting to 70 yards, as shewn on plan J. The sides of the cutting must be sloped from top to bottom to such angle as the nature of the material will permit.

When completed, the whole line of navigation thus formed should be well buoyed on either hand. Where required stone obelisks should be built out of the rubble rock excavated.

A Lighthouse, exhibiting a revolving light, to distinguish it from Paumben light, should be erected on the island of Ramissaram near the Godender Rama pagoda, as suggested by Captain Biden, and all the old Beacons in the Paumben Channel should be renovated and made conspicuous. At or near the horse-shoe bend it may be necessary to establish a small floating light.

A powerful Steam Tug, provided with boats, hawsers, and towing warps, should be stationed at Paumben, to assist ships through the canal.

The North-east monsoon sets in about the middle of November, and lasts until April. The South-west monsoon is said to prevail for the five months of summer, and the North-east for the winter months.

The progress of the works for the contemplated channel would necessarily be governed accordingly,—that is to say, there are only 150 available working days in the year for deepening the channel at the respective entrances.

Under the assumption that the foregoing data afford sufficient basis for compiling prices, and approximately estimating the probable cost, I shall at once proceed to that end.

To carry on works of this importance in a rapid but safe manner, I am of opinion, that it will be necessary to call in the services of experienced English divers and mechanics, and employ the best machinery for dredging. Probably twelve well-trained Helmet

[CCI]

Current six to
seven miles per hour.
Tides and Current,
Gulf of Mannár.

Proportions of
proposed canal.
Average width,
70 yards.
Width of entrance
to channel, 500
yards.

Buoyed.

New Lighthouse.
Paumben Light-
house 97 feet above
high-water mark,
seen 11 to 12 miles
off. Beacons.
Floating light.
Steam Tug.

Winds.

Only 150 working
days per annum at
each end.

English mechanics
and workmen em-
ployed.

PAUMBEN
CHANNEL.

Report.

Divers.
Diving Bells.

Cranes.

Boats, Barges, &c.

Workshops.

Depots, Coal and
Wood.

Officers' Residences.

Coolies.

Convict labour.

Three Steam Launches.

divers would be found sufficient, each provided with a complete waterproof dress, helmet, air pump, and all things for performing their sub-marine work in a satisfactory manner. In addition, at least six Diving Bells, with air pumps and all other fittings necessary for working the same, should be employed in deep water, and where the current runs the strongest. Each bell must be slung from the prow of a large vessel, which is to be provided with efficient overhead traveller-crab winches, for lowering and lifting the bells at all times with facility when moored over their respective sites of operation.

At least ten Derrick cranes will have to be provided for lifting purposes, afloat and on shore, Plymouth Breakwater pattern.

As for small craft, boats and barges, &c., these may be found on the spot in sufficient numbers.

Workshops for repairing engine-works, making jumpers, sharpening tools, mending broken chain, &c., will of course be constructed on shore, to the extent required by the Engineer conducting the operations.

Coal and wood depots ashore and afloat will of course be secured at such points of the works as may best suit the service.

A perfect arrangement of Officers and workmen's dwellings must be provided on shore, with reading and billiard rooms, and other reasonable means for agreeably occupying their leisure hours, when off duty. I may urge, that this accommodation is indispensable if Englishmen are to be employed on so isolated a place as Paumben, devoid of all attractions of scenery and amusements,—to which must be added a tropical climate and all its depressing influences.

Coolies should be employed as labourers where necessary. Those who may exhibit aptitude for mechanical work should be selected and encouraged, especially in the blasting and diving business, as performed by the English workmen.

Convict labour, if employed, will of course be confined to the present management, but co-operating with the general scheme of operations, as may be approved by the Resident Engineer.

It will be found necessary and economical to provide the new establishment with three small Steam Launches, strongly built, covered in from the sun and rain. Of these useful adjuncts to harbour works, I have had great experience; especially at Plymouth, where they abound, of all sizes. I would suggest that the larger one, say 50 feet in length by 10 feet beam, and drawing about 3 feet 3 inches a foot, and driven by a pair of Messrs. Yarrow and Hedley's (or any other maker's) Engines of $5\frac{1}{2}$ inches cylinders, which would give a speed of about 8 to 9 miles an hour in fair weather, be appropriated to the conveyance of workmen. This size is calculated to carry over eighty people, with their tools and shifting plant, and at the same time tow other boats astern. The crew comprises Captain, one third-class Engineer, and two boys. The consumption of fuel, 8 cwt. per day of twelve hours; fresh water, 350 gallons per day. Probable first cost in England, £550.

The two smaller Steam Launches should be 40 feet in length by 8 feet beam, and of proportional power, to secure a speed of 8 miles per hour; the draught of water aft being 3 feet, and at the bow 12 inches, for beaching on sandy shore. Protection from the sun and rain to be secured. One of these Launches to be fitted up for the Resident Engineer and principal Officers, the other for Foremen afloat. The cost of each of the above pinnaces, about £350 in England.

In a place like Paumben, with Harbour Works in progress, and spreading over a wide channel of six miles in length, the assistance of these small steam boats would prove invaluable to the Officers and men, and their services would prove economical by the work performed, and time saved.

Steam-Dredging Machine.

I am of opinion that at least two powerful Steam-Dredging machines should be provided, of sufficient power to work long bucket-ladders constructed to dredge to a depth of upwards of 30 feet below low-water level.

The hull of each of the Dredges to be of ample proportions and tonnage, with watertight compartments; the whole to be of great strength to resist strain from torsion in a seaway. They must be provided with incline double shoots, crab winches, self-acting gear, wherever required for lifts, ladders, anchors, &c., also stern and head moorings, side warps, anchors, buoys, boats, deck cranes, &c., and all other appliances that may be required for the perfect working of each machine.

The capacity of each dredge bucket should be such that, at ordinary working speed, 600 tons of sand and broken rock coral, &c., can be lifted per hour.

One of the dredges should be provided with suitable set of float pipes for discharging the sand and rubble on adjoining wharves, if so required.

The type of dredge I would recommend should be similar to the screw dredge "Greenore" built by Messrs. Simons & Co., of Renfren. It is said that it has cut a channel of a mile in length and 400 feet in width, through the bar at the entrance to Carlingford Lough, Ireland, notwithstanding tide and channel swell. This bar is composed of boulder stones, varying in weight from three to four tons, and so cemented together, by marl and blue plastic clay, as to resemble masonry.

[CCII]

PAUMBEN
CHANNEL.

Report.

Hopper Barges.

Steam Tug.
Pier built from
surplus Rock.Depositing ground
for rock.Deposit ground for
sand.

Appendix F.

Par. 6.

Pars. 7 and 8.

Pars. 9 and 10.

Pars. 13—17.

It is reported, this dredging vessel in six working days removed 17,650 tons, and on one day no less than 4,660 tons. If therefore the proposal for making a deep channel through Paumben Pass is to be realized, this great work must be carried out on a totally different basis to that hitherto followed.

From the foregoing remarks it will be seen that, if proper means be taken in the selection of men, and machinery, that the completion of a Ship canal at Paumben, connecting the Gulf of Mannár with Palk's Bay, is only a question of time and money.

In connection with the Steam Dredges, Hopper Barges, capable of holding at least one hundred tons each, will be required for conveying away the sand to the depositing ground; the number to be regulated by the capabilities of the dredgers to fill.

A Steam Tug must be employed for towing these Barges to and from the dredgers.

As there will be a large quantity of surplus sand-stone rock brought to the surface, care should be taken to convey this material to that part of the shore near the Custom House Flagstaff, to be there deposited as a foundation for a small Pier, which should be projected from the land into the channel, so as to secure at this extremity six feet of water at low-water. The facilities thus afforded, for landing or shipping small stores, during the progress of the works, and otherwise facilitating the business of the establishment, must be seen at a glance.

All rock, excepting that mentioned above, should be deposited on either side of the new channel to not less than five feet above high-water mark, and it should be packed together, so as to afford stability to certain warping Bollards, to be provided, and fixed, for the better tracking of native ships through the channel.

The sand, if not landed, must be conveyed away to a depositing spot selected by the Engineer, and this selection should be at least six miles from the site of dredging.

I beg to add a few more observations on the opinions Mr. Stoddart has given in his Report, in order that there shall be no misconception as to my views on the best site for a Ship canal; observing that the depths and widths he has given for a canal are according to my instructions.

I will commence with paragraph 4, in his Report. On the general plan marked I., the line through the old passage may be recognized by following the letters, A, B, C, D, to K, and is that which I recommended to be carefully examined, taking borings, soundings, &c.

Line I. J. represents the late Sir William Dennison's scheme for a Ship canal. The short line from C to E in blue lines is that recommended by Mr. Riedy, the Immigration Agent, and Mr. Stoddart.

The suggestion made by Mr. Daviott, the Master Attendant at Paumben, to dredge from G to deep water at H, is not at all necessary, as Mr. Stoddart properly remarks, that by the inner course, nearly half a mile from the shore, whether sailing east or west, there is a deep channel of 30 feet leading into the open sea.

The borings have so far proved satisfactory, shewing that the presence of rock and coral formation is far less in quantity than originally anticipated.

Mr. Stoddart proposes to avoid the Horse Shoe Bank altogether, by adopting the straight line from C to E (blue lines) because it would shorten the channel by $\frac{1}{2}$ mile.

No doubt the distance from sea to sea would be shortened, but at the same time, by adopting this line two sharp bends have to be made, which would very much increase the difficulties of the navigation through waters so rapid as those flowing through Paumben Channel. I think that the water running southwards would overrun the entrance at C, scour away the western bank of the new-cut canal, and open up a channel in the direction of the Horse Shoe Bank, which, I contend, is the natural direction for the water to take during a North-east monsoon. Silt up would follow on a shore so secluded as that now selected. I therefore at once state that I do not coincide with this project.

Line I. J., selected by Sir Wm. Dennison. Having already referred to this design at some length, and as Mr. Stoddart's remarks are, on the whole, clear, and afford a good insight into the peculiarities of the ground, I need only observe that the total quantity of excavation for this channel is only about 95,500 yards less than that for the Paumben Channel.

Par. 20. Refers to the accompanying Tabular Statements A. B. C., which contain the estimated quantities of sand, silt, rock, &c., to be excavated and removed from each of the sites under consideration.

If my arguments against the short line E. C., on drawing J., hold good, I presume they are sufficiently conclusive to throw that scheme on one side. There remains then only Sir Wm. Dennison's line to be considered, and I think it must be patent to all who may study the subject, that though the line across the Island is short, its adoption, without a Breakwater to protect its southern entrance from the South-west monsoon, would be more than an act of imprudence. This canal is really little less in cost to that estimated for the Paumben Channel; and when the cost of a Breakwater is added, I presume it is useless to urge the matter further.

Assuming that the quantities of earth, sand, rock, &c., given in the alphabetical column A. B. C., attached to Mr. Stoddart's Report, are to be relied upon, I have worked out therefrom Estimates for each design, adding the probable expenditure for plant, machi-

[CCIII]

PAUMBEN
CHANNEL.

Report.

nery, lighthouses, steam tugs, steam dredges, supervision, &c., as already described in this Report. The result is as follows:—

A. Paumben Channel, of the proportions described in this Report.	£1,386,786
B. Line E. C., as suggested by Mr. Riedy and Mr. Stoddart—but objected to for reasons given herein.	£1,278,142
C. Line said to be selected by Sir Wm. Dennison near Ramissaram, from I. to J. on Plan J.	1,372,810
Add Breakwater	1,000,000
	£2,372,810

I cannot but think, taking all things into consideration, that the results of the above totals are in favour of the line A., which alone is feasible. I therefore adopt the line of the old Paumben Channel as the true site for forming a Ship canal between the Gulf of Mannár and Palk's Bay.

Borings, Drawing
K.

Recent soundings and borings have satisfactorily proved, to a certain extent, that there is no great depth of rock to be blasted and removed (see drawing K., sections of borings accompanying this Report). With powerful steam dredges as described, all the sand, mud, silt, and other material now lying in the direction of the proposed channel, can be raised and conveyed away. The south end is completely protected by several Islands, and thus deepening the canal at the Horse Shoe Bank can be executed even during the South-west monsoon. This is an important fact.

Making due allowance for prevailing winds, and currents, there are no Engineering difficulties in deepening and widening the Paumben Pass, so as to permit large vessels to pass through it, which cannot be overcome by an experienced Engineer and Contractor.

There only remains to add, that this work might be completed in about six years after commencement.

R. TOWNSHEND, M. Inst. C. E.,
Superintendent of Plymouth Breakwater.

APPENDIX.

PAUMBEN
CHANNEL.

Appendix F.

F.

No. 223.

Surveyor-General's Office,
Colombo, 16th November, 1871.

Sir,

WITH reference to your letter No. 112 of 2nd September last, and my letter No. 148 of 5th September, I have the honor to forward

- 1.—One 16-chain Plan of Paumben.
- 2.—Two 16-chain Plans of Pagoda scheme.
- 3.—Two sheets of Sections.
- 4.—One sheet Sections of Borings.

Also a Report by Mr. John Stoddart, the Officer in charge of the operations.

As no copies have been made of sheets numbered 6, 7, 8, 9, I beg to request that they may be returned to me when Mr. Townshend has done with them.

I have, &c.,

A. B. FYERS, Capt., R.E.

The Hon'ble

The Colonial Secretary.

REPORT to accompany Plans and Sections of Paumben.

1. In accordance with instructions from Government, the surveying party under my command left Colombo on the 9th, and landed at Paumben on the 11th September.
2. The first four days after our arrival were occupied in making a house habitable, fitting up boring apparatus, erecting a temporary jetty, fixing a tide gauge, &c.
3. We then directed our attention to the survey of the existing channel; and in order to fix its position accurately, a short base line was measured along the shore, and a traverse survey continued from the base line to the Port Beacon. From this base and traverse, the positions of the various islands, buoys, beacons, borings, and lines of soundings were established by means of angles of intersection.
4. The present channel may be said to extend from the outer buoy B, north anchorage, to E, Kundagal Gut; but there being only 17 feet of water at B, and 20 feet at E, it became necessary, in order to reach 30-feet soundings, to extend our operations from B to A on the north side, and from E to F on the south.
5. The line from E to F was selected by Mr. Daviott, the Master Attendant at Paumben, who rendered every assistance in taking soundings, &c.
6. In sounding this line however, we found that it ran along a coral reef—the edge of the Shingle Islands—the greater part of the way between E and F: this induced us to try the soundings nearer the shore, where we found deep water on a sandy bottom much nearer Kundagal Gut. The objections offered by Mr. Daviott to this course are, that it is rather close to a lee-shore during the force of the South-west monsoon, and that there will still remain to be dredged a bar, from deep water at G to deep water at H. These objections from a person of Mr. Daviott's experience are worthy of consideration. Nevertheless, I should recommend the inner course, which is nearly half a mile from shore when within shelter of the Shingle Islands.
7. Borings have been made as nearly as possible at the various points indicated by Mr. Townshend, and the Plan and Sections will shew the difficulties that have to be contended with, in widening and deepening the present channel.
8. The only place where rock may be expected is from B to C—a little over $\frac{3}{4}$ of a mile—and this but a thin crust of sandstone for a considerable part of that distance. This stratum of sandstone does not seem to extend, in any part of the channel, to a greater depth than 16 feet below the level of low-water, as in all the trial bores we made along the reef we found silting sand below that depth, and bores Nos. 1 and 4 shew that there is no rock to the depth of 30 feet; it may therefore be inferred, almost to a certainty, that the rock cutting will be light.
9. A thin layer of rock may be found on the "Horse Shoe Bank" at D, but I propose avoiding the "Horse Shoe Bank" altogether, by adopting the straight line from C to E.
10. This line, originally proposed by Mr. Riedy, the Immigration Agent, and strongly advocated by Mr. J. W. Robertson, Assistant Surveyor, is recommended, as it would shorten the channel $\frac{3}{4}$ of a mile; cut off the sharp, and therefore dangerous, curve over the "Horse Shoe Bank," and as there is no indication of rock along the proposed course, the cutting would be lighter than that of the old channel. Another argument in favour of this deviation is, that the greater part of the cutting could be executed by fixed dredges, without the aid of lighters, as was done in the Suez Canal.
11. A boring was tried on the narrow neck of land near the point C, but we only got down to a depth of 8 feet below sea-level, on account of silting sand.
12. A longitudinal section of the proposed deviation C to E accompanies this. Cross sections have been dispensed with, as the ground is of a uniform level transversely.

PAUMBEN CHANNEL.

13. Having been informed by Mr. Riedy that Captain Ethersey and Sir William Dennison had at different times proposed a cutting through the Island, we made a survey and section from deep water near the Port Beacon I. direct north to the point J; but as I had no instructions to undertake this work, I did not consider myself justified in going to any expense in boring experiments. I noticed however that rock was visible in several places, but the inhabitants say that this rock is superficial, and that it seldom exists below the level of the sea. This statement is borne out by the appearance of the tanks and wells in the vicinity.

14. The elevations generally are mere sand-hills, and could be very easily removed.
15. The objections to this cutting are, that its southern entrance would be very much exposed during the South-west monsoon, and some people imagine that the northern entrance would be similarly exposed during the prevalence of the North-east monsoon, but I disagree with the last objection.

16. Its advantages are, that it would be only three miles in length from deep water to deep water, two miles of which would be through the land; and there is a nice basin for anchorage on the north side, tolerably well sheltered from the North-east monsoon.

17. Anticipating that the objection to the southern entrance, if the cutting could only be made in the position shewn on Plan, might prove fatal to this project, I beg to state that an equally favourable opening might be made through the Island further to the westward, where the southern entrance would be sheltered by the Cooresuddy and Shingle Islands.

18. The Pagoda scheme, 13 miles east of Paumben, occupied our attention for five days.
19. We tried three borings on the Island at the points indicated on Plan, but could not get to a greater depth than ten feet below low-water in any of the trials, on account of silting sand. We sounded out to the northward a distance of five miles before reaching 30-feet soundings, and we could not put off a boat on the south side at all, on account of the heavy surf.

20. The accompanying Statements A, B, C, shew the quantities to be excavated for each of the schemes at Paumben.

21. In concluding this Report, I beg to add that the work of surveying, sounding, and boring over such a large area could not have been accomplished in the short time we were at it, had we not received valuable assistance from Mr. Daviott, the Master Attendant at Paumben, and Mr. Riedy, the Immigration Agent.

22. Mr. Daviott not only found boats and men for us on the shortest notice, but he assisted in taking the soundings, and in mooring boats for boring, &c.
23. Captain Phipps, the Master Attendant of Tuticoreen, paid us a visit shortly after our arrival, and he was also very kind in offering his assistance. I have therefore much pleasure in returning these gentlemen my sincere thanks for their kindness and attention.

J. STODDART.

16th November, 1871.

A.

By Old Channel, as indicated by Mr. Townshend.
See red dotted lines on Plan.

Longitudinal distances in yards.	Cubic yards of gravel, sand, and mud.	Cubic yards of Rock.	Remarks.
2,948	1,198,000	...	Southern entrance.—From 30-feet soundings, opposite the Port Beacon, to have a gradual slope to 26 feet at Kundagal Gut. 500 yards wide at entrance, narrowing to 100 yards at the Gut. Excavations in from 20 to 30 feet of water.
5,324	1,891,000	47,520	From Kundagal Gut over the "Horse Shoe Bank" to the junction with the proposed deviation, south of the reef—an average width of 90 yards of cutting, in from 8 to 20 feet of water, the depth to be attained being 26 feet throughout.
748	164,600	103,180	Over the reef, averaging 70 yards wide in from 2 to 15 feet of water, the depth to be attained being 26 feet throughout.
572	125,160	23,840	North of the reef, widening from an average of 70 to an average of 90 yards, in from 8 to 17 feet of water, the depth to be attained being 26 feet.
748	168,300	...	North of the outer buoy, averaging 90 yards wide, in from 17 to 23 feet of water, the depth to be attained being a gradual slope outwards from 26 to 30 feet.
1,496	848,530	...	Northern entrance.—Opening out from 100 yards in width to 500. Present depth 23 to 30 feet. Depth to be attained, 30 feet throughout.
11,836	4,395,670	174,540	

16th November, 1871.

J. STODDART.

[CCVI]

PAUMBEN CHANNEL.

B.

By adopting deviation, as shewn by blue dotted lines on Plan.

Longitudinal distance in yards.	Cubic yards of gravel and sand.	Cubic yards of Rock.	Remarks.
2,948	1,198,000	...	Southern entrance.—From 30-feet soundings opposite the Port Beacon, to have a gradual slope to 26 feet at Kundagal Gut. 500 yards wide at entrance, narrowing to 100 yards at the Gut. Excavations in from 20 to 30 feet of water.
2,244	886,492	...	Deviation.—From Kundagal Gut, in a depth of 20 feet, running in to the mud flat. Across the mud flat and spit of land to low-water mark.
1,154	624,680	...	From low-water mark to junction with present channel, south of reef.
431	149,436	32,670	Over the reef, averaging 70 yards wide, in from 2 to 15-feet water, the depth to be attained being 26 feet throughout.
748	164,600	103,180	North of the reef, widening from an average of 70 to an average of 90 yards, in from 8 to 17 feet of water. The depth to be attained being 26 feet.
572	125,160	23,840	North of the outer buoy, averaging 90 yards wide, in from 17 to 23 feet of water. The depth to be attained being a gradual slope outwards from 26 to 30 feet.
748	168,300	...	Northern entrance.—Opening out from 100 yards in width to 500. Present depth 23 to 30 feet. Depth to be attained, 30 feet throughout.
1,496	848,530	...	
10,341	4,165,198	159,690	

16th November, 1871.

J. STODDART.

C.

Proposed Channel across Ramissaram.

Longitudinal distance in yards.	Cube yards below low-water.	Cube yards above low-water mark.	Remarks.
660	1,089,000	...	Southern entrance.—From 30-feet soundings, with a gradual slope to 26 feet at low-water mark. Width 500 yards at entrance, narrowing to 100 yards at beach.
3,758	2,279,753	1,703,300	The section above low-water is calculated at 100 yards in width, and that below low water to a depth of 26 feet at 70 yards wide.
264	297,000	...	From low-water mark on the north side, calculated at 100 yards in width, opening out to 300, and from 26 feet a gradual slope to 30 feet in depth.
264	105,600	...	Cutting running from low-water to 24-feet soundings. 300 yards wide, opening out to 500. Cutting, in from 24 to 30 feet of water. Depth to be attained, 30 feet throughout.
4,946	3,771,353	1,703,300	

16th November, 1871.

J. STODDART.

G.

List of Drawings.

Charts of Palk's Straits and Gulf of Mannár, 1838—1845, from Hydrographic Office.
Plan of Paumben Pass, surveyed by Mr. Stoddart.
Sections of Borings in the Paumben Channel, shewing the strata in natural colours.
Section and Plan of the proposed Ship Canal through the Island of Ramissaram, at a point 13 miles east of Paumben.
Scale of depths of sounding.
Section across the Island of Ramissaram, 3½ miles east of Paumben.
Section of proposed deviation, Paumben Pass, from Kundagal Gut to the Reef.

[CCVII]

C.

Appendix G.

Marked I.
J.
K.
No. 6. I.
No. 7. N.
No. 8. N.
No. 9. O.

Paumben
Channel

*Proceedings of the Madras Government, Public Works Department,
19th April 1873.*

Read the following papers :—

No. 309. Endorsement of the Judicial Department, dated Fort St. George,
1st March 1873.

From the Inspector General of Jails, to the Chief Secretary to Government, Fort
St. George, dated Madras, 31st January 1873, No. 12.

WITH reference to my letter No. 1, dated 17th instant, I have the honour to
forward a letter from the District Engineer at Madura, in which he requests, for
certain reasons stated, that the Jail at Paumben may not be given up.

2. Two propositions are made by Colonel Roberts, namely,—

I. That the labour of every convict employed by the Department of
Public Works should be paid for at the rate of 4 annas a day, or

II. That 3 annas a day should be paid for every convict whether employed
by the Department of Public Works, or on the necessary menial
occupations for the service of the Jail. This last proposal is coupled
with the condition that the officer in charge of the works should
be the Superintendent of the Jail.

3. The accounts for 1872 are not complete, but those for 1871 will suffice
for the present purpose. The daily average number of prisoners during that year
was 111, and the cost per man for everything, guarding included, came to
Rupees 104-7-7 per annum, or to Rupees 0-4-6 per diem. The cost of guarding is
not paid in cash by this department, and if that item be deducted, the cost per man
comes to Rupees 89-1-4 per annum, or Rupees 0-3-10 per diem.

4. From inquiry I made at Paumben I came to the conclusion that there
would be a difficulty in obtaining a sufficient and continuous supply of free labour
at a moderate rate, owing to the nature
Judicial Department, 23rd September 1872, of the locality and the severe character
No. 1,293. of much of the work. Colonel Roberts

does not say anything regarding this point; but from his offering to pay 3 annas
a day for each prisoner, which for 90 men would come to upwards of Rupees 6,000
per annum, whereas the allotment required by him in addition to the ordinary
maintenance allowance is only Rupees 4,000, I infer that some such difficulty is
apprehended.

5. Should it be determined to keep prisoners at Paumben, the sum to be paid
by the Department of Public Works ought, I think, to be determined on the follow-
ing principle, namely, that it should bear all expenses which would be saved were
the convicts to be removed, that is to say the cost of the establishment and that of

Establishment...	Rs. 214 per mensem.
Allowance of Deputy	
Magistrate ...	25 ..

contingencies, such as lighting, etc., etc.,
and that it ought also to pay a fair rate
for labour. The cost of establishment
comes to about Rupees 2,868 per annum,

and that of contingencies to between Rupees 500 and Rupees 600. If the sum of
3 annas and 6 pie per head per diem be paid for every man in Jail it will
cover these two items, and a moderate charge for labour. Taking the daily average
number at 111, as in 1871, the sum paid for labour would be about Rupees 0-2-1 per
man, but if the proposed arrangement is carried out, the strength of the Jail will
be kept down as much as possible to the number actually required for Public

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19th April 1873.*

Works *plus* that wanted for the service of the Jail, and the number will therefore probably be between 80 and 90. With 90 prisoners the rate paid for labour would only be about Rupees 0-1-9 per man.

6. I am unable to consent to the transfer of the superintendence from the Deputy Magistrate to the Supervisor or Overseer of the Works, but the direction of the labour will be left to him, and any complaints of short work or of misconduct will be disposed of by the Superintendent.

7. Considering that arrangements had been made for transferring the convicts on the 31st December, when the march was countermanded on the requisition of Colonel Roberts, I think the payment, if determined upon, should commence from the 1st instant.

8. Colonel Roberts makes certain observations upon the question as it affects the Jail Department, which I would not notice were it not that if allowed to pass unanswered they might create an erroneous impression. When it is put forward that the labour is suitable, all that can be said in favour of the Jail has been said. Whether owing to the locality, or to the nature of the labour, but most probably to the latter, the Jail cannot be considered as healthy, for, although the death rate generally has been low, except in 1871, when it came to 4.15 per cent., the number of admissions into hospital has been very large, and the ratio per cent. of daily average sick to strength is considerably higher than that of any other Jail in the Presidency. Again, little is to be procured on the island, as food and clothing have to be brought from a distance, and the population of the Jail is made up of transfers from other Jails, so that all things considered it is the most inconvenient one there is as far as this department is concerned.

REFERRED to the Department Public Works for remarks.

(Signed) W. HUDLESTON,
Chief Secretary.

No. 310. From the District Engineer, Madura, to the Secretary to Government, Public Works Department, dated Madura, 11th March 1873, No. 5,313.

In reference to your telegram, dated 8th instant, and received this day by post, and my telegram in reply, I have the honour to state that the amount, Rupees 7,000, recommended by me for the maintenance allotment for the Paumben Channel when convict labour is dispensed with, is arrived at as follows:—

	RS.
(a.)—Annual maintenance allowance as at present	2,000
(b.)—For maintenance of a gang of coolies for one dredge, namely, 41 men, at about Rupees 8 per mensem	4,000
(c.)—Maintenance of a gang of coolies for blasting operations, namely, 32 coolies (for 8 jumpers) for 20 days per mensem for 6 months at 5 annas per cooly	1,200
Total	7,200

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19th April 1873.*

2. As however the gangs of coolies thus entertained would be of use in undertaking special jobs for which the convicts were not available, and which had to be executed therefore by paid labour out of the annual allotment of Rupees 2,000, a certain saving in this respect may be anticipated, and I am of opinion therefore that Rupees 7,000 will suffice for the annual allotment when the convicts are withdrawn.

3. I take the opportunity of forwarding to you herewith a copy of my letter No. 4,341, dated 30th December 1872, to the address of the Inspector General of Jails, wherein I have fully explained my views in regard to the expediency of retaining the convicts at Paumben.

From the District Engineer, Madura, to the Inspector General of Jails, Cannanore, dated Paumben, 30th December 1872, No. 4,341.

In reference to G. O., 23rd September 1872, No. 1,293, and the correspondence printed therewith, also to your letter No. 2,403, dated 3rd October 1872, intimating that the Jail at Paumben will be given up on the 31st idem, I have the honour to request the favour of your re-considering the question of the abandonment of the Jail on the following grounds, and should you concur with these views by your being so good as to address the Government on the subject.

2. My reasons for wishing you to re-consider the question are simply these:—In paragraph 5 of my letter printed with the Government Order above quoted, I have distinctly explained that should the convicts be removed it will be necessary to make an allotment of Rupees 4,000 per annum, in addition to the annual maintenance allowance of Rupees 2,000 for the sand bank channel.

3. Unfortunately up to the present moment no notice whatever has been taken by Government of this representation, and even the maintenance allowance of Rupees 2,000 has been sanctioned only on the 26th instant, after my oft repeated solicitations for the same.

4. When I suggested the removal of the convicts from Paumben, I did not anticipate that the order would be passed for the same without any steps being taken to supply their place. It now appears however quite futile to expect that any additional allotment will be made for the channel this year. If therefore the prisoners are now removed from Paumben and the present season for dredging the sand bank channel be allowed to slip by, the efficiency of the channel will be greatly impaired, as no work can be undertaken on this portion of the channel until the corresponding season next year, and by that time there will be two years' silt to remove.

5. I am quite aware that your answer may be that this is no affair of yours, but I would submit that it is clearly to the interests of the Government that all departments should work in harmony together.

6. We have at Paumben Jail premises admirably adapted for the detention of prisoners; the locality and the site are remarkably healthy, and they offer, moreover, no facilities for escape. The work on which the convicts are employed is suitable, being hard and continuous and at the same time attended with advantage to the State. On the other hand, the Jail premises, on the repair of which a sum of no less than Rupees 4,900 was spent but four years since, are scarcely adapted for any other purpose. It seems a pity therefore to remove the prisoners unless there are cogent reasons for that step.

7. The point on which the whole question hinges is how is the cost of the establishment to be met? What is the reasonable sum which we are all agreed should be paid for the labour of the prisoners? In calculating this, it appears to me too late in the day to consider the question how it is that convicts happen to be located at Paumben. It is sufficient to know that they are here, and that they have been housed here at a considerable expense to Government. It is also to be borne in mind, in arranging the charge for the prisoner's labour, the great inconvenience experienced on the channel work by the fact of the men not being allowed to work except in gangs of eighteen, and with a maistry over every eight men, while by reason of their gyves, the prisoners are incapacitated for performing certain kinds of work.

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19th April 1873.*

8. The rate paid by this department to coolies, for such work as the convicts at Paumben are in the habit of performing, is 4 annas per diem; and if that rate be charged to every prisoner told off daily to the department, it is, I think, as much as we can be fairly expected to pay.

9. On the other hand, if, as you say, you consider it preferable that "the labour of every convict should be paid for, whether employed on public works or in the necessary menial duties of the Jail," let the sum to be so paid be calculated at the rate of 3 annas per prisoner per diem. I am quite prepared to consent to this arrangement provided that the Public Works Officer in charge of the Paumben operations be also Superintendent of the Jail, as was always formerly the case.

10. I would suggest, therefore, that either the one or the other system be started from the 1st proximo, and I shall feel greatly obliged by your favouring me with your views on the subject.

11. In the meantime I have taken upon myself the responsibility to request the Superintendent of the Paumben Jail not to remove the prisoners therefrom until he is furnished with fresh instructions from you in reply to my telegrams to you of the 26th instant, and of this day's date, respectively, as also to this letter.

12. I may mention, in conclusion, that I believe that the Local Fund Board will not refuse to pay half the salary of the present Jail Apothecary on the establishment of a suitable Dispensary at Paumben.

P.S.—Your telegram of this day's date received just as this letter was being despatched.
(Initialled) R. A. R.

No. 311. Telegram from the District Engineer, Madura.
(Here enter No. —, dated 13th March 1873.)

No. 312. From the District Engineer, Madura, to the Secretary to Government, Public Works Department, dated Madura, 24th March 1873, No. 5,509.

In acknowledging the receipt of your telegram, dated the 22nd instant, and received by me this day, I have the honour to state that I anticipate no difficulty in obtaining free labour up to the amount of the proposed allotment of Rupees 7,000 for the maintenance of the Paumben channel.

No. 313. ORDER THEREON, 19th April 1873, No. 1,134.

CIVIL WORKS, No. 24.

It does not appear from the further correspondence herewith recorded that any good object will be secured by retaining convicts at Paumben. And His Excellency the Governor in Council accordingly directs that measures be adopted by the Inspector General of Jails for carrying into effect the Order of 23rd September 1872 after the 1st April, when the maintenance allowance for channel clearings will be increased from Rupees 2,000 to Rupees 6,000.

2. The additional sum of Rupees 1,000, now asked for by Lieutenant-Colonel Roberts, cannot be conceded as an annual maintenance allowance, being for new work; nor does it appear to be required: the estimate of Rupees 43,340 for cutting the inner angle of the reef channel, sanctioned in 1862, having been worked out this year, and Rupees 3,000 being entered in the Provincial Budget for progress with

*Proceedings of the Madras Government, Public Works Department,
19th April 1873.*

the work of deepening the channel to 14 feet on the estimate of Rupees 22,810 sanctioned in 1866. Whatever additional funds may be required must be duly estimated for.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

To the District Engineer, Madura.
„ Judicial Department.
„ Inspector General of Jails.
„ Controller of Public Works Accounts.
„ Financial Department.

Erd. S. T. Austin.

10/6/84
Govt. of 1873 Madras.

PUBLIC WORKS.

To

THE DISTRICT ENGINEER MADURA,

&c. &c. &c.

Dated April 19th.

Recd.

Encl.

G. O., 19th April 1873, No. 1,134.

APRIL

Nos. 309-313

Paumben Channel.—Passing orders on the subject of the retention of convicts at Paumben and the additional funds required on account of the channel.

Proceedings of the Madras Government, Public Works Department,
25th June 1873.

No. 369. Read the following letter from Lieutenant-Colonel R. A. ROBERTS, R.E., District Engineer, Madura, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Camp at Kodicanal, 29th May 1873, No. 699:—

ADVERTING to the remarks contained in the concluding portion of paragraph 2 of G. O., No. 1,134, dated 19th April 1873, I have the honour to submit, for the sanction of Government, an estimate,

1 Estimate of Rupees 3,240.

1 Copy of the Estimate of Rupees 6,000.

amounting to Rupees 3,240, for removing the remaining shallow places in the inner angle of the Paumben Channel by blasting and dredging.

2. Were the two dredges at work, as was the case formerly, the service in question could be carried out in one year, but owing to there being only one dredge available to work with, it is now proposed to do in two succeeding years the work still remaining to be executed.

3. Under these circumstances I request that the Government will be pleased to allot for this year a moiety of the amount of the estimate, viz., Rs. 1,620, from the Reserve* at their disposal. *Vide* paragraph 3 of G. O., No. 1,120, dated 17th April 1873.

*Rupees 63,840.

4. I take the opportunity to submit, for the information of Government, a copy of the estimate, showing how the current year's grant of Rupees 6,000, for the maintenance of the Paumben Channel, is proposed to be utilized.

No. 370. ORDER THEREON, 25th June 1873, No. 1,650.

CIVIL WORKS, No. 26.

THE entire amount of the Provincial Reserve at the disposal of the Public Works Department having been absorbed

in providing for incomplete works in progress during the past year, the additional work required for removing shallow places in the inner angle of Paumben Channel alluded to in this letter will be paid for out of the maintenance allowance of Rupees 6,000 until that shall have been fully availed of. After which the Madura District Engineer will bring to notice his further requirements for the current year, to be met from any savings that may be available.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,

Secretary to Government.

To the District Engineer, Madura.

„ Officiating Controller of Public Works Accounts.

„ Financial Department.

„ Accountant General.

Exd. S. T. Austin.

Spare Copies.

10/6/84
Govt. of 1873 Madras.

PUBLIC WORKS.

To

THE DISTRICT ENGINEER MADURAI,

&c. &c. &c.

Dated June 25th.

Recd.

Encl.

G. O., 25th June 1873, No. 1,650

JUNE

Nos. 369-370

Paumben Channel.—Passing orders on letter from the District Engineer, Madura, submitting an estimate for removing shallow places in the inner angle of the channel.

Proceedings of the Madras Government, Public Works Department,
24th July 1873.

No. 401A. Read the following letter from Lieutenant-Colonel R. A. ROBERTS, R.E., District Engineer, Madura, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Camp at Kodicanal, 29th May 1873, No. 715:—

I HAVE the honour to submit, for the sanction of Government, the three estimates named in the margin for such works connected with the Paumben Channel as require to be executed exclusively from an allotment to be provided for under the head "Tools and Plant, Provincial."

Three Estimates.	RS.
A.—Estimate for annual allotment required to maintain Tools and Plant at Paumben	1,300
B.—Estimate for new Plant required to make good deficiencies in order to maintain Paumben Channel for present traffic	3,500
C.—Estimate for special repairs to Plant in addition to what is allowed in the estimate for maintaining Paumben Channel	550
Total...	5,350

2. I take the opportunity to state briefly the nature and description of the services included in the three estimates above mentioned:—

(a.)—The estimate of Rs. 1,300 provides for making current repairs throughout the official year to mud and stone boats, canoes, hand dredge machinery, jumpers, anchors, wheel-barrows, rope, machines, etc., in order to render them fit for channel service.

(b.)—The remaining two estimates of Rupees 3,500 and 550 for new Plant and special repairs to the stone boat, respectively, are required, owing to the Plant having from age deteriorated past all repairs, or beyond the ordinary maintenance repairs.

3. I may mention here that none of the Plant was new when purchased for the Government, and that for many years an annual grant of Rupees 1,680 was allotted for the repair of Tools and Plant. At the time, however, of the financial crisis, this allotment appears to have been stopped, and has not been granted since.

4. As the works enumerated in the three estimates in question are urgently necessary for the efficient working of the channel, I have the honour to request that the Government will be pleased to allot the necessary funds under the head "Tools and Plant, Provincial," in order to enable me to commence with the works as soon as possible.

No. 401B.

ORDER THEREON, 24th July 1873, No. 1,876-A.

ACCOUNT, No. 24A.

THE District Engineer's letter does not sufficiently point out the alternative nature of the three estimates submitted

with it. That of Rupees 1,300 provides for—

	RS.	
1. Annual Repairs to two mud boats	300	300
2. Do. to one stone boat	200	140
3. Do. to two canoes	40	60
4. Do. to Superintendent's boat	46	75
5. Do. to hand dredge machinery	480	480

Suppts. 30

305

1085

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24th July 1873.*

6.	Annual Repairs to jumpers for blasting	...	...	...	...	...	...	Rs.
7.	Do. to anchors	...	...	...	...	...	...	50
8.	Do. to sundry tools	...	...	...	...	...	...	90
								94
								1,300

Total Annual Repair allotment... 1,300

That of Rupees 3,500 provides for—

Fifteen new wrought-iron dredge buckets	...	...	...	...	...	...	...	1,100
Two new mud boats	...	...	...	...	...	...	...	2,600
One new boat for Superintendent of Works	...	...	...	...	...	...	...	370
								4,070

Total... 4,070

Less Items 1 and 2 and part of 5 of first estimate... 570

Net Balance... 3,500

That of Rupees 550 provides for—

Special Repairs to stone boat	...	...	...	...	...	...	...	750
Less Item No. 2 of first estimate	...	...	...	...	...	...	...	200
								550

Net Balance... 550

What is wanted therefore for the current year is an allotment of Rupees 4,070 for New Work under Tools and Plant, and allotments of Rupees 750 and 530, respectively, for special and ordinary repairs under the same heading, which sums His Excellency the Governor in Council is pleased to allot from the Provincial assignment for the purpose. And in order that the improved Plant may be maintained efficiently hereafter, he directs that a sum of Rupees 1,300, for repair of Tools and Plant at Paumben, be entered in future Provincial Budgets, although it does not appear from the records that any such separate assignment, as that of Rupees 1,680 alluded to by the District Engineer, was habitually made in former times.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,

Secretary to Government.

Special 1874-75

To the District Engineer, Madura.
,, Officiating Controller of Public Works Accounts.
,, Financial Department.
,, Accountant-General.

200 2000 1500 11,960
Amid... 020
12 80

Exd. W. H. French.

Spare Copies.

10/6/84
Govt. of 1873 Madras

PUBLIC WORKS.

To
THE DISTRICT ENGINEER MADURA.

cc., cc., cc.,

Dated July 24th.

Recd.

Encl.

G. O., 24th July 1873, No. 1,876a.

JULY.

Nos. 401A-401B

Paumben Channel.—Passing orders on letter from the District Engineer, Madura, submitting estimates for certain works in the Paumben Channel and applying for funds for the works.

Proceedings of the Madras Government, Public Works Department,
6th November 1874.

No. 99. Read the following letter from Lieutenant-Colonel J. F. FISCHER, R.E., District Engineer, Madura, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Camp at Paumben, 22nd September 1874, No. 2,684 :—

ADVERTING to G. O. No. 2,241, of the 14th August 1874, I have the honor to report, for the information of Government, after personal examination and

One Statement. inspection, that the expenditure on the floating plant at Paumben is applied strictly for the purposes for which it has been sanctioned, both as regards new supplies and repairs, and proper registers with vouchers to support all outlay are fully maintained.

2. I would take this opportunity of bringing to the notice of Government the necessity for greatly increasing the grants for deepening this channel. I beg to forward a statement showing the trade passing through for the last five years, in order to exhibit the remarkable increase which has occurred in this time; the number of vessels has increased from 2,092 in 1869-70 to 2,788 in 1873-74, or over 33 per cent.; and the tonnage from 166,746 in 1869-70 to 265,436 in 1873-74, or nearly 60 per cent., and the receipts to Government have increased from Rupees 16,944 in 1869-70 to Rupees 26,688 in 1873-74, or 57 per cent.

3. The channel is in places only 10 feet deep at low water. The hand dredge available is of little use for such purposes as are required here, and its machinery has been inefficiently arranged, but this I have ordered to be rectified, and I trust the cost of the work will be much diminished; but it is very necessary to build another hand dredge at once if only to keep the channel open to such a trade as is springing up, and which is sure to increase now that the Suez Canal is so great a success. In order however to make the channel a perfect success it is necessary to deepen this to 20 feet throughout, and for this purpose I would beg to recommend the Government to get out one of the Clyde dredges, with all its appurtenances, as soon as possible.

Statement showing the collection of Pilotage fee for five years from the Official year 1869-70 to 1873-74.

Official years.	Number of Vessels.	Tonnage.	Government four-fifths share.		Pilots one-fifth share.		Total.		Warps.		Grappells.		Total.	
			RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.
1869-70 ...	2,092	166,746	*15,474	6 6	3,867	12 6	19,342	3 0	1,069	2 0	401	0 0	*1,470	2 0
1870-71 ...	2,402	201,676	18,818	4 0	4,706	13 6	23,525	1 6	1,114	0 0	533	0 0	1,647	0 0
1871-72 ...	2,723	239,376	21,529	4 7	5,332	11 5	26,912	0 0	1,226	0 0	593	0 0	1,819	0 0
1872-73 ...	2,770	247,001	22,234	11 7	5,560	15 5	27,795	11 0	1,273	0 0	565	0 0	1,838	0 0
1873-74 ...	2,788	265,436	*23,869	12 3	5,967	10 9	29,837	7 0	1,925	8 0	892	0 0	*2,817	8 0
Grand Total...	12,775	1,120,235	1,01,926	6 11	25,485	15 7	1,27,412	6 6	6,607	10 0	2,984	0 0	9,591	10 0

PAUMBEN,
19th September 1874.

(Signed) J. F. FONSECA,
Overseer in charge of Operations, Paumben.

*Proceedings of the Madras Government, Public Works Department,
6th November 1874.*

No. 100. ORDER THEREON, 6th November 1874, No. 3,154.

CIVIL WORKS, No. 11.

His Excellency the Governor in Council is gratified to learn that so large an increase in the number and tonnage of vessels using the Paumben channel as that reported by the District Engineer of Madura has occurred between 1869-70 and 1873-74. It indicates the efficacy of the measures adopted for deepening the channel to 14 feet throughout under the estimate of Rupees 22,810, sanctioned in G. O., No. 721 of 1866, of which sum Rupees 11,350 were expended up to 31st March 1874, and an allotment of Rupees 5,000 was made in the current year's Budget. Lieutenant-Colonel Fischer will report at once how much of that allotment has been already availed of up to the 30th September, and what addition to it he is prepared to utilize in conformity with the sanctioned estimate. He should likewise send in specific demands accompanied with regular estimates for any additional plant he may require.

2. The question of converting the channel into a first-class ship canal is quite a separate one; Lieutenant-Colonel Fischer has apparently not read the report on the subject communicated to him with G.O., No. 22, of 4th October 1873.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

To the District Engineer, Madura.
,, Marine Department.

Exd. S. T. Austin.

Spare Copies

16/54
Govt. of 1874 Madras.

PUBLIC WORKS.

To

THE DISTRICT ENGINEER, MADURA,

&c., &c., &c.

Dated November 6th.

Recd.

Encl.

G., O., 6th November 1874, No. 3,154.

NOVEMBER.

Nos. 99-100

Paumben Channel.—The large increase in the number and tonnage of vessels using the channel as reported to have occurred between 1869-70 and 1873-74, noticed with satisfaction; the District Engineer to report how much of the allotment of Rupees 5,000, made in the current year's Budget for deepening the channel, has been already availed of up to the 30th September and what addition to it can be utilized in conformity with the sanctioned estimate.

Proceedings of the Madras Government, Public Works Department,
21st January 1875.

No. 373. Read the following letter from Lieutenant-Colonel J. F. FISCHER, R.E., District Engineer, Madura, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madura, 16th November 1874, No. 3,399 :—

ADVERTING to G. O. of the 6th November 1874, No. 3,154, I have the honor to report that out of the allotment of Rupees 5,000 for deepening the Paumben channel, Rupees 1,550 had been expended up to the end of September last. The average expenditure in any year since the estimate was sanctioned in 1866 appears to have been only Rupees 1,600 per annum, or a total of Rupees 11,310 up to the 31st of March 1874 in seven years. This alone is sufficient to show how very inefficient the existing plant is, and totally inadequate for the purposes it is maintained; I did not, therefore, propose any great increase of this to the Government, but recommended that a really efficient and useful dredge should be obtained from England at once, so that the works might make proper progress.

2. In the event of a ship-canal being determined on hereafter, I do not suppose the line of the present channel would be abandoned; with really good dredges this can be easily converted into a canal for large vessels, and as so much work has been done in it there is no object to be gained by not utilizing this as much as possible.

3. I will, if the Government desire it, send in estimate for an additional hand-dredge and some more boats, as, with only one to work with, whenever this has to be taken into dock for repairs, the whole work comes to a stand-still, and it has been found impossible to maintain a greater depth than 10 feet at low water in parts of the channel. I am afraid, therefore, the Government will be disappointed in establishing a depth of 14 feet throughout this channel with such insufficient means as these hand-dredges are; a very strong current runs through this channel for months in the year, and carries an immense deal of sand into it, with such insufficient means as hand-dredges no proper uniform bed has been made for the channel, and the sand is deposited in several parts where obstructions exist; as fast as this is removed in one place it forms up in others, and as often as the single dredge available is taken in for repairs the sands form shoals, so that in reality the work now doing is nothing more than striving to keep up the canal to a depth of 10 feet at best with such means as are at hand. On the other hand, Clyde dredges would establish a ship-canal through this pass in less than three years; for there is really no serious obstacle existing to prevent this being done at once; it only requires the use of proper means, and the canal could be made available for large vessels in about one-tenth of the time which has been occupied in keeping it open to its present insufficient level of 10 feet only. As far as I can recollect, these operations at Paumben began at least thirty years ago, and up to this time nothing more has been done than keeping the channel open to the smallest class of trading vessels.

4. I regret to say, with reference to paragraph 2, that G. O. of the 4th October 1873, No. 22, is not on the file of this office, and I should be obliged by your sending me a copy of the same as soon as possible.

5. From what has been shown above, it will be quite apparent that no increase of allotment is necessary.

*Proceedings of the Madras Government, Public Works Department,
21st January 1875.*

No. 374.

ORDER THEREON, 21st January 1875, No. 179.

CIVIL WORKS, No. 23.

THE District Engineer of Madura
has already been instructed by G. O.,
No. 3,154, of 6th November, to send

in specific demands, accompanied by regular estimates, for any additional plant he may require to carry out the work of deepening the Paumben channel to 14 feet throughout, more expeditiously than has hitherto been done since its sanction in G. O., No. 721 of 2nd March 1866. Lieutenant-Colonel Fischer will now lose no time in submitting practical proposals for the supply of another hand-dredge that a reasonable rate of progress may be made annually with the work.

2. Lieutenant-Colonel Fischer will also arrange for sections of the portion of the channel estimated for being taken by the Overseer in charge within the month of January, at such intervals as shall, together with a line of longitudinal levels along the centre of the channel, show its exact state with reference to the proposed depth of 14 feet at low water estimated for. Bench-marks shall be laid down where possible and necessary, and the exact bearings of the sections marked on a Survey, so that these observations may be repeated every year for comparison.

3. The Government Order referred to by the District Engineer as not having been received is one simply forwarding copy of Mr. Robertson's second Report on Indian Harbours, in which a Report on the Paumben channel is included, and this doubtless will be found in the District Engineer's Office.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,

Secretary to Government.

To the District Engineer, Madura.

Exd. S. T. Austin.

Spare Copies

10/6/88

Govt. of 1875 Madras.
PUBLIC WORKS.

To

THE DISTRICT ENGINEER, MADURA.

*See 1 file
5558/102*

Dated January 21st.

Recd.

Encl.

G. O., 21st January 1875, No. 179.

JANUARY.

Nos. 373-374

Paumben Channel.—The District Engineer, Madura, requested to submit without loss of time practical proposals for the supply of another hand-dredge that a reasonable rate of progress may be made annually with the work of deepening the channel to 14 feet throughout, and also to arrange for sections of the portion of the channel estimated for being taken by the Overseer in charge within the month of January.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

12th June 1878, No. 2,475 W.

General.
Account.

Read the following paper:—

No. 107. Telegram from the Master Attendant, Madras, to the Secretary to Government, Ootacamund, dated 11th June 1878.

Six thousand Rupees provided Budget Public Works Department dredging Paumbem. Please transfer disposal, Marine, Paumben.

No. 108. ORDER THEREON, 12th June 1878, No. 2,475 W.

The District Engineer, Madura, will pay over to the local Master Attendant the unexpended balance of the appropriation of Rupees 6,000 in the current year's provincial budget for the maintenance of the north channel and sand bank channel at Paumben.

(True Extract.)

(Signed) E. A. FOORD, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the District Engineer, Madura.
„ Examiner of Public Works Accounts.
„ Marine Department.

Exd. E. C. Shunker.
Spare Copies

GENERAL.
ACCOUNT.

Govt. of (1878) Madras
PUBLIC WORKS.

To

THE DISTRICT ENGINEER,
MADURA,
&c., &c., &c.

Dated June 12th.

Issued

Recd.

Encl.

G. O., 12th June 1878, No. 2,475 W.

JUNE

Nos. 107-108.

Maintenance of north channel and sand bank channel, Paumben.—The unexpended balance of the appropriation of Rupees 6,000 in the current year's provincial budget for the — to be handed over to Master Attendant by District Engineer, Madura.

GOVERNMENT OF MADRAS.

FINANCIAL DEPARTMENT.

21st November 1878, No. 2065.

Paumben Channel.

Read the following paper:—

No. 107. From L. C. PROBYN, Esq., Accountant-General, to the Acting Chief Secretary to Government, dated Fort St. George, 12th November 1878, No. 6245.

Audit Department.

With reference to Proceedings of Government, No. 463, dated the 12th September 1878, I have the honor to forward copy of letter from the Master Attendant, Madras, dated 10th October 1878, No. 7579, with original statements therewith attached, the favor of the return of which is requested.

2. It appears from the letter that the total cost of the dredging operations at Paumben (which he informs me in letter, No. 8396, dated 7th instant, were closed at the end of September) is Rupees 8,960-11-11, and for this sum Government sanction is required; of this amount Rupees 4,564-4-10 were transferred to the Master Attendant from the Public Works Department under G.O., No. 2475-W, dated 12th June 1878, Public Works Department.

3. These charges now stand debited to Port Funds; but, as Government in their Order under reference have directed that they should be passed against Provincial Services, I beg respectfully to request, as there is no budget provision for it under Marine, that I may be instructed how to act.

ENCLOSURE No. 1.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Madras, to the Accountant-General, dated Madras, 10th October 1878, No. 7579.

Administrative Department.

With reference to your letter, No. 5647, dated the 24th ultimo, I have the honor to forward the accompanying statement showing the receipts and charges of the S.S. *Albuquerque* in connection with her employment at Paumben.

2. It will be seen that a sum of Rupees 4,594-12-1* has been drawn from the Madura Treasury on account of salaries up to September and other charges up to the time that the allotment on account of dredging, Paumben, was transferred from the Public Works Department. The bills on which the above amount was drawn have not come before me, and I am not aware to what head the charges have been debited. If to any other than "Provincial," the debit will have to be reversed to this head.

* Statement No. 1.

3. There is also a sum of Rupees 211-8-0† paid by your department in June last and debited in your accounts against Port Fund. This item will also require to be transferred to Provincial.

† Statement No. 3.

4. The payments made by the Master Attendant, Paumben, from the allotment transferred from the Public Works Department amounted to Rupees 2,982-9-6,* and a balance of Rupees 1,581-11-4 is now left on hand from which the charges remaining unpaid up to the end of September, amounting to Rupees 1,171-14-4,† can be met. There will still remain Rupees 409-13-0 cash in hand.

*Statement No. 2.

†Statement No. 4.

5. Referring to paragraphs 2 and 3, the total amount requiring adjustment against Provincial will be Rupees 4,806-4-1 less the cash balance of Rupees 409-13-0 expected to remain in the hands of the Master Attendant, Paumben, or the net sum of Rupees 4,396-7-1.

No. 108. ORDER THEREON, 21st November 1878, No. 2065.

The entire charge, amounting to Rupees 8,960-11-11, must be debited against Provincial Services.

2. Deducting the amount (Rupees 4,564-4-10) transferred by the Public Works Department from the assignment made to it from Provincial Funds for the upkeep of the Paumben Channel, the balance, viz., Rupees 4,396-7-1, will form an extra debit against those funds.

3. The Accountant-General is authorized to adjust the charge accordingly.

(True Extract.)

C. G. MASTER,
Acting Chief Secretary.

To the Accountant-General, with original statement.
,, Public Works Department.
,, Master Attendant, Madras.

FINANCIAL DEPARTMENT.

Paumben Channel.

Read the following paper :—

No. 135. *From L. C. PROBYN, Esq., Accountant-General, Madras, to the Acting Chief Secretary to Government, dated Fort St. George, 20th January 1879, No. 234.*

Audit Department.

In forwarding the accompanying letter from the Master Attendant, Madras, No. 296, dated the 15th instant, I have the honor to state that, as entered in the proposition statement attached thereto, no establishment exists at present for conducting the dredging operations in the Paumben Channel.

2. If the proposed establishment is sanctioned, the charge, namely, Rupees 49 a-month, should be met from the general savings in the provincial grant, as no provision appears to have been made in the budget estimate for 1878-79.

ENCLOSURE No. 1.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Madras, to the Acting Chief Secretary to Government, dated Madras, 15th January 1879, No. 296, (through the Accountant-General.)

Administrative Department.

I have the honor to report that the Port Officer of Paumben has brought to notice that it is necessary dredging operations should be at once commenced in the Sand Bank Channel, but as he has no funds to carry on the work, I request that an allotment may be made from Provincial Funds to enable him to commence at once, otherwise serious silting may take place, leading eventually to heavy outlay in clearing it away.

2. It will be remembered that the dredging plant has been made over to the Port Officer by the Public Works Department; and to enable him to carry out the work efficiently, he will require a small increase of establishment as noted per margin; and I request that sanction may also be accorded for the entertainment of these employés accordingly, as the Paumben Port Establishment is too small to perform the additional work required.

One Writer	..	..	..	..	..	..	15
One Syang	..	..	..	..	..	..	13
Three Lascars, at Rupees 7	..	..	..	..	..	..	21

No. 136. ORDER THEREON, 27th January 1879, No. 126.

The papers regarding the transfer of the steam dredge *Albuquerque* from Cochin to Paumben are under consideration, and will be disposed of shortly.

2. Any expenditure incurred during the current year on account of dredging operations at Paumben must form a debit against the available balance under Provincial Funds.

3. The provision of funds for the purpose for 1879-80 will be considered in the Public Works Department, all available funds under Provincial having been allotted to that department.

This No 4604 was 5 days
 Com'd to the Regt - Mr. Amb
 5/11.7.

Ex Vera mltw gono 5757 45/2
25 Sept 58

S.E. of the mile

4. On the transfer of the dredge to Paumben the establishment* proposed by the Master Attendant, and now sanctioned, will be entertained. It is understood that the establishment will be temporary, *i.e.*, as long as the dredge may be at work at Paumben.

* One Writer	rs. 15
One Syrang	13
Three Lascars, at Rupees 7	21
Total, Monthly	49

5. The transfer of the dredging plant authorised in G.O., dated 5th June 1878, No. 304, to which the Master

Attendant refers, was a *temporary* and not a *permanent* transfer.

(True Extract.)

C. G. MASTER,
Acting Chief Secretary.

To the Public Works Department.
„ Master Attendant, Madras.
„ Accountant-General, with Statement.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

5th March 1879, No. 135.

Paumben Channel.

Read the following papers:—

No. 13. From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Madras, to the Acting Chief Secretary to Government, dated 25th February 1879, No. 1681.

Administrative Department.

Referring to Proceedings of Government in the Financial Department, No. 126, of 27th ultimo, I have the honor to point out that, as it is imperatively necessary that the Port Officer at Paumben should proceed with dredging operations in the sand-bank channel, I asked the Accountant-General to inform me what is the balance available from Provincial Funds in reference to paragraph 2 of the Order above quoted.

2. That officer informs me that no separate account is kept in his office of Paumben transactions, they being merged in the account of Provincial Services, and that Provincial expenditure should be incurred, not against the balance available under that head, but only with reference to the balance available out of the grants sanctioned by Government in any one year for expenditure.

3. He further states that the balance estimated under Provincial Services for 1878-79 has been communicated to Government in the Regular Estimate, but as I am not cognizant of the amount, I respectfully solicit that Government may be pleased to order an allotment to be made therefrom to enable the Port Officer to go on dredging without delay.

No. 14. From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Madras, to the Acting Chief Secretary to Government, dated 1st March 1879, No. 1792.

Administrative Department.

With reference to your official memorandum, No. 498, of 27th February 1879, I have the honor to report that the expenses of working the hand dredge in the Paumben Channel during the month of March 1879 is estimated at Rupees 400.

No. 15. ORDER THEREON, 5th March 1879, No. 135.

His Grace the Governor in Council sanctions the dredging operations in the sand-bank channel at Paumben being carried on, at a charge not exceeding Rupees 400, during the month of March.

2. As the charge will fall to be debited in the accounts for the month of April 1879, the Public Works Department will, with reference to paragraph 3 of G.O., dated 27th January 1879, No. 126, arrange for the requisite debit and for the provision of funds.

(True Extract.)

C. G. MASTER.
Acting Chief Secretary.

To the Master Attendant, Madras.
" Public Works Department.
" Accountant-General.

Exd. J. Wright.

Bobt. of 1879

FINANCIAL.

To

THE PUBLIC WORKS DEPARTMENT,

&c., &c., &c.

Dated January, 27th.

Issued

Recd.

Encl.

G.O., 27th January 1879, No. 126.

JANUARY.

Nos. 135-136.

Paumben Channel.—Orders passed relative to the provision of funds for the current year and 1879-80 for the dredging operations at Paumben, and remarked that the papers regarding the transfer of the steam dredge *Albionique* from Cochin to Paumben are under consideration.

Mis Rs 501 W/19th Feb. 1879

Communicated to the S.E.
Fifth Circle.

8/

W.F.

S. Eng Fifth Circle
Sp. P.W.D.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

31st July 1879, No. 2,006 W.

General.
Establishment.

Read the following papers:—

No. 215. From J. W. RUNDALL, Esq., Acting Superintending Engineer, Fifth Circle, to the Chief Engineer, Public Works Department, dated Trichinopoly, 26th May 1879, No. 188 M.D.

WITH reference to your telegram of the 7th April, directing me to hand over to the Master Attendant, Paumben, temporarily the workshop and establishment at that station, I have the honor to request you will arrange to transfer the allotment for work at Paumben, viz.:—

Provincial Rupees 1,300 for maintenance of Tools and Plant.

Special Funds Rupees 6,000 for maintenance of north and sand bank channel.

2. An Overseer has hitherto been kept exclusively at Paumben; if the dredging operations are in future to be carried out entirely by the Marine Department the permanent location of an Overseer at Paumben is unnecessary, and a reduction of one Overseer can be effected.

3. The pay of the workshop establishment at Paumben, Rupees 108 per mensem, is at present drawn by the Executive Engineer, Madura, in his monthly abstract. This establishment should also be transferred to the Marine Department if their charge of the work is to be permanent.

No. 2,076.

TRANSFERRED to the Master Attendant, through the Marine Department, for report.

(By Order.)

(Signed) J. PENNYCUICK, Major, R.E.,
Ag. Under Secy. to Govt., P.W.D.

3rd June 1879.

To the Master Attendant, through the Marine Department.

No. 1,158.

FORWARDED to the Master Attendant, Madras, for the required report.

OOTACAMUND,
7th June 1879.

(Signed) C. G. MASTER,
Offg. Chief Secretary.

No. 215-A. Endorsement of the Officiating Chief Secretary to Government, Marine Department, dated Ootacamund, 8th July 1879, No. 1,372.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Acting Chief Secretary to Government, Marine Department, dated Madras, 3rd July 1879, No. 5,211.

I HAVE the honor to return Marine reference, No. 1,158 of 7th ultimo, and its enclosures, and to state that I think it will be advantageous to permanently transfer the charge of the workshop establishment, and the works hitherto carried on by the

Paumben Channel.—The dredging operations in the sand-bank channel at Paumben being carried on, at a charge of Rupees 400, during the month of March, sanctioned.

MARCH.
Nos. 13-15.

G.O., 5th March 1879, No. 136.

Dated March, 5th.
Issued
Recd.

Encl.

Copy of 11879
MARINE.
To
THE MASTER ATTENDANT,
Madras,
&c.,
&c.,
&c.

Miss No. 801 W of 18 March 1879.

Comd to the Super Engineer
Fifth Circle.

The funds required, viz.
Rs 4.00 will be applied for
by the Super Engineer in his
statement of demands
due in April next.

J. H. Taylor

In Marine Department
Lt. Fifth Circle
Exec. P.W. Dept.

Public Works Department at Paumben to the Master Attendant there, who has now had considerable experience of the requirements of the place and of the working of the *Albuquerque*, and moreover possesses special qualifications for the appointment, having formerly belonged to the Marine Survey Department and was actually employed on the survey of the place. Countless small jobs are now executed by the Engineer of the *Albuquerque* which used to form large items in the expenses of the dredge. Though I am aware it is not a favorable time to advocate expenditure of any kind, yet in Mr. Baker's case I feel that his salary of Rupees 200 is greatly inadequate for the onerous duties he has to perform, and his peculiar fitness for Paumben will stand in the way of his promotion to a better paid post. In this view of the matter and as there will be considerable saving by the transfer, I would recommend that his salary be raised to Rupees 350, which would place him on the same footing as the officers at Cocanada, Calicut, and Cochin.

2. Having dealt at some length on this matter in my report recorded in Proceedings of Government, Marine Department, No. 312 of 10th ultimo, it is scarcely necessary to go over the same grounds again, and I therefore close this communication with the hope that Government will be pleased, under the exceptional circumstances, to grant the salary asked for which though an increase to Mr. Baker is only a readjustment of the money hitherto spent upon the port.

FORWARDED to the Public Works Department, with reference to endorsement of that Department, No. 2,076, dated 3rd June 1879.

(Signed) C. G. MASTER,
Offg. Chief Secretary.

No. 216. ORDER THEREON, 31st July 1879, No. 2,006 W.

UNDER the circumstances brought to notice in these papers, the Government resolve to transfer the charge of the workshops establishment at Paumben and the works hitherto carried on by the Public Works Department at Paumben, to the Marine Department.

2. The unexpended portion of the allotments provided in this connection in the Provincial and Special Fund Public Works Budgets for 1879-80 will be retransferred to the credit of the Marine Department; similar provision for the future being made in that Department without the intervention of the Public Works Department.

3. The services of the Paumben Overseer should be utilised by the Superintending Engineer, Fifth Circle, until he is required elsewhere.

4. The question of the increase to Mr. Baker's salary will be considered in the Marine Department.

(True Extract.)

Major, R.E.,
Ag. Under Secy. to Govt., P.W.D.

To the Superintending Engineer, Fifth Circle.
" Examiner of Public Works Accounts.
" Marine Department.
" Financial do.

Exd. S. T. Austin.
6 Spare Copies

sent to Madras office



12. Aug 1879
Marini (1879) Department
(Paumben (Paumotu))

GENERAL
ESTABLISHMENT.

P. W. 1880

Gobt. of (1879) Madras.

PUBLIC WORKS.

No. 1441

To
THE SUPERINTENDING ENGINEER,
FIFTH CIRCLE.

Sec., Sec., Sec.

P.W.D.

114880

N.P.

Dated July 31st.

Issued

Recd. 11. August 1879. Encl.

G. O., 31st July 1879, No. 2,006 W.

JULY.

No. 215-216.

Order 12/8/79 - 446.

*Forward to the Master
Attendant Madras, who will
submit a tabular statement
in the prescribed form, thus the*

Workshops Establishment at Paumben.—
The charges of the — and the works
hitherto carried on by the Public Works
Department at Paumben to be transferred
to the Marine Department.

*Recd. sent, as regards the increase
proposed to Mr. Perkins Salary.*

11/8
Forward to the Master Attendant. Recd. 11/8/79.
Recd. forward 11/8/79.

Administrative Department.

No. 8883

MADRAS,
Marine Office,
20th November 1879.

From

J. H. TAYLOR, Esq., LIEUT., R.N.R.,
Master Attendant,
Administrative Department,
Madras.

To

C. J. Master Esquire
Acting Chief Secretary to Government,
Marine Department,
Fort Saint George.

SIR,

I have the honor to state that
in G. O. Public Works Department, No. 2006 W.,
dated 3 July 1879, the available balance of
the allotment, provided for the Paumben in
dredging operations in the Provincial and
Special Fund Public Works Budget 1879/80,
is authorized to be transferred to the credit
of the Marine Department.

2 A sum of Rupees (9155-14-0) Nine
thousand one hundred and fifty five, and annas
fourteen, has accordingly been placed at the
disposal of this Department, but in doing so, the
Accountant General has intimated that Rupees
(3539) Three thousand five hundred and thirty
nine should be debited to Marine Provincial,
and Rupees (5617) Five thousand six hundred
and

and seventeen to Port Fund, pointing out with regard to the latter that Rupees (6000) six thousand is entered in the special Fund Public Works Department Budget, under the head of Port Fund, for the maintenance of the North Channel and South Channel, Pamban. As the Government are aware that at present there is no Port Fund at that port, it can have no accounts under that head, and it is therefore impossible to adjust the charges in question to the debit of Port Fund.

2 The dredging expenses at Pamban amounted to Rupees (9876-0-9) Nine thousand eight hundred and seventy six and pice nine up to the end of last month, and the provision made for the Albuguerque's employment on that work for six months in this Department Budget Estimate, under Provincial Services, is Rupees (10,596) Ten thousand five hundred and ninety six. This amount being almost exhausted, it is necessary to provide funds to meet the charges for the remainder of

of the official year. A further sum of Rupees (7000) seven thousand will probably be sufficient.

3 Under the above circumstances, I beg the Government will be pleased to order the whole amount transferred, viz Rupees (9155-14-0) Nine thousand one hundred and fifty five, and annas fourteen, to be allotted from savings under the head of Provincial in the Public Works Department Budget.

I have the honor to be

Sir

Your most Obedt Servant

M. A. S.

Master Attendant

Administrative Department

ML

EXAMINER

Marini 1879 Debar...

No. 2235



1879-3-8

Book DEPARTMENT.

No. 4321

Fort Saint George, Accountant General's Office, 3rd December 1879.

TO BE RETURNED WITH REPLY.

Referred to the Accountant General for his opinion.

24 November 1879



By Chief Secy

FROM THE ACCOUNTANT GENERAL TO THE GOVERNMENT OF MADRAS,

To THE Secretary to Government Financial Department

SIR,

With reference to your endorsement No. 2235 dated the 24th ultimo on a letter from the Master Attendant Madras, I have the honor to report that that officer furnished me with a statement from the Examiner Public Works Accounts showing that Rs. 9155-14-0 was unexpended out of Budget allotments on account of Tanjore dredging operations and he requested that the amount might be placed at the disposal of the Marine Department.

2. It was subsequently ascertained from the Examiner Public Works Accounts that Rs. 3539 appertain to Provincial and Rs. 5614 to Port Funds. I am not in a position to state whether there will be any savings in the grant to the Public Works Department from Provincial Services so that the entire sum can be borne by these services.

3. As provision to meet the charges was partly made under Port Funds I beg to recommend (in the event of the Public Works Department not being able to give up part of its allotment) that the expenditure in excess

Enclosure. I submit under the circumstances explained that the whole sum of Rs. 9155-14-0 transferred to the credit of the Marine Department for the dredging operations at Tanjore be allotted from savings under the local Provincial in the Public Works Budget.

To The Chief Secy. to Govt., Marine Department, Fort Saint George.

From The Master Attendant, Administrative Department, Madras.

No. 8883

Dated 20th November 1879.

excess of Rs 3539. - to be debited against the
Post Funds, the Master Attendant determining
from which Post Fund the amount can be
contributed and this sum being refunded by
Provincial Services in the ensuing year.

I have the honor to be

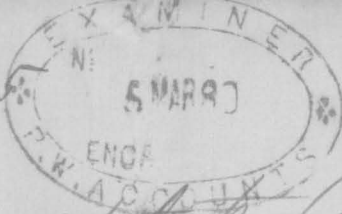
Sir,

Your obedient servant

W. Herrell Trapp
Agent Account General.

TO BE RETURNED
WITH REPLY.

N. 2355



625079

Referred to the Chief Engineer P. W.
Department for his opinion.

Master
Ag Chief Secy

Book

DEPARTMENT.

No. 4688

Fort Saint George,
Accountant General's Office,
23 December 1879.

FROM THE ACCOUNTANT GENERAL
TO THE GOVERNMENT OF MADRAS,

To The Secretary to Government
Public Works Department

SIR,

With reference to the Under Secretary's memo
N. 3866 dated the 16th Instant, I have the honor to
inform you, that the unexpended allotment of
Rs. 56.17 has not been credited in the accounts of
this office.

2. Allotments to the Public Works Department
are simply recorded in a register and all alterations
subsequently made are noted. The actual expen-
-diture only as reported by the Examiner Public
Works Accounts is adjusted in the accounts of
this office, such expenditure being also noted in
the register maintained for allotments.

I have the honor to be

Sir

Your obedient servant
A. Botterell Tupper

Ag. Account General.

At Fort St. George.
5 December 1879

To the Chief Engineer P. W. Department

13614

1879
FROM THE ACCOUNTANT GENERAL, MADRAS,
ACCT. GENL'S OFFICE, MADRAS.
(*Sanction Channel*)
No. 4321

Dated 19th December
Recd. 44
Ans'd.

Subject.

(24 3459)
Lands.

To the Secretary to Govt
Financial Dept

Refers that a statement
from the Dy. Commr. A. S. S. S.
that Rs. 91.55-14- was un-
expended out of Rs. 100.00
and on account of P. W. D.
and of P. W. D.

At Fort St. George

For. to 2133. 29.11.78

2025. 16.11.78.

P. W. to. 2006. W. 31.7.79

Memor 3866 - 16.12.79



1880
No. 1441
4

Plates with reference to Memo
No 3866 dated the 6th instant that
the much wanted statement of
Rs 577 has not been sent to
the Accountant General's Office

Dated
Recd m/v

1879 Department
From the Accountant General
to the Secretary of Govt
of Madras
P. S. D. S.

Memo 165 - 10-1-80

Memo 3866- 16-12-79 to

In File 2347/80

Book DEPARTMENT.

No. 165

Fort Saint George,
Accountant General's Office,
21st January 1880.

FROM THE ACCOUNTANT GENERAL
TO THE GOVERNMENT OF MADRAS,

To THE Secretary to Government
Public Works Department

SIR,

With reference to your Memo No 168
dated the 15th instant, I have the honor to in-
form you that the sum of Rs 5617 is shown
as a deduction under Local (Post) Funds
in the registers kept in this office for the allot-
ments to the Public Works Department.

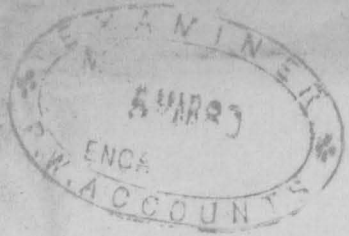
Any expenditure incurred by the
Marine Department from the above allotment
should therefore be debited to "Post Funds."

I have the honor to be
Sir,

Your obedient servant

A. H. S. S. S.
Off. Accountant General,

P.S.



W.D.
22/11/80 1-3-80
1441
3

State with reference to Memo
No. 118 dated the 13th Decr that
the sum of Rs 500 is shown
as deduction in the
Port Funds in the Negatives
kept in this office

Dated
Dec 2

1880 Department
From the Accountant General
Madras
To The Secretary to Govt
of the Department

Mem 118 - 15-1-80

In File 2367/80

P.W.D.

No 288

Endorsement in the Financial Dept. No 2355
of 5th Decr 1879

Letter from the Accountant General, Madras,
No. 4688 of 23rd December 1879

Letter from the Accountant General, No. 165
of 21st January 1880.

Communicated to the Financial
Dept. for information with reference to en-
dorsement in that Dept. No. 2355 dated
5th December 1879.

2. Under the circumstances explained
by the Accountant General in his letters
No. 4688 dated 23rd December 1879 and No. 165
dated 21st January 1880, the charge should
apparently be borne by Port Funds, Marine,
and not Provincial Public Works.

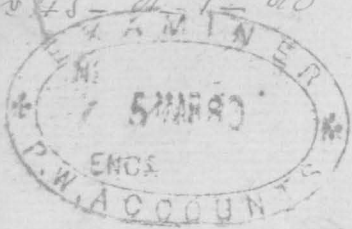
(By order)

Y. Pany: 80

To the Chief Secretary to Govt.
Financial Dept.

For Deputy Magistrate Major R.E.

Ag. by Chief Secy. P.W.D.
Under Secy.

No. 446-12 Aug 79-
 8045-44-40


To
 The Chief Secy to Govt
 P.W.D.
 (Pambeen Dredging Operations)
 The P. W. Dept

To
 The Chief Secy to Govt
 P.W.D.

No 288
 Dated 27 Jan'y/80
 Recd. - 28 - u

R.D.
 28 JAN 80

2 Encs

No 347

Communicates letter
 from the Accountant Madras
 relative to the adjustment
 of the expenditure on dredging
 operations at Pambeen.

Financial Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

Read the following

From the Master Attendant, Madras,
 20 November 1879, N: 8883.

the Accountant General,
 3 Decr 1879, N: 4321.

the Public Works Department,
 (Indorsement) N: 288, 27 Jan'y/80.

Order thereon,

Communicated

The matter seems a little
 complicated. Port funds
 cannot be debited with
 charges for Port B. as
 not included in the Schedule

to the Master Attendant
 Madras, who will
 adjust all expenditure
 incurred on the Pambeen
 channel

C. 152-2

the No. 446-12 Aug 79-

Final
M. 1890 / Department



channel in excess of
Budget Provision as
proposed in para. 3
of the Accountant
General's letter No.
4321, d. the 3rd Dec.
1879.

Ans. 2. 90

and the W. M. L. says
there is no port fund at
Lambert. It is not
in the Sch. of Act 12/75
How have the Lambert
receipts been hitherto
credited?

I imagine L. Port?
as G. I. undertook the
R. B. does L. as on
condition of our doing
the work required to
maintain the channel
if so. I think Port?
To the Master Attendant,
Madras.
" Accountant General.
" Public Works Dept.

must have the charge of
Lambert is brought
under the operation of the
Act for L. I think we
have recently asked
G. I. confirmation - or
sanction - the measure
having been approved by
the Govt years ago - say
it was sanctioned in
the Sch. I have never
seen what L. looks out.

LB

Communicates letter

from the ... Madras
relative to the ...
the ...
or a ...

C. 1523

P. W. D.

11490

 To

NR

Dated _____

Recd.

187 , No.

Nos.

c 3/2
R 20/2

C 2 1/2 R 24/2

Note for submission
to the Hon: W. Hardcastle

The Accountant General's proposal is, to debit the charge to Provincial next year, the Master Attendant merely lending the money for the present from Port Funds during the current year.

the 2nd of the 1st. Both came
to all the portions of
Lambert's charges. The
1st of the 2nd does not
appear the last
letter he asked his
authority. The funds

2. The Indian Ports
Act is to come into
force at Pannchen
from the 1st April
1880.

Q. 153-8

1880, vide Proceedings
of 8th January 1880,
No. 43.

3. The pitotage
receipts at Pannam
have been credited
to Provincial.

Rs 280

Whole period
from the 1st of Dec.
balance of previous
to 1st Dec. has not
yet been paid
Rs 20. [Rs 23 1/2]

Rs 20 1/2/80

c 3/2

R 20/2

Communicates letter

C. 15-9

268 W

P. W. D.

1490

A1-47

No. 431.

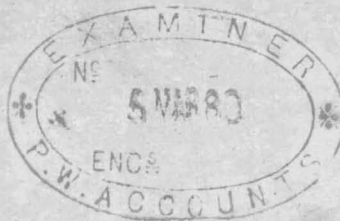
Forwarded with
papers, to the Secretary
to Government Public
works Department for
the information desired
by the Honorable. W.
Kendall.

J. Vanhook.

Chief Secretary

Herb. Sp. fenzl - 2
27. February 1880.
to his Secy to Gov. P. W. Veprek

Communicates letters



FUNDS. THE BUDGET SANCTION THEREFORE
IS THE AUTHORITY UNDER WHICH THIS
OFFICE TRANSFERRED THE AMOUNT TO
THE CIVIL DEPARTMENT UNDER THE HEAD
SPECIAL.

2. AS IT IS NOW STATED THAT THERE ARE NO PORT FUNDS AT PAUMBEN, THE AMOUNT MAY BE *Sanctioned* ~~SUBMITTED~~ FROM THE PROVINCIAL RESERVE AT THE DISPOSAL OF GOVERNMENT, AND ADJUSTED NEXT YEAR WHEN THE PORTS ACT IS TO COME IN FORCE AT PAUMBEN, BY CREDITING PROVINCIAL AND DEBITING SPECIAL.

Dec 12/3
OFFG. C.

JB
12/3

$\frac{12}{12} \mid \frac{3}{3}$

c3/ C. 15.2.40.
R 20/2

9.15-3-3

15W
R. No 1134/7980 1441
No 158
GOVT. } 1880. { P. W.
OF MADRAS. } { DEPT.

SECRETARY.

Fort St. George, 4th March 1880.

OFFICE NOTE.

To C

For report with
reference to the Hon.
Mr. Anderton's remarks.

D
by W.

OF 187

11/13

No 1279 of 12-3-80
Enc: 7

TO W.

THE SUM OF RS. 5617 IS THE
BALANCE OF THE APPROPRIATION OF
RS. 6,000 SANCTIONED FOR THE WORK

PORT FUND
PAUMBEN :- MAINTENANCE
OF THE NORTH CHANNEL
& SAND BANK CHANNEL RS.
6000. NOTED IN THE
MARGIN IN
THE SPECIAL

FUND BUDGET OF 1879-80 UNDER PORT

No 757 W P. W. Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 22nd May 80

READ the following

End: Financial Dept. / No. 431 of 27th Feb. 1880

The sum of Rs 5617
required on account
of the maintenance
of the North Channel
and Sand bank Chan-
-nel at Paumben
is appropriated
from the Provincial
Revenue of 1879-80.

JM

L 150

By: Mr. C. S. Mr. Depd. - 23-3-80
Finl. Dept. ✓ Mr. Depd. 23-3-8
S. R. 5th Circle. ✓ —————

R. P.

Appendix to G.O., No. 1,341 W., dated 28th May 1881.

ON THE PROPOSED SHIP CANAL BETWEEN CEYLON AND INDIA.

By COMMANDER A. DUNDAS TAYLOR, F.R.G.S., LATE INDIAN NAVY.

THE Ceylon papers inform us that Pámban and its neighbourhood were visited in August last by Sir Hercules Robinson and Mr. Townsend, C.E., who expressed astonishment that a ship canal had at long ago been cut through Pámban. This, according to the newspaper, was after inspecting Sir James Elphinstone's proposed site for a cutting and three others; so I infer that engineering sympathy still leans towards the improvement of old Pámban passage, or a new cutting through Rámesvaram Island, which Mr. Townsend minutely examined.

The important question is, "which is the best site for a ship canal?" And it is my desire to show that no scheme as yet advanced can compare with that which has been brought into public notice by Sir James Elphinstone. The consideration of such a question demands a good general knowledge of the atmospheric and oceanic agencies that affect the approaches to the proposed canal. An expenditure of much time and money may result in the attainment of a pretty good harbour, but it is scarcely wisdom to leave the consideration of its accessibility to an after-thought; nor will a brief visit to the locality in the fine season give the Engineer the least insight into oceanic forces which are displayed on so grand a scale in the foul-weather season and more so in an exceptional cyclone.

The discussion of the practicability of forming a navigable passage from the Gulf of Manaar into Palk Strait dates from the very commencement of this century, when Colonel Manuel Martinez exchanged sentiments with Stephen Rumbold Lushington, of the Madras Civil Service, then in charge of the southern provinces of Madras, regarding a removal of the obstruction to the trade of Malabar, Coromandel, and Bengal, caused by the shallowness of the channel of Pámban. But Colonel De Havilland, of the Madras Engineers, was the first to recommend to the Marine Board a regular survey of the locality. In 1822 Ensign Arthur Cotton made a first examination of the pass and sent in an admirable report to Captain Fullerton, Civil Engineer of the Southern Division, who, in his turn, was instructed by De Havilland to inspect the Pámban passage, and reported the result in 1822 to Lieutenant-Colonel Caldwell, who had in the interim succeeded De Havilland as Inspector-General of Civil Estimates.

But then came the Burmese war, in the prosecution of which to a successful issue all the means and men at the disposal of the Madras Government were required for succeeding years. So the Pámban question was hushed for a time, until Stephen Rumbold Lushington had become Governor of Madras, and in 1828 wrote an official minute, in which he mentions having consulted with Colonel Garrard and Major Sim, whose sentiments entirely accorded with those of Arthur Cotton and the others; and he wrote as follows concerning the Pámban rocky barrier: "The calmness of the sea at some periods of the year, the quality of the stone which intersects the passage, and the presence of a large population of pearl-divers upon that part of the coast, seemed to offer peculiar facilities to the removal of a portion of this great obstruction to the navigation and commerce of our territories." At the same time the Bombay Government, and especially the Superintendent of Marine, Sir Charles Malcolm, entered warmly into the proposal of the Governor of Madras, as "one of the very greatest importance to the general coasting trade of Madras and Bombay," and they offered the use of a "cruiser to assist in surveying the approaches to the pass.

Sir Edward Barnes, the Governor of Ceylon, in the early part of 1829, directed an inspection of the several waterways between India and Ceylon, with a view to finding one that was capable of improvement for the passage of large vessels. The channels on both sides of Manaar

Ins. N. 751 N 8 222 March 1880

Island, and those through Adam's Bridge, were then surveyed by Captain Dawson, of the Royal Engineers, and Mr. Stewart, Master Attendant of Colombo. The preparation of the report, however, devolved upon the latter, owing to the untimely death of Captain Dawson, from "a disease contracted in the course of this service by exposure to the sun and the noxious exhalations from the stagnant waters in the old stopped-up channels at Manaar."

This happened in 1829, and the report of Major Sim, of the Madras Engineers, comprising three or four distinct schemes for removing portions of the rocky dam, came out in 1830. Thus were all the known channels inspected, viz., the old Dutch Manaar passage; the Tal-Manaar at the island's west point; one near the centre of Adam's Bridge; the Tanny-Cody at the east end of Ramesvaram Island; and the Pámban.

I cannot ascertain what hindered the acceptance of Sir Charles Malcolm's offer in 1828 of a "Bombay Marine" cruiser to survey the approaches to the various channels; but it was not till November 1837 that Powell and Ethersey, of the Indian Navy, in the schooners *Royal Tiger* and *Shannon*, commenced work on Ramesvaram Island and accurately delineated* the Pámban barrier and channels with all the off-lying reefs and islets, westward to Mootapetta, eastward to Manaar with the old Dutch channel between that island and Ceylon, and northward from Cape Tonitoray to Point Calimere; but before they had completed the soundings in Palk Strait their vessels were recalled to Bombay.

The report of Captain Stewart, the Master Attendant of Colombo, was emphatic against attempts at deepening any of the channels enumerated, except that of Pámban; and that only for *coasting craft*, as the expectation of gaining an average depth of 15 feet throughout was hopeless. It appears from his "Notes on Ceylon," published in 1862, that the Governor of that colony from 1832-37, Sir Robert Wilmot Horton, had already three surveys of Manaar when he made application to the East India Company to execute another (which was entrusted to Powell and Ethersey), consequent on an extraordinary proposition by an Assistant Civil Engineer to excavate a navigable channel for shipping through the island of Manaar, at the cost of 20,000*l*. This scheme was referred to the Hydrographer of the Admiralty, Sir Francis Beaufort, who, as a scientific mariner, advised an *accurate survey of the approaches* to Palk Strait and the Gulf of Manaar, which was partially effected, as just stated, under the orders of Sir Charles Malcolm. But unfortunately for India that distinguished Admiral and devoted geographer, before the survey was complete, was succeeded by an old sailor of the pre-scientific school, who, on receipt of the charts and report of the surveyors, allowed the former to go to Madras without taking copies, and the latter, through some inadvertence or misunderstanding, to be put on the shelf; thus were they buried in oblivion for more than thirty years. And we have proof in Stewart's "Notes on Ceylon" that a report was expected to accompany the charts; for on the preferment, by the East India Company, in 1845, of a claim to remuneration from the Ceylon Exchequer, for the use of their surveying vessels, the Government of that colony demurred even to paying half the outlay, because "it nowhere appeared that the officers who conducted these surveys had made any *special report* on the island of Manaar or the approaches to the projected channel through it, nor on the *probable success* of such undertaking." But the report of Powell and Ethersey has at length been brought to light and printed in this year 1871, and comes most opportunely with information concerning the meteorology of the Gulf of Manaar, its currents and tides, as well as some of the geological features of its shores. The opinion of those Marine Surveyors was directly opposed to the expectation of success in attempts to deepen any of the channels through Adam's Bridge and Manaar Island, whilst they advocated the adoption of the Pámban Pass.

Major Sim's report in 1830, which concludes by mentioning the able services of his co-laborers from the Madras Engineers, the brothers Arthur and Frederick Cotton, presented three schemes; firstly, the clearance from rocks and straightening of the then existing principal opening; secondly, the still further deepening of that or another deep cutting through the dam further west; thirdly, a channel with 12 or 14 feet at high water, either at the last shown cutting through the rocks, or through the Ramnad Promontory, about two miles west of Point Ramen. Of these plans the first was adopted; and the Pámban channel, the general favorite, was gradually improved till 1834. From that year till 1837 the work was at a standstill; but, since then, has steadily but slowly advanced in the hands of the Madras Sappers and Miners, with a gang of convicts, under the direction of the Chief Engineer of that Presidency. In 1854, when Colonel Arthur Cotton held the latter office, he reported the great success of the undertaking, and argued for its more vigorous prosecution, with a view of rendering the passage navigable for vessels of large burthen, and in particular for the steamers of the Suez line; his estimate of the outlay was 15 lakhs of rupees, or 150,000*l*. But Captains Biden and Franklin, successive Master Attendants of Madras, doubted whether the mail steamers would take this inner passage even if it were made practicable for them. I also, as a marine surveyor of some experience amongst Indian monsoons, gave evidence before the Parliamentary Committee of 1862, against the practicability of deepening the Pámban, or of making another cutting through Ramesvaram Island (see plan) for the benefit of mail steamers or other large ships. And I ask the Government to examine that plan and then say whether the lines of equal soundings do not show plainly that *nowhere* between Manaar Island

* On a scale of one inch to the mile. The charts are now in Hydrographic Office, Admiralty.

and Moosel Islet can be found a *practicable entrance* for a ship canal. But now look further west at the admirable harbour near Mootapetta, pointed out by Sir James Elphinstone, which (he tells me) has already been named "Port Lorne" by the Colombo merchants. This has a naturally deep entrance, which engineering science can improve and mark off by beacons and lights, and its capacity will suffice to meet the requirements of commercial traffic, even to the extent of an hundredfold increase in the shipping using the strait.

It must be borne in mind that the vicinity of Manaar Island suffers much from the violence of the south-west monsoon for at least two months of the year; is, in fact, a dead lee-shore, whilst the Madura coast is protected from the surf by barrier reefs. Ramesvaram has a large share of Manaar's troubles and but little of Mootapetta's security; for it must be apparent to everybody that the further we go westward the more shelter we get. But we must not pass over Mootapetta, which has such an admirable harbour, the area of which, for accommodating vessels of any size, is more than a dozen *square miles*, whereas (for the sake of comparison) the capacity of Galle harbour can only be reckoned by *cable lengths*, and that is all subject to the south-west monsoon surf.

Of course there will be a ground swell outside the barrier reefs of Mootapetta harbour between May and September, but not so for the rest of the year.

Thus I have endeavoured to give a summary of the various projects entertained for making a navigable passage between Ceylon and the Indian continent. Successive governors of Madras have, with prudence, sanctioned yearly outlays of money upon Sir Arthur Cotton's scheme, though to a smaller extent than its originator wished. But that little has enormously benefited the coasting trade and the revenues of Madras and Ceylon, whilst amply recompensing the State already for every expenditure incurred. Much has lately been said as to the apathy and parsimony of the Indian Government in not having, after the successful experiment of the Suez Canal, spent more money on a similar useful work; but time has shown that they exercised a wise discretion in the face of the arguments which more than one nautical authority of Indian experience had advanced against the probability of success.

But now rumours are current that the Indian Government no longer offers opposition to an effectual deepening of the Pámban channel; that those who formerly doubted the practicability of the scheme have now come round to the originator's way of thinking; and that a project, said to have been disowned for half a century, now bids fair to become an accomplished fact, and that very soon, for the projectors say there is neither nautical nor engineering difficulty to be overcome, and that no further examination of the approaches north and south of the canal is needed.

But what is the scheme? The India Office has no printed memoir or even MS. of Sir James Elphinstone's plan; and the newspaper accounts of the meetings whereat it was discussed are very vague and evidently confound the newborn one with its defunct ancestor the Pámban. Some correspondence, backed by an article in the editorial summary of the "Asiatic" weekly paper of June 20, 1871, advocates "the further and complete excavation of the Pámban passage as it has already been begun and carried forward to a considerable extent." Now, so far from this being the case with regard to Sir James Elphinstone's new and valuable project, the fact is that the site of the canal is not yet marked out or even decided upon, nor does anybody in this country know what a section across the Ramnad Promontory is likely to show as to the nature and quantity of material to be removed, so that no correct estimate of the expense can be framed. Understanding this fact, we shall comprehend the meaning of the Duke of Argyll's answer to the deputation from the East India Association on the 3rd of May, that although the responsibility of the construction of the ship canal should be shared by all three, Imperial, Colonial, and Indian Governments, yet "it would be well for the latter to take the initiative, so as to determine finally the *precise course* of the channel and its probable cost."

The state of matters is this. Several distinct plans have been advanced, as I have endeavoured to explain; two of these were chosen out of the mass, but were so far decided against by a Parliamentary Committee in 1862, that neither of them could be recommended for adoption. Then the subject was allowed to slumber for nine years, till Sir James Elphinstone, as a practical seaman, had personally investigated Pámban channel and discovered that such a tortuous passage, even if it could be deepened, would never do for long ships. His examination of the neighbourhood, in concert with Captain Donnan, Master Attendant of Colombo, led to the discovery of a well-sheltered area of anchorage, with soundings of five and six fathoms extending over five square miles, and thence gradually decreasing to four fathoms at less than half a mile from the Indian shore, where the canal's mouth is proposed. This harbour lies between Mootapetta Point and Moosel Islet lengthways on the plan, whilst its north and south limits are respectively at Poonamudum town and Moolee Islet. The entrance, in which there is now a depth of three fathoms at high water, is about a mile and a half to the east of the last-named islet. The anchorage is well protected against the southerly swell of the monsoon by coral islands and connecting reefs extending from Valinookam Point to Ramesvaram. This was the very thing to satisfy nautical demands, which in the previous schemes had not been attended to, though some few ship captains had heedlessly joined with landmen in an opinion that there would be no nautical difficulty in running through the Pámban Pass, when deepened, or by a new deep cut through Ramesvaram Island, at all seasons of the year.

To examine the sea-approaches and thus to determine the accessibility of a port is a first essential and comes within the province of the marine surveyor. A glance at the plan, which exhibits the sites of all proposed schemes, will explain how unreasonable would be the tax upon a master-mariner's skill in seamanship and navigation, when attempting to enter either of the openings which were submitted to the consideration of the Parliamentary Committee. For ten months of the year the sheltered situation of the cutting through Ramesvaram Island would have presented no difficulty to the approach of an ocean ship; but I am convinced that mishap would have attended any attempt to shoot the canal's mouth when the monsoon swell and current accompanied the steamer. And more than this I am persuaded that the mouth of a canal in that neighbourhood would be silted up during the first week of the south-west monsoon's violence past hope of recovery until those two monsoon months are over in the Gulf of Manaar.

The first project, viz., deepening Pamban passage for large ships, has now been set aside by its own advocates, in favor of the "Port Lorne" or Mootapetta scheme, which has such remarkable advantages as to claim the attention of the Governments and mercantile communities of Bengal, Madras, Bombay, and Ceylon. That Pamban mail-steamer-passage scheme was unfortunately introduced to public notice, and attempted to be carried through, without the co-operation of scientific naval men; nay, more, it was persevered with, contrary to the official opinion published in 1837, of the former Master Attendant of Colombo, Captain James Stewart, a nautical authority of great experience, in the Gulf of Manaar, who tells us in his "Notes" on Ceylon, that "he was clearly of opinion that the only channel capable of improvement was that of Pamban, on account of the comparative shelter it received from the adjacent isles; but that it would not be practicable even to improve that channel further than to deepen it sufficiently to admit of the safe passage of such vessels as were used in the coasting trade of Ceylon and the Presidency of Madras." It had been erroneously assumed that there is four fathoms of water and upwards up to the pass on both sides from the open ocean, so that there is "nothing to prevent the pass being entirely open for all vessels." The chart shows this statement to be incorrect. Outside of the Horse-shoe bank there is a sand flat with only 12 and 13 feet water at low tide, and extending this shallowness to the very coral islands. A depth of 24 feet is not found till you emerge from behind every vestige of such shelter as those islets and reefs can afford and find your vessel in the open Gulf of Manaar. Let the eye also scan the approaches to such a ship canal. Outlying shoals, too numerous to mark by buoys or lights, warn off the mariner; and who can say how many *unknown* sub-marine banks and rocks exist? The discarded surveyors of the old Indian navy well know that a more exact delineation of all shoals—both in the Gulf of Manaar and Palk Strait—is needed before that locality can become a great commercial highway.

And this seems the place to introduce a rapid sketch of the weather on opposite shores of this gulf, which, though only a hundred miles apart, are the scene of very different climatic conditions. Along the Tinnevely and Madura coasts the south-west winds of May, June, and July blow as an along-shore wind which has been robbed of its moisture by the lofty interposing Travancore mountains. Thus the Indian shore from Cape Comorin to the River Cauvery has to wait till the end of October or beginning of November for its rainy season, with the north-east wind; while Colombo, on the Ceylon shore, has its greatest rainfall in May, with the south-west monsoon, and another, though less copious, in October and November, at the burst of what is called the Madras monsoon. The setting-in of that north-east monsoon gives a brief time of bad weather at Pamban, and experience expects the tail of a Madras cyclone to visit Palk Bay about once in 17 years. During one which occurred in 1814, the sea broke over and cut a channel across the Ramnad Promontory, at two miles distance from Point Ramen or Tonitory, which afterwards closed up. This, then, is a contingency that engineering skill must guard against; but, as a rule, the atmospheric disturbance is not so great at the setting-in of the north-east monsoon, as in May, with that from the south-west. When the monsoons change the currents also change, and the loose shifting sands, which form Adam's Bridge, are swept over to the opposite side. The north-east monsoon, being established in November, increases in steady strength towards Christmas. In January at its height, it decreases in February, and then the weather becomes calm, and the water so clear that at Pamban almost every pebble at the bottom can be seen. March is a calm month, with daily land and sea breezes, which vary with the trend of coast. In April the winds are variable and the weather hot and oppressive, but sometimes the end of this month gets a premature burst of the south-west monsoon; yet this more frequently sets in early in May, and with it a rush of northerly current over Adam's Bridge. In June the south-west wind increases in strength, and this is the most dangerous month for shipping in Colombo Roads; whilst along the Indian shore the winds are a little off the sea by day and rather off the land by night.

With regard to rainfall, Colombo has most, about 13 or 14 inches in May; about 8 or 9 in June, and only about 4 in July. But, whereas these three months constitute a wet season of the west coast of Ceylon, they form (with the months preceding and following) the dry season of Tinnevely and Madura, as has been already stated. That lofty Travancore range, averaging 4,000 feet in altitude, and here and there mounting up to 6,000 feet, stands across the path of the rain clouds and wrings out their moisture. Then those clouds ascend and pass on over Tinnevely, Madura, and Tanjore as dry winds. The northern districts of Ceylon likewise partake of a partial drought in the hottest months of the year and through the same cause.

And here I cannot resist the pleasure of recording a project in contemplation by the admirable irrigation engineers of Madras, which consists in damming off the upper waters of the Perryaur River (whose source is the unexplored mountain range that separates northern Tinnevely from Travancore and whose outfall is just above Cochin on the Malabar Coast), and turning them into the Vigay River, the little Nile of Madura, thus producing a supply of water for irrigating the latter district at its period of greatest heat and drought. I only make passing allusion to this excellent scheme, as it scarcely comes within a sailor's province, but it promises benefit to Madura's inhabitants and to the revenues of India, and we can wish speedy success to the good work.

But to return to meteorology. July, though more boisterous generally than June, along the Canara and Concan coasts of Western India, is more moderate on the west coast of Ceylon. On the Indian shores of the Gulf of Manaar little wind is experienced, though the monsoon swell of the Arabian Sea rolls on to the south face of the islets and shoals which form a natural break-water to Port Lorne and to the whole internal navigation (now made use of by coasting craft throughout the south-west monsoon) which extends from Valinookum, about 20 miles west of Mootapetta, to Ramesvaram. August and September are beautiful months, with light westerly breezes, in the Gulf of Manaar.

My object in giving these details being to show how the weather will affect the operations of engineers who have to construct the piers at the canal's northern entrance, with two minor piers on the south, as well as the dredging of a deeper passage between Moolee and Moosel Islets, I cannot do better than make the following extracts from the report of Major Sim's work in 1829-30:—"The best seasons for working, whatever plan be preferred, as far as can be judged from the experience of the present year, are from the beginning of March to the middle of May and from the end of August to the commencement of the north-east monsoon. There are occasional intervals of fine weather in the months of February and August, which might also be taken advantage of, but more than four or five months in the year cannot be calculated on for carrying on the work with advantage. The sea appears to be smoothest and least affected by currents from the beginning of September to the middle of October, and during that period the improvements to the north of the dam or promontory ought to be executed, for in the north-east monsoon the water there is generally too rough to admit of the work being prosecuted with much success. In the months of March, April, and May the rocks to the south of the main dam might be removed.

"There are good grounds for considering the undertaking to be practicable, but it is necessary to take into consideration the possibility of a partial or complete failure, for the project is so entirely new and so unlike anything that has hitherto been undertaken in India that no comparison can be made with the result of other works of the same kind, and no information, therefore, drawn from experience; while at the same time the nature of the currents, their strength and direction at different seasons of the year, and the manner in which they are affected by the opposite monsoons are all, in a great degree still to be learnt."

Since 1830 the Madras engineers have improved their knowledge of the currents and winds while carrying out the deepening of Pamban passage for the coasting traffic with such marked success. But, as a marine surveyor, it is my duty to point out that, before the ship canal can be opened for large vessels, the soundings in the Gulf of Manaar, between Ramesvaram and Cape Comorin must be completed; so also in Palk Strait, from four to eight miles north-west of Kara Teevo Island, and ten miles to northward of Tondimanaar off the Ceylon coast, where the northern end of the Point Pedro shoals is not laid down on the charts, and yet all ocean traffic will have to pass it.

During a survey of the above dangers the proper positions for lights and beacons should be determined and complete directions drawn up for the navigation of this new inner passage.

Then we want a first-class light near the Crocodile rock, which lies 16 miles to the west of Cape Comorin. A similar light on Minikoy Island, which, standing midway between the Laccadives and Maldives, is in the direct steamer track from Aden and was proposed as the point for a lighthouse several years ago after the wreck of the P. and O. steamer *Colombo* during a fog. The short cut through Ramnad Promontory will save a steamer 350 miles in the journey from the Red Sea to Madras and will bring the latter nearer to Bombay by about 370 miles. Then may Point de Galle give place to Colombo and "farewell" be said to the Basses rocks and their heavy light-dues. On the Ramnad shore the pilgrim traffic from all India to Ramesvaram will be cut across by the new canal, but a steam ferry in these fast days will make amends.

I have, as much as possible, confined my remarks to the nautical bearings of the question. Perhaps attention ought to have been called to this fact, that the five-fathom line of soundings runs closer to the high-water mark between the mouth of the Vigay River and Point Ramen (Tonitorai). This might be used as an argument that no silting-up process takes place there; and why? Because the Coromandel current of the north-east monsoon, from November to February travelling down the Indian shore of Palk Strait, is deflected eastward by the promontory and scours that piece of Ramnad shore before escaping into the Gulf of Manaar, partly through Pamban passage (in which it sometimes attains a velocity of more than five miles an hour) and partly over Adam's Bridge. But it is my opinion that the ship canal cannot be perfected without the formation of

a pier at its northern mouth, of one mile in length, with a lighthouse at its tip, and that when such a pier is thrown out (as absolute a necessity here as at Port Said in the Bay of Pelusium) the obstruction will cause a deposit till the angle is filled up, after which the current will convey, as formerly, its silt across the mouth further eastward, whilst dredging machines will be thoroughly able to keep the entrance clear. I trust it will be seen that I do not state this as any argument against the proposed scheme, but merely to show that all the opposing forces of nature have been taken into consideration before I openly announce myself an advocate of Sir James Elphinstone's ship canal through Ramnad Promontory near Mootapetta.

What more can I say to show my hearty concurrence in this new plan of bringing Bengal and Madras nearer to Bombay and Aden? Mootapetta point is already one of the *health-resorts* of the European residents of Madura, and the passing ships will give the sanitarium an additional charm. Madura District may soon be more amply irrigated and will need the new port as an outlet for the increase of her productions. A branch railway must also connect it with Madura town and Madras. But—better still for India's wants—canal communication *must be completed* along the east coast into the harbour of Mootapetta. Then may the words of Wassaf, the historian at the close of the 13th century, quoted in Colonel Yule's "Marco Polo," become true, that Ma'bar (Marava), that southern province, "is so situated as to be the key of Hind."

London, July 28th, 1871.

A. D. TAYLOR.

P.S. February 1872.—Since the above was written, Messrs. Robertson and Townsend, eminent harbour-engineers, have separately inspected the Gulf of Manaar. The former draws the attention of Government to the great value of Mootapetta harbour, though not specially ordered to report upon it; whilst he writes about Pámban passage, "*it would be out of all question to attempt to make this pass fit for large ships, or to a greater depth than 14 feet.*" Mr. Townsend, however, with few words, passes by the Mootapetta scheme and advocates the old Pámban site. Who shall decide when doctors disagree?

I have not a word to *alter* in the above paper on the best site for a canal; certainly not till I see Mr. Townsend's plan for making the *necessary straight cutting* near Pámban, and whether he will give us a harbour, and where. But I think it rather absurd that he should take exception to Mootapetta harbour because anticipating some difficulty in getting his dredge-buckets at work over the entrance barrier, to gain a depth of 30 feet at low water. If his Pámban Canal is to have that depth at its south entrance, he will have to construct an *artificial* breakwater to protect it, for he will not find so great a depth behind the *natural* shelter of the Shingle Islets.

I can moreover show him by Admiralty Charts that at two places off the north coast of Ceylon his big ships (wanting 30 feet depth) will not find more than 24 to 27 feet in crossing the shoals there, fully exposed to the ocean swell, without a particle of shelter from the north-east monsoon, and with a heavy ground-swell from the south-west monsoon as it rolls up the Bay of Bengal.

These serious impediments are—firstly, the north end of the Point Pedro shoal, with only 4 and $4\frac{1}{2}$ fathoms, where it joins the Point Calimere sand-banks; secondly, the shallow water with only $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms (pointed out by me to the Parliamentary Committee in 1862), which extends—so far as has been surveyed—over the whole space of sea to north-west of Kara Teevo Island. Some of the then advocates for deepening Pámban passage termed this objection *puerile*; be it so; I am only still a student, though one for 30 years, in Indian hydrography.

The visit of Mr. Robertson to the Gulf of Manaar was too early in the year, but he witnessed the smoothness and natural advantages of Mootapetta harbour. The south-west monsoon's violence was over at Mr. Townsend's visit in August, but there was then a ground-swell at the entrance of Mootapetta. Neither gentlemen witnessed the burst of either south-west or north-east monsoon. But those whose task it will be to construct the canal will have to encounter the violence of those annual visitations.

A. D. T.

EXTRACT FROM A REPORT ON THE PÁMBAN PASS BY MR. GEORGE ROBERTSON.

The present pass appears, from its tortuous nature, to be the original natural channel opened out and deepened. There are two distinct channels—the north or reef channel and the south or sand-bank channel.

The former is cut through a sandstone reef, partly dry at low water, which connects the main land of Madura with the Island of Rámesveram. The latter has been dredged through a sand-bank, nearly one-and-a-half miles to the south. The two channels are connected by a natural gullet in the sand-bank, which appears to maintain itself at a greater depth of water than there is in the channels.

The reef channel also keeps open and requires hardly any dredging, except for a few days at the end of each monsoon, as the current through the pass is usually very strong.

At the sand-bank channel the current and the tide set more across the channel, and there is in consequence a greater tendency to silt up.

Fortunately for this channel it is under the shelter of a large coral reef, dry at low water of springs, the three highest points of which form islands at high water. Were it not for this

protection, it would be difficult to keep open the sand-bank channel during the south-west monsoon.

The Master Attendant of Madras has furnished me with the last set of soundings, taken by Captain Daviot and Serjeant Sanderson during March 1870, which shows the present state of the works to be very nearly as follows:

The reef channel has a least depth, at any one section, of 11 feet at low water of neap tides, but the greater part is fully 12 feet in the centre, and some places are 13 and 14 feet and even more. Unless the high points have been reduced lately, it cannot be called a safe channel at high water for vessels drawing more than 12 feet, and that only in fine weather. A little more deepening would give a clear 12 feet at low water of springs.

The length of the reef channel is 4,232 feet. Its navigable width is called 80 feet; but a good part of it is more, soundings being taken for a width of 130 feet. Near the middle of the channel there is an extremely awkward angle, which is being taken off so as to widen the channel for a length of 1,300 feet. The tide often runs so strong that it is found extremely difficult to warp vessels through without their getting athwart the channel at this angle. The sandstone rock in the reef channel is said to be softer below than on the crust, and a good deal can be removed by the dredger alone without being blasted.

The sand-bank channel is 2,100 feet in length from buoy to buoy. The width on the plan appears to be rather more than that of the reef channel, soundings being taken for a width of 150 feet. The average depth in March 1870 was rather less than the depth of the reef channel, but the depth varies on account of the silting before alluded to.

The tides rise from two to three feet, but are very irregular, depending principally on the wind.

The water at the head of the Gulf of Manaar, at the point where the sand-bank channel enters, is not much, if at all, deeper than the channel itself. To reach a depth of 14 feet at low water of springs would require a good deal of dredging and would entail a considerable amount of yearly dredging in addition to what is already required. Looking at the character of the bay into which the Pámban passage opens, as well as the tortuous nature of the channel, it would be out of all question to attempt to make this pass fit for large ships, or to a greater depth than 14 feet. I am of opinion, moreover, that it is not worth while making it deeper than 12 feet at low water of spring tides. A depth of 14 feet would be of no use to the steam trade, and a depth of 12 feet at low water of springs would be sufficient for all the purposes of the local trade of the south of India as at present carried on.

During the last ten official years the average annual tonnage of vessels using the passage has been 173,894 tons. The number of vessels has averaged 2,101 per annum, which gives an average of 82 tons per vessel. The Government share of pilotage, exclusive of the share allowed to the pilots, has averaged 14,816 rupees per annum.

At Pámban the north-east monsoon sets in early in November with heavy squalls and rain. Up to December the weather is generally dark and cloudy, with a heavy sea on the north roadstead. During this time it requires much tact and care in running vessels through the pass. At the end of December the weather clears up, leaving a strong breeze, generally from N.N.E., up to the middle of February. It then moderates, with light variable winds up to the middle of April, when the southerly winds set in. The south-west monsoon commences to blow strong after the middle of May and continues so up to August, when light variable winds set in (with a couple of days of blowing weather at intervals) until the change in November.

During the strong winds vessels are delayed being warped through the pass, owing to the strong currents in the direction of the wind. The current has been known to have a velocity of six knots an hour, but is generally from $2\frac{1}{2}$ to 3 knots.

During the first two or three months of either monsoon there is no change in the direction of the current, the prevailing winds influencing its course, although the tide ebbs and flows. During stormy weather the level of the sea on the weather side of the reef is generally 9 inches to 1 foot higher than on the lee side, the reef of rocks acting like a weir across the opening between Madura and Rámesveram.

In approaching Pámban from the south, the deep water channel is on the Rámesveram side of the Gulf of Manaar, but in gales of wind small vessels take advantage of an inner channel on the Madura side of the gulf.

From Keelacarry to Pámban and, to a certain extent, almost the whole way from Tuticorin the inner channel is sheltered by reefs and islands.

I would draw the attention of Government to an excellent anchorage in this channel, about ten miles to the west of Pámban, and situated between Moosel Island and Mootapetta Point. There is a stretch of water here 7 miles long by $4\frac{1}{2}$ miles wide, fairly well sheltered by reefs and islands, the greater part of which has a depth of 20 feet, and much of it 25 and even 30 feet of water. The entrance to this anchorage from the sea, between Moosel Island and Moolee Island, has only about $2\frac{1}{2}$ fathoms, so that some deepening would be required before full advantage could be taken of the anchorage. We passed through this natural harbour in the steamer *Margaret Northcote* entering from the Keelacarry end, where there is only from 10 to 14 feet of water.

On reaching England I found that the new ship canal proposed by Sir James Elphinstone is at this place. Should a ship canal ever be made between India and Ceylon, this long stretch of sheltered water will be of the greatest value as a coaling station for steamers, as it is far superior to Galle. The produce of the south of India could also be shipped here much easier than at Tuticorin or Negapatam, as the sheltered deep water comes within about half a mile of the shore.

In the excavation of any ship canal through Tonitorai Point, the probability is that a large amount of sandstone would be obtained; a portion of this would be required for works in connection with the canal, but the remainder might be deposited on the reefs, which to a great extent already protect this anchorage, so as to make the protection perfect. This could be done for the mere cost of carriage. Were this done and a cut made between Moosel Island and Moolee Island, I have no hesitation in saying that this anchorage would be second to none in India.

There is another fairly well-sheltered but much smaller piece of water at Valinookum Point, about eight miles to the west of Keelacarry. There is a little bay here, under shelter of the point and of two islands, where there is deeper water than at Tuticorin, with 5 fathoms in the entrance from the sea.

These anchorages are of little value at present, and it is always very difficult to divert trade from the outlets which have already been fixed upon by accident or circumstances. Still it is desirable to point out that there is at all events one good anchorage on the south coast of a Presidency singularly devoid of natural harbours or sheltered places, where trade can be carried on independent of the weather.

In connection with the approaches to Pámban from the south, it may not be out of place to draw attention to the great necessity there is for a light at the Crocodile Rock, about 17 miles to the west of Cape Comorin, and $2\frac{3}{4}$ miles from the shore at Cadipatam Point. This rock is much dreaded by the captains of steamers trading round the south of India and Ceylon and by native craft making for Pámban. It would not be easy to put a light on the rock itself, as it is barely awash at low water and is much exposed, but there are two small islands between it and the shore, on either of which a light could be placed. The shore is also high at this point and well suited for a lighthouse.

On the north side of Pámban I would strongly advise that a light should be put on Point Calimere where there is at present only a pillar. Vessels using the pass are liable to get embayed and into danger at Point Calimere. When the wind permits they have to leave Pámban at night, so as to make the point by day. In our little steamer, drawing only five feet, we experienced the want of a light at this place.

PUBLIC WORKS DEPARTMENT.

28th May 1881, No. 1,341 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 62. JOINT REPORT by the Chief Engineer and Master Attendant on the Pámban Pass and proposals for a Ship Canal.

IN our late inspection of the important ports between Tuticorin and Madras, the Pámban Pass and the various schemes connected therewith for the establishment of such a ship canal as would save all steamers coming from Europe the voyage round Ceylon necessarily engaged our attention.

2. It may however be at once stated that neither the time nor the means at our disposal were sufficient for any but a very cursory investigation of the schemes which from time to time have with the above object been brought forward, and our remarks must therefore be of a very general nature, directed however in such a way to the salient points as may serve to narrow the issues for future special discussion, should it appear desirable to Government to take up the question at any time with a view to its practical solution.

3. In the first place, however, it may be as well to state generally the condition of the pass as it now exists.

4. The accompanying chart No. 1,184 of the "*approaches to the Pámban (Paumben) Pass*" shows that vessels from the south entering by the Kundugal channel (as is usual with the larger class of vessels) have, after passing north of "*Shingle*" island, to enter the so-called "*Sand bank channel*." This latter, which has been all along kept open by dredging (the *Albuquerque* having been here engaged), is 2,100 feet long, has an average width of 60 feet, and a depth varying from a minimum of 10 at low water spring tides to a maximum of 15 feet. Tide rises from 2 to 3 feet, but irregularly.

5. The course after this for all vessels, whether entering by the "*Sand bank channel*" or, as is more frequently the case, with smaller craft, which, taking advantage of the protection afforded by the coral reefs, hug the coast of Madura and arrive by the western or Keelacany passage, is through the so-called "*Basin*," which is an irregular channel running north-east, over 6,000 feet long, up to the north or rocky portion of the pass, and is kept open by the current.

6. The rock channel or "*pass*" has a length of 4,232 feet, a width varying from 60 to 90 feet and 130 feet in places, and depth from 11 to 15 feet.

7. During the north-east monsoon the level of the water to the north is generally 9 inches higher than at the south of the pass; precisely the reverse conditions existing during the south-west monsoon. The result of this inequality of level taken with other circumstances affecting the flow of water through the pass is that the velocity of the stream is often as much as 6 knots and has been even known to reach 10 per hour.

8. There would apparently be little difficulty in keeping the pass open did it all like the "*Basin*" consist of sand, or of metamorphic or other rock which once removed would give no further trouble; but, unfortunately, it, to a great extent, consists of coral, which, as it is constantly growing, as constantly requires to be removed by blasting and dredging.

9. The work, now very systematically carried out by the Port Officer Captain Baker is done at a very reasonable cost, the outlay in the past year not having exceeded Rs. 1,649-6-6, and in the present state of the trade little more appears to be required.

10. Square rigged and other native craft, as shown by the following table drawing up to 10 feet of water, have availed themselves of the facilities of this channel, though of course from its want of depth it is quite useless for any of the ordinary coasting steamers and still less for vessels of greater draught:—

	Vessels.	Tonnage.
1876-77	2,165	217,253
1877-78	1,532	136,579
1878-79	1,618	154,113
1879-80	2,143	228,087
1880-81	1,953	223,623

11. An inspection of the chart will show that it would again be quite useless attempting to deepen either the "pass" or the Sand bank channel more than has already been accomplished, as throughout the approaches from the south, both by the eastern as well as the western channels, there are shallows which would have to be deepened "*pari passu*" in order to make the passage throughout available for vessels of greater draught.

12. It may thus be affirmed that (1) the channels as now and hitherto maintained are all that is required for the existing coasting trade, and (2) if a ship canal is ever to be constructed, the existing channels would not be thought of as being capable of adaptation with this object.

13. For much the same reason the old tortuous channel known as the "Dutch passage" between the island of Manaar and the main island of Ceylon, and again the direct cut which it is understood was proposed a little west of the present pass (where the sea is said to have breached through in 1814) would have to be rejected as unsuitable.

14. The various proposals for a ship canal between Ceylon and India, as carried down to 1871, are discussed in the annexed pamphlet (dated 28th July of that year) with chart by Commander A. D. Taylor, strongly advocating what is known as Sir James Elphinstone's scheme, consisting of a canal some $7\frac{1}{2}$ miles in length through the Ramnad promontory, situated about 10 miles west of the "pass."

15. The canal would have a north-east direction débouching on the north in Palk's bay where there is 5 fathoms of water, but affording apparently no shelter in the north-east monsoon, which blowing freely in would render the approach to the entrance difficult, unless thoroughly protected artificially. The débouchure to the south would be into a fine natural harbour* having a large area of 5 and 6 fathoms water, but as it is locked to the south by sand banks, if not by a coral reef, a second canal of over a mile in length would be needed, and to this the approach during the south-west monsoon would also be difficult if not similarly sheltered.

16. Having no longitudinal sections to refer to or trial-pits showing the nature of the material through which (especially in the Ramnad promontory) the canal would have to be excavated, it is impossible to hazard even a guess at the probable outlay, but we have no hesitation in saying that to render this in any way a complete scheme considerable lengths of breakwater would have to be carried out seaward so as to afford the requisite shelter to vessels making either the north or south ends of the canal; and that the cost of such work, taken with that of the canal itself, would make the scheme certainly more costly than some others, to which we will presently advert.

17. It must be borne in mind that the chief merit of the Ramnad project consists in its providing a sheltered harbour for south India which at present only possesses the imperfect port of Tuticorin. It has been supposed that given another railway from Madura down to this projected harbour (which is another very expensive work to be added to the canal cost) the trade in cotton and other exports and all imports for the south would at once resort to it. But even this is uncertain; trade is not easily directed or driven, as witness the expensive railway from Shoranur to Beypore which has never commanded any remunerative traffic.

* With reference to this Mr. George Robertson observes in his report—"There is a stretch of water here, 7 miles long by $4\frac{1}{2}$ miles wide, fairly well sheltered by reefs and islands, the greater part of which has a depth of 20 feet, and much of it 25, and even 30 feet of water.

"The entrance to this anchorage from the sea between Moosel island and Moolae island has only about $2\frac{1}{2}$ fathoms, so that some deepening would be required before full advantage could be taken of the anchorage."

18. Mr. George Robertson, in his report on the harbours of this Presidency, (1871) alludes to this scheme in only very general terms, as he seems to have considered the state of the "pass" channel as alone falling within the scope of his inquiries, but what he does say leads to the conclusion that he was favorably impressed with it. He gives, however, no even approximate estimate or sufficient facts in support of this opinion, and we therefore consider it unnecessary to make further allusion to it.

19. Although not adverted to in his report we were pointed out a line running due north and south about half a mile east of the Pámban lighthouse which it is said Mr. Robertson thought might prove suitable for the proposed ship canal, and with a view to test which two or three trial-pits had been sunk.

20. There is no record so far as we are aware as to the nature of the material met with, though it is said that in the northernmost pit near the seashore gneiss rock was met with at no great distance from the surface.

21. The portion of the Rámesvaram island through which this line is carried is to all appearances very favorable for a work of the proposed character, being so far as can be judged composed mostly of drift sand overlaid to a great extent with just enough *humus* and sufficiently supplied with springs of fresh water to admit of cocoanuts and some other crops being raised, but in no place more than 20 feet (at least judging by the eye) above mean sea level.

22. This line is, however, so inferior as compared with the next line carried parallel to it north and south, two miles more to the eastward, the selection of which rightly or wrongly is attributed to Sir William Denison, that we are clearly of opinion this latter, or one which may possibly be selected close to it, presents much greater facilities for a work of the character proposed than any other.

23. Here the mouth of the ship canal both to the north and south could certainly be protected more conveniently than elsewhere, indeed as regards the former it would only seem necessary to run a short breakwater out north-west from the shore, which here trending towards the north affords as it is fairly good shelter from the west and north.

24. By connecting the "Pullie reef" with "Shingle island" and by running out seaward a breakwater south-east from the beacon on the latter, adequate shelter could no doubt be afforded.

25. A ship canal here through the island would not exceed $2\frac{1}{4}$ miles in length with excavation to 26 feet below mean sea level, also deepening for a mile north and south. For the latter an average of, say, 5 feet of material would have to be removed throughout.

26. Probably 3,000 feet of breakwater north and 10,000 feet south would at the outside be needed, making on the whole, in our opinion, much less work than that required for any of the other schemes.

27. This is the same line which, we are given to understand, was selected by Colonel Thomason in 1878, but there is nothing on record by that officer to refer to.

28. Both the last-named lines with also that close to the place where the sea is said to have broken through in 1814 are shown in red ink on the accompanying detailed chart of the "approaches to the Pámban pass."

29. Yet another line has been indicated to us as having been examined by Captain Hausard on the part of the Ceylon Government, but whether he approved of it or not we have no means of judging.

30. This line appears to run in a north-east direction some 6 miles south-east from the Rámesvaram temple across the sand-pit north-west of Adam's bridge at a point marked "*chatrams*" on the map, but not only would the northern end of a ship canal here be greatly exposed during the north-east monsoon, but the length of the canal to reach 5 fathom water on each side would be at least a mile longer than in Sir William Denison's line. The cost of this would, we consider, be greater, though in other respects it seems to stand next to the one mentioned.

31. In any case we have little hesitation in recording our opinion that if ever the scheme for a ship canal demand serious consideration, the choice so far as facility

of construction and economy are concerned will rest between, what for convenience may be termed, Sir William Denison's and Captain Hausard's lines. Special surveys, with the requisite levels and trial-pits carried down to the full depth of the proposed canal, would soon admit of a definite opinion being formed.

32. It is impossible, however, to conceal the fact that the works how or wherever undertaken must be very expensive; probably at best not less than 1 or 1 $\frac{1}{4}$ millions sterling for canal breakwaters north and south, lighthouses both here and along the bays on both sides, &c. Considering the intricacy of the whole passage, a very complete system of lighting would be required throughout.

33. It is very doubtful moreover, considering the inevitable delays of getting large ships through a canal of the proposed character, whether more than 12 hours of daylight would be saved to steamers passing through over those taking the passage round Ceylon, or that the trade for a very long time to come could afford to pay the extra dues which would necessarily have to be levied in order to make the work pay for its working expenses added to interest on capital sunk.

34. On other grounds it would also appear to be undesirable to urge on the construction of a work of this character till its advantages have been proved in a much more distinct manner than by the reasons which have come under our notice.

35. The introduction of coasting steamers has, as is now beginning to be distinctly perceived, had such effect on the old south Indian native coasting trade that the total extinction of the latter is now apparently inevitable, the single exception being the trade which now passes through and uses the Pámban pass.

36. Here as yet there has practically been no steamer competition, and as the late famine has shown the desirability of fostering diversity of occupation among the natives by all the means at the disposal of Government, we cannot but think it unadvisable to press the question of a ship canal prematurely accompanied, as such a measure would be by the inevitable destruction of what little there remains of the old native coasting trade in the southern portion of the Presidency.

(Signed) J. H. TAYLOR, Captain, R.N.R.,
Master Attendant, Administrative Department.
(Signed) R. H. SANKEY, Colonel, R.E.,
Chief Engineer, P.W.D.

17th May 1881.

No. 63. ORDER THEREON, 28th May 1881, No. 1,341 W.

THE Government are glad to learn that the Pámban Pass has hitherto been so well maintained and that its usefulness has by no means diminished of late years. They are however not prepared at present to consider the desirability of carrying out the costly works, which it appears would be necessary were a canal to be cut capable of meeting the requirements of vessels of large draught.

2. As a matter of general information it may be desirable to obtain a section with borings to 26 feet below mean sea level along the line apparently originally selected by Sir William Denison, about 2 miles east of the pass and running directly north and south through the Rámesvaram island, and if this can be arranged for by the Master Attendant in communication with the Chief Engineer, the Government will not object to sanction the small expense of the operation.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Master Attendant, Administrative Department.
„ Marine Department.
„ Superintending Engineer, Third Circle.

Exd. E. C. Shunker.
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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1881) Madras.
PUBLIC WORKS.

To

THE MASTER ATTENDANT,
ADMINISTRATIVE DEPARTMENT,

&c., &c., &c.

Dated May, 28th

Issued

Recd.

Encl.

G. O., 28th May 1881, No. 1,341 W.

MAY.
Nos. 62-63.

Pámban Pass.—Orders on joint report by the Chief Engineer, Public Works Department, and the Master Attendant, Administrative Department, on the — and proposals for a ship canal.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

6th October 1881, No. 2454 W.

Buildings and Roads.
Civil Works.

Read the following papers :—

No. 27.

No. 263.

MEMORANDUM BY CHIEF ENGINEER.

Letter from the Master Attendant, Administrative Department, Madras, No. 6,000, dated 5th July 1881, forwarding copies of a letter and estimates for making borings across the Island of Rámesvaram received from the Port Officer at Pámban with a sketch.

FORWARDED to the Superintending Engineer, Third Circle, with reference to G.O., No. 1341 W., dated 28th May 1881, and with a request that he will make the requisite arrangements for boring the section taken by Captain Baker, and sinking test wells on the line indicated, in the month of October or such other time as may be most convenient to that officer, under whose supervision the work will be carried out.

2. The Superintending Engineer can allot such funds as may be needed from Provincial, reporting to this office the sum appropriated.

3. The requisite tools and instruments should also be supplied by the Superintending Engineer.

(Signed) R. H. SANKEY, Colonel, R.E.,
Chief Engineer, P.W.D.

To the Superintending Engineer, Third Circle with original enclosures.

No. 264.

COPY of the above forwarded to the Master Attendant, Madras, with a request that he will be so good as to state what he would propose as Captain Baker's remuneration while engaged on the work.

(Signed) R. H. SANKEY, Colonel, R.E.,
Chief Engineer, P.W.D.

10th July 1881.

To the Master Attendant, Madras.

No. 27-A. From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Chief Engineer, Public Works Department, dated Madras, 16th July 1881, No. 6,384.

WITH reference to your No. 264, dated 11th instant, I have the honor to state that Mr. Baker will return from leave early in October, when further inquiries will be made and a report submitted to you.

No. 27-B. Endorsement of the Chief Secretary to Government in the Marine Department, dated 26th September 1881, No. 1602.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Chief Secretary to Government, Marine Department, dated Madras, 19th September 1881, No. 8157.

I HAVE the honor to forward with this letter a chart of the Island of Ceylon and the adjacent shores of Madura, Tinnevely, and Tanjore. The whole is intended to illustrate the various tracks that would be taken by steamers in the event of a canal being opened through Ramesvaram. It seems to me highly desirable that Government should be in possession of reliable evidence upon the various points of comparison offered by the present routes and the proposed alterations. I would respectfully recommend, therefore, that some copies of this letter and chart should be struck off and sent to accompany all letters passing through the hands of Government bearing upon this important subject—important, I mean, with reference to the very large sum of money involved in the construction of a canal through Pamban, and the many difficulties which will necessarily be encountered.

2. In the first place the more eastern ports, such as Brisbane and other ports of Queensland, whose new line of mail steamers might wish to call at Galle or Colombo for coal, could not use the canal without loss of time and mileage, and to this class must be added all the Straits, China, and Japan shipping, which, whether calling at Ceylon for coals or not, would lose both in time, distance, and expense by passing through the canal. We next come to Moulmein and Rangoon, the direct passages to which from the meridian of Cape Comorin, through the canal, and round the island, are nearly equal, so nearly so as to render the delay and expense of the canal an entirely extra charge, while if they coaled at Galle or Colombo, as nearly all ships do, the scale is turned very largely in favor of the outer passage.

3. It is not, therefore, until we come to Calcutta that any positive comparison can be offered, or any advantage suggested, and even then it will be at once recognized that the promised gain in distance was much exaggerated in the reports formerly written upon the subject, in which the gain is placed at 350 miles or one and a half days.

4. The chart supposes the various vessels to pass from Aden to the meridian of Cape Comorin, crossing it in the most convenient latitudes for their several objects. Thus A red dotted line is a steamer bound to Calcutta, touching at Colombo for cargo, passengers and coal, and then passing through the canal to a convenient point off Calimere A'. B red dotted line also is a similar ship passing from Colombo round the south of the island until she reaches an equally convenient point on the radius of distance from Sandheads B'.

Red dotted line A from meridian of Comorin to Colombo ...	135	361	} difference 94,
from Colombo through Canal A' ...	226		
Red dotted line B to Colombo and round Island to B' ...	135	455	
... ..	320		

or, say, nine hours ordinary steaming at a ton of coal an hour. The average price of coal for outward and homeward voyages combined, we may call Rs. (20) twenty a ton, saving Rs. (180) one hundred and eighty, against which stand the expense, delay, and risk of the canal, its approaches and passages.

5. In the very rare case of steamers bound to Calcutta passing Ceylon without calling at any of its ports, the difference would be—

Red line C through Canal C' ...	220	} difference 190.
Red line D round Island D' ...	410	

6. The delay caused by the passage of the canal, the moderate speed necessary to render the approach to it safe, and the risk from the shoals about Point Pedro has to be set against, say, twenty hours ordinary steaming, and expense of about (400) four hundred rupees for coal.

7. The case of Madras comes next, and the canal certainly shows on it to greater advantage—

Blue dotted line. { E to Colombo ...	135	361	} difference 167,
{ E Colombo through Canal to E' ...	226		
Blue dotted line. { F to Colombo ...	135	528	
{ F Colombo round Island F' ...	393		

or sixteen hours steaming, or Rs. (320) three hundred and twenty for coal.

8. It seems hardly possible that the passage of the canal can be made without considerable delay, often involving a whole night, and great expense, so that even in this case it does not offer much mercantile advantage, if any.

9. In the very unusual case of a vessel requiring to reach Madras by a direct passage, without calling at any Ceylon port, the comparison would be—

Blue line G through Canal to G' ...	226	} difference 264,
Blue line H round Island H' ...	490	

little more than one day at ordinary steaming, and not taking in account the delays or risks of the canal.

10. It will thus be seen that the advantages of the canal do not press much upon the consideration of either the Imperial or Local Governments, and the selection of Colombo as a site for a harbour and calling place for all classes of ships has altered the conditions under which Colonel Sir Anthon Cotton and other writers presented the subject to former Governments. The choice of a cut through Ramesvaram, which seems now decided by a consensus of opinion, deprives Madras of one of its chief reasons for direct interference, as it does not offer or render convenient the construction of a harbour for Southern India, such as was proposed by the Lorne Harbour and the canal through the Ramnad Peninsula. The rapid growth of the coral, which is a principal feature at what would be the mouth of the Lorne Harbour, is a most serious obstacle, as it also forms a difficulty in keeping the present pass open. The navigation of a canal will always be difficult in the strength of the monsoon or, say, six months in every year. The current would have to be shut out by locks, for no ship could run through a canal with a gale of wind and current behind her, the wind will be trial enough, and the large tract of shoal water will require many lighthouses. I cannot believe it will ever be a popular passage. It will certainly have the effect of destroying the large native trade that now uses the Pamban Pass, and that is a serious consideration. The rates and dues charged upon the few steamers that would use it would have to be very heavy, if any re-imbursement of the outlay is intended.

TRANSFERRED to the Public Works Department.

(Signed) R. DAVIDSON,
Chief Secretary.

No. 28.

ORDER THEREON, 6th October 1881, No. 2454 W.

THE Honorable the Governor in Council considers that it will be useful to have the purely nautical points connected with the proposed ship canal for Pamban discussed at an early date by the best available experts, but the subject can be best considered when the Government are in possession of the survey and trial borings to be undertaken by Captain Baker in accordance with G.O., No. 1341 W., dated 23rd May 1881, and a rough estimate of the probable cost.

2. Captain Baker will be requested by the Master Attendant to give such information as he may be able to gather from the present clearances of the existing pass channel, both as to the rate of growth of the coral, quantity to be removed annually, and the probable cost of such removal for the proposed canal.

3. When complete information has thus been collected and considered the whole question can be laid before the Government of India for final decision.
4. The chart submitted by the Master Attendant will be lithographed.

(True Extract.)

(Signed) R. H. SANKEY, Col., R.E.,
Secretary. to Government.

To the Marine Department.
„ Master Attendant.
„ Superintending Engineer, Third Circle.

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of 1881 Madras.

PUBLIC WORKS.

To

THE MARINE DEPARTMENT,

&c., &c., &c.

Dated October, 6th.

Issued

Recd.

Encl.

G. O., 6th October 1881, No. 2454 W.

OCTOBER.

Nos. 27-28.

Proposed Ship Canal for Pámban.—Orders
on the subject of the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

23rd November 1881, No. 2924 W.

General.
Account.

Read the following papers :—

No. 103. Despatch from the Most Honorable the Secretary of State for India.

Public Works,
No. 29.

INDIA OFFICE, LONDON,
8th September 1881.

SIR,—Your Government will learn from the marginally quoted reply which I returned to an inquiry addressed to me in the House of Commons on the 15th ultimo, that no reports have been recently transmitted to this country respecting operations in the Pámban Channel between the coasts of India and Ceylon.

2. I request, therefore, that I may be furnished by your Government with all necessary information on this subject, and more especially with reference to the scope of the inquiry made by Sir J. Hay.

Extract from "Times," 16th August 1881.
Sir John Hay asked the Secretary of State for India whether he would state what progress had been made in the works for deepening and improving the Pámban Pass, and what appropriation would be made for these works in the current financial year.

The Marquis of Hartington said he found that no report had been received at the India Office on the progress made with the work of deepening and improving that passage, but he would take care that information on the subject should be asked for at once.

I have, &c.,

(Signed) HARTINGTON.

His Excellency the Honorable
The Governor in Council, Fort St. George.

No. 103-A. From the Government of India, dated 10th November 1881, No. 369 M.

No. 104. ORDER THEREON, 23rd November 1881, No. 2923 W.

ORDERED that copies of the undermentioned papers be forwarded to the Secretary of State and the Government of India :—

Proceedings, No. 1341 W., dated 28th May 1881.
" " 2454 W., " 6th October 1881, with copy of chart.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

No. 104-A. DOCKET No. 2924 W., dated 23rd November 1881.)

COPY of the above, with copy of the despatch to the Secretary of State, forwarded to the Government of India with reference to their letter No. 369 M., dated 10th November 1881.

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

Exd. E. C. Shunker.
Spare Copies

GENERAL.
ESTABLISHMENT.

Gobt. of (1881) Madras.
PUBLIC WORKS.

To

THE SECRETARY TO THE
GOVERNMENT OF INDIA.

Dated November, 23rd.

Issued

Recd.

Encl.

G.O., 23rd November 1881, No. 2924 W.

NOVEMBER.

Nos. 103-104-A.

FORWARDING correspondence on the sub-
ject of the proposed ship canal in the
Pámban Pass between Ceylon and India.

19TH OCTOBER 1882, No. 2726 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 118.

READ—the following papers :—

From T. E. MARSHALL, Esq., Acting Master Attendant, Administrative
Department, Madras, to the Secretary to Government, Public Works Depart-
ment, dated Madras, 31st July 1882, No. 6355.

With reference to G.O., Public Works Department, No. 2454, dated October 6th,
1881, I have the honor to forward the accompanying report from the Port Officer,
Pámban, on the boring operations carried out by him, and to state that the plans
connected therewith are sent separately by Railway parcel. A case of specimens of
soil is to be despatched by rail.

ENCLOSURE.

Pámban Proposed Canal Boring and Levelling Operations.

The first object being to establish a bench mark, a line of levels was run from Captain
Baird's, R.E., bench mark situated on the western side of the Cable House (Pámban) 7·5 feet
above mean sea level to a bench mark cut on the south-west edge of the south-east port
limit beacon which was found to be 17·485 feet above mean sea level, and to which all levels in
the plan are referred.

Boring No. 1—Was sunk on the south side of the island 600 feet from high water mark,
and was commenced on the 16th January 1882; two kinds of strata were found, the top of dark
fine grey sand, the lower of a darker colored sand containing small particles of shells and of an
adhesive nature as it contained much clay.

Boring No. 2—Situated 2,100 feet due north of No. 1 was found to be composed of five (5)
different strata, a stratum consisting of a very coarse and friable conglomerate of sandstone called
by the natives *oopum par* was found in this boring.

Boring No. 3—Was sunk in a cocoanut tope 2·570 feet due north of No. 2; the top stratum
consisted of an alluvial soil mixed with fine sand, and the other six strata were different kinds of
mud, sand and clay.

Boring No. 4—Distant 1,200 feet due north of No. 3 was the first boring in which stone or
rock was come upon 4 feet below the upper surface. It did not extend to any great depth, but
was of rather a hard nature; *oopum par* was also found in this boring; about 33 feet below the
surface a dark colored thin stratum of rock was encountered; the spear pointed jumper brought to
bear on it pounded it up into a dark paste, and strange to say this paste when dry weighs very little,
although the rock was hard enough to turn the edge of the chisel jumper first used on it; be-
tween this boring and boring No. 5, a distance of 1,230 feet, stone is found just below the surface
in curious layers to a depth of 5 feet; these slabs as they may be termed average 3 to 4 inches
in thickness and are 4 to 5 feet long; the natives use them for terracing the roofs of their houses
and call them masai or palakai kul; the rounded edges and white appearance of this stone
would lead one to believe it to be old stone thrown down at some previous period, and that time
had covered it with sand, the friction of which combined with wind had rounded the edges; the
grain was very fine with dark specks but brittle.

Boring No. 5—Situated on the south edge of the village of Thangachimudam had a top
stratum of sand with sandstone of a hard nature; underneath the other strata were *oopum par*
red clay and sandy soils.

Boring No. 6—Just north of the village had a stratum of sandstone of a hard nature with
sandy soils underneath.

Boring No. 7—Situated due north 1,100 feet from No. 6 consisted of a top stratum of very coarse friable sandstone slabs with sandy soils under.

Boring No. 8—Just at the water's edge 1.35 above mean sea level had a top stratum of decayed coral mixed with mud and sand, and at a depth of 8 feet hard coral rock was come upon 3½ feet thick.

APPROACHES.

The southern entrance of the proposed canal has a sandy bottom with a depth of 22 feet within 1,000 feet of the shore.

Off the northern entrance is a coral reef 500 feet wide which nearly dries at low water, outside of which the bottom is sandy, but interspersed for a short distance with boulders and coral formation and quickly deepens into 18 and 20 feet of water.

REMARKS.

From the result of the borings and from other personal observations I am of opinion that a wavey stratum of rock or stone runs through the island in an almost easterly direction from the great dam of the Pámban Channel; and this opinion is strengthened by the fact that in or near Pámban itself the stone or rock is near the surface dipping to 11 or 12 feet at the village of Ukkulmudum, rising again at Thangachimudum to within 3 or 4 feet of the surface, appearing above the surface a little to the east of the village, and again sinking to rise near Thanikodi, and form the basis on which the sand heaps between the island of Rámesvaram and Tallamaar (Ceylon) rest; the boring show that this stratum is about 3,000 feet in width, but as at the spot selected for the operations the stone comes within 3 or 4 feet of the surface, the excavation of it is not a very difficult matter; the longitude of the proposed line of canal is 79° 14' 40" east, and is through the narrowest part of the island in a due north and south direction, being 11,350 feet from high water mark one side to high water mark the other.

Regarding the growth of coral and amount likely to require removal annually, I am of opinion, judging from my experience of the north reef channel (Pámban) and the various boat channels around and adjacent to the outlying islands, that after a first and thorough removal of it the growth is so slow as not to require attention again for some few years, and in illustration of this I may state that during the building of the large beacon on the shingle islets it was necessary to make a boat channel to the northward of the reef to admit of loaded boats getting to the spot to unload; this was in 1878; the same channel was used this year to take some sized boats loaded with stone to effect the repairs needed in the base of the beacon; coral can be removed at a depth of 12 to 14 feet at Re. 1 per cubic yard. I do not anticipate that it will prove any great obstacle to the successful working of the canal, should it ever be opened.

I can form no estimate of its growth, but from the beforementioned fact I should imagine it must be slow. I have noticed that coral which is uncovered at low water soon decays away and is washed up on the sea shore in small pieces, but if it is covered with sand, and that be removed, the coral is found fresh and alive, although the spot is uncovered at high water.

In the plan herewith forwarded, I have endeavoured to show the nature of the country through which the proposed canal is to pass; also the height of the country above mean sea level is delineated in the level plan, and the approaches can be seen by a glance at the chart which accompanies this report.

Samples of the different strata sunk through are sent in a case, the soil itself is packed in bags, on which are marked the numbers of the borings referred to; also the depths at which the different strata were found; samples of the stone found in borings Nos. 4, 5, and 6 are also forwarded.

(Signed) T. H. BAKER,

Ag. Port Officer, Cocanada,
Late in charge of the Boring and Levelling Operations
across the Island of Rámesvaram.

No. 118-A.

From the Master Attendant, Madras, dated 3rd August 1882, No. 6604.

No. 118-B.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, Madras, to the Chief Engineer, Public Works Department, dated Madras, 28th August 1882, No. 7548.

With reference to your letter No. 580 E., dated 14th August 1882, I have the honor to forward copy of the report received from Mr. Baker, furnishing the information called for in connection with his boring operations across the island of Rámesvaram.

ENCLOSURE.

From T. H. BAKER, Esq., Acting Port Officer, Cocanada, to the Master Attendant, Administrative Department, Madras, dated Cocanada, 24th August 1882, No. 1222.

With reference to your memorandum, No. 7235, dated 19th August 1882, received this morning by dawk, and not per steamer *Satara*, as marked on the cover, enclosing a letter from Colonel Sankey, respecting the borings across the island of Rámesvaram, I have the honor to inform you as follows:—

1. The many stratum of rock mentioned by me in my report is the thin layer of rock shown in the sections, and no rock was encountered below it with the exception of No. 4 boring, where, at a depth of 33 feet below the ground surface, a very dark hard stratum, about 6 inches in thickness, was come upon; all the other rock or stone found was on a level with or above mean sea level, and was of no great thickness.

2. The sandstone found in No. 7 boring was totally unlike that in Nos. 4, 5, and 6. To make myself as easily understood as possible, I may say that it was like cakes of very coarse sand and small stones mixed, a conglomerate strong enough if lifted by both ends to hold together, but if lifted by one end only it crumbles off and breaks away by its own weight; the sand augur went through it as easily as if it were only sand.

3. In the detailed survey plan I have drawn a blue line, which I consider includes the space within which the many stratum referred to in the report lies, that is Nos. 4, 5, and 6 borings about 3,000 feet in width; after coming upon rock I made the borings closer together than in the sandy places, to make sure if possible of not missing the commencement and ending of the rocky stratum, which through my observations of the various wells sunk in the vicinity I knew existed.

4. I beg to state that, in my opinion, the rocky stratum at or near the village Thangachimudum is nearer the surface and thinner than at any other part of the island.

5. To the south of the island 30 feet of water is found at a distance of from 10,000 to 11,000 feet from the shore, and the bottom consists of coarse sand and small shells and stones. To the north the 30-foot line is distant about 6,000 feet from the shore, and the bottom is hard, fine sand, and in places decayed coral in small pieces.

Trusting I have fully treated in the matters required, I have, &c.

No. 119.

ORDER—dated 19th October 1882, No. 2726 W., Public Works.

Recorded.

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Offg. Secretary to Govt., P.W.D.

To the Superintending Engineer, Sixth Circle.
,, Marine Department.

Exd. C. Howarth.
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CIVIL WORKS.

Govt. of (1882) Madras.
PUBLIC WORKS.

Dated October, 19th.

Recd.

Encl.

¹⁹
G.O., 19th Oct. 1882, No. 2726 W.

OCTOBER.
Nos. 118-119.

Pamban Pass.

Reports on the boring operations in the —,
recorded.

27TH OCTOBER 1882, No. 2836 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

General.
Establishment.

No. 196.

READ—the following papers:—

From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 26th September 1882, No. 8273.

In your No. 264, dated 11th July 1881, I am directed to state what remuneration I would propose for Mr. T. H. Baker, Port Officer, Pámban, while engaged on the boring operations at Pámban. I was not in a position at the time to make any recommendation, but with full particulars of the work now before me I beg to address you on the matter.

Mr. Baker was engaged on the duty for three months, besides two months during which he was occupied in plotting, &c., and the nature of the work was such as to subject him to great exposure to sun and fatigue, having to ride backwards and forwards, at his own expense, a distance of 5 to 6 miles, and he managed to have the whole work done with a saving of Rs. 180 on the original estimate.

3. Taking all the circumstances into consideration, I beg to recommend that he be granted a moiety of the net pay of Rs. 350 of his office, or Rs. 875 for the five months he performed that duty. The charge will be one against the Public Works Department.

No. 196-A.

OFFICE NOTE from the Examiner, Public Works Accounts, dated 16th October 1882, No. 593.

The honorarium of Rs. 875 proposed for Captain Baker will raise his salary above Rs. 5,000 per annum and will require the sanction of the Secretary of State, *vide* paragraph 415 of the Public Works Code, and G.O., No. 2417 W., dated 18th September 1882.

2. The only charges against the Public Works Department in connection with the Pámban Pass is an expenditure of Rs. 620 against the estimate for Rs. 800 sanctioned in G.O., No. 186 W., dated 23rd February 1882, whereas from paragraph 9 of the report printed with G.O., No. 1341 W., dated 28th May 1881, it would appear that expenditure has been incurred outside the Public Works Department in connection with this work.

3. The honorarium, if sanctioned, may, I consider, with the approval of Government, be charged off to the estimate for the Pámban Pass.

No. 197.

ORDER—dated 27th October 1882, No. 2836 W., Public Works.

The recommendation of the Master Attendant that Mr. Baker be allowed an extra remuneration of Rs. 175 per mensem for five months, for work in connection with the boring operations at Pámban, will be submitted through the Government of India for the sanction of the Secretary of State.

(Here enter No. 2837 W., dated 27th October 1882.)

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Offg. Secretary to Govt., P.W.D.

To the Superintending Engineer, Sixth Circle.
„ Examiner, Public Works Accounts.
„ Master Attendant.
„ Marine Department.

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ESTABLISHMENT.

Govt. of {1882} Madras.
PUBLIC WORKS.

Dated October, 27th.

Recd.

Encl.

G.O., 27th Oct. 1882, No. 2836 W.

OCTOBER.
Nos. 196-197.

Boring operations at Pamban.

The recommendation of the Master Attendant that Mr. Baker be allowed an extra remuneration of Rs. 175 per mensem for work in connection with the — ordered to be submitted through the Government of India for the sanction of the Secretary of State.

27TH OCTOBER 1882, No. 2837 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

General.
Establishment.

No. 198.

LETTER—from

COLONEL J. SHAW-STEWART, R.E.,

Offg. Secretary to Government, Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

PUBLIC WORKS DEPARTMENT.

SIR,

With reference to my endorsement No. 2924 W., dated 23rd November 1881, and to the Proceedings of the Government of India in the Department of Finance and Commerce, No. 2792, dated 5th August 1882, I am directed to forward a copy of the Proceedings of this Government, No. 2836 W., dated 27th October 1882, and to request that, under the orders of the Government of India, the sanction of the Secretary of State may be obtained to the grant to Mr. T. H. Baker, Port Officer, Pámban, of an extra remuneration of Rs. 175 per mensem for five months, in addition to his salary of Rs. 350 per mensem, for work in connection with the boring operations at Pámban.

2. I am also to forward at the same time, for the information of the Government of India and the Secretary of State, a copy of Proceedings No. 2726 W., dated 19th October 1882, embodying a report of the operations conducted by Mr. Baker.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Offg. Secretary to Govt., P.W.D.

OOTACAMUND,
27th October 1882.

Exd. S. T. Austin.
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GENERAL.
ESTABLISHMENT.

Govt. of {1882} Madras.
PUBLIC WORKS.

Dated October, 27th.

Recd.

Encl.

27th Oct. 1882, No. 2837 W.

OCTOBER.
No. 198.

Boring operations at Pamban.

REQUESTING to obtain the sanction of the Secretary of State to the grant to Mr. T. H. Baker, Port Officer, Pamban, of an extra remuneration of Rs. 175 per mensem for five months for work in connection with the —.

4TH NOVEMBER 1882, No. 2883 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 9.

READ—the following papers :—

From Messrs. GRINDROD, JENKINS and Company, to His Excellency the Governor of Madras, dated Colombo, 6th September 1882.

Knowing that you are favorably disposed for the development of trade, we venture to place before you the desirability of cutting a passage through the island of Ramesvaram, and trust to have your cordial support.

Mr. Grindrod had a long interview with Sir James Longden yesterday, and he was strongly in favor of it, and as far as Ceylon was concerned he would give his cordial support.

He will allude to Mr. Grindrod's interview in his despatches home, but of course refused to promise any aid in carrying out the work, and further stipulated that the present channel should be kept open for native craft. In fact he said, "I have really nothing to do with it as Ramesvaram is in the Madras Presidency."

Surveys have already been carefully made, and we propose to adopt that of the Honorable J. Stoddart, at present acting Surveyor-General of Ceylon.

Our proposition is not to call upon your Presidency for any grant of money.

We are prepared to raise a Company at home with a capital of one million sterling if necessary, but we estimate the cost at five hundred thousand pounds.

In the work we should provide for docks, of which none exist between Calcutta and Bombay.

We trust that you will lend your aid towards carrying this important work.

Transferred to the Chief Secretary to Government.

(By Order.)

CAMP, PALAMCOTTAH,
16th September 1882.

(Signed)

A. AWDRY, Capt., R.E.,
Private Secretary.

No. 988.

Referred to the Public Works Department.

OOTACAMUND,
21st September 1882.

(Signed)

C. G. MASTER,
Chief Secretary.

No. 900 E.

Referred to the Master Attendant, Madras, for any remarks he may wish to offer.

2. An early reply is requested.

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Ag. Secretary to Govt., P.W.D.

No. 9-A.

From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Administrative Department, to the Acting Secretary to Government, Public Works Department, dated Madras, 20th October 1882, No. 9031.

I have the honor to return the letter from Messrs. Grindrod, Jenkins and Company of Colombo, relating to the canal through Ramesvaram, and respectfully to remark that the question of a canal between Ceylon and India has been so often and strongly urged upon public attention that nothing but a practical effort to solve the problem will ever be satisfactory.

2. Not being able, for reasons set forth in my letter dated 19th September 1881, No. 8157, to recommend it as a measure demanded either by imperial necessity or any requirements of this Presidency, I am very glad to see a public Company stepping forward to construct a canal upon commercial principles, which seem in the opinion of the Company to promise pecuniary success. As money is not asked for, it does not appear easy to suggest any mode in which direct support can be given to the project, except perhaps a free grant of the land upon Ramesvaram island required for the canal. The use of it when finished will no doubt depend upon the facilities it will offer. It should, however, be pointed out that the choice of a line through Ramesvaram with a water passage which must be maintained between the island and the South of India, will cut off the latter from all the advantages that might have been secured to it from Sir John Hay's project of a cut through Ramnad with harbour and docks within Southern India itself. The letter speaks of careful survey having been made, but I am not aware of any, nor have I any knowledge of the track called Honorable J. Stoddart's. But as several tracks have received much notice lately from Colonel Sankey and myself, I think it not improbable that it may be not far from the one selected by Colonel Sankey along which I have had a complete line of borings made. A copy of these borings and the various sections of the soil might be forwarded to the Company by Government, and would prove invaluable in drawing up a tolerably correct estimate of the canal itself. But the further measures of protection to the ships and to the entrance of the canal will cost much, and if a dock is added and light-houses, which will be also an imperative necessity, a million seems to me a very insufficient sum.

3. But if little more can be done at present by Government than promising a full measure of support, as Sir J. Longden has done, it will be necessary to warn them upon one point of great importance, I might say vital importance, to the success of the scheme, and that is want of proper surveys of the sea about Point Pedro, for until

* *Vide Chart.*

a clear and safe channel for vessels of large draft is discovered and marked out at A,* the canal cannot be called practicable, and if that channel proves navigable, then a similar clear channel must be found at B, failing which the only alternative route would be along shore until the end of Point Pedro shoal is reached, a distance of 40 miles from point C on the chart herewith sent, and then a return to the northward of nearly the same distance, the two combined making up a sum greater than any advantage promised by the canal over the Dondra Head route *via* Colombo. I have made a circle over the doubtful portions. The chart is 40 years old and shoals have a general tendency to increase. Some of the British India Steam Navigation steamers do go through this water, B, safely to Tondimanar, but they are of light draft, and not the first-class vessels upon which the canal will depend for dividend. Lights in this part of the passage will also be imperative. It may be that the survey proves satisfactory, but it is my duty as marine adviser to Government to point out that grave

doubts at present exist, which should be pointed out to the Company and a solution sought for them.

4. As soon as the fine season in January or February sets in, I would recommend that I should be allowed to make arrangements for the settlement of these questions, using the tug *Undaunted* for the purpose. So long as this cloud hangs over the prospects of the canal, it would not be prudent for the Company to take any irrevocable steps in the matter.

No. 9-B.

From the same Officer, dated Madras, 20th October 1882, No. 9045.

In continuation of my letter of this day's date regarding the Pamban canal, I think it advisable to state that I do not propose making a survey of the shoals north of Point Pedro; that will be an elaborate and lengthy operation, and could be conducted while the canal was being cut. I merely wish to place beyond doubt the existence or otherwise of a 6-fathom passage in one or both of the situations I have marked out on the chart. This would not occupy much time, and would settle the question of a canal and its advantage.

No. 9-C.

From Messrs. GRINDROD, JENKINS and Company, to His Excellency the Governor of Madras, dated Colombo, 16th October 1882.

We had the honor to address you a short time since on the subject of cutting the Ramesvaram canal, and have since received an acknowledgment from your Private Secretary to our letter. We beg to thank you for the prompt reply.

On the 20th ultimo we forwarded to England full information as regards estimates for constructing, and possible returns on the expenditure.

As far as starting this very important work there should be no delay. To-day we have received a telegram from our friends advising us that we must get the concession, and that can only be obtained by your permission and authority, and we trust that no difficulty will arise with your good Government to forward a work which would in the long run prove of great advantage to the capital of Madras. The whole undertaking is far advanced as regards the work to be done. It would be placed in the hands of Mr. John Kyle, a very able Engineer, who is at present engaged in the construction of the breakwater at this port.

Ramesvaram, as you are no doubt aware, is simply a barren waste island, and if we are successful, of which there is no doubt, it will give congenial employment to a large number of natives, and permanent employment to many more.

Hoping that you will give this your serious and prompt attention.

READ—again—

G.O., dated 19th October 1882, No. 2726 W., Public Works.

No. 10.

ORDER—dated 4th November 1882, No. 2883 W., Public Works.

In their letters recorded above, Messrs. Grindrod, Jenkins and Company of Colombo propose the cutting of a ship-channel through the island of Ramesvaram, and, to enable them to do this, ask for certain concessions from the Madras Government, the exact nature of which is not clear from the correspondence. The Right Honorable the Governor in Council will however be glad to further the undertaking by such support as it may be in the power of the Local Government to afford; no money guarantee being, it is understood, desired by the projectors.

2. Messrs. Grindrod, Jenkins and Company will now be furnished with a copy of the Proceedings of Government, dated 19th October 1882, No. 2726 W., with which are printed the results of the boring operations recently undertaken by order of Government. The firm will also be furnished with copies of the papers recorded with

* No. 9031, dated 20th October 1882. these Proceedings, among which is a report * by the Master Attendant, Madras, giving practical hints as to the present condition and probable requirements of the route which would be taken by vessels in the event of the canal being constructed.

3. Captain Taylor's proposal in paragraph 4 of his letter No. 9031, and in his subsequent letter No. 9045, to take advantage of the next fine weather for investigating the existence or otherwise of a 6-fathom passage in the situations indicated on the chart, is approved. Arrangements should be made accordingly.

4. Ordered that the following letter be addressed to Messrs. Grindrod, Jenkins and Company.

(Here enter No. 2884 W., dated 4th November 1882.)

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Offg. Secy. to Govt., P.W.D.

To the Master Attendant, Madras.
„ Superintending Engineer, Sixth Circle.
„ Marine Department.

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Dated November, 4th.

Recd.

Encl.

G.O., 4th Nov. 1882, No. 2883 W.

NOVEMBER.

Nos. 9-10.

Cutting of a Ship-channel
through the Island of Rames-
varam.

*Passing orders on proposals made by
Messrs. Grindrod, Jenkins and Company
for — .*

4TH NOVEMBER 1882, No. 2884 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 11.

LETTER—from

COLONEL J. SHAW-STEWART, R.E.,

Ag. Secretary to Government, Public Works Department, Madras,

To

MESSRS. GRINDROD, JENKINS and Company,

COLOMBO.

GENTLEMEN,

I am directed to acknowledge the receipt of your communications dated 6th September and 16th October 1882, addressed to the Right Honorable the Governor, on the subject of a ship-channel through the island of Ramesvaram which you desire to construct. I am to inform you in reply that the Right Honorable the Governor in Council is prepared to support the enterprise as far as possible. I am however to ask for further and full information as to the nature and details of the "concession" sought from this Government, which does not, it is understood, include any guarantee or involve any grant of money.

I am also to forward for your information copies of the papers recorded with the Proceedings of Government, No. 2726 W., dated 19th October, and No. 2883 W., dated 4th November 1882, which may afford you useful information.

I have the honor to be,

Gentlemen,

Your most obedient servant,

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Offg. Secretary to Govt., P.W.D.

OOTACAMUND,
4th November 1882.

Exd. S. T. Austin.
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Govt. of (1882) Madras.
PUBLIC WORKS.

Dated November, 4th.

Recd.

Encl.

4th Nov. 1882, No. 2884 W.

NOVEMBER.

No. 11.

**Cutting of a Ship-channel
through the Island of Rames-
varam.**

*Requesting full information as to the nature
and details of the "concession" sought from
this Government for the —.*

13TH NOVEMBER 1882, No. 2982 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 81.

READ—the following papers:—

From B. GRINDROD, Esq., to His Excellency the Governor of Madras, dated
Colombo, 18th October 1882.

I have the honor to address you on the subject of cutting a canal through the island of Ramesvaram, a work that, I think, would meet the approval of every one interested in the Eastern trade, especially with the large traffic of the Bay of Bengal and its numerous ports. I have been assured by a large body of steamship owners that it would be a great boon to them, and a vast saving of expenditure, as the saving of time in going round the island of Ceylon would be fully three to four days. I feel most confident that it would be the means of developing trade, and that the port of Madras would be a gainer, while the port of Colombo would not suffer.

My object, therefore, is to ask from your good Government a concession to cut this canal, terms to be arranged as to the concession.

The canal will in no way interfere with the canal now open, which would still be available for native craft.

The work will be undertaken and carried through by capital raised in England, and your Government would not be called upon for any assistance whatever.

The scheme would include dry docks, of which there are none between Calcutta and Bombay.

The necessity of dry docks becomes more apparent every day, and only lately we have had steamers in the port of Colombo disabled, and after temporary repairs have had to proceed to Bombay to make them of a more permanent character so as to enable them to proceed home.

I am prepared to raise at once the sum of £550,000 or £1,000,000 if required.

Trusting that your Government will not throw in the way any impediments to this most valuable and important undertaking, I have, &c.

Transferred to the Chief Secretary to Government.
(By Order.)

(Signed) A. H. L. BAGOT, Lieut.,
for Private Secretary.

OOTACAMUND,
27th October 1882.

No. 1252, Marine.

Transferred to the Public Works Department.

(Signed) C. G. MASTER,
Chief Secretary.

OOTACAMUND,
6th November 1882.

No. 81-A.

From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Administrative Department, to the Acting Secretary to Government, Public Works Department, dated Madras, 28th October 1882, No. 9368.

I have the honor, in continuation of my letter of 20th instant, No. 9031, on the subject of the Pámban Pass, to report that Mr. Grindrod, of the Firm of Grindrod and Jenkins, who are moving in this matter, has called upon me in Madras, and I have fully discussed it with him. I found that the proposed Company have never heard of any navigation difficulties other than those of the approaches to Rámesvaram from the southward, and he was much surprised at the information given him, the importance of which he at once realized. He has left his chart with me, being obliged to return at once to Colombo. I have personally always insisted on the uncertainty of what may be called the Point Pedro passage, but I was not aware till yesterday that a report on the subject existed in the records of the Madras Government, and I think I cannot do better than recite it for the information of Government at this day.

In 1848—52, say 40 years ago, a survey was made of Palk's Bay by Mr. J. J. Franklin and Lieutenants Powell and Ethersey, and that survey, the only one existing, is plotted on the chart I submitted with my letter of 20th instant, No. 9031.

In 1854 Mr. J. J. Franklin was in the position I now virtually hold of Superintendent of Madras Marine, and Captain Biden, who has left a name well remembered for experience and judgment as a sailor, was Master Attendant.

Colonel A. Cotton having at that time formulated a scheme for a ship passage through the Pámban, these officers were severally called upon for their opinions. I will now quote extracts from their letters. Mr. Franklin, page 21, paragraph 2:—

"The improvement of the Pámban channels has been the means of promoting a very active trade between the south-eastern coast of India and the south-western coast of Ceylon, carried on by small craft adapted to the navigation of the adjoining seas; but from the *difficulty and intricacy* of the approaches as well from the *north* as from the south, I am fully of opinion that no large ships or even steamers would attempt the passage, notwithstanding that the channels themselves offered no impediment. I have heard it urged that vessels voluntarily encounter much more difficult navigation than this, and no doubt such is the case, as in the Hoogly, the Thames, and elsewhere; but it is because they have either no alternative, or that the inducements are greater."

Captain Biden, who writes more fully, says, page 10, paragraph 2:—

"In the first place I consider that the navigation of Palk's Bay, to the vicinity of the Pámban channel on the one side, and the navigation of the Gulf of Manaar towards the eastern entrance of that channel on the other side, so very intricate that those seas are neither safe nor easily navigable for large steamers; and to render those seas and the approaches to the Pámban channel so safe and easy of navigation as would ensure the perfect confidence of Commanders of Mail Steamers and sailing ships of the largest class excavating between sand banks to a very considerable extent would be indispensable, and fixed lights, buoys, and beacons in several prominent positions and dangers would be equally necessary, all which shall, in this communication, be pointed out and explained."

And he also in page 19, paragraph 26, explains that he is only treating of vessels with a maximum draft of 21 to 22 feet, whereas now we have to deal with 26 and upwards. Sir John Coode lays down an axiom that a depth of 40 feet at the entrance of the Colombo Harbour is imperative, in view of the size of steamers of the present day, and the effect upon them of the open swell, which will also obtain at Palk's Bay and Gulf of Manaar. I myself, in treating of the possible entrance to a Harbour at Cochin, mentioned 30 feet as a minimum, but I was very anxious not to throw any more discouragement than I could help upon the Cochin undertaking, and I reasoned that very large ships and vessels of war would never be likely to use the Harbour.

Now, an inspection of the chart sent with my letter shows that the ominous letter 5, 30 feet, is not exceeded in the passes, and Mr. Franklin, page 22, paragraph 3, observes that he has reason to believe that the shoals from Calymere to north coast of Ceylon are shifting. It may be that, if sand or mud alone is present, no unfavorable change may have occurred, and a passage be found, but if the formation partakes

of coral, which largely abounds in these seas, and surrounds Rámesvaram, some difficulty, perhaps insuperable, may intervene. As this projected work is throughout in the Madras Presidency, it would not be advisable for Government to promise support without a full knowledge of what points that support may embrace. I can easily, with the assistance of Mr. Baker of Pámban, who is a skilled Surveyor, ascertain the fact of a good passage, or its non-existence. I would in the *Undaunted* take the earliest opportunity offered by the weather, say 15th January, and make as speedy a report to Government as possible. I send the pamphlet containing the record of Captain Biden and Mr. Franklin for reference.

No. 82.

ORDER—dated 13th November 1882, No. 2982 W., Public Works.

Recorded in continuation of G.O., No. 2883 W., dated 4th November 1882.

2. The Master Attendant has already been authorised to take steps for the examination of the passage, the result of which will be awaited.

3. A copy of these Proceedings will be forwarded to Messrs. Grindrod, Jenkins and Company, for information, in continuation of letter, No. 2884, dated 4th November 1882, in which precise information was asked for as to the nature of the concession which the Madras Government are requested to make.

(Here enter No. 2983 W., dated 13th November 1882.)

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Master Attendant, Madras.
" Superintending Engineer, Sixth Circle.
" Marine Department.

Exd. C. Howarth.
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Govt. of {1882} Madras.
PUBLIC WORKS.

Dated November, 13th,

Recd.

Encl.

G.O., 13th Nov. 1882, No. 2982 W.

NOVEMBER.

Nos. 81-82.

Ramesvaram Island.

Letters from Messrs. Grindrod, Jenkins and Company, and the Master Attendant on the subject of the proposed Canal through the —, recorded with remarks.

13TH NOVEMBER 1882, No. 2983 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 83.

LETTER—from

THE ACTING SECRETARY TO THE GOVERNMENT OF MADRAS,
Public Works Department,

To

MESSRS. GRINDROD, JENKINS AND COMPANY,
Colombo.

GENTLEMEN,

In continuation of my letter, No. 2884, dated 4th November 1882, I am now directed to forward, for your information, a copy of the Proceedings of Government, dated the 13th November 1882, No. 2982 W., with which is recorded a further communication from the Master Attendant, Madras, on the subject of the proposed ship channel through Ramesvaram.

2. You will observe that an examination of the approach to the proposed channel is about to be undertaken by Captain Taylor, the results of which will doubtless be of value.

3. Your letter of the 18th October, which has since come to hand, affords no more information than previous communications as to the nature of the concession which you desire to obtain from the Madras Government. I am accordingly to request that the information asked for in my letter, No. 2884, dated 4th November 1882, may be supplied as early as may be convenient.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

FORT ST. GEORGE,
13th November 1882.

Exd. C. Howarth.
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CIVIL WORKS.

Govt. of (1882) Madras.
PUBLIC WORKS.

Dated November, 13th.

Recd.

Encl.

13th Nov. 1882, No. 2983 W.

NOVEMBER.

No. 83.

Ramesvaram Island.

FORWARDING copy of Proceedings on the subject of the proposed canal through the — to Messrs. Grindrod, Jenkins and Company.

6TH DECEMBER 1882, No. 3210 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 41.

READ—the following papers :—

From Messrs. GRINDROD, JENKINS and Company, to the Acting Secretary to Government, Public Works Department, dated Colombo, 20th November 1882.

Ramesvaram Canal.

With reference to our letter of the 16th instant, our London friends, under date of the 27th ultimo, allude to a paragraph in the *Daily News*, stating that some Engineers on account of Lesseps were surveying the Pamban channel with a view of forming a French Company to carry out the work.

2. We need scarcely point out that a concession to a French Company would be very unwise in many respects.

3. When in Madras Mr. Grindrod mentioned this to Captain Taylor. Our partner, Mr. Jenkins, had an interview with Mr. Colvin, Chief of the Correspondence Department at the India Office, Sir Louis Mallet being away. He gave it as his opinion that the Home Government would consent, provided no pecuniary help was asked for.

4. At his request we sent in a formal application for the concession, and we beg to enclose a copy which runs very much as ours of the 16th ultimo.

5. Again, we might point out the advantage to sailing vessels calling at Galle or Colombo for orders, it would take them a very considerable time to reach any port in the Bay of Bengal, whereas, with powerful steam-tugs, we could place them in the Bay in a very short time.

ENCLOSURE.

From Messrs. BRADBRIDGE, JENKINS and Company, to the Under Secretary of State, India Office, W., dated London, 26th October 1882.

We wish to address you with reference to granting us a concession for cutting a ship canal through the island of Ramesvaram, which will enable mail and other large steamers to pass from the Gulf of Manar to Palks Straits and *vice versa* (instead of going round the island of Ceylon), and thereby save about three days steamings, both ways, in the passage of vessels bound from England or Colombo for any port in the Bay of Bengal.

We do not ask for any pecuniary assistance from the Madras or Home Governments, but simply permission to cut the canal.

We, with other friends, will form a Company with capital sufficient to carry out the work, according to the plans proposed by Mr. J. Stoddart, Government Engineer at Colombo, and shown in the Parliamentary Papers upon the Pamban channel, marked C. 761, 1873. Mr. Stoddart's plans will be adopted, with any modifications which may be shown to be of advantage.

But before taking definite steps in forming the Company, it is necessary for us to have a concession granted for a long lease, and we shall therefore be glad to know that the Government are prepared to grant our request, and that an agreement may be entered into forthwith.

On September 6th, our Colombo partner, Mr. Barton Grindrod, addressed a letter to Mr. Grant Duff, Governor of Madras, upon the subject.

Mr. Grindrod has also had a long interview with Sir James Longden, Governor of Ceylon, who fully approves of the scheme, and also promised to report favorably.

We shall be pleased to call upon you with reference to the above proposal, and to give any information in our power, to facilitate the Government coming to a favorable decision.

We wish to add that shortening the voyage to Calcutta, Madras, &c., cannot but be of great service to all shipowners, passengers, and merchants.

No. 41-A.

From Messrs. GRINDROD, JENKINS and Company, to the Secretary to Government, Public Works Department, Madras, dated Colombo, 27th November 1882.

We have the honor to acknowledge your letters of the 13th November, 2982, Nos. 81 and 82 and 2983 and No. 83, the former containing Mr. Grindrod's letter to His Excellency the Governor of Madras, dated the 18th October, and a letter, No. 81-A, appended from Captain Taylor, Master Attendant of Madras, which has our particular attention. The chart of 40 years old was shown to Mr. Grindrod, but since his departure from Madras he has seen charts, dated 1878, of the Palks Straits, which look very favorable as compared with that of 1848-'52. Both Colonel A. Cotton's and Captain Biden's reports allude to the Pámban Passage, but we propose to leave that alone and take up a position entirely different. Our Master Attendant at Colombo, Captain Dönnan, in the course of conversation with Mr. Grindrod, said he saw no very great difficulty in the way.

In case the concession is granted, then we place ourselves in the hands of competent Engineers, who will again make their own surveys.

We beg to thank you for copy of your order, No. 82, granting permission to Captain Taylor to take steps for the examination of the passage, and we await with interest his report.

It is our earnest wish, and to the benefit and interest of all concerned, that the work should be thoroughly well done and a credit to those who undertake it.

In our letter of the 16th November the terms of concession are not quite in order. We place them again—

- 1st. A concession to cut the canal.
- 2nd. That no pecuniary aid whatever is required from the Madras Government.
- 3rd. Remains as stated in our letter of the 16th November.
- 4th. We refer to this at the conclusion of our letter.
- 5th. } Could stand as they are.
- 6th. }
- 7th. }
- 8th. }

With regard to No. 4, we think that the Government of Madras should not claim for any title or royalty; we merely mentioned it as a point that might arise, but we are of opinion that the port of Madras would derive some benefit from the undertaking.

We should be pleased to receive from you any suggestions that you could make, and in conclusion have to thank the Madras Presidency for the promptitude and ready spirit they have evinced in taking up the object we have in view.

No. 41-B.

From BARTON GRINDROD, Esq., to the Secretary to Government, Public Works Department, Madras, dated Colombo, 27th November 1882.

I have to acknowledge the receipt of your letter of the 17th November, No. 2100 C., calling my attention to the communications of your Government of the 4th and 13th November, to which I make further allusion in a separate letter.

Mine of the 16th November, addressed to Colonel J. Shaw-Stewart, R.E., will give some of the heads of the concession required.

I am pleased to get instructions as to the address of my letters in future upon this subject, and beg you will convey to His Excellency my warmest thanks for his great courtesy in receiving my communications, for I was somewhat in doubt as to whether I was not infringing the rules of etiquette.

No. 42.

ORDER—dated 6th December 1882, No. 3210 W., Public Works.

Recorded with reference to G.O., No. 2982 W., dated 4th November 1882, paragraph 2.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1882) Madras.
PUBLIC WORKS.

Dated December, 6th.

Recd.

Encl.

G.O., 6th Dec. 1882, No. 3210 W.

DECEMBER.

Nos. 41-42.

Ramesvaram Island.

*Letters from Messrs. Grindrod, Jenkins
and Company on the subject of cutting a Ship
Channel across the —, recorded.*

26TH DECEMBER 1882, No. 3429 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 185.

READ—the following letter from Messrs. GRINDROD, JENKINS and Company, to the
Secretary to Government, Public Works Department, Madras, dated Colombo,
13th December 1882 :—

We have the honor to acknowledge the receipt of your letter of the 2nd instant,
No. 3175 W.

2. With regard to your paragraph No. 3, we wish to explain this, that what-
ever Captain Taylor's report may be, whether favorable or otherwise, we must
ascertain for ourselves, by competent Engineers, whether it is practicable or not and
the cost of the undertaking. We know there are difficulties in the way, as there
always must be in such undertakings, but as far as we can ascertain there are none
that cannot be overcome.

First—We require the concession, and having obtained that then we employ
competent Engineers for making the calculations, for which we pay. If
their verdict is against us then we shall only lose some £2,000 to £3,000,
but it would not be politic to spend this sum unless we were assured before-
hand that the concession would be given to us.

3. We have every respect for Captain Taylor's knowledge and his report will be
of great value, but we must base the undertaking as a whole, and this can only be
arrived at by Engineers well versed in such works.

No. 186.

ORDER—dated 26th December 1882, No. 3429 W., Public Works.

Ordered that the following reply be sent.

(Here enter No. 3430 W., dated 26th December 1882.)

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1882) Madras.
PUBLIC WORKS.

Dated December, 26th.

Recd.

Encl.

G.O., 26th Dec. 1882, No. 3429 W.

DECEMBER.
Nos. 185-186.

Ship Canal across the Island of
Ramesvaram.

Cutting a —. Proposals for —.

26TH DECEMBER 1882, No. 3430 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 187.

LETTER—from

COLONEL R. H. SANKEY, R.E., C.B.,

Secretary to the Government of Madras, Public Works Department,

To

MESSRS. GRINDROD, JENKINS AND COMPANY.

GENTLEMEN,

I am directed to acknowledge the receipt of your letter of the 13th instant, and as you now consider it needless to await the result of the investigations shortly to be undertaken by the Master Attendant, as to the practicability of the scheme for cutting a ship canal through the island of Ramesvaram, I am desirous to reply as follows in regard to the terms of the concession which you ask for.

2. In the first place I am to say, in regard to the general concession for cutting the canal, that no objection will be raised by this Government; secondly, that the land being all private property you will have yourselves to arrange the terms of acquisition with the owners; thirdly, that before any definite agreement is come to it will be necessary to submit for the approval of this Government the scale of dues which it is proposed to levy on vessels making use of the proposed canal.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

FORT ST. GEORGE,
26th December 1882.

Exd. S. T. Austin.
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CIVIL WORKS.

Gobt. of (1882) Madras.
PUBLIC WORKS.

Dated December, 26th.

Recd.

Encl.

G.O., 26th Dec. 1882, No. 3430 W.

DECEMBER.

No. 187.

**Ship Canal across the Island of
Ramesvaram.**

CUTTING a — . Proposals for — .

5TH JANUARY 1883, No. 4 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 4.

READ—the following docket from the Government of India, Public Works Department, (Civil Works—Communication,) dated Fort William, 16th December 1882, No. 495 C. :—

Copy of the following, with copy of its enclosure, forwarded to the Government of Madras, Public Works Department, for early report.

(By Order.)

(Signed) G. F. L. MARSHALL, Major, R.E.,
Under Secy. to the Govt. of India.

ENCLOSURES.

Despatch from the Most Honorable the Secretary of State for India, to His Excellency the Most Honorable the Governor-General of India in Council, dated India Office, London, 9th November 1882, Public Works, No. 62.

I transmit herewith for your Excellency's information copy of an application* addressed to me by a firm of merchants in this country, Messrs. Bradbridge, Jenkins and Company of 2,

Fen Court, E.C., and of Colombo, for permission to cut a ship canal across the island of Ramesvaram between the coasts of India and Ceylon, and for the lease of such canal to them for a term of years. In return for this concession the firm offer to form a Company to carry out the work.

2. I have caused the applicants to be informed that no definite reply can be made to their application till I am in possession of the views of your Government on the proposal, and I request, therefore, that I may be furnished in due course with your opinion on the merits of the scheme.

From Messrs. BRADBRIDGE, JENKINS AND COMPANY, to the Under Secretary of State, India Office, dated 2, Fen Court, Fenchurch Street, London, 26th October 1882.

We wish to address you with reference to granting us a concession for cutting a ship canal through the island of Ramesvaram which will enable mail and other large steamers to pass from the Gulf of Manaar to Palk's Straits and *vice versa* (instead of going round the island of Ceylon), and thereby save about three days' steamings both ways in the passage of vessels bound from England or Colombo for any port in the Bay of Bengal.

We do not ask for any pecuniary assistance from the Madras or Home Governments, but simply permission to cut the canal. We with other friends will form a Company with capital sufficient to carry out the work, according to the plans proposed by Mr. J. Stoddart, Government Engineer at Colombo, and shown in the Parliamentary Papers upon the Pamban Channel, marked C 761, 1873. Mr. Stoddart's plans will be adopted with any modifications which may be shown to be of advantage.

But before taking definite steps in forming the Company it is necessary for us to have a concession granted for a long lease, and we shall therefore be glad to know that the Government are prepared to grant our request, and that an agreement may be entered into forthwith.

On September 6th our Colombo partner, Mr. Barton Grindrod, addressed a letter to Mr. Grant Duff, Governor of Madras, upon the subject, and received a reply to the effect that our proposal was read with interest and his views would be forwarded to the authorities at Home.

Mr. Grindrod has also had a long interview with Sir James Longden, Governor of Ceylon, who fully approves of the scheme and also promised to report favorably. We shall be pleased to call upon you with reference to the above proposal and to give any information in our power to facilitate the Government coming to a favorable decision.

We wish to add that shortening the voyage to Calcutta, Madras, &c., cannot but be of great service to all ship-owners, passengers and merchants.

No. 5.

ORDER—dated 5th January 1883, No. 4 W., Public Works.

Ordered that the following reply be sent.

2. The further report expected from the Master Attendant should be submitted as soon as possible.

(Here enter No. 5 W., dated 5th January 1883.)

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Master Attendant, Madras.
„ Marine Department.

Exd. S. T. Austin.
Spare Copies



BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1883) Madras.

PUBLIC WORKS.

Dated January, 5th.

Recd.

Encl.

G.O., 5th January 1883, No. 4 W.

JANUARY.

Nos. 4-5.

Ramesvaram Island.

Regarding the proposed ship canal across —

5TH JANUARY 1883, No. 5 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 6.

LETTER—from

COLONEL R. H. SANKEY, R.E., C.B.,

Secretary to the Government of Madras, Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

PUBLIC WORKS DEPARTMENT.

SIR,

I am directed to acknowledge receipt of your endorsement, No. 495 C., dated 16th December 1882, forwarding copy of a despatch from the Secretary of State in regard to an application which has been made by a firm of merchants in England for permission to cut a ship canal across the island of Ramesvaram.

2. In reply I am to forward, for the information of the Government of India, copies of the correspondence quoted in the margin, from which it will be observed that the Ceylon representatives of the firm have addressed this Government direct in the matter, and that they have been informed that no objection will be raised by the Madras Government to the grant of a general concession, involving

no pecuniary guarantee, for cutting a canal, but that the land required to be taken up, being all private property, will have to be acquired by direct negotiation with the owners.

3. It has been further stipulated that before any definite agreement is come to, it will be necessary to submit for the approval of Government the scale of dues proposed to be levied for the use of the canal.

4. I am to add that the Master Attendant will shortly proceed to further investigate the passage, and the result of this, with the definite opinion of this Government, will be communicated to the Government of India.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

FORT ST. GEORGE,
5th January 1883.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1883) Madras.

PUBLIC WORKS

Dated January, 5th.

Recd.

Encl.

5th January 1883, No. 5 W.

JANUARY.

No. 6.

Ramesvaram Island.

REGARDING the proposed ship canal
across — .

9TH FEBRUARY 1883, No. 439 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 72.

READ—the following letter from J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Administrative Department, Madras, to the Secretary to Government, Public Works Department, dated 2nd February 1883, No. 1000 :—

I have the honor to report that I have completed a careful survey of the passages through the shoals between Point Calimere and Point Pedro, and find that only two can be made available, of neither of them, however, being fit for large vessels such as pass through the Suez Canal.

2. One on the west side, opposite the Island of Elewa Tevoo, has $31\frac{1}{2}$ feet L.W., and the other on the N.E., opposite Tondiman, has only $28\frac{1}{2}$ L.W. All vessels using a canal through Ramesweram will be compelled to make use of both. Now, the depth necessary to enable a ship to pass with safety from and to open sea is fixed by Sir John Coode at 40 feet, and during the heavy swells of the north-east and south-west monsoons that depth in so exposed a situation is probably not excessive, but putting it at a moderate limit of 35 feet, it is obvious that large dredging or canal works will have to be carried on, in addition to that on the south side of the Island of Ramesweram, before the canal itself can be availed of. The Company represented by Mr. Grindrod should therefore be made acquainted with these facts, as the construction of the passages, their lighting and buoying are very heavy items, and the very fact of the navigation of these dangerous shoals being undoubted, prudent Commanders will certainly not run risks, except in the finest weather, which does not prevail more than four months in every year.

3. I have drawn a broad black line on the chart now returned, showing the impassable portions of the shoals and the approximate position of the passages.

No. 73.

ORDER—dated 9th February 1883, No. 439 W., Public Works.

A copy of the Master Attendant's report will be furnished to Messrs. Grindrod, Jenkins and Co., and they will be informed that, should they still wish to proceed with the undertaking of cutting a canal through the Island of Ramesweram, the Madras Government will be prepared to support the grant of the concession applied for, on the understanding that they must make their own arrangements for obtaining the requisite land, which is private property.

2. Copies of these Proceedings will also be forwarded to the Government of India for communication to the Secretary of State in continuation of previous correspondence.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Master Attendant, Madras.
„ Superintending Engineer, Sixth Circle.
„ Marine Department.

Exd. A. F. Goodall.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1883) Madras.

PUBLIC WORKS.

Dated February, 9th.

Recd.

Encl.

G.O., 9th Feb. 1883, No. 439 W.

FEBRUARY.

Nos. 72-73.

Ramesweram Island.

*Passing orders on the Master Attendant's
report on the proposed ship canal across—.*

9TH FEBRUARY 1883, No. 440 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 74.

LETTER—from

COLONEL R. H. SANKEY, C.B., R.E.,

Secretary to the Government of Madras,

Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

PUBLIC WORKS DEPARTMENT.

SIR,

Adverting to paragraph 4 of my letter, No. 5 W., dated 5th January 1883, I am directed to forward, for the information of the Government of India and communication to the Secretary of State, the accompanying Proceedings of the Madras Government, No. 439 W., dated 9th February 1883, with which is recorded a report by the Master Attendant, Madras, on the result of his survey of the passages through the shoals in the neighbourhood of the proposed ship channel through the Island of Ramesweram. A copy of the Master Attendant's report has, it will be observed, been furnished to Messrs. Grindrod, Jenkins and Co., the Ceylon representatives of the firm, who have applied for the concession for cutting the canal; and they have been informed that the Madras Government are prepared to support the grant of the concession asked for should they still be desirous of proceeding with the undertaking.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

FORT ST. GEORGE,
9th February 1883.

Exd. A. F. Goodall.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1883) Madras.

PUBLIC WORKS.

Dated February, 9th.

Recd.

Encl.

9th February 1883, No. 440 W.

FEBRUARY.

No. 74.

Ramesweram Island.

REGARDING the proposed ship canal
across —.

9TH FEBRUARY 1883, No. 441 W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 75.

LETTER—from

COLONEL R. H. SANKEY, C.B., R.E.,

Secretary to the Government of Madras,

Public Works Department,

To

MESSRS. GRINDROD, JENKINS AND Co.

GENTLEMEN,

In continuation of my letter, No. 3430 W., dated 26th December 1882, I am now directed to forward, for your information, a copy of the report of the Master Attendant, Madras, which contains the results of his recent survey of the passages through the shoals in the neighbourhood of the proposed ship channel through the Island of Ramesweram. I am to state that, should you still be desirous of proceeding with the undertaking, the Madras Government will be prepared to recommend the grant of the concessions applied for, on the conditions specified in my letter, No. 3430 W., dated 26th December. The Government of India have been informed accordingly, and they have been requested to communicate this decision to the Secretary of State for India.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

FORT ST. GEORGE,
9th February 1883.

Exd. A. F. Goodall.
Spare Copies

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CIVIL WORKS.

Govt. of (1883) Madras.

PUBLIC WORKS.

Dated February, 9th.

Recd.

Encl.

9th February 1883, No. 441 W.

FEBRUARY.

No. 75.

Ramesweram Island.

REGARDING the proposed ship canal
across —.

7TH MARCH 1883, No. 742 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 47.

READ—the following despatch from the Right Honorable the Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 8th February 1883, No. 6 (Public Works):—

Herewith is transmitted, for your Excellency's information, copy of a despatch, with enclosure, which I have this day addressed to the Government of India in respect to a proposal which has recently been made to Government for permission to cut a ship canal through the Island of Ramesvaram lying between the coasts of India and Ceylon.

ENCLOSURES.

From the Right Honorable the Secretary of State for India, to His Excellency the Most Honorable the Governor-General of India in Council, dated India Office, London, 8th February 1883, No. 8 (Public Works).

With reference to my predecessor's despatch of the 9th November last, No. 62, requesting to be furnished with the opinion of your Government on the merits of a scheme submitted by Messrs. Bradbridge, Jenkins and Co., for cutting a ship canal across the Island of Ramesvaram, between the coasts of India and Ceylon, I transmit herewith, for your Excellency's information, a copy of a report* thereon by Sir James Longden, the present Governor of Ceylon.

* Dated 23rd September 1882.

From Sir JAMES R. LONGDEN, Governor of Ceylon, to the Right Honorable the Secretary of State for India, dated Queen's House, Colombo, Ceylon, 23rd September 1882, Miscellaneous No. 405.

I have the honor to report, for your Lordship's information, that the question of improving the sea passage for steamers between India and Ceylon, commonly known as the Pamban Channel, has again been brought forward on behalf of a Joint Stock Company which it is proposed to form to carry out the necessary works.

2. It will be remembered that when this question occupied public attention, both in England and in the East, about ten years ago, various schemes were proposed, and were examined and reported upon by competent engineers, and especially by Mr. George Robertson, C.E., an Engineer employed by the Government of India to report on Indian Harbours.

3. Mr. Robertson's second series of reports to the Government of India (printed at Edinburgh, 1873) contains a very exhaustive survey of all the schemes that had been propounded for improving the Pamban Passage, concluding with an opinion that the most feasible and inexpensive course would be to cut a ship canal through the (Indian) Island of Ramesvaram at a cost of about 440,000. This is substantially, I am told, the scheme that it is contemplated to carry out, and Mr. Barton Grindrod, of the firm of Grindrod, Jenkins and Co., of this city, waited on me a few days ago to ask what would be the attitude of this Government towards the scheme were a Company formed to carry it out. I informed him, in reply, that, as the matter had not been laid formally before the Government, I could not give him any positive assurance upon it, but that, in my opinion, this Government would not offer any opposition to

the scheme, provided that the present free navigation of the Pámban Channel were not interrupted or burdened with any tolls not at present levied there. At the same time I added that this Government could not be expected to contribute in any way directly or indirectly to the cost of the works. I laid some stress on this latter point, because it was a necessary part of Mr. Robertson's scheme, and will probably be of any new scheme, that lighthouses should be erected and maintained on Delft Island and on the coast of the Jaffna Peninsula for the guidance of vessels approaching the canal, and it was then suggested that the lighthouses should be provided at the cost of this Government, and that this Government should give to the undertaking a guarantee of 5,000% per annum on condition that the Serendeb should be allowed to pass through the canal toll free.

4. The benefits of the proposed canal to ships bound from the westward to Calcutta and the other ports in the Bay of Bengal are incontestable, but this Government has no special interest in the work. The Pámban Channel, though at times difficult of navigation, has afforded for many years a cheap and convenient means of circumnavigating the island. It has been and is used by the Serendeb and by the innumerable native coasting vessels which trade between the ports of India and Ceylon, and is sufficient for their purpose. In any encouragement which may be given to a Company to open a ship canal, the present free navigation of the Pámban Channel should be carefully guarded, for the small coasting trade of the natives is not profitable enough to enable them to pay canal tolls. If this point be conceded, the Government of Ceylon have not in my opinion any right to offer any opposition to the proposed works. It may indeed be questionable whether the opening of the ship canal through Ramesvaram Island would not have an unfavorable effect on the commerce of Ceylon, but such a consideration would not justify any opposition to an enterprise so useful to India. But on the other hand, it cannot be expected that the Government of Ceylon would give any pecuniary aid to an undertaking from which the island can derive no benefit.

No. 48.

ORDER—dated 7th March 1883, No. 742 W., Public Works.

Recorded with reference to the letter to the Government of India, No. 440 W., dated 9th February 1883.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Marine Department.

„ Superintending Engineer, Sixth Circle.
„ Master Attendant, Madras.

Exd. A. F. Goodall.

Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1883} Madras.

PUBLIC WORKS.

Dated March, 7th.

Recd.

Encl.

G.O., 7th March 1883, No. 742 W.

MARCH.

Nos. 47-48.

Ramesvaram Island

Despatch from the Secretary of State regarding the proposed ship canal across—, recorded.

14TH NOVEMBER 1883, No. 3229 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper :—

Petition from SETU KARUPPAN, CHINNATAMBI and others, dated 3rd November 1883.

ABSTRACT.—Bring to notice that the cutting of the proposed ship-canal through Ramesvaram will divide the island into two portions, and that the influx of sea-water will cause danger to life and property, contaminate the water-supply, and ruin the pasturage, besides rendering the transit of goods and passengers across the island difficult. Suggest that the excavation be made at one end of the island, either on the east or west side.

ORDER—dated 14th November 1883, No. 3229 W., Public Works.

The petitioners will be informed that, if the proposal to cut a canal through the island of Ramesvaram is ever given effect to, the circumstances brought to notice in their petition will receive consideration.

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Secretary to Govt., P.W.D

To the Petitioners.

- „ Marine Department.
- „ Revenue Department.
- „ Superintending Engineer, Sixth Circle.

Exd. A. F. Goodall.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1883) Madras.

PUBLIC WORKS.

Dated November, 14th.

Recd.

Encl.

G.O., 14th Nov. 1883, No. 3229 W.

NOVEMBER.

Ramesvaram Island

Passing orders on a petition regarding the results that will be produced if the proposed ship-canal across — be sanctioned.

COURT OF WARDS, 16TH JULY 1883, No. 2043.

PROCEEDINGS OF THE COURT OF WARDS.

READ—the following letter from C. S. CROLE, Esq., Acting Collector of Madura, to the Secretary to the Court of Wards, dated Madura, 30th June 1883, No. 203 :—

I have the honor to submit copy of a letter, dated 19th instant, from Messrs. Grindrod, Jenkins and Co., of Colombo.

2. The letter relates to the proposed ship canal through Ramesvaram. Messrs. Grindrod, Jenkins and Co., the financial agents of the proposed Company, under instructions received from the Public Works Department Secretariat of the Madras Government, deputed Mr. Wall to talk the matter over with me in the beginning of April last. It was clearly understood on both sides that the conversation was semi-official, and that I was only expressing personal views not binding on the Court of Wards in any way, while they, on their side, were unable to make any definite proposals.

I think, however, that Rs. 200 an acre for the Zemindar's right to the tract of almost unbroken sand through which the canal will pass must be considered a good bargain for the Ramnad Estate, and I request the Court's orders.

3. We would not be able to obtain more than a fraction of that price if the Land Acquisition Act were put in force.

ENCLOSURE No. 1.

From Messrs. GRINDROD, JENKINS AND Co., to the Collector of Madura, dated Colombo, 19th June 1883.

We beg to call to your remembrance the conversation which took place between you and our representative, Mr. Wall, on the subject of the purchase of land for a canal through the island of Ramesvaram.

2. We should be pleased if you would make over to us a strip of land three hundred yards in width right across the island, and at the rate previously mentioned, viz., Rs. 200 per acre. The terms of payment to be half in cash and half in shares, both cash and shares to be payable after formation of the Company.

3. We should be pleased also if you would favor us with a letter or other document stating that you made over to us on the above conditions of payment such a portion of land. The strip to be in the position or closely adjacent to the site chosen by Mr. Stoddart and so marked on the plans in his possession.

4. The only use we should put such letter to would be to lay it before the financiers on forming the Company, in order to convince them that the land would be made over to us on certain conditions.

RESOLUTION—dated 16th July 1883, No. 2043.

The Collector may inform Messrs. Grindrod, Jenkins and Co. that the Court of Wards are not opposed to the cutting of a ship canal through the island of Ramesvaram, but before giving their consent to such a scheme they must have before them a rough survey showing the proposed course of the canal.

2. The Court of Wards would not, however, in any case entertain the proposal that payment for the land should be made half in cash and half in shares of the proposed Company, while in addition to the price paid for the land to the Court of Wards on behalf of the Minor Zemindar, the proposed Company must undertake to pay full compensation for any tenants whom it may be necessary and competent to the Court of Wards to oust. It must further be distinctly understood that, in the event of the canal being cut, the Company must provide and maintain such ferries across the canal as may seem to the Court of Wards sufficient to maintain any rights of way which now exist.

3. With these provisos the Court are willing to accept Rs. 200 an acre for their ward's interest in the required land.

(True Copies and Extract.)

(Signed) J. A. DAVIES,
Acting Secretary.

To the Collector of Madura.

Exd. C. Howarth.

To W.

Kannaswévan Channel.

With reference to Court of
Wards Resolution, No 3804, of
17th December, 1883, para 6,
I presume copy of Proceedings
should be forwarded to S. 2.
6th Circle, with request that he
will place himself in com-
munication with Messrs. J. S. S. & Co., and report on the
proposal to carry the Vambur-
Kannaswévan Road across the
proposed Canal & means of a
swing bridge or wire draw bridge.

Cy.

9.1.84

Yes - M.

9.1.84

1883.
Court of Wards,
MADRAS.

Printed July 24th.

Proceedings, 16th July 1883, No. 2043.

Passing orders on letter from Collector of Madura submitting proposals of Messrs. Grindrod, Jenkins and Co. for cutting a Ship Canal through the Island of Ramesvaram.

COURT OF WARDS, 17TH DECEMBER 1883, No. 3804.

PROCEEDINGS OF THE COURT OF WARDS.

READ—again the following Proceedings of the Board of Revenue, dated 15th September 1883, Mis. No. 7824 :—

Read—the following letter from C. S. CROLE, Esq., Acting Collector of Madura, to the Secretary to the Court of Wards, dated 31st August 1883, No. 275 :—

With reference to Court's Proceedings, No. 2043, dated 16th July 1883, I have the honor to submit, for their orders, copies of two letters, dated 13th and 16th instant, with a rough survey showing the proposed course of the canal, received from Messrs. Grindrod, Jenkins and Co., of Colombo.

2. The channel proposed to be cut is the one in the middle, as marked in pencil in the sketch.

ENCLOSURE No. 1.

From Messrs. GRINDROD, JENKINS and Co., to the Collector of Madura, dated Colombo, 13th August 1883.

We have the honor to acknowledge receipt of your letter of 1st instant, handing us a copy of the resolution passed by the Court of Wards.

In the course of a day or two we hope to send you a rough draft showing the position, &c., of the proposed canal. In the meantime we beg to state that we are prepared to submit to the conditions which the Court would impose, viz. :—

- (1) To pay compensation to any tenants whom it may be necessary and competent to the Court of Wards to oust.
- (2) To provide and maintain such ferries across the canal as may be sufficient to maintain the present rights of way.
- (3) To pay in cash Rs. 200 per acre for the land required.

We should be glad to be informed whether it would be in accordance with the views of the Court to receive payment for the land in instalments as it is required to be taken over for the work. Payments to be made after due formation of the company.

ENCLOSURE No. 2.

From Messrs. GRINDROD, JENKINS and Co., to the Collector of Madura, dated Colombo, 16th August 1883.

Referring to our letter of 13th instant, we have now the honor to hand you a tracing of the island of Ramesvaram showing the position of the proposed canal. This channel is selected in preference to any other, as the southern entrance is protected by the Kurusaddi and Shingle islands.

P.S.—It would be of material service to us if you could now supply us with some document which we could lay before the financiers.

ENCLOSURE No. 3.—Survey Map.

Resolution—dated 15th September 1883, Mis. No. 7824.

Before submitting these papers for the orders of Government, the Court of Wards desire information on the following points:—

- (1) Whether, in addition to the main road from Pámban to Rámesvaram, the proposed canal cuts any public line of road.
- (2) The positions and number of the proposed ferries and the exact responsibilities of the Canal Company in respect of them in the matter of maintaining and working them free of cost to the public.
- (3) Whether any temples or objects of religious veneration will be interfered with by the canal.

- (4) What occupied lands will be taken up.

The information should be submitted at the earliest possible date.

The lands may be paid for by instalments, payment in all cases being made before lands are entered upon.

A copy of Board's Resolution, No. 2043, dated 16th July 1883, is herewith forwarded for despatch to Messrs. Grindrod and Jenkins; but it must be understood that the matter will be finally disposed of only after receipt of the orders of Government.

(True Copies and Extract.)

(Signed) F. A. NICHOLSON,
Acting Sub-Secretary.

To the Collector of Madura, with copy of
Board's Resolution, No. 2043, dated 16th July 1883.

READ—again the following letter from T. RAJARAM ROW, Honorary Deputy Collector and Manager, Ramnad, to the Acting Collector of Madura, dated Thangachimadam, 19th November 1883, No. 293 :—

With reference to your letter, No. 230, dated 26th September last, and the marginally-noted papers relating to the proposed ship canal through the island of Rámesvaram, I have the honor to report as follows.

- (1) Proceedings of the Court of Wards, No. 2043, dated 16th July 1883.
- (2) Proceedings of the Court of Wards, No. 7824, dated 15th September 1883.

- (3) Letter, dated 13th August 1883, from Messrs. Grindrod, Jenkins and Co.
- (4) Letter, dated 16th August 1883, from Messrs. Grindrod, Jenkins and Co.

2. Messrs. Bradbridge, a financial agent of the proposed company, and Stoddart, Acting Surveyor-General of Ceylon, came to Pámban on the 2nd instant in the *Seremidile* and went back the same day by the same steamer. They, however, gave me the necessary information regarding the site of the proposed canal and deputed Mr. Riedy, the Emigration Agent of Ceylon, to point out the site selected for the southern entrance of the canal as the starting point, leaving with him a tracing on which Mr. Stoddart has inserted distances and bearings to several points from the proposed southern entrance.

3. Mr. Riedy was accordingly pleased to point out the site of the proposed southern entrance and left with me the above tracing, with reference to which the course of the proposed canal was marked from the southern entrance, and the lands required for the canal carefully surveyed and demarcated.

4. The canal is proposed to be cut in a direct northerly line through the island into Palks Bay from the Gulf of Mannar, and the site of the proposed canal, as shown in the tracing, has been selected by Mr. Stoddart and chosen by the promoters of the company as the most suitable.

5. The width of the canal from east to west is 900 feet and its length from south to north 10,920 feet, or 2 miles and 360 feet. The lands required for the canal are 225 acres and 62 cents in extent, as particularized below:—

	ACS.	CENTS.
(1) The extent of lands on which odai or thorn trees stand, the trees being annually rented out on behalf of the estate ...	178	10
(2) The extent of lands on which stand cocoanut and palmyra trees with three wells. The trees have been planted by the ryots and are enjoyed by them, paying tree-tax of Rs. 38-15-9 to the zemindar ...	34	8
(3) The extent of lands partly enclosed and partly cultivated as punjah by certain ryots without permission in faslis 1291 and 1292, paying a rent of Rs. 6-3-9 ...	8	83
(4) Extent of land occupied by a temple and a pond including the site of the temple garden paying no rent ...	4	61
Total ...	225	62

6. The price to be paid for the land (225 acres 62 cents in extent) to the Court of Wards on behalf of the minor zemindar, at the rate of Rs. 200 an acre, as accepted by the Court, amounts to Rs. 45,124 plus Rs. 500, the price of the odai trees standing on the land (No. 1), 500 cart loads at one rupee per cart load, making a total of Rs. 45,624.

7. In addition to the above sum to be paid for the zemindar's interest in the land, a sum of Rs. 6,371-1-7 should be paid as compensation for the tenants whom it is necessary to the Court of Wards to oust as shown below:—

I. On account of the trees standing on the land (No. 2)—

	RS.	A.	P.
Cocoanut trees, 918 in full bearing, at Rs. 3 a tree ...	2,754	0	0
Do. 977 not bearing, at Rs. 2 a tree ...	1,954	0	0
Palmyra trees, 8 in full bearing, at Rs. 3 a tree ...	24	0	0
Do. 500 not bearing, at Re. 1 per tree ...	500	0	0
Do. 10,000 young trees, at Rs. 40 per 1,000. ...	400	0	0
Total ...	5,632	0	0

II. On account of the cost of the three wells situated in a portion of the land (No. 2) for two wells, at Rs. 35 each, and for the other, Rs. 50 ...

120 0 0

III. On account of the cost incurred in reclaiming and preparing the land (No. 3) for cultivation, at Rs. 20 an acre ...

176 9 7

IV. On account of the cost of the temple building on land (No. 4) ...

50 0 0

On account of the pond ...

50 0 0

On account of certain ceremonies to be performed for removing the deities from the present building and placing them in another place to be consecrated for the purpose. The temple building is a raised platform measuring 13 into 13, and 4½ feet built with stones in chunam ...

342 8 0

Total ...

442 8 0

Grand Total ...

6,371 1 7

Thus it will be seen that the amount which the proposed company will have to pay for the interests of the zemindar and of his tenants in the required land amounts to Rs. 51,995-1-7.

8. In determining the compensation to be paid for the tenants, I have carefully taken into consideration the prices prevailing in the village, the ordinary cost of the buildings, and the opinion of certain arbitrators chosen for the purpose. I think that

the compensation determined on is reasonable, and all the tenants concerned, with the exception of those who were absent from the village, appeared before me and expressed their willingness to accept the amount of compensation fixed for their respective interests in the required land.

9. The priest of the temple on land (No. 4) and the persons interested in it apply for a piece of an unoccupied waste land to build the temple on, equal in extent to the one which will be taken up for the proposed canal. They pointed out to me the site selected by them for the purpose, and I see no objection to the grant of the land applied for on the condition that it should be used only for the purpose for which it is wanted.

10. It may not be out of place to observe here that before the lands required for the proposed canal were surveyed and demarcated the inhabitants of the Thangachimadam village had presented a petition to me complaining that the scheme would injuriously affect their interests, inasmuch as it would interfere with their houses, &c., but the survey soon convinced them that they were quite safe, as the canal would run at a distance of about 1,300 feet from the village and their houses would not be in the least affected by the said project.

11. I beg to send, herewith, a sketch showing the course of the proposed canal and the positions of the lands required for the same. I think that it must be distinctly understood that, in the event of the canal being cut, the company must take care to prevent encroachment of the sea in the two entrances of the canal.

12. I also beg to furnish the information called for by the Court of Wards in their Proceedings, Mis. No. 7824, dated 15th September 1883, on the following points:—

(1.) Whether in addition to the main road from Pámban to Rámesvaram the proposed canal cuts any line of road.

(2.) The positions and the number of the proposed ferries and the exact responsibilities of the Canal Company in respect of them in the matter of maintaining and working them free of cost to the public.

No.

I. The proposed line of the canal cuts the main road to Rámesvaram from Pámban at the distance of about 1,500 feet to the west of the Thangachimadam chattram. This is the only place where the company has to provide, free of cost to the public, for crossing the canal either by a swing-bridge or by boats. With a view to avoid any probable danger in crossing the canal during night by boats and their dependence as much as possible on the mercy of the company's servants, the public prefer having an iron draw-bridge sufficiently strong and large to allow, at a time, 10 laden bandies, 50 animals and 100 passengers to pass with safety, and properly maintained and worked by trained men and kept open to the public at all times, both day and night, the time when the vessels pass being of course excepted. In the course of my conversation with Mr. Bradbridge he expressed the intention of the company to have a swing-bridge over the canal. If this course is not considered to be feasible, the company should be prepared to have, on both sides of the canal, as many boats as are necessary to carry at all times not less than the number of passengers, animals and carts mentioned above for a trip.

II. There is a telegraph line to Ceylon passing at a distance of 650 feet to the south of the Rámesvaram road. At this point there should either be a cable or the wire has to be taken sufficiently high, so that it may not be interfered with by the masts of the vessels. The cost of this work and of any probable repairs to the same should be borne by the company.

III. I think that the company should bind themselves in writing to provide and maintain such number of boats or the bridge free of cost to the public, as above mentioned, to maintain the rights of way which now exist, under certain penalty.

(3.) Whether any temples or objects of religious veneration will be interfered with by the canal.

It interferes with a small temple in the limits of the Tangachimadam village—*vide* paragraphs 5 and 7 *supra*.

(4.) What occupied lands will be taken up.

Acres 47 and cents 52 of land will be taken up—*vide* the above paragraphs.

13. The enclosures to the above letter under reply are returned herewith.

Endorsement by C. S. CROLE, Esq., Acting Collector of Madura, dated 1st December 1883, No. 389.

Submitted * to the Court of Wards with reference to their Proceedings, Mis. No. 7824, dated 15th September 1883.

* With the sketch to be returned. The manager has given information on all the points on which report has been called for, and his proposals regarding ferries, &c., are fair and reasonable. It does not appear that the company have been asked whether they consent to the proposals or not, and the manager has been asked to do so now and to report the result.

RESOLUTION—dated 17th December 1883, No. 3804.

In April 1883 an Agent of Messrs. Grindrod, Jenkins and Co. of Colombo spoke to the Collector of Madura upon the subject of a ship canal to be excavated by a company through the island of Rámesvaram, and this conversation was followed by a letter, dated 19th June 1883, in which Messrs. Grindrod, Jenkins and Co. asked the Collector to make over to them a strip of land, three hundred yards in width, across the island, at the price of Rs. 200 per acre.

2. The Court of Wards in Proceedings, No. 2043, dated 16th July 1883, asked for a rough survey of the line of the canal and remarked that while the Court were willing to accept Rs. 200 per acre for their ward's interest in the required land it must be understood that the company must pay full compensation to any ousted tenants and must provide and maintain ferries on the existing rights of way.

3. In reply Messrs Grindrod, Jenkins and Co. forwarded to the Collector a rough sketch showing the position of the proposed canal and stated that they were prepared to submit to the conditions which the Court would impose.

4. The Court thereupon, in Proceedings, No. 7824, dated 15th September 1883, asked for particulars as to the lines of road crossed, the ferries to be maintained, whether any religious buildings would be interfered with, and what extent of occupied land would be taken up.

5. The manager of the Ramnad estate now reports that the line of the proposed canal has been surveyed by the promoters of the company. The following land will be taken up:—

	ACRES.
Covered with thorn bushes	178.10
Cocoanut and palmyra trees	34.08
Dry cultivation without permission	8.83
Temple, pond, and garden	4.61
Total ...	225.62

The manager says that the occupants have agreed to accept Rs. 6,371-1-7 as compensation, and quotes the compensation to the zemindar at Rs. 45,624, which includes Rs. 500 for trees, making a total of Rs. 51,995-1-7.

6. The manager further reports that the main road from Pámban to Rámesvaram is the only line of road which the canal will cut. The agent of the promoters proposes to place a swing-bridge here, and the manager suggests an iron draw-bridge. This is a matter upon which the Court would be glad to have a professional opinion.

They resolve therefore to forward the papers to the Public Works Department with the request that the Chief Engineer will advise them as to the method of crossing the canal which the Canal Company should be bound to provide.

7. The promoters of the company must, of course, arrange with the telegraph department as regards the passage of a cable under the canal.

8. A plot of ground can be given for the re-erection of the temple as suggested in paragraph 9 of the manager's letter.

9. The Court await the further communication promised by the Collector.

10. A copy of these proceedings with the sketch plans will be submitted for the information of Government.

(True Copies and Extract.)

from MacKenzie
Acting Sub-Secretary.

To the Secretary to Government, Revenue Department,
with two enclosures to be returned, and copy of Board's
Proceedings, dated 16th July 1883, No. 2043.
„ Secretary to Government, Public Works Department,
with copy of Board's Proceedings, dated 16th July 1883, No. 2043.
„ Chief Superintendent of Telegraphs, Madras Division.
„ Collector of Madura.

Exd. C. Howarth.

14/1/89

No. 110 C of 16th January/84

C

Copies forwarded
to the Suptg Engr Sixth
Circle with request
that he will, with
reference to para 6
of the Court's letter
Pros, place himself
in communication
with Messrs Grindrod
Jenkins & Co. and report
on the proposal to
carry the Pamban -
Ramesvaram road
across the proposed
canal by means of
a swing-bridge &
iron draw-bridge.

2C.
B. No. 210 W
5-2-83
4752 W 22/2/84
10.1.84
To The S. E. II Circle
440 W a/9-2-83 A No. 4 wa/5-1-83
432 W a/9-2-83 " " 3430 W a/26-12-83
5 W a/5-1-83 3424 W a/26-12-83
A No. 3229 W a/14-11-83
742 W a/7-3-83 A No. 3210 W
441 W a/9-2-83 46-12-83
2884 W a/4-11-83 2982 W
4/12-11-83
2987 W
13-11-83

REVENUE DEPARTMENT.
1883.
Court of Wards,
MADRAS.

Printed December th.

Proceedings, 17th Dec. 1883, No. 3804.

Enc 1
Copy 7/1/84
No. 110 C of 16th Jan'y/84

Passing orders on papers regarding the proposal of cutting a ship canal through the island of Ramesvaram.

with audt.
Smt. Rm. Dept. Secy

22ND JANUARY 1884, No. 113, REVENUE.

GOVERNMENT OF MADRAS.
REVENUE DEPARTMENT.

READ—the following Proceedings of the Court of Wards, dated 17th December 1883, No. 3804 :—

Read—again the following Proceedings of the Board of Revenue, dated 15th September 1883, Mis. No. 7824 :—

Read—the following letter from C. S. CROLE, Esq., Acting Collector of Madura, to the Secretary to the Court of Wards, dated 31st August 1883, No. 275 :—

With reference to Court's Proceedings, No. 2043, dated 16th July 1883, I have the honor to submit, for their orders, copies of two letters, dated 13th and 16th instant, with a rough survey showing the proposed course of the canal, received from Messrs. Grindrod, Jenkins and Co., of Colombo.

2. The channel proposed to be cut is the one in the middle, as marked in pencil in the sketch.

ENCLOSURE No. 1.

From Messrs. GRINDROD, JENKINS and Co., to the Collector of Madura, dated Colombo, 13th August 1883.

We have the honor to acknowledge receipt of your letter of 1st 3rd instant, handing us a copy of the resolution passed by the Court of Wards.

In the course of a day or two we hope to send you a rough draft showing the position, &c., of the proposed canal. In the meantime we beg to state that we are prepared to submit to the conditions which the Court would impose, viz. :—

- (1) To pay compensation to any tenants whom it may be necessary and competent to the Court of Wards to oust.
- (2) To provide and maintain such ferries across the canal as may be sufficient to maintain the present rights of way.
- (3) To pay in cash Rs. 200 per acre for the land required.

We should be glad to be informed whether it would be in accordance with the views of the Court to receive payment for the land in instalments as it is required to be taken over for the work. Payments to be made after due formation of the company.

ENCLOSURE No. 2.

From Messrs. GRINDROD, JENKINS and Co., to the Collector of Madura, dated Colombo, 16th August 1883.

Referring to our letter of 13th instant, we have now the honor to hand you a tracing of the island of Ramesvaram showing the position of the proposed canal. This channel is selected in preference to any other, as the southern entrance is protected by the Kurusaddi and Shingle islands.

P.S.—It would be of material service to us if you could now supply us with some document which we could lay before the financiers.

ENCLOSURE No. 3.—Survey Map.

Resolution—dated 15th September 1883, Mis. No. 7824.

Before submitting these papers for the orders of Government, the Court of Wards desire information on the following points:—

- (1) Whether, in addition to the main road from Pámban to Rámesvaram, the proposed canal cuts any public line of road.
- (2) The positions and number of the proposed ferries and the exact responsibilities of the Canal Company in respect of them in the matter of maintaining and working them free of cost to the public.
- (3) Whether any temples or objects of religious veneration will be interfered with by the canal.
- (4) What occupied lands will be taken up.

The information should be submitted at the earliest possible date.

The lands may be paid for by instalments, payment in all cases being made before lands are entered upon.

A copy of Board's Resolution, No. 2043, dated 16th July 1883, is herewith forwarded for despatch to Messrs. Grindrod and Jenkins; but it must be understood that the matter will be finally disposed of only after receipt of the orders of Government.

(True Copies and Extract.)

(Signed) F. A. NICHOLSON,
Acting Sub-Secretary.

To the Collector of Madura, with copy of
Board's Resolution, No. 2043, dated 16th July 1883.

Read—again the following letter from T. RAJARAM ROW, Honorary Deputy Collector and Manager, Ramnad, to the Acting Collector of Madura, dated Thangachimadam, 19th November 1883, No. 293:—

With reference to your letter, No. 230, dated 26th September last, and the marginally-noted papers relating to the proposed ship canal through the island of Rámesvaram, I have the honor to report as follows.

- (1) Proceedings of the Court of Wards, No. 2043, dated 16th July 1883.
- (2) Proceedings of the Court of Wards, No. 7824, dated 15th September 1883.
- (3) Letter, dated 13th August 1883, from Messrs. Grindrod, Jenkins and Co.
- (4) Letter, dated 16th August 1883, from Messrs. Grindrod, Jenkins and Co.

2. Messrs. Bradbridge, a financial agent of the proposed company, and Stoddart, Acting Surveyor-General of Ceylon, came to Pámban on the 2nd instant in the *Serendibile* and went back the same day by the same steamer. They, however, gave me the necessary information regarding the site of the proposed canal and deputed Mr. Riedy, the Emigration Agent of Ceylon, to point out the site selected for the southern entrance of the canal as the starting point, leaving with him a tracing on which Mr. Stoddart has inserted distances and bearings to several points from the proposed southern entrance.

3. Mr. Riedy was accordingly pleased to point out the site of the proposed southern entrance and left with me the above tracing, with reference to which the course of the proposed canal was marked from the southern entrance, and the lands required for the canal carefully surveyed and demarcated.

4. The canal is proposed to be cut in a direct northerly line through the island into Palks Bay from the Gulf of Mannar, and the site of the proposed canal, as shown in the tracing, has been selected by Mr. Stoddart and chosen by the promoters of the company as the most suitable.

5. The width of the canal from east to west is 900 feet and its length from south to north 10,920 feet, or 2 miles and 360 feet. The lands required for the canal are 225 acres and 62 cents in extent, as particularized below:—

	ACS.	CENTS.
(1) The extent of lands on which odai or thorn trees stand, the trees being annually rented out on behalf of the estate ...	178	10
(2) The extent of lands on which stand cocoanut and palmyra trees with three wells. The trees have been planted by the ryots and are enjoyed by them, paying tree-tax of Rs. 38-15-9 to the zemindar ...	34	8
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(4) Extent of land occupied by a temple and a pond including the site of the temple garden paying no rent ...	4	61
Total ...	225	62

6. The price to be paid for the land (225 acres 62 cents in extent) to the Court of Wards on behalf of the minor zemindar, at the rate of Rs. 200 an acre, as accepted by the Court, amounts to Rs. 45,124 plus Rs. 500, the price of the odai trees standing on the land (No. 1), 500 cart loads at one rupee per cart load, making a total of Rs. 45,624.

7. In addition to the above sum to be paid for the zemindar's interest in the land, a sum of Rs. 6,371-1-7 should be paid as compensation for the tenants whom it is necessary to the Court of Wards to oust as shown below:—

I. On account of the trees standing on the land (No. 2) —

	RS.	A.	P.
Cocoanut trees, 918 in full bearing, at Rs. 3 a tree ...	2,754	0	0
Do. 977 not bearing, at Rs. 2 a tree ...	1,954	0	0
Palmyra trees, 8 in full bearing, at Rs. 3 a tree ...	24	0	0
Do. 500 not bearing, at Re. 1 per tree ...	500	0	0
Do. 10,000 young trees, at Rs. 40 per 1,000. ...	400	0	0
Total ...	5,632	0	0

II. On account of the cost of the three wells situated in a portion of the land (No. 2) for two wells, at Rs. 35 each, and for the other, Rs. 50 ...

120 0 0

III. On account of the cost incurred in reclaiming and preparing the land (No. 3) for cultivation, at Rs. 20 an acre ...

176 9 7

IV. On account of the cost of the temple building on land (No. 4) ...

50 0 0

On account of the pond ...

50 0 0

On account of certain ceremonies to be performed for re-mov-ing the deities from the present building and placing them in another place to be consecrated for the purpose. The temple building is a raised platform measuring 13 into 13, and 4½ feet built with stones in chunam ...

342 8 0

Total ...

442 8 0

Grand Total ...

6,371 1 7

Thus it will be seen that the amount which the proposed company will have to pay for the interests of the zemindar and of his tenants in the required land amounts to Rs. 51,995-1-7.

8. In determining the compensation to be paid for the tenants, I have carefully taken into consideration the prices prevailing in the village, the ordinary cost of the buildings, and the opinion of certain arbitrators chosen for the purpose. I think that

the compensation determined on is reasonable, and all the tenants concerned, with the exception of those who were absent from the village, appeared before me and expressed their willingness to accept the amount of compensation fixed for their respective interests in the required land.

9. The priest of the temple on land (No. 4) and the persons interested in it apply for a piece of an unoccupied waste land to build the temple on, equal in extent to the one which will be taken up for the proposed canal. They pointed out to me the site selected by them for the purpose, and I see no objection to the grant of the land applied for on the condition that it should be used only for the purpose for which it is wanted.

10. It may not be out of place to observe here that before the lands required for the proposed canal were surveyed and demarcated the inhabitants of the Thangachimadam village had presented a petition to me complaining that the scheme would injuriously affect their interests, inasmuch as it would interfere with their houses, &c., but the survey soon convinced them that they were quite safe, as the canal would run at a distance of about 1,300 feet from the village and their houses would not be in the least affected by the said project.

11. I beg to send, herewith, a sketch showing the course of the proposed canal and the positions of the lands required for the same. I think that it must be distinctly understood that, in the event of the canal being cut, the company must take care to prevent encroachment of the sea in the two entrances of the canal.

12. I also beg to furnish the information called for by the Court of Wards in their Proceedings, Mis. No. 7824, dated 15th September 1883, on the following points:—

(1.) Whether in addition to the main road from Pámban to Rámesvaram the proposed canal cuts any line of road.

(2.) The positions and the number of the proposed ferries and the exact responsibilities of the Canal Company in respect of them in the matter of maintaining and working them free of cost to the public.

No.

I. The proposed line of the canal cuts the main road to Rámesvaram from Pámban at the distance of about 1,500 feet to the west of the Thangachimadam chattram. This is the only place where the company has to provide, free of cost to the public, for crossing the canal either by a swing-bridge or by boats. With a view to avoid any probable danger in crossing the canal during night by boats and their dependence as much as possible on the mercy of the company's servants, the public prefer having an iron draw-bridge sufficiently strong and large to allow, at a time, 10 laden bandies, 50 animals and 100 passengers to pass with safety, and properly maintained and worked by trained men and kept open to the public at all times, both day and night, the time when the vessels pass being of course excepted. In the course of my conversation with Mr. Bradbridge he expressed the intention of the company to have a swing-bridge over the canal. If this course is not considered to be feasible, the company should be prepared to have, on both sides of the canal, as many boats as are necessary to carry at all times not less than the number of passengers, animals and carts mentioned above for a trip.

II. There is a telegraph line to Ceylon passing at a distance of 650 feet to the south of the Rámesvaram road. At this point there should either be a cable or the wire has to be taken sufficiently high, so that it may not be interfered with by the masts of the vessels. The cost of this work and of any probable repairs to the same should be borne by the company.

III. I think that the company should bind themselves in writing to provide and maintain such number of boats or the bridge free of cost to the public, as above mentioned, to maintain the rights of way which now exist, under certain penalty.

It interferes with a small temple in the limits of the Tangachimadam village—*vide* paragraphs 5 and 7 *supra*.

Acres 47 and cents 52 of land will be taken up—*vide* the above paragraphs.

(3.) Whether any temples or objects of religious veneration will be interfered with by the canal.

(4.) What occupied lands will be taken up.

13. The enclosures to the above letter under reply are returned herewith.

ENCLOSURE No. 1.—Sketch-map.

Endorsement by C. S. CROLE, Esq., Acting Collector of Madura, dated 1st December 1883, No. 389.

Submitted * to the Court of Wards with reference to their Proceedings, Mis. No. 7824, dated 15th September 1883.

* With the sketch to be returned. The manager has given information on all the points on which report has been called for, and his proposals regarding ferries, &c., are fair and reasonable. It does not appear that the company have been asked whether they consent to the proposals or not, and the manager has been asked to do so now and to report the result.

Resolution—dated 17th December 1883, No. 3804.

In April 1883 an Agent of Messrs. Grindrod, Jenkins and Co. of Colombo spoke to the Collector of Madura upon the subject of a ship canal to be excavated by a company through the island of Rámesvaram, and this conversation was followed by a letter, dated 19th June 1883, in which Messrs. Grindrod, Jenkins and Co. asked the Collector to make over to them a strip of land, three hundred yards in width, across the island, at the price of Rs. 200 per acre.

2. The Court of Wards in Proceedings, No. 2043, dated 16th July 1883, asked for a rough survey of the line of the canal and remarked that while the Court were willing to accept Rs. 200 per acre for their ward's interest in the required land it must be understood that the company must pay full compensation to any ousted tenants and must provide and maintain ferries on the existing rights of way.

3. In reply Messrs. Grindrod, Jenkins and Co. forwarded to the Collector a rough sketch showing the position of the proposed canal and stated that they were prepared to submit to the conditions which the Court would impose.

4. The Court thereupon, in Proceedings, No. 7824, dated 15th September 1883, asked for particulars as to the lines of road crossed, the ferries to be maintained, whether any religious buildings would be interfered with, and what extent of occupied land would be taken up.

5. The manager of the Ramnad estate now reports that the line of the proposed canal has been surveyed by the promoters of the company. The following land will be taken up:—

	ACRES.
Covered with thron bushes	178.10
Cocanut and palmyra trees	34.08
Dry cultivation without permission	8.83
Temple, pond, and garden	4.61
Total	225.62

The manager says that the occupants have agreed to accept Rs. 6,371-1-7 as compensation, and quotes the compensation to the zemindar at Rs. 45,624, which includes Rs. 500 for trees, making a total of Rs. 51,995-1-7.

6. The manager further reports that the main road from Pámban to Rámesvaram is the only line of road which the canal will cut. The agent of the promoters proposes to place a swing-bridge here, and the manager suggests an iron draw-bridge. This is a matter upon which the Court would be glad to have a professional opinion.

They resolve therefore to forward the papers to the Public Works Department with the request that the Chief Engineer will advise them as to the method of crossing the canal which the Canal Company should be bound to provide.

7. The promoters of the company must, of course, arrange with the telegraph department as regards the passage of a cable under the canal.

8. A plot of ground can be given for the re-erection of the temple as suggested in paragraph 9 of the manager's letter.

9. The Court await the further communication promised by the Collector.

10. A copy of these proceedings with the sketch plans will be submitted for the information of Government.

(True Copies and Extract.)

(Signed) G. MACKENZIE,
Acting Sub-Secretary.

To the Secretary to Government, Revenue Department, with two enclosures to be returned, and copy of Board's Proceedings, dated 16th July 1883, No. 2043.

To the Secretary to Government, Public Works Department, with copy of Board's Proceedings, dated 16th July 1883, No. 2043.

To the Chief Superintendent of Telegraphs, Madras Division.

To the Collector of Madura.

READ—also the following Proceedings of the Court of Wards, dated 7th January 1884, No. 4:—

Read—the following letter from C. S. CROLE, Esq., Acting Collector of Madura, to the Acting Secretary to the Court of Wards, dated 25th December 1883, No. 424:—

In continuation of my endorsement, No. 389, dated 1st December 1883, to the Ramnad Manager's letter, No. 293, dated 19th November last, I have the honor to submit, for the information of the Court of Wards, copy of a letter, dated 12th instant, with its enclosure, received from Messrs. Grindrod, Jenkins and Co.

ENCLOSURES.

Letter from Messrs. GRINDROD, JENKINS and Co., to the Collector of Madura, dated Colombo, 12th December 1883.

We have the honor to enclose a copy of our letter of this date to the Honorary Deputy Collector and Manager, Ramnad, from which you will see that we accept the conditions as set forth in his letter to us, dated 4th instant.

2. We hope now that you may be able to provide us with the needful document, making over to us the ground required for the canal, we binding ourselves on behalf of the Company to a fulfilment of the various conditions.

3. With regard to paragraph No. 11 of the Honorary Deputy Collector's report to you, No. 293, we may state that for their own sake alone the Company would be most careful to prevent any encroachment of the sea.

Letter from Messrs. GRINDROD, JENKINS and Co., to the Honorary Deputy Collector and Manager of Ramnad, Pámban, dated Colombo, 12th December 1883.

We have the honor to acknowledge receipt of your two letters, dated 28th ultimo and 4th instant, together with a copy of your report on the canal scheme, dated 19th ultimo, as forwarded by you to the Honorable the Acting Collector of Madura, and a copy of the Proceedings of the Court of Wards, dated 15th September last.

2. Pray accept our thanks for these documents, and we may remark here that your letter of 28th ultimo only reached us two days before the one of 4th instant.

3. The conditions on which the land for the proposed canal will be made over to the Canal Company, as set forth in your letter of 4th instant, we accept on behalf of the Company, viz.:—

- (1) The Company to pay Rs. 51,995-1-7 for the interests of the Zemindar and of his tenants in the required land.
- (2) The Company to provide, at the point where the proposed canal cuts, the main road from Pámban to Rámesvaram, free of cost, to the public for crossing the canal either by a swing bridge or by boats sufficiently strong and large to allow at a time 10 laden carts, 50 animals, and 100 passengers to pass with safety and promptly maintained and worked by trained men, and kept open to the public at all times, both day and night, the time when vessels pass being of course excepted.
- (3) At the point where the telegraph line to Ceylon is affected by the proposed canal, the Company will provide either a cable, or will carry the line at such a height over the canal as not to be interfered with by the passing vessels. The cost of this to be borne by the Company. The Company will also be prepared to pay for any repairs which may be shown to be necessary as arising from any negligence on their part, or from any accident in the working of the canal.
- (4) The Company will, if needful, bind themselves, in writing, to provide and maintain such boats or bridge free of cost to the public as before mentioned, and to maintain the rights of way which now exist under reasonable penalty.

4. We shall be glad to receive now, as early as convenient, some formal document, promising to hand over the land on the conditions enumerated.

Resolution—dated 7th January 1884, No. 4.

Submitted for the information of Government in continuation of Court's Proceedings, No. 3804, dated 17th December 1883.

2. The Court of Wards presume that there is no objection on the part of Government to their accepting the terms of the promoters of the Company on behalf of their ward. As Messrs. Grindrod, Jenkins and Co. are anxious to have a formal document executed speedily by which the land required is promised to be conveyed to them on the conditions specified, the Court would be glad to receive a reply from Government as soon as possible.

(True Copies and Extract.)

(Signed) G. MACKENZIE,
Acting Sub-Secretary.

To the Secretary to Government, Revenue Department, with copy of letter from Messrs. Grindrod, Jenkins and Co., dated 12th December 1883, and its enclosure.

Copy to the Collector of Madura.
„ to the Secretary to Government,
Public Works Department.

8

22ND JANUARY 1884, No. 113, REVENUE.

ORDER—dated 22nd January 1884, No. 113, Revenue.

Miscellaneous.

The Government in this Department
see no objection to the action which the
Court propose to take.

(True Extract.)

W. Nicol
Secretary to Government.

To the Court of Wards, with two enclosures.
„ Public Works Department.
„ Chief Superintendent of Telegraphs.

Exd. C. Howarth.

60 Copies.

20 22

Gobt. of (1884) Madras.

REVENUE.

Issued

Recd.

Encl.

G.O., 22nd January 1884, No. 113.

JANUARY.

Ship Canal through the Island of
Ramesvaram.

Court of Wards' action in accepting Messrs.
Grindrod, Jenkins and Co.'s terms to cut a —,
approved.

COURT OF WARDS, 7TH JANUARY 1884, No. 4.

PROCEEDINGS OF THE COURT OF WARDS.

READ—the following letter from C. S. CROLE, Esq., Acting Collector of Madura, to the Secretary to the Court of Wards, dated Madura, 25th December 1883, No. 424 :—

In continuation of my endorsement No. 389, dated 1st December 1883, to the Ramnad Manager's letter No. 293, dated 19th November last, I have the honor to submit, for the information of the Court of Wards, copy of a letter dated 12th instant, with its enclosure, received from Messrs. Grindrod, Jenkins and Co.

ENCLOSURE No. 1.

From Messrs. GRINDROD, JENKINS and CO., to the Collector of Madura, dated Colombo, 12th December 1883.

We have the honor to enclose a copy of our letter of this date to the Honorary Deputy Collector and Manager, Ramnad, from which you will see that we accept the conditions as set forth in his letter to us, dated 4th instant.

2. We hope now that you may be able to provide us with the needful document, making over to us the ground required for the canal, we binding ourselves on behalf of the Company to a fulfilment of the various conditions.

3. With regard to paragraph No. 11 of the Honorary Deputy Collector's report to you, No. 293, we may state that for their own sake alone the Company would be most careful to prevent any encroachment of the sea.

ENCLOSURE No. 2.

From Messrs. GRINDROD, JENKINS and CO., to the Honorary Deputy Collector and Manager of Ramnad, Pámban, dated Colombo, 12th December 1883.

We have the honor to acknowledge receipt of your two letters, dated 28th ultimo and 4th instant, together with a copy of your report on the canal scheme, dated 19th ultimo, as forwarded by you to the Honorable the Acting Collector of Madura, and a copy of the Proceedings of the Court of Wards, dated 15th September last.

2. Pray accept our thanks for these documents, and we may remark here that your letter of 28th ultimo only reached us two days before the one of 4th instant.

3. The conditions on which the land for the proposed canal will be made over to the Canal Company as set forth in your letter of 4th instant, we accept on behalf of the Company, viz.—

- (i) The Company to pay Rs. 51,995-1-7 for the interests of the Zamindar and of his tenants in the required land.
- (ii) The Company to provide at the point where the proposed canal cuts the main road from Pámban to Rámesvaram, free of costs to the public, for crossing the canal either by a swing bridge or by boats sufficiently strong and large to allow at a time 10 laden carts, 50 animals, and 100 passengers to pass with safety and properly maintained, and worked by trained men and kept open to the public at all times, both day and night, the time when vessels pass being of course excepted.
- (iii) At the point where the telegraph line to Ceylon is affected by the proposed canal, the Company will provide either a cable, or will carry the line at such a height over the canal, as not to be interfered with by the passing vessels. The cost of this to be borne by the Company. The Company will also be prepared to pay for any repairs which may be shown to be necessary as arising from any negligence on their part, or from any accident in the working of the canal.
- (iv) The Company will, if needful, bind themselves in writing to provide and maintain such boats or bridge free of cost to the public as before mentioned, and to maintain the rights of way which now exist under reasonable penalty.

4. We shall be glad to receive now as early as convenient some formal document promising to hand over the land on the conditions enumerated.

RESOLUTION—dated 7th January 1884, No. 4.

Submitted for the information of Government in continuation of Court's Proceedings, No. 3804, dated 17th December 1883.

2. The Court of Wards presume that there is no objection on the part of Government to their accepting the terms of the promoters of the Company on behalf of their ward. As Messrs. Grindrod, Jenkins and Co. are anxious to have a formal document executed speedily by which the land required is promised to be conveyed to them on the conditions specified, the Court would be glad to receive a reply from Government as soon as possible.

(True Copies and Extract.)

[Signature]
for Acting Sub-Secretary.

To the Secretary to Government, Revenue Department.

Copy to the Collector of Madura.

" " Secretary to Government, Public Works Department. ✓

REVENUE DEPARTMENT.
1884.
Court of Wards,
MADRAS.

Printed January th.

Proceedings, 7th January 1884, No. 4.

Dec 7 1884

Submitting to Government, with remarks,
letter from the Collector of Madura forwarding
copy of another from Messrs. Grindrod, Jenkins
and Co. regarding the proposed ship canal
through the Island of Rameswaram.

the copy already sent

The Honorary Deputy Collector
and Manager of Ramnad
Pambau.

Sir,

We have the honor to acknowledge
receipt of your two letters, dated
28th ultimo and 4th Instant, together
with a copy of your report on
the Canal scheme, dated 19th ultimo,
as forwarded by you to the
Honorable the Ag. Collector,
of Madura, and a copy of
the proceedings of the Court
of Wards, dated 15th September
last.

Pray accept our thanks
for these documents, and we
may remark here that your
letter of 28th ultimo only
reached us two days before the
one of 4th Instant.

The conditions on which
the

the land for the proposed canal will be made over to the Canal Company as set forth in your letter of 4th Instant we accept on behalf of the Company viz.

(1) The Company to pay Rs 51995-1-7 for the interests of the Zemindar and of his tenants in the required land.

(2) The Company to provide at the point where the proposed canal cuts the main road from Pamban to Rameswarum free of cost to the public for crossing the canal either by a swing bridge or by boats sufficiently strong and large to allow at a time 10 laden carts, 50 animals, and 100 passengers to pass with safety and properly maintained, and

worked by trained men, and kept open to the public at all times both day and night, the time when vessels pass being of course excepted.

At the point where the telegraph line to Ceylon is affected by the proposed canal, the Company will provide either a cable, or will carry the line at such a height over the canal, as not to be interfered with by the passing vessels. The cost of this to be borne by the Company. The Company will also be prepared to pay for any repairs which may be shown to be necessary as arising from any negligence on their part, or from any accident in the working of the canal.

(4) The Company will, if needful, bind themselves in writing to provide and maintain such

such boats, or bridge free of cost to the public as before mentioned, and to maintain the rights of way which now exist under reasonable penalty.

We shall be glad to receive now as early as convenient some formal document, promising to hand over the land on the conditions enumerated.

Columbo } We have &c
12 Decr/83. } (signed) Grindrod Jenkins & Co.

The Honorable

The Collector
Madura.

Sir,

We have the honor to enclose a copy of our letter of this date to the Honorary Deputy Collector and Manager, Ramnad, from which you will see that we accept the conditions

conditions as set forth in his letter to us, dated 4 Instant.

We hope now that you may be able to provide us with the needful document, making over to us the ground required for the canal, we binding ourselves on behalf of the Company to a fulfilment of the various conditions.

With regard to paragraph No 11 of the Honorary Deputy Collector's report to you (No 293) we may state that for their own sake alone the Company would be most careful to prevent any encroachment of the Sea.

We have &c
Columbo }
12 December/83. } (signed) Grindrod Jenkins & Co.

(True copy)

Forom Mackenzie
Sg. Secy.

kd

copy

Enclosure in Court's
Prop: to the Secretary
to Government
P. W. D. dated
7 January 1884
No. 4.

Copy of letter &
enclosure from
Messrs Grindrod
Jenkins & Co dated
12 December 1883.



Court of Wards.
Proceedings of the Board of Revenue,
Dated 7th January 1884.
No. 4.

READ the following letter from C. S. Carle
Esquire Ag. Collector of Madras
to E. Gibson Esquire Ag. Secretary
to the Court of Wards Madras,
dated 25th December 1883 No. 424.

In continuation of my endorse-
ment No. 389, dated 1st December
1883, to the Ramnad Manager's
letter No. 293, dated 19th November
last, I have the honor to submit,
for the information of the Court
of Wards, copy of a letter, dated
12th Instant, with its enclosure
received from Messrs Grindrod
Jenkins & Co.

Resolution

Submitted for the information
of

of Government in continuation of
Court's Proceedings No. 3804 dated
17th December 1883.

2. The Court of Wards
presume that there is no objection
on the part of Government to
their accepting the terms of the
promoters of the Company on
behalf of their Ward. As Messrs
Grindrod Jenkins & Co are anxious
to have a formal document
executed speedily by which
the land required is promised
to be conveyed to them on
the conditions specified the
Court would be glad to receive
a reply from Government as
soon as possible.

(True copy & Extract)

John Mackenzie
Ag. Sub. Secretary.

To The Secretary to Government R.D.
Copy " Comptroller of Madras.

Secretary to Government P.W.D with copy of
letter from Messrs Grindrod Jenkins & Co dated 12th
December 1883 & enclosure.

Court of Wards.
1884.
Board of Revenue,
MADRAS.

To

The Secretary to
Government

Public Works Department.

Proceedings, dated 7 January 1884.
No. 4.

Subject.

Submitting to Govt.
with remarks letter
from collector of
Madura forwarding
another from Messrs.
Grindrod Jenkins
re regarding the
ship canal through
the island of
Rameswaram.

To S.W.
Q.No. 107

The previous paper,
C.No. 76. with the
file was sent up
to you yesterday.
The present reference
requires no action
in the P.W.D. Dept. to
whom a "copy" only
has been forwarded
by the Court of Wards.
The paper may be
"Recorded".

R.S.
8.1.84.

C.A.W.

Will order in this paper
to pass in the Dept. or should
action be taken in P.W.D.?
It seems to me something is
required. Action in previous paper
would be confined to the question
of a bridge across the canal, but it
seems something more is necessary.
to be passed in the P.W.D.

COURT OF WARDS, 13TH FEBRUARY 1884, No. 493.

PROCEEDINGS OF THE COURT OF WARDS.

READ—the following G.O., dated 22nd January 1884, No. 113, Revenue:—

Read—the following Proceedings of the Court of Wards, dated 17th December 1883, No. 3804:—

ABSTRACT—Passing orders on papers regarding the proposal of cutting a ship-canal through the Island of Rameswaram.

Order—dated 22nd January 1884, No. 113, Revenue.

Miscellaneous.

The Government in this Department
see no objection to the action which the
Court propose to take.

(True Extract.)

(Signed) H. E. STOKES,
Secretary to Government.

To the Court of Wards, with two enclosures.
" Public Works Department.
" Chief Superintendent of Telegraphs.

RESOLUTION—dated 13th February 1884, No. 496.

Communicated to the Collector of Madura, who is authorised to inform Messrs. Grindrod, Jenkins and Co., in reply to their letter of the 12th December 1883, that the Court, on behalf of their ward, accept the terms mentioned in the first clause of paragraph 3 of that letter, and are prepared to hand over the land, but that the details mentioned in the second and fourth clauses are the subject of a reference to the Public Works Department for advice, and that the provision for the telegraph wire is a detail which the promoters must settle in communication with the Chief Superintendent of Telegraphs, Madras Division, and in such manner as that officer shall determine, prior to work being commenced.

(A true Copy and Extract.)

Proth MacRune
Acting Sub-Secretary.

To the Collector of Madura,
with sketch map and survey plan returned.
" Superintendent of Telegraphs, Madras Division,
with copy of Board's Proceedings,
dated 17th December 1883, No. 3804.
Copy to the Secretary to Government, Revenue Department.
" " " " Public Works Department.

Exd. C. Vencatasubbaiyar.

REVENUE AND PUBLIC WORKS
DEPARTMENTS.

1884.

Court of Wards,
MADRAS.

Printed February th.

Proceedings, 13th February 1884, No. 496.

Communicating to the Collector of Madura,
with instructions, Government Order approving
the action of the Court of Wards in accepting
Messrs. Grindrod, Jenkins and Co.'s terms to
cut a ship-canal through the Island of Rames-
varam.

No. 2 M.D.

Sup: Engrs office b: biele
Kodaikanal 2: April 1884.

Engrs.

The Sup: Engineer
b: biele.

To,

The Chief Engineer
P. W. Dept.

Sir,

En: 1.

With reference to your Endorse-
ment No. 110C dated 16: January
1884 on Resolution No. 3804 dated
17: December 1883 of the Court of Wards,
I have the honor to report that I
have addressed the Honorary
Deputy Collector and Manager
of the Rameswaram Satab regarding
the traffic on the Road to Ra-
meswaram to Pamban and in
his opinion it is absolutely neces-
sary that if the ship canal is cut
across the Island a permanent iron
Road Bridge should be built across
the canal, the centre portion of which
should be moveable so as to allow
ships to pass.

No. 475 Cap 18 Feb 1884

Recorded, with
reference to No. 110C d/
16 Jan. 1884.

G.O. 310 Wd 5-2-84
No. 110C d/ 16-1-84
G.O. 322 Wd 14-11-83
" 742 Wd 7-3-83
" 441 Wd 9-2-83
" 440 Wd do
" 439 Wd do
" 5 Wd 5-1-83
" 4 Wd do
" 3430 Wd 26-12-82
" 3429 Wd do
" 3210 Wd 6-12-82
" 2983 Wd 13-11-82
" 2982 Wd do
" 2884 Wd 4-11-82
" 2883 Wd do
" 2837 Wd 27-10-82

En: Circular 204 d/ 29/2/84
(cont) " 2836 Wd do
" 2726 Wd 19-10-82
" 2924 Wd 23-11-81
" 2454 Wd 6-10-81
" 1341 Wd 28-5-81

2. I agree with this, as during festivals & the traffic on the Road is enormous it is stated to be in 24 hours as follows:-

Passengers. 2,500 to 3,000.

Bandies 250 to 300

animals including

Elephants . . . 300 to 400.

with this traffic a steam ferry would cause the greatest inconvenience.

3. I enclose (a reply to a letter from me) a copy of a letter from Messrs Grindrod Jenkins & Co. in

it they agree to provide for all requirements. I think therefore in the present state of the scheme, all that is necessary is for the following to be entered in any agreement that may be made.

1st That the canal company are to build across the canal a good iron bridge with road way not less than 24 ft to carry a 1st

class road and strong enough to pass elephants over it.

2nd The centre portion to be moveable for the passage of ships and be so designed and constructed so that there may be no unreasonable delay in opening & shutting.

3rd That the plans &c are to be sent to the Madras Government for approval and any suggestions made by that Government are to be carried out without question.

4th That the company are to maintain at their cost a proper establishment for working the Bridge and also to maintain the Bridge Road way and approaches in good order.

I have the honor to be

Sir

your most obedient

M. M. M. Lieut. Col. R. R.

Super. Engineer to Govt.

4750. 20/2
No 869 Cap 18 April 1884

Copy of the above for
warranted to the Court of
Wards with advice to
para 6 of their Resolution
dated 17th Decr 1883 No
3804 and with the re
mark that the Chief
Engineer concurs in the
suggestions of the Supg:
Eng^r VI Circle.

C.S.
8-4-84
S.C.
5050. 24/4/84

4750. 28th Feb 1884
No 310 Way 5-2-84
No 110C ay 16-1-84
No 3229 Way 14-11-83
" 742W ay 7-3-83
" 441W ay 9-2-83
" 440W ay - 00
" 439W ay - 00 (Contd) (over page)
To The Secy to the Court of
Wards with the En
S.E. VI Circle - J
MS 1/4
Jorg/4

From
The Supd Engineer
b.cide.

To
The Chief Engineer
(contd)
No 2726W ay 19-10-82
No 2924W ay 23-11-81
" 2454W ay 6-10-81
" 1341W ay 28-5-81

No 2 no.
dated 2^d
Recd 7 } April 1884.

No 869 Cap 18-4-84

Ship Canal through the
Island of Rameswaram:

Proposals on the
proposal of cutting a -

contd A
No 5 Way 5-1-83
" 4 Way 00 -
" 3430W ay 26-11-82
" 3429W ay - 00
" 3210W ay 6-12-82
" 2983W ay 13-11-82
" 2982W ay 00 -
" 2884W ay 4-11-82
" 2883W ay 00 -
" 2837W ay 27-10-82
With Encl (Contd)

PROCEEDINGS OF THE COURT OF WARDS.

READ—the following letter from GRINDROD, JENKINS and Co., to the Collector of Madura, dated Colombo, 6th March 1884 :—

We have the honor to acknowledge receipt of your letter of 26th ultimo, conveying the information that the Court of Wards has authorized you to accept the terms in the first clause of paragraph 3 of our letter of 12th December last, and that you are prepared to hand over land.

We are not certain whether you accept the whole of paragraph 3, as your letter goes on to say that *Clauses* 2 and 4 are subject of reference to the Public Works Department. Does this mean that paragraphs 2 and 4 are thus referred? With regard to the handing over of the land, we beg that you will inform us if the letter of the 26th ultimo is sufficient, or whether any formal instrument will be granted. May we beg that you give us a definite reply to this question?

We shall write to the Chief Superintendent of Telegraphs with regard to the carrying over of the wires.

Endorsement by C. S. CROLE, Esq., Collector of Madura, dated 20th March 1884, No. 92.

Submitted to the Court of Wards, for orders, with reference to their Proceedings, dated 13th February 1884, No. 496. The above order was duly communicated to the firm.

RESOLUTION—dated 2nd April 1884, No. 1204.

Messrs. Grindrod, Jenkins and Co. have already been informed, through the Collector of Madura, that the Court of Wards, on behalf of their ward, are prepared to hand over the land required for the ship-canal at Rameswaram. The Collector may furnish the firm with copies of Proceedings, No. 496, dated 13th February 1884, and of these Proceedings. At this stage, no more formal document is necessary.

2. When the company is in existence and ready to pay for the land, conveyances, stamped in accordance with the Indian Stamp Act, must, of course, be executed.

3. The acceptance of *Clauses* 2 and 4 of paragraph 3 of Messrs. Grindrod, Jenkins and Co.'s letter to the Deputy Collector at Pamban, of 12th December 1883, with or without modifications, will depend on the advice tendered to the Court of Wards by the Public Works Department.

(True Copies and Extract.)

From MacKinnon
Acting Sub-Secretary.

To the Collector of Madura.
Copy to the Secretary to Government, Revenue Department.
" " " " Public Works Department.

Exd. C. Venkatasubbaiyar.

4. G. No 131, 1 W. 7 28-5-81
 " " 245, 1 W. 7 6-10-81
 " " 292, 1 W. " 23-11-81
 " " 272, 6 W. " 19-14-82
 " " 283, 6 W. " 27-10-82
 " " 288, 2 W. " 4-11-82
 " " 298, 2 W. " 13- " "
 " " 321, 0 W. " 6-12-82
 " " 342, 8 W. " 26- " "
 " " 445, 5 W. " 5- " "
 " " 459, 4 W. " 9-2-83

Recorded with ref

To Memo - No 869-C
 of 18th April 1884

31.
 21.4.84

F.C.
 1007 C 12.5.84

2W. 7 7/3/83
 9W. 4 4/11/83
 0W. " 5/2/84
 5C. " 28/2/84
 9C. " 18/4/84
 1C. " 16/1/84

1884 of 14. 15. 30/4

REVENUE AND PUBLIC WORKS DEPARTMENTS.

1884.

Court of Wards,
MADRAS.

Printed April th.

Proceedings, 2nd April 1884, No. 1204.

Manuscript

Passing orders on letter from Collector of
 Madura, submitting copy of one from Messrs.
 Grindrod, Jenkins and Co., Colombo, on the
 subject of cutting a Ship-canal through the Island
 of Ramesvaram.

With disposal
 15. 30/4

COURT OF WARDS, 25TH APRIL 1884, No. 1425.

PROCEEDINGS OF THE COURT OF WARDS.

READ—the following letter from the Superintending Engineer, VI Circle, to the Chief
 Engineer, Public Works Department, dated 2nd April 1884, No 2 M.D. :—

With reference to your endorsement, No. 110 C., dated 16th January 1884, on
 Resolution No. 3804, dated 17th December 1883, of the Court of Wards, I have the
 honor to report that I have addressed the Honorary Deputy Collector and Manager of
 the Ramnad estate regarding the traffic, &c., on the road to Ramesvaram to Pamban,
 and in his opinion it is absolutely necessary that, if the ship canal is cut across the
 island, a permanent iron road bridge should be built across the canal, the centre
 portion of which should be moveable so as to allow ships to pass.

2. I agree with this, as during festivals, &c., the traffic on the road is enormous ;
 it is stated to be in twenty-four hours as follows :—

Passengers	...	...	...	...	...	2,500 to 3,000
Bandies	...	...	...	...	...	250 to 300
Animals including elephants	...	...	...	...	...	300 to 400

With this traffic a steam ferry would cause the greatest inconvenience.

3. I enclose (a reply to a letter from me) a copy of a letter from Messrs. Grindrod,
 Jenkins and Co.; in it they agree to provide for all requirements. I think therefore, in
 the present state of the scheme, all that is necessary is for the following to be entered
 in any agreement that may be made :—

- 1st.—That the Canal Company are to build across the canal a good iron bridge
with roadway, not less than 24 feet, to carry a first-class road and
strong enough to pass elephants over it.
- 2ndly.—The centre portion to be moveable for the passage of ships and be so
designed and constructed, so that there may be no unreasonable delay
in opening and shutting.
- 3rdly.—That the plans, &c., are to be sent to the Madras Government for
approval, and any suggestions made by that Government are to be
carried out without question.
- 4thly.—That the company are to maintain at their cost a proper establishment
for working the bridge and also to maintain the bridge, roadway and
approaches in good order.

ENCLOSURE No. 1.

From Messrs. GRINDROD, JENKINS and CO., to the Superintending Engineer, VI Circle,
 dated Colombo, 24th March 1884.

We have the honor to acknowledge receipt of your letter of 17th instant, with reference to
 the proposed method of carrying a bridge, across the Ramesvaram Canal in order to keep com-
 munication open between Pamban and Ramesvaram.

2. We can only speak as non-professional men, but we can state that the Canal Company
 would be quite willing to construct an iron bridge, such as you allude to, and strong enough to
 carry over safely far more weight than is ever likely to be put upon it.

3. When the scheme is a little more advanced, the Engineers would no doubt consult you
 with plans, and when we undertake that the work shall be done in every way to the satisfaction
 of your department, we hope that at the present stage no difficulties will be thrown in our way.
 It is quite likely that more than one plan would be submitted for your selection.

Endorsement by Major C. BOWEN, R.E., Deputy Chief Engineer, Public Works Department, dated Chepauk, 18th April 1884, No. 869 C.

Copy of the above forwarded to the Court of Wards with advertence to paragraph 6 of their Resolution, dated 17th December 1883, No. 3804, and with the remark that the Chief Engineer concurs in the suggestions of the Superintending Engineer, VI Circle.

To the Secretary to the Court of Wards,
with one enclosure.

RESOLUTION—dated 25th April 1884, No. 1425.

Communicated to the Collector of Madura, who is authorised to furnish Messrs. Grindrod, Jenkins and Co. with a copy of these proceedings, and to inform that firm that the conditions specified by the Superintending Engineer are adopted by the Court of Wards.

(True Copies and Extract.)

(Signed) G. MACKENZIE,
Acting Sub-Secretary.

To the Collector of Madura.

Copy to the Chief Engineer, Public Works Department.

P. W. W.

1884.

Court of Wards,

MADRAS.

Recorded.

(Signed) J. S.

Printed May 3rd.

Proceedings, 25th April 1884, No. 1425.

No 1001 C 4/12 May/84

S. E. VI Circle

Communicating to the Collector of Madura endorsement of the Chief Engineer concurring in the suggestions of the Superintending Engineer, VI Circle, regarding a bridge across the Rameswaram Canal, and authorising the Collector to furnish Messrs. Grindrod, Jenkins and Co. with a copy of these proceedings.

With order

Madras.

7th June 1884

From

The Honorable H. S. Thomas

Second Member
of the
Board of Revenue
on special duty

To.

The Secretary to Government
Public Works Department

Sir,

Can you oblige me with information of the amount by which the Pamban Channel has been sectionally not longitudinally enlarged and when.

I have the honor to be
Your most ^{Sir} obed^t serv^t

H. S. Thomas.

Second Member of the
Board of Revenue
on special duty

Chapath
13th June/84
No 1081D

Referred to
the Supdy Eng^r VI
Circle, for submission
of the required informa-
tion, if available
(By order)

C. Anwen. Major R.E.
Under-Secretary to Govt
P.W. Dept

From

The Honble H.L. Thomas
Second Member,
Bd of Rev.
on special duty

To

The Secretary to Government
P.W. Dept

Dated 7th June 1884
Recd

No 1175-27-6-84

Requesting information
of the amount by which the Pamban
Channel has been sectionally
enlarged & when.

Referred

OFFICE OF THE SUPERINTENDING ENGINEER,
6TH CIRCLE.

Tachinopoly 17th June 1884.
No. 138 M.D.

From

The Superintending Engineer,
6th Circle.

To

The Chief Engineer
P. W. D.

Sir,

ENCLOSURE-1*

With reference to your Memo No 1081D
dated 13th June, I have the honor to
return it and Mr. Thomas's letter and
to report that as the Pamban Channel
has been for years under the Marine Depart-
ment, neither I nor my officers have
any information regarding it. Probably
if Mr. Thomas is referred to the Marine
Department he will be able then to get
the information he requires.

+ Preliminary copy
sent to H.L.
1-2-84

The Madura Channel Part 5
Chapter IV page 62 gives some infor-
mation.

I have the honor to be
your most obedt servt.

M. M. M. L. Colwell

Super Engineer, Circle.

That M. Thomas was
like

A
 G.O. No. 179 of 21.1.75
 " 3154 of 6.11.74
 " 1876 of 7.11.73
 " 1650 of 25.6.73
 " 1134 of 19.4.73
 " 2674 of 3-9-67
 " 2280 of 29.7.67
 " 721 of 2-3-66
 " 434 of 3-2-66
 " 2058 of 18.7.65
 " 2431 of 24.8.64
 " 3142 of 1-11.64
 " 2442 of 24-8-64
 " 3410 of 21.11.63
 " 3194 of 3-11-63
 " 2711 of 18.9-63
 " 1998 of 22.7.63
 " 958 of 18.11.63
 " 801 of 31.3.63
 " 417 of 17-2-63
 " 3007 of 15.12.62
 " 2787 of 14-11.62
 " 2668 of 6.11.62
 " 2342 of 20.9.62
 " 1061 of 16.5.62

P. W. D. 6TH CIRCLE.

From

The Superintending Engineer,
 6th Circle.

To

The Chief Engineer
 P. W. D.

No. 138 M.D

Dated

Received

17th June 1884

Enclosure +

Pamban channel
 states that the
 information called
 for regarding —
 is not available

P. W. Deptt

No. 1175 of 27th June 84

To

The Hon'ble H. L. Thomas
 2nd Member of
 the Board of Revenue
 on special duty

Sir,

In acknowledg-
 ing receipt of your
 letter of the 7th June
 1884, asking for
 information of the
 amount by which
 the Pamban Channel
 has been sectionally
 (not longitudinally)
 enlarged, and when,
 — I have the honor to
 forward a copy
 of

P. S. 90/16.
 C.O. 21-6-84

A
G.O. No. of a letter on the sub-
-ject, No. 138 dated
17th June 1884, ^{from the S. & VI. Council} and
to express regret that
more satisfactory
information cannot
be supplied by the
P. & W. Department.

2. I have the
honour at the same
time, to forward
for perusal, and
favor of return, the
enclosed file of
printed papers, and
to draw your at-
-tention to the
Superintending Engi-
-neer's suggestion
that the Marine
Department will
probably

Mr. Thomas' letter is I see probably be able to
addressed to W. furnish you with the
particulars you
require.
Would it not be better
to transfer it to Marine
Dept. for disposal. ~~if~~
it is a fact that the
information asked for
cannot be given in
this Dept.?

LL
24.6.84
J.W.

I think that the
papers which it is
proposed to send to
Mr. Thomas will prove
useful, and may satisfy
his requirements. These
papers contain the history
of the work, so far as the
S. & W. Dept. is concerned,
from the commencement.
They show what has
actually been done to im-
prove the passage. I have
gone through them, and
am inclined to think
that Mr. Thomas would
like

CW
21.6.84

LL
24.6.84

ge
27/6/84

CW

P.S.

Copy 2/1

7.6
G. 1213C 4.7.12

No 1175 C 1427-6-84

17
1830/6

Vengambakum
Madras.
30th June 1884.

From,

The Honble H. S. Thomas
Member, Board of Revenue
on Special duty

To, The Under Secretary to Government
P. W. D.

Sir,

I am much obliged by your
letter No. 1175, dated the 27th Instant and have
the pleasure to return the enclosures.

2. The Marine Office had referred me to you.
3. I make out from the enclosures that apart
from keeping under silt it was never intended
to deepen by more than 2 feet. This therefore
is not likely to have been exceeded. The breadth
seems to be 100 feet. Enough for my purpose

I have the honor to be,
Sir, Your most obedt. Servt.
H. S. Thomas.

Member, Board of Revenue
on Special duty

Cd
85 h

No 1175 Cap 7-6-84
 404179 ay 21-1-75
 " 3154 ay 6-11-74
 " 1876A ay 24-7-73
 " 1650 ay 25-6-73
 " 1134 ay 19-4-73
 " 2694 ay 3-9-67
 " 2280 ay 29-7-67
 " 721 ay 2-3-66
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 " 2431 ay 24-8-64
 " 3142 ay 1-11-63
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 " 2711 ay 18-9-63
 " 1998 ay 22-7-63
 " 955 ay 18-4-63
 " 801 ay 31-3-63
 " 417 ay 17-2-63
 " 3007 ay 15-12-62
 " 2739 ay 14-11-62
 " 2668 ay 6-11-62
 " 2342 ay 30-9-62
 " 1061 ay 16-5-62

No 1213 Cap 4 July 84

Recorded

Cy.
3-7-84

94/7

6TH JANUARY 1885, No. 2 R., PUBLIC WORKS.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

From BARTON GRINDROD, Esq., to His Excellency the Governor of Madras, dated 44, Oxford Road, Ealing, Middlesex, 15th November 1884.

Some time ago I had the pleasure to address you upon the proposed canal through the island of Ramesvaram, and I am pleased to inform you that the project is making steady but slow progress. Sir John Coode has reported upon it very fully, and his report is highly satisfactory. In framing it he has had the advice of the most experienced captains in the employ of the P. and O. Company and the B. I. S. Company, who consider, with him, that there are no difficulties in the way of navigation, and further that the undertaking would be of great advantage to the trade of India. The concession has been engrossed by the order of the Government, and we are about forming an able Board of Directors to bring out the scheme. The proposed Directors are approved of by the Government.

2. My present object in now addressing you is to ask you for another concession, and that is to construct a line of railway from Madura to a point near the proposed canal, and a further line from the Ramesvaram canal to Tuticorin. The terms to be the same as those granted to others who may have obtained similar concessions. My object is to open up more extensively the land south of Madura, which is but poorly cultivated, and capable of producing other products than cotton and rice.

3. I contend that if the canal is made, and the railways that I suggest are constructed, it would not only raise the value of land, but stir up the characteristic indolence of the natives and improve their condition.

4. I am aware that both lines will pass through territory belonging to the Rajah of Ramnad, but there should be no difficulty on this score.

Transferred to the Chief Secretary to Government for disposal.

MADRAS,
4th December 1884.

(By Order.)
(Signed)

A. AWDRY, Captain, R.E.,
Private Secretary.

No. 2724, Marine.

Transferred to the Public Works Department.

(Signed)

E. F. WEBSTER,
Chief Secretary.

8th December 1884.

No 1175 Cap 27-1-85

ORDER—dated 6th January 1885, No. 2 R., Public Works.

Mr. Barton Grindrod will be informed that the Madras Government will be prepared to consider his proposals for lines of railway from the projected ship canal near Ramesvaram to Madura and Tuticorin, when they have been furnished with such definite information as will enable the financial prospects of the lines in question to be approximately estimated.

(True Extract.)

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To Barton Grindrod, Esq.
To the Marine Department.
„ Consulting Engineer for Railways.

Exd. A. Grubert.
Spare Copies.

RAILWAY.

Gobt. of (1885) Madras.

PUBLIC WORKS.

Dated January, 6th.

Recd.

Encl.

G.O., 6th Jan. 1885, No. 2 R.

JANUARY.

**Railway from the projected
Ramesvaram Ship Canal**

Mr. Grindrod informed that Government will consider his proposals for lines of — to Madura and Tuticorin on definite information being furnished.

COURT OF WARDS, 9TH MARCH 1885, No. 795.

PROCEEDINGS OF THE COURT OF WARDS.

READ—the following letter from C. S. CROLE, Esq., Collector of Madura, to the Secretary to the Court of Wards, dated 28th February 1885, No. 40 :—

I have the honor to submit, for orders, the enclosed original papers from Messrs. Grindrod Jenkins and Co. relating to the sale by the Court of land belonging to the Ramnad Zemindar for the construction of the Ramesvaram ship canal. I see no objection to the proposals, except that it seems undesirable to give any undertaking regarding the price for which land to be applied for hereafter will be sold.

ENCLOSURE No. 1.

From Messrs. GRINDROD JENKINS and Co., to the Collector of Madura, dated Colombo, 13th February 1885.

We have the honor to inform you that we have received a letter, dated 31st January last, from the Honorary Deputy Collector and Manager on the subject of the proposed Ramesvaram ship canal.

Before entering upon the subject of this letter, we would beg your reference to the enclosed documents, viz, a report on the scheme from Sir J. Coode and a small plan showing a slight deviation suggested by him from the course of the canal as proposed by Mr. Stoddart. The report alluded to states Sir J. Coode's reasons for the deviation. Kindly return us the documents when finished with.

You will readily see that until final surveys are complete, it is impossible to state the *specific* land required, but our London House thinks that Sir J. Coode has finally settled the route.

Under these circumstances, we have therefore the honor to apply for such land as may be required in accordance with such deviation in lieu of the land already conditionally granted. That is to say, a strip of land 300 yards wide across the island in the oblique direction marked in the plan herewith, price, terms, and conditions as previously agreed to on the line proposed by Mr. Stoddart.

An option granted us of taking on each side of this strip an extra hundred yards or thereabouts, the Zemindar agreeing to sell such land if we require it, and such extra land to be paid for as we require possession. Price, terms and conditions the same as for the 300 yards strip. For the sake of distinction, we think it would be advisable to have a separate agreement for the extra land.

Should any further change eventually be made in the route of the canal, we beg that we may be empowered to take the original land as agreed upon or other lands in addition or substitution at same price and on same terms as the original grant. We would call special attention to this, as in Sir J. Coode's plan a basin is marked at each end of the canal, and more land might be required.

All rights of the Zemindar or his tenants to be protected, and any compensation made for disturbance as agreed upon.

All agreements as to taking the land to be subject to actual cutting of the canal.

We have further to request that the proposed Company may have facilities for the landing of surveyors, tools, plant, &c., and for any preliminary work until actual possession of the land as required be taken.

ENCLOSURE No. 2.

From J. COODE, Esq., to Messrs. CLARKSON, GREENWELL, and WYLES, dated 5, Westminster Chambers, London, S.W., 26th August 1884.

Ramesvaram Ship Canal.

In compliance with the request conveyed to me in your letter of 31st ultimo, I have carefully considered the important question of forming a ship canal through the Island of Ramesvaram, for the purpose of shortening the sea passage between this country and Madras, Calcutta, and the other ports on the eastern coast of India; also between Bombay and ports upon the eastern coast; and likewise between Colombo and Madras, Calcutta, and intermediate ports on the western shore of the Bay of Bengal.

Any such reduction in the length of the voyage from England to Madras or Calcutta, &c., as would result in a material shortening of the distance to be traversed must obviously be a matter of great importance. In the case now under consideration it happens, as will hereinafter be more particularly explained, that, in addition to the saving in point of *actual distance*, the circumstances are exceptional, whether as regards (1) the direction of the courses navigated; (2) the relation of these courses to the north-east or south-west monsoon, as the case may be; (3) the ocean currents generated by those monsoons; and (4) the comparative smoothness of the sea at all times along that portion of the route which will be new.

I should here premise that I have examined the charts showing the line of canal recommended by Mr. McBean, C.E., and have also carefully considered the proposals for cutting through Toni Turei Point for the improvement of the navigation through the Pámban Pass, and for the construction of a canal through Rámesvaram, as described in the official documents printed by order of the Legislative Council of Ceylon, and of the House of Commons.

As to the several projects above adverted to, it will suffice here to remark, in general terms, that although the improvement of the Pámban Channel would appear, *prima facie*, to be the most simple and feasible solution of the problem, its great cost—estimated by Mr. Townshend, C.E., at nearly £1,400,000—would alone preclude its adoption. But in addition to this, I may observe that the navigation of large vessels through such a channel as that proposed would be so difficult and indeed so dangerous during the south-west monsoon that its execution should not be seriously entertained.

I agree entirely with Mr. G. Robertson, C.E., in the view expressed in his report of March 1873 to the effect that a canal through Rámesvaram will give the “cheapest satisfactory short cut to the East of India.” Having arrived at this conclusion, I addressed my particular attention to the best mode of carrying it into effect, and shall now state my views on this subject.

It may be well, however, to mention, by way of preface, that through the courtesy of the Chairman of the British India Steam Navigation Company, Mr. Mackinnon, and the Chairman of the Peninsular and Oriental Steam Navigation Company, Mr. Sutherland, I have placed before two of the most experienced captains of the former Company, and one of the latter, the proposals which I shall presently explain in detail, and I have the satisfaction of being able to state that these proposals have met with their entire concurrence.

I send herewith three drawings, in illustration of this report, viz:—

Sheet No. 1, a chart of the Bay of Bengal, on which the existing routes are shown by blue dotted lines, and the routes which would be adopted after the execution of the new canal and channels by red dotted lines.

Sheet No. 2, a chart of Palk's Strait and the Gulf of Manaar, with the proposed canal and navigation courses shown in red lines; and

Sheet No. 3, a chart, on a large scale, of the western portion of the Island of Rámesvaram, showing (also in red colour) the line of canal together with its northern and southern entrance channels, and the piers at either end.

Sheet No. 1 may be regarded as self-explanatory, when taken in connection with the remarks above made, as to the red and blue dotted lines respectively.

A reference to Sheet No. 2 will show, in detail, the navigation courses from the open water in the Gulf of Manaar to the open water in the Bay of Bengal, and also the three lightships and the several buoys which I consider to be desirable to render the navigation perfectly easy at all times. From these it will be seen that a vessel coming from the southward, if bound to Madras or Calcutta direct—whether from Europe by the Red Sea, or by the Cape of Good Hope, or from Bombay, or any of the ports on the western seaboard of India—after passing Cape Comorin would take her course on the bearing of N. 49° E., through the Gulf of Manaar up to Lat. 9° 8' N., and when between the lightship and the buoys lying to the southward of Rámesvaram, she would change her course to N. 36° W., which would lead her up to the entrance between the piers at the south end of the canal.

After passing through the canal itself, the main features of which I shall presently describe in some detail, the vessel's course would be N. 40° E. through the broad sheltered water of Palk's Strait, which has a depth of remarkable uniformity (7 to 8 fathoms) for a length of about fifty miles.

When off the Island of Kara-Tivo at the north-western extremity of the Island of Ceylon, the course would be N. 78° E., until about five miles north of Point Palmyra, which lies a little to the westward of Point Pedro (the north-eastern extremity of Ceylon), when it would be N. 18° E., and this would lead her into the open water (about 30 fathoms deep) in the Bay of Bengal.

Comparing the courses on the present and the proposed routes, an inspection of the respective lines on No. 1 Chart will serve to show how direct are the latter as compared with the former, the actual distance saved between a point off Cape Comorin and Madras would be from 320 to 360 nautic miles, according to circumstances. In case of a vessel calling at Colombo, the saving would, of course, be less; but, as before intimated, and as will presently be further explained, the question in this case is not simply one of saving of distance alone.

As to the direction of the proposed navigation courses with relation to the winds during the monsoons and to the ocean currents, it is well known that around the coasts of Ceylon the

winds during both the south-west and north-east monsoons are greatly modified in their direction by the direction of the land. As a matter of fact, within the region of the present steamers' tracks around the island the winds blow *along* the land, viz., towards the east along the south coast and towards the north along the east coast in the south-west monsoon, and towards the south along the east coast, and towards the west along the south coast, in the north-east monsoon.

It is equally established that strong sea currents are set up by the respective monsoons; these currents running in the same directions as the monsoon winds may be blowing.

With respect to the comparative smoothness of the sea along the respective routes, Charts Nos. 1 and 2 will show that the new route is sheltered by the land of Southern India on the west and the Island of Ceylon on the east, and, as a consequence, the water will at all times be smoother than along the present tracks.

In corroboration of what I have just stated, I may quote the following extract from a well-known book entitled *Navigation of the Indian Ocean*, by the late Capt. A. B. Becher, R.N., formerly of the Hydrographic Office of the Admiralty:—

“On the west coast of Ceylon the north-east monsoon brings the fine season, while on the east coast it is accompanied with storms and a heavy sea, and either continual rain or dark, cloudy, and foggy weather. Such weather prevails at this time of the year between the Basses and Point Palmyra, while fine weather is found between Galle and Jaffnapatam, a town situated in the Bay of Palk.”

I may here remark in passing that, according to the best information I can obtain, the new route will be out of the region of the cyclones which occasionally visit portions of the Bay of Bengal. These do not appear to extend to the southward of Lat. 11° N., and but *very rarely* as far down as Lat. 12° N., whereas the northern extremity of the new route is in Lat. 10° N.

In consequence of this combination of circumstances in favor of the new route, the saving in point of time on the voyage to Madras or Calcutta—whether from England by Aden, or from Bombay, or any of the ports on the western coast of India—may be fairly taken at thirty-six hours (a day and a half) on the voyage out, and the same on the voyage home, or three days in all, not to speak of the comfort and convenience to all concerned, and the diminished wear and tear, &c., owing to the navigation being in smoother water on the new than on the present route.

On the regular fortnightly voyages to Madras and Calcutta of the larger ships of the Peninsular and Oriental Company only, the reduction of time would thus amount to no less than 78 days per annum, the saving upon which in *coals alone* would amount to a very considerable sum annually.

Before describing the canal proper, and line upon which I would recommend it to be constructed, together with the reasons which have guided me in making these recommendations, it may be well to explain that the Island of Rámesvaram is separated from the mainland immediately opposite the south-east cape of Hindostan (Toni Turei Point) by a rocky barrier upwards of a mile in length from west to east. The channel known as the “Pámban Pass” is an artificial cut which has been made through this barrier, of about 50 yards in breadth, and with depths ranging from 10 to 14 feet at low water. The current through the Pass is usually about three knots an hour; it varies with the monsoons, and is sometimes as strong as six knots an hour, or even more. Patches of rock and shoals encumber the southern approaches to the Pass for several miles to such an extent that it cannot be rendered fit for navigation by large vessels at any reasonable cost. Even the expenditure of £1,400,000 hereinbefore alluded to as the estimate by Mr. Townshend, C.E., in 1871, contemplated a channel of such a character that it could not be used with safety by the large steamers of the present day, not to speak of the question of the possibility of maintaining it without such a heavy annual expense as would be inadmissible.

Rámesvaram is low and sandy; in length from W.N.W. to E.S.E. it is nearly fourteen miles; its eastern half is merely a narrow strip of sand. At the point of greatest breadth, on which stands the great Brahmin Temple,* the width of the island is about five miles.

It is across the westernmost part of Rámesvaram, as is shown on enlarged scale on Sheet No. 3, that it has been and is proposed to cut the ship canal for the purpose of shortening the passage of vessels to and from the eastern coasts of India.

As will be seen on Sheet No. 2, Rámesvaram is connected with the Island of Manaar (which latter is nearly joined to Ceylon) by a barrier consisting of a narrow ridge of sand and rocks, mostly dry, and known as “Adam's Bridge,” so that Ceylon is nearly joined with the continent of India.

Three different lines have hitherto been proposed for the suggested canal. The first in point of date was laid down by the late Sir William Denison, R.E.; this is the easternmost of the

* The great temple, or coil, stands on a piece of rising ground on the north part of the island, bearing north-west ten miles from Thani Kodi, and E. $\frac{1}{2}$ N. five miles from Pámban Lighthouse. Its height is about 120 feet, and with its majestic towers, its vast and gloomy colonnades, and its walls encrusted with carved work and statuary, this temple exhibits a grand example of the style of such monuments in Southern India, though inferior in dimensions to those of Seringam, Madura, and Tanjore. Thousands of pilgrims from all parts of India resort here. In the year 1877, 47,000 pilgrims visited the temple of Rámesvaram. (From the Admiralty Sailing Directions for the West Coast of Hindostan.)

three lines running from north to south; on Sheet No. 3 it is marked No. 1, and is colored yellow.

The northern entrance to this canal would be well placed, inasmuch as it would derive considerable shelter during the north-east monsoon from that part of the island which trends directly to the northward at a short distance from the proposed northern entrance of the canal.

But, on the other hand, this proposal has been objected to—and justly so—on the ground that the southern entrance would be so much exposed to the sea during the south-west monsoon that it would be necessary to construct for its protection a breakwater a mile in length, and in from 20 to 25 feet of water at low water. The cost of this breakwater alone would be considerably more than equal to that of the canal itself. This line may therefore be disregarded.

The westernmost of the three lines is that which was selected by Mr. G. Robertson, C.E., and recommended in his Report of March 1873; it is colored grey, and is marked No. 3 on the accompanying Sheet 3. I am unable to recommend the adoption of this line; 1st, because the direction of the south approach or entrance channel would be such as to expose vessels broadside to the wind and sea in the south-west monsoon to a greater extent than is desirable; and, 2nd, because the northern entrance of this canal would be so much exposed during the north-east monsoon.

The middle line, colored green on Sheet 3 (and marked as No. 2), is that which was recommended in November 1871 by Mr. Stoddart, of the Surveyor-General's Department, Ceylon, and has been adopted by Mr. McBean.

Having regard to all the conditions of the case, I regard this as decidedly preferable to either No. 1 or No. 3; but, nevertheless, it is open to considerable improvement.

The best line that can, in my opinion, be adopted for the canal is that shown by red color on Sheets Nos. 2 and 3, more especially on the latter, which is on a much larger scale than the former.

It will be seen that, as in the case of line No. 2, the southern entrance is well under the shelter of the Kallaroo Reef with the Shingle Islets, as also of the Coorisuddy, Pullivausel, and Pulli Islands, and their surrounding reefs, which, taken together, would form a great natural breakwater for this entrance during the south-west monsoon. At the same time, the northern entrance is so placed as to derive considerable shelter during the north-east monsoon from the northerly stretch of the coast immediately to the eastward.

It should be understood that this line may possibly be slightly modified after a complete (marine and land) engineering survey has been made, such as is usual, and indeed necessary, before finally determining the details of important works of this nature. There can be no doubt, however, that this may, for all practical purposes, be regarded as the line that will be adopted.

Although the placing of the canal obliquely, as I have shown it, will slightly lengthen the cutting through the island, as compared with a line running directly north and south, there will be a further advantage than the improved sheltering of the entrances to which I have just adverted, viz., the bringing of the course of vessels passing through it more directly in line of the winds, both in the north-east and south-west monsoons. This I regard as a material consideration, seeing that vessels of the largest class, which have their sides so high above the water, will be much less liable to be deflected from their true course whilst passing through the canal, owing to the wind being almost invariably nearly either ahead or astern whichever monsoon might be blowing. I have said "nearly," but am inclined to believe that, inasmuch as the average height of the canal banks will be from 12 to 15 feet above the water level, the wind through the cut will be either directly ahead or directly astern, according to the monsoon, and the outward or homeward course of the ship.

The total length of the canal through the island, from high water to high water, will be $2\frac{1}{10}$ miles (nautic), and the bottom width 100 feet, or nearly 40 per cent. wider than the Suez Canal at the present time. The inclination of the side slopes will be 2 to 1.

The tides here are irregular, but the depth would be 28 feet at low water of the lowest springs. The spring tides sometimes rise as much as 3 feet, but during neaps the range is frequently not more than a few inches, so that at neap tides there would be, throughout the whole twenty-four hours, a depth of, say, 29 feet. The mean depth in the canal for the twenty-four hours during spring tides would be 29 feet 6 inches, or fully 2 feet more than in the Suez Canal at present.

Inasmuch as the tide streams enter Palk's Strait from the north and the Gulf of Manaar from the south, the tidal range is practically the same in both. During the strongest of the monsoon winds, however, the sea level immediately on the weather side of the island and of Adam's bridge is sometimes 12 inches higher than on the opposite side. The effect of this will be that on such occasions a current of about two knots an hour will be generated through the canal and entrance channels, resulting in a most beneficial action in maintaining the depths when once they have been created by the dredging operations in executing the works.

It will be noticed that I have provided protecting piers at each entrance, and within the piers at each end of the canal a basin 400 feet wide clear of the canal channel and 1,000 feet long; these will serve mainly as "gares" or stopping places for vessels, and also as wave-traps; but having regard to the sheltered positions of the entrances, and the form given to the piers, I am of opinion that no really inconvenient disturbance will enter the canal at either end at any time.

In order to simplify the lighting arrangements, and to enable vessels to traverse the canal by night, I have so arranged the positions of the outer ends of the respective piers and the light houses thereon at the north and south entrances, that the same lights which serve to guide vessel into the canal shall also serve to guide them through it. For example, a vessel having entered between the southern pier heads by means of the light at the outer end of the western pier would at once port her helm and steer directly for the light on the outer end of the eastern pier at the north entrance; and *vice versa*, a vessel having entered between the northern pier heads would steer directly for the light on the western pier at the south entrance. These lights being powerful and but a little over two miles apart, vessels could enter the canal at night whenever it was safe to navigate at all near land.

A light, such as ordinarily used on pier heads, would be placed at the inner salient angle of each basin.

If it were deemed desirable, a small light on the "Pintsch" system might be placed at equal intervals of 600 yards along the length of the canal; the number thus required would only be five in all. Erected on standards set up on the side slope, about 25 feet landward of the junction of the slope with the floor of the canal, they would be found useful as guiding beacons by day as well as by night.

It will be seen by reference to Sheet No. 2, that a vessel coming from the southward, after passing the lightship off Thani Kodi, would steer a course N. 36° W., and, as will appear more clearly from Sheet No. 3, when on this course she would have the existing Pámban light near the Zemindari Bungalow as a guide, this being the line on which I have fixed the course for the south entrance channel, which is to be dredged to a depth of 30 feet at low water for a width of 600 feet. Being properly marked with three Pintsch's light buoys, this channel would be as easily and safely navigated by night as by day.

This Pámban light is 97 feet above sea level, being visible 14 miles "all round the compass," and the Thani Kodi lightship being only $11\frac{1}{2}$ miles distant from it, no change whatever would be needed to render the Pámban light available for the new navigable route.

The lightships to which I have already referred would be fitted with lighting apparatus of the best kind, and of ample power, and also with the means of signalling in foggy weather according to the method most approved by the Trinity House of London. The buoys also, and their moorings, and those for the lightships, would likewise be of the most approved type and strength, and provision has been made accordingly in the estimate.

I have considered that, in a navigation of such great importance, the works and accessories should be of the highest class, so as to ensure the confidence of all who may use it, or who may be interested therein.

Provision has also been made in the estimate for a complete ferry, adapted for road vehicles, and for the use of the numerous pilgrims resorting to the great Brahmin Temple in the northern part of the island.

Assuming, what seems to be almost certain, that the nature of the ground along the line of the canal herein recommended will be the same as that which has been found by borings to exist along line No. 2—the westernmost of those shown on Sheet No. 3—I estimate the cost of the canal complete, with the entrance channels, piers, and adjunct works hereinbefore described, at the sum of £865,270, say £870,000.

This sum comprehends the supply, delivery, and placing of the lightships and buoys ("Bell," "Pintsch," and ordinary), and a spare lightship, to be placed temporarily on either station, whilst that particular vessel may be removed for "overhaul," &c., as would be the case once in about every two years. It further includes the cost of spare buoys and moorings, and a proper margin upon the works, and for their supervision and direction.

I may add that I have the fullest confidence in the sufficiency of the amount of the estimate above given, from the circumstance that it is based to a great extent upon works executed under my own direction at Colombo during the past ten years.

With regard to time, I assume that four years from the actual commencement of operations on the ground would be necessary for the execution of the works, but previous to this a period of about nine months would be required for making the surveys, &c., and for preparing the contract, drawings, and specifications, and a further period of about nine months would be necessary for concluding a contract and enabling the contractor to commence the execution of the works, so that there completion might be safely calculated upon within six years from the time of the authorization of the detailed surveys.

In Sir Emerson Tennent's well-known work on "Ceylon," I find the following observation:—"It is remarkable that in the little Island of Rámesvaram, one of the chain which connects Adam's Bridge with the Indian continent, fresh water is found freely by sinking for it in the sand." I regard this as very important, and therefore quote it here.

There is not, as far as I am aware, any other point on which I need now make any comment; if, however, there should be any matter upon which explanation or further information is desired, I shall be happy to render it, so far as may be in my power.

RESOLUTION—dated 9th March 1885, No. 795.

The Court of Wards will be prepared to grant such land as may be required for the altered alignment of the canal in lieu of the land already conditionally granted, that is to say, a strip of land across the island in the oblique direction marked in the plan, 300 yards wide, price, terms, and conditions as previously agreed.

2. They will also place no difficulty in the way of such further acquisition of lands as may be found necessary, which, however, must form the subject of a separate agreement.

3. The Collector will report if Rs. 200 per acre may be accepted for the extra land that may be taken up for the Company, and he will also inform the Court whether the proposed alteration in the alignment of the canal will interfere with any other rights or rights of way than those affected by the canal as originally aligned.

(True Copies and Extract.)

G. H. M. S.
Acting Sub-Secretary.

To the Collector of Madura, with two enclosures returned.
Copy to the Secretary to Government, Revenue Department,
" " " " Public Works Department.

Exd. W. J. Lewis.

REVENUE DEPARTMENT.

1885.

Court of Wards,

MADRAS.



Printed March th.

Proceedings, 9th March 1885, No. 795.

Passing orders on letter from Collector of Madura, submitting papers received from Messrs. Grindrod Jenkins and Co., of Colombo, relating to sale by Court of Wards of certain land belonging to Ramnad Zemindar required for the construction of the Rameswaram ship canal.

With order

Recorded
Recorded

21

21-3-85

23.3.85

21.176/1/85
310.4.15/1/85
310.4.16/1/85
42.4.27/3/83
440.4.19/2/83
532.4.1/1/85
54.4.95/1/83
3429.4.120/1/82
3430.4.1/1/85
3208.4.9.6/1/82
2082.4.9/13/1/82
2983.4.9/13/1/82
383.4.9.4/1/82
1804.4.9/13/1/82
889.4.9/13/1/82

S. E VI Circle

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