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MADRAS RECORD OFFICE

Government of Madras

Public Works. DEPARTMENT

G.O. No.	2966	Press
B.P. No.		Mis.
157-158.		
Dated	9-12-1873	195

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department
9th December 1873.

No. 157. Read the following Proceedings of the Government of India, Public Works Department, (Buildings and Roads—Miscellaneous), dated Simla, 6th November 1873, No. 461 B.—C. :—

Paumben Ship-Canal.

Read the following :—

From the Secretary of State for India, to the Government of India, Public Works Department, dated 16th September 1873, No. 79.

IN continuation of my despatch, dated the 29th of May 1872, No. 48, on the subject of the construction of a ship-canal by the Paumben Pass, or otherwise, to unite Palk Strait with the Gulf of Manaar, and with reference to your letter, dated the 6th of August, No. 83, I transmit, for your Excellency's information, a copy of a letter from the Colonial Office, dated the 5th instant, with its enclosures, containing replies from Mr. Stoddart and Mr. Reidy to certain observations made by Mr. G. Robertson in that portion of his second Report on the Harbours of India which relates to this question.

2. I also forward a copy of a correspondence which took place with the Colonial Office in April last, relating to the presentation of Mr. Robertson's report to Parliament.

From Colonial Office, 7th April 1873.
To do. do. 21st April 1873.

From R. H. MEADE, Esq., to the Under Secretary of State, India Office, dated Downing Street, 5th September 1873.

WITH reference to previous correspondence, I am directed by the Earl of Kimberley to transmit to you the enclosed copy of a despatch from the Governor of Ceylon, enclosing certain communications from Messrs. Stoddart and Reidy, the accuracy of whose calculations had been called in question by Mr. Robertson in his Report on the proposed Paumben Ship-Canal.

2. A copy of this despatch and its enclosures has been communicated to Mr. Robertson.

From His Excellency W. H. GREGORY, Governor of Ceylon, Miscellaneous, to the Right Honourable the Earl of KIMBERLEY, dated Queen's House, Columbo, Ceylon, 18th July 1873, No. 223.

I HAVE the honour to acknowledge the receipt of your Lordship's despatch, No. 89 of the 9th April last, forwarding copies of the second series of Mr. Robertson's Report on Indian Harbours.

2. In compliance with your instructions, I will lay a copy of this Report before the Legislative Council at its next Session.

3. With reference to the concluding paragraph of your Lordship's despatch, I transmit copies of a letter from the Surveyor-General, enclosing one from Mr. Stoddart and of a letter from Mr. Reidy, submitting their explanations of the cause of the discrepancy between their figures and those of Mr. Robertson in the survey of the proposed ship-canal at Paumben.

From Major A. B. FRYERS, R.E., Surveyor-General, to the Honourable the Colonial Secretary, dated Columbo, 10th June 1873, No. 173.

WITH reference to your letter, No. 134 of 31st ultimo, I have the honour to forward a letter from Mr. John Stoddart explaining the cause of the discrepancy between his figures and those of Mr. Robertson.

2. Mr. Stoddart provided for a canal 10 yards average width above the level of low water and 70 yards average width below low water-line, whereas Mr. Robertson's proposed canal is only 70 yards wide at low water level and 24 yards at the bottom.

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STODDART, Esq., to Major A. B. FYERS, R. E., Surveyor-General, dated Colombo, 9th June 1873.

With reference to the letter No. 134 of the 31st ultimo, from the Colonial Secretary to your address, calling upon me to submit any remarks or any explanations I may desire to make on that part of Mr. Robertson's Report to the Government of India, where he questions the accuracy of my calculations for the proposed ship-canal at Paumben, I have the honour to state—

1st.—That my calculations are perfectly accurate, and that the great difference between Mr. Robertson's quantities and mine for the cutting through the island is owing to his having adopted a section of only half the carrying capacity of that adopted by me, which is clearly illustrated in the accompanying drawing of the two sections.

2nd.—That the section given me by Mr. Townshend from which to work out the quantities for the late Sir W. Denison's scheme; in fact, the survey of that section was made on my own responsibility, and Mr. Townshend estimated its cost from my quantities and his own rates.

3rd.—It is to be regretted that Mr. Robertson did not, while at Paumben, with a copy of Mr. Townshend's Report in his possession, enter into this subject by comparing my figures with the section, the exact dimensions of which are given in Appendix C.

4th.—Although not called upon to do so, I beg permission to add that I still consider my selection of a site the best to be found, if a cutting through the island is to be adopted. It would be much better to have the anchorage on the south side, west of the entrance to the canal, than in the fair way, and it appears to me that Mr. Robertson's site is much too confined at the southern entrance to permit of large vessels entering with safety.

2. I beg to thank the Government for the opportunity that has been afforded me of explanation, and I trust that a copy of this letter may be forwarded to the Government of India.

From T. J. REIDY, Esq., to the Honourable J. DOUGLAS, Acting Colonial Secretary, Ceylon, dated Davipatam, Madura District, 26th June 1873.

I HAVE the honour, in compliance with His Excellency the Governor's wishes, to make the following remarks in connection with Mr. Robertson's Report on the Paumben Ship-Canal.

2. In reference to Mr. Robertson's Report, page 67, he says—"This price he states was from his experience of what coolies had done in excavating two cubic yards." It seems I did not express myself clear enough in my estimate when mentioning about the two cubic yards. I mentioned two cubic yards merely to show the physical certainty of work an average Tamil cooly can do in one day of nine working hours.

3. When I was Superintendent in the Public Works Department in Ceylon, I had excavated many thousands of cubic yards of clay and sand at depths varying from 3 feet to 20 feet below the ground level.

4. I also at the same time had several thousands of cubic feet of sand-stone quarried, as also some hundreds of blocks of stone, from one to ten tons each in weight, quarried for various works in the Public Works Department in Ceylon.

5. I beg to mention that these facts will show that my estimate was not based on the experience of two cubic yards.

6. In Mr. Robertson's Report, page 67, he also mentions: "as he names much smaller prices per cubic yard in another memorandum to me, it occurs to me that the above price refers more nearly to two yards cube than to two cubic yards." I beg to state that I did not mention cube yards in any of my estimates. In all my estimates I calculated cubic yards.

7. I have no doubt coolies can do excavating work much cheaper than my estimate provided, there was constantly sufficient European supervision over the labourers.

8. In reference to Mr. Robertson's Report at page 69, in mentioning the dimensions of the Suez Canal, I beg to mention I did not calculate these dimensions in computing my estimate. My estimate was on Mr. Townshend's figures, which took for 70 yards in width of canal at low water level, and the same width at the bottom with a width of 26 feet. This size, as pointed out by Mr. Robertson, is needless, as the width of the bottom of this Paumben Canal will be sufficient at the same width as the bottom of the Suez Canal, 72 feet. This would reduce my original estimate of £660,000 with reductions in contingencies to £121,000.

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9. Mr. Robertson mentions at page 64 in his Report that the site chosen by him is a lower level above sea-level than the site of Sir W. Denison's. This is a fact to my knowledge. But then Mr. Robertson says at end of page 67 in his Report that there would be some 500,000 cubic yards more dredging at his site than would be required at Sir W. Denison's site, so that what would be gained in excavation above sea-level would be counterbalanced by the excess in dredging. Thus, in a great measure, giving the cubic contents to be removed out of these two proposed sites as an equal quantity from each.

10. Mr. Robertson mentions at page 70 in his Report that my estimate for excavation is too high, and my estimate for dredging and dredging plant are too low; I would put one to counterbalance the other, and by so doing my estimate may be near the actual cost.

11. But with Mr. Robertson's great experience every consideration should be given to his estimate.

12. I beg to mention, in reference to the site of canal worked on Mr. John Stoddart's plan, of the Surveyor-General's map of the 15th November 1872, viz., "Deviation proposed by Mr. Reidy." This deviation was suggested by me merely as an improvement on Mr. Townshend's plan of deepening the existing old channels, which deviation would be an improvement in the navigation of the present channel, and also be a material saving in cost of construction.

13. At the same time I pointed out to Mr. Townshend my belief was that the only successful site for a ship-canal would be a cut right through Ramissaram Island in the vicinity of Sir W. Denison's site. I pointed out also at the same time to the ample protection which the Cooresuddy and Shingle Islands would be to the southern entrance of this canal throughout the south-west monsoon.

14. I also pointed out the foregoing advantages of such a site, above all others, to Mr. John Stoddart previous to the latter's survey of the site proposed by Sir W. Denison.

15. I send herewith a copy of my detailed estimate for the canal less £121,000 than any previous estimate. But this reduction does not take from the accuracy of my first estimate as regards figures giving quantity of excavation and dredging. I simply have amended my first estimate by abstracting from it the quantity over estimate in calculating the same width for the top and bottom of canal as given in Mr. Townshend's Report.

16. Should portable iron water-pipes with good screw joints be laid down parallel with the canal cutting, with some 100 iron tanks to hold water, this would be a means of having constantly lots of good water supplied daily along the works for the many thousands of coolies employed, and would supply one of the greatest requirements of the labourers during the construction of the works.

17. I beg to mention that the large jail at Paumben, recently occupied as a Convict Depot, is now vacant, the convicts having been removed to jails on the main land. It is reported that these premises are to be sold; should the Madras Government or a contractor go on with the ship-canal, this jail, etc., would be of the greatest benefit to them, having two splendid fresh water wells in its compound, with several tiled sheds, and two large corrugated iron roofed buildings.

18. There is also adjacent to the jail a large permanent tiled bungalow, which could at once be handed over as a residence for the Chief Engineer in charge of the works.

19. These buildings aforesaid are only some three-quarters of an English mile from north entrance of Mr. Robertson's proposed site.

20. I have no doubt that when this Paumben Ship-Canal is completed, it will be a means of inducing dozens of steamers to call at Colombo, which vessels otherwise would pass by Colombo without calling, thus offering to the Port of Colombo the cheapest steam freight to England than from any other port in India, east of Cape Comorin. Steamers such as the *J. C. Stevenson* would alone save 50 tons of coal by going through this canal on the trip out and home.

21. I gave no estimate or prices to Mr. Townshend in reference to the proposed ship-canal at Paumben.

22. By far the best time in the year to commence work in making a ship-canal in Paumben would be early in January.

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Estimate for a Ship-Canal through the Island of Ramisseram on the site proposed by the late Sir W. Denison, 300 feet wide above the sea-level, 210 feet in width at sea-level, 76 feet in width at the bottom of the canal, depth 26 feet.

SALARIES.

	£.	s.	d.
One Head Chief Engineer, four years, at £1,500 per annum ...	6,000	0	0
Two Assistant Engineers, at £800 each per annum for four years ...	6,400	0	0
Four European Overseers at £200 each per annum for four years ...	3,200	0	0
One European Foreman Carpenter, at £200 per annum for four years ...	800	0	0
One European Foreman Smith, at £200 per annum for four years ...	800	0	0
One European head clerk for four years at £200 per annum ...	1,200	0	0
One Clerk at £150 per annum, four years ...	600	0	0
Three Clerks at £60 each per annum, four years each ...	720	0	0
Thirty Lime-keepers at £36 each per annum for four years each ...	4,320	0	0
Twelve Peons for four years each, at £12 each per annum ...	576	0	0
One Apothecary four years, at £150 per annum ...	600	0	0
Salaries of Hospital staff for four years ...	288	0	0
Medicines for four years ...	360	0	0

BUILDINGS.

Three houses for Engineers, at £533-6-8 each ...	1,600	0	0
Four houses for Overseers, at £150 each ...	600	0	0
One hundred temporary cooly sheds constructed of palmyrah rafter and kadjans, at £20 each, size 100 feet x 18 feet x 7 feet	2,000	0	0
Repairs on do. for four years ...	1,000	0	0
Three forge sheds at £200 each, size 60 x 18 x 7 feet with masonry pillars...	600	0	0
Office and Clerks' houses ...	1,000	0	0
Thirty Lime-keepers' houses at £15 each ...	450	0	0
300 Small houses for use of labourers with families at £6 each..	1,800	0	0
Two hospitals, permanent buildings, at £200 each, size 60 x 18 x 8 ...	400	0	0
Two Lighthouses at the entrances to canal at £1,500 each ...	3,000	0	0
Two Stores at £500 each, size 200 x 18 x 7 ...	1,000	0	0
House for Apothecary and staff ...	100	0	0

PLANT.

Two Steam tugs at £5,000 each ...	10,000	0	0
Fifteen Hopper barges at £300 each ...	4,500	0	0
Two first-class steam dredgers capable of dredging 600 tons clay and broken rock coral per hour at £10,000 each	20,000	0	0
Two steam launches at £350 each ...	700	0	0
Two of Gwynne's 6-inch centrifugal pumps, at £700 each	1,400	0	0
Two 15 horse-power portable engines work same	1,500	0	0
Tools, mamotties, crowbars, kathces, wheel-barras	1,500	0	0
100,000 rattan baskets at 9d. each	3,750	0	0
One mile of eight portable tramway rails for 20 tons used such in excavating and removing stones	3,000	0	0

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SUNDRIES.

	£.	s.	d.
Land.—Remuneration for same ...	5,000	0	0
Two small Piers ...	600	0	0
Stationery ...	300	0	0
Furniture ...	1,100	0	0
Steam Labour.—Working two steam dredges 10 hours each daily for 300 days at £50 each per day. This includes pay of officers, crew, coal, etc., etc. ...	30,000	0	0
Working two steam tugs 300 days each at £13 per day each ...	7,800	0	0
Do. 15 Hopper barges for 300 days each at 12s. per day..	2,700	0	0
Do. Steam launches, 300 days each, at £2 per day each...	1,200	0	0
Do. Two Gwynne's pumps, 600 days, at £4 per day ...			
Total...	2,400	0	0

Night work of pumps are wanted, say 600 nights, at £4 per night. 2,400 0 0

Hand Labour.—Excavating 1,703,300 cubic yards of sand above low water mark and removing same quantity to a distance of 250 lineal yards from side of canal.

Note.—This is the quantity above low water line as given in Mr. Townshend's Estimate Report, 20th November 1871. Two coolies can easily dig 2 cubic yards of sand or light sand per day, five women can remove 2 cubic yards of sand or stone 250 lineal yards from side of canal in one day.

RATES OF DAILY PAY.

	£	s.	d.
Cooly 8d. per day Woman at 4½ per day—			
This rate of work and pay is equal to 1s. 7½d. per cubic yard on the forementioned quantity ...	136,618	17	1
Excavating 1,530,658½ cubic yards of sand, gravel, clay, and sand-stone below low water level and removing same 250 lineal yards from side of canal.			

Note.—This quantity is estimated according to the figures in Mr. Townshend's Report, but less the quantity as calculated in giving the dimensions of the ship-canal as 210 feet in width at sea-level, with a slope as recommended by Mr. Robertson to 72 feet in width at bottom, same as Suez Canal, with a depth of 26 feet. I consider labour as follows ample to excavate 2 cubic yards, viz. :—

- 4 coolies, one day each, at 9d. per day.
- 2 coolies, one day each, at 6d. per day.
- 5 women, one day each, at 5d. per day.

This equal to 3s. 0½d. per cubic yard on the before mentioned quantity ... 232,787 12 5½

CONTINGENCIES.

Having allowed what I consider sufficient for labour and plank, I herewith put down 7 per cent. for contingencies, on the amount of £429,456-9-6½, this being the estimate for buildings, excavated and dredging ...

	£	s.	d.
Buildings, excavated and dredging ...	30,061	19	0½
Total amount...	538,732	8	6½
ABSTRACT.			
Salaries ...	25,504	0	0
Medicines ...	360	0	0
Buildings ...	13,550	0	0
Plant ...	46,350	0	0
Sundries ...	7,000	0	0

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Steam labour	£	s.	d.
Hand labour	46,500	0	0
Contingencies	309,406	9	6½
	30,061	19	0½
Total...	538,732	8	6½

Mr. Townshend's estimate for Sir W. Denison's proposed cutting, including the breakwater	2,372,810	0	0
Mr. Reidy's present estimate, calculated on the original figures furnished in Mr. Townshend's Report, less the quantity as over-estimated in calculating the cutting as the same width at top and bottom	538,732	8	6½
Difference...	1,834,077	11	5½

Cubic yards.

Total cubic contents as by Mr. Townshend's Report of 20th November 1871	5,474,653
Mr. Reidy's revised estimate on Mr. Townshend's above mentioned figures but less the quantity taken out for the slopes of the canal as adopted by Mr. Robertson in having the canal 210 feet in width at sea-level, and 72 feet width at bottom. This gives cubic contents	4,725,559

(Signed) T. J. REIDY.

From R. G. W. HERBERT, Esq., to the Under Secretary of State, India Office, dated Downing Street, 7th April 1873.

With reference to your letter of 23rd January last, I am directed by the Earl of Kimberley to state to you, for the information of the Duke of Argyll, that Mr. Robertson has forwarded direct to this department copies of the second series of his Reports on Indian Harbours, and that Lord Kimberley will transmit the papers as to the Paumben Ship-Canal for the consideration of the Government of Ceylon.

2. Lord Kimberley would suggest, for the consideration of the Duke of Argyll, that Mr. Robertson's Reports to the Government of India on the Paumben Pass should be laid before Parliament, as Lord Kimberley has already presented that addressed to the Governor of Ceylon by Mr. Townshend, as well as that of Commander A. Dundas Taylor enclosed in your letter of the 3rd May 1872.

From M. E. GRANT DUFF, Esq., to the Under Secretary of State for the Colonies, dated India Office, 21st April 1873.

I am directed by the Secretary of State for India in Council to acknowledge the receipt of your letter of the 7th instant, suggesting that he should lay before Parliament Mr. Robertson's Report to the Government of India on the Paumben Pass.

2. In reply, I am desired to state that, as the Government of India requested that as far as they were concerned Mr. Townshend's project for a canal from Palk Strait to the Gulf of Bengal might be discouraged, and as their opinion on the plan now suggested by Mr. Robertson has not been received, the Duke of Argyll is not likely to be prepared at present to take steps for laying a paper on the subject before Parliament.

3. Should the Earl of Kimberley have any objection to the proposed extracts from the Duke of Argyll's Report being presented to the Colonial Office, as was done in the case of Commander A. Dundas Taylor's Report, I am directed to state that it is desirable to do so, the Duke of Argyll will not object to the proposed extracts from his Report being presented to the Colonial Office, as was done in the case of Commander A. Dundas Taylor's Report.

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9th December 1873.*

From R. G. W. HERBERT, Esq., to the Under Secretary, India Office, dated Downing Street, 17th September 1873.

I am directed by the Secretary of State for the Colonies to transmit to you, for the information of the Duke of Argyll with reference to your letter of the 11th instant, the undermentioned document:—

No.—1. Date.—September 8th.—Letter from Mr. Robertson on the Paumben Channel.

From G. ROBERTSON, Esq., to the Right Honourable the Secretary of State for the Colonies, dated 47, Albany Street, Edinburgh, 8th September 1873.

I am in receipt of the correspondence sent to me by your directions from Ceylon regarding my Report on the Paumben Canal.

2. The discrepancies between my quantities of excavation and those of Mr. Stoddart are now easily accounted for. He has taken a section of canal *twice* as large as the Suez Canal, whereas I have taken the same section as the Suez Canal.

3. As the Paumben Canal may be considered supplementary to the one at Suez, I can see no necessity for making the proposed ship-canal larger.

4. Mr. Stoddart prefers his own site for the canal to the one he surveyed for me. I chose the site which would have the maximum amount of shelter from the south-west monsoon, a point I consider of paramount importance; but in page 63 of the Report I say, "It is very probable that further examination during the height of the south-west monsoon may lead to the final fixing of a medium line between mine and Mr. Stoddart's."

5. I regard the anchorage at the south end of the canal, which is to be deepened by dredging, as a dock or basin in which vessels can anchor, or be moored, till their turn comes to enter the canal. It is not intended that a vessel shall at once steam into the canal from the Gulf of Manaar without stopping. The proposed basin is some 6,000 feet long by an average width of 1,050 feet. The basin will therefore be of an area greater than the combined area of the London and West India Docks. It will be as easy to turn a vessel into the proposed canal as it is to turn her into the entrances of the above named docks.

6. With regard to Mr. Reidy's observations, I have only to say again that I consider his price of 3/0½ per cubic yard to be far too high for excavation in sand, and his prices for dredging plant, etc., to be too low.

7. To both these gentlemen I was much indebted, and have fully acknowledged it in my Report.

8. These are all the observations I have to make on the papers sent me, unless it be to express my opinion that when shelter is afforded at Columbo by the breakwater now to be built the construction of a canal at Paumben will be of great value to the island of Ceylon.

9. I should be glad if your Lordship will send a copy of this letter to the Government of Ceylon.

ORDERED that a copy of the despatch be forwarded to the Government of Madras for information.

(Signed) W. A. CROMMELIN, Colonel, R.E.,
Deputy Secretary to the Government of India.

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No. 158. ORDER THEREON, 9th December 1873, No. 2,966.

CIVIL WORKS, No. 15.

ORDERED to be recorded and communicated to the Inspecting Engineer for Ports and Communications and the Marine Department in continuation of G. O., No. 2,127 of 26th August 1873.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

PAUMBEN SHIP CANAL.

M^r Stoddart's Section

100 Yards

70 Yards

48 Yards.

Low Water Level.

M^r Roberts's Section

100 Yards

70 Yards

24 Yards.

Low Water Level.

Natural Scale
40 feet to an Inch.

PRINTED BY C. RAMA-POUSAM, 11, "S" ST., "ALAN'S CORNER" TRISTE PLACE, ST. GEORGE'S ROAD, 102.

Signed J Stoddart

Gobt. of 1873 Madras
PUBLIC WORKS.

To

THE INSPECTING ENGINEER FOR PORTS
AND COMMUNICATIONS.

&c. &c. &c.

Dated December 9th

Encl.

Recd.

G. O., 9th December 1873, No. 2,000.

DECEMBER
Nos. 157-159

Proposed Ship-Canal at Pamban.
Correspondence forwarded by the Govern-
ment of India on the subject of the canal
referred.

Estimate for a Ship Canal through the
Island of Pamban on the site proposed by the late
Sir W. Emerson, 300 feet wide above the sea level, 210
feet in width at sea level, 76 feet in width at the bottom
of the Canal, Depth 26 feet.

Salaries.

	£	s.	d.
One Head Chief Engineer, four years at £1500 per annum	6000	0	0
Two Assistant Engineers, at £800 each per annum for four years	6400	0	0
Four European Overseers at £200 each per annum for four years	3200	0	0
One European Foreman Carpenter, at £200 per annum for four years	800	0	0
One European Foreman Smith, at £200 per annum for four years	800	0	0
One European Head Clerk for four years at £300 per annum	1200	0	0
One Clerk at £150 per annum 4 years	600	0	0
Three clerks at £60 each per annum four years each	720	0	0
Thirty Line Keepers, at £36 each per annum for four years each	4320	0	0
Twelve Boats, for four years each at £12 each per annum	576	0	0
One Apothecary, for four years at £150 per annum	600	0	0
Salaries of Hospital Staff for four years	288	0	0

Medicines

Panama Ship Canal

	L.	S.	d.
Medicines for four years	360	0	0
<u>Buildings</u>			
Three Houses for Engineers at £336.8 each	1000	0	0
Four Houses for Overseers at £150 each	600	0	0
One hundred ten temporary Cooky sheds Constructed of Palmyra Rafters and Radjais, at £20 each size 100ft x 18ft x 7ft	2000	0	0
Repairs on do for four years	1000	0	0
Three forge sheds at £20 each size 60 x 18 x 7 ft with masonry pillars	600	0	0
Office and clerkshouses	1200	0	0
Thirty Line Keepers houses at £15 each	450	0	0
300 small houses for use of Labourers with families at £6 each	1800	0	0
Two Hospitals, permanent Buildings at £200 each - size 60 x 18 x 8	400	0	0
Two Light houses at the entrances to Canal at £1500 each	3000	0	0
Two Stores at £500 each - size 200 x 18 x 7	1000	0	0
House for Apothecary and staff	100	0	0
<u>Plant</u>			
Two Steam Tugs at £5,000 each	10,000	0	0
15 Hopper Barges at £300 each	4,500	0	0

Two

Panama Ship Canal

	L.	S.	d.
Two first class Steam Dredgers. Capable of dredging 600 tons clay and broken rock coral per hour at £10,000 each	20,000	0	0
Two Steam Launches at £350 each	700	0	0
Two of Gwynnes six inch centrifugal pumps at £700 each	1400	0	0
Two 15 Horse Power portable Engines to work same	1500	0	0
Tools, Maniollies, Crowbars, Ratties Wheel Barrows	1500	0	0
100,000 Rattan Baskets at 9 ^d each	3750	0	0
One mile of light portable Tramway with 40 or 50 Trucks. Used such in excavating and removing stores	3,000	0	0
<u>Sundries</u>			
Land - Remuneration for same	5000	0	0
Two small Piers	600	0	0
Stationery	300	0	0
Furniture	1100	0	0
Steam Labour - Working Two Steam Dredges 10 hours each daily for 300 days at £50 each per day - This includes pay of officers, crew, Coal &c. 30,000	0	0	0

Working

Panama Ship Canal

	£	s.	d.
Working Two Steam Tugs 300 days each at £13 per day each	7,800	0	0
Working 15 Hopper Barges for 300 days each at 12 ^s /per day	2,700	0	0
Working Two Steam Launches 300 days each at £2 per day each	1,200	0	0
Working Two Hydraulic Pumps 600 days at £4 per day			
Total	2,400	0	0
Night Work of Pumps are wanted say 600 nights at £4 per night	2,400	0	0

Hand Labour.

Excavating 1,703,300 cubic yards of sand
above low-water mark, and removing
same quantity to a distance of 250
lineal yards from side of Canal.

Note. This is the quantity above low-
water line as given in Mr. Townshend's
Estimate Report 20th November 1871.

Two coolies can easily dig 2 cubic
yards of sand or light sand per
day. Five women can remove 2
cubic yards of sand or stone 250
lineal yards from side of Canal
in one day. Rates of daily pay—

Cooly 8^s per day

Women at 4½ per day

This rate of work and pay is equal
to

Panama Ship Canal

to 17⁷/₄ per cubic yard on the
forementioned quantity—136,618 17 1

Excavating 1,530,658¹/₃ cubic yards of
sand, gravel, clay, and sand stone below
low-water level, and removing same 250
lineal yards from side of Canal.

Note. This quantity is estimated
according to the figures in Mr.
Townshend's Report— but uses the quantity
as calculated in giving the dimensions
of the Ship Canal as 210 feet in width
at sea level, with a slope as recom-
mended by Mr. Robertson to 72 feet in
width at bottom, same as Suez Canal,
with a depth of 26 feet—Consider
labour as follows able to excavate
2 cubic yards night

Four coolies 1 day each at 9^s per day

Two coolies 1 day each at 6^s per day

Five women 1 day each at 5^s per day

This equal to 3¹⁰/₂ per cubic yard on
the before mentioned quantity—232,787 12 5¹/₂

Contingencies.

Making allowed what I consider
sufficient for labour and plants
there will be put down 7 per cent for
contingencies—on the amount

Panama Ship Canal

Amount of \$429 456. 9. 6/2 this being
the estimate for Buildings excavated
and dredging

\$ s c

30,061 19 0 3/4

Total Amount

\$ 538,732 8 6 7/8

Abstract

Salaries

25,514 " "

Medicines

360 " "

Buildings

13,550 " "

Plant

46,350 " "

Supplies

7,000 " "

Steam Labour

46,500 " "

Hand Labour

369,406 9 6 7/8

Contingencies

30,061 19 0 3/4

Total \$

538,732 8 6 7/8

Panama Ship Canal

Mr. Townshend's Estimate for Sir W
A. R. R. proposed cutting including
the Break Water

2372,810

Mr. Reidy's present Estimate, calculated
on the original figures furnished in
Mr. Townshend's Report less the quantity
as over estimated in calculating the
cutting as the same width at top and
bottom

538,732 8 6 7/8

Difference

\$ 1834,077 11 5 1/8

Total cubic contents as by Mr. Townshend's
Report of 25th November 1871

cubic yards
5,474,653

Mr. Reidy's revised estimate on Mr.
Townshend's above mentioned figures
but less the quantity taken out for
the slopes of the Canal as adopted by
Mr. Robertson in leaving the Canal
210 feet in width at sea level, and 72
feet in width at bottom. This gives
Cubic Contents

4,725,557

W. L. Reidy.

the Despatch be forwarded to
the Government of Madras for
information. -

W. Munroe J. R. L.
Deputy Secy. to the Gov. of India

4 Dec. 2966-9 Dec 1/73

P. W. 6364/73
4

P. W. 1873 Department 6.
157- No 6364.

From
The Government of India
P. W. Department
To
The Secretary to Govt.
P. W. Department
Madras.

Dated
Recd of 22nd } Noam 1873

27/11

Forwarding
copies of correspondence
on the subject of the
proposed ship canal
at Panambur.

With an order

Ordered to be recorded, and communicated to the
No 2966

Meeting Engineer for Ports and Communication and the Marine Dept. in continuation
of S.O. No 2127 of 26 August 1873.

W. R. L. ...
...
...

...
...
...

11-157-58.
Civ 25/4/73

12/26/64

Oct. of 1873 Madras.

PUBLIC WORKS.

The Inspecting Eng.
for Ports and
Communications

Noted

Recd.

Encl. 4

G. O. 9 "Revenue" No. 2966.

Nos. 157 & 158

Proposed Ship Canal at

Pannchen. Correspondence

marked by the prob.

in the subject

to canal, recorded