

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 963,304	1757	Press Mis.
Dated	24. 7.	1872.

Not to be folded or roughly handled

No 373. Read the following letter from the Officiating Superintending Engineer, 7th Division, to the Secretary to Government, Public Works Department, dated Coimbatore, 8th June 1872, No 45 —

On the 21st of April I demi-officially communicated to you the state of the Cruz Milagre Gap works at Cochin, noting that the experimental groyne had ceased to act in the way desired, that the gap had suddenly widened; that I had consequently directed the further lengthening of the groyne to be stopped, and every precaution taken to preserve the beach that had been gained by the action of the groyne, and to prevent the gap being cut any deeper. I ordered that its perimeter should be lined with sand-bags and stone, and I further noted my impression that, under the circumstances reported, there was not time to close the gap before the monsoon, and, in accordance with your own views, expressed when discussing the subject with me some ten or fifteen days before, proposed to defer the work until after monsoon. In reply, you informed me that Government approved of the suggestion to delay the filling of the gap until after the monsoon, and I arranged accordingly.

2 Having reached Cochin on the 27th April, I have the honour to report that I inspected the works in progress at the Cruz Milagre Gap, which were being carried out as directed by me, and I ascertained that the cause of the sudden widening of the gap was in consequence of the wind having for some days blown freshly from the north-west, driving a heavy sea against the beach, the reflux waves of which cut away the regained shore behind the groyne very considerably, but immediately the beach exposed was properly revetted at the point of erosion, and the wind changed to the west and south, much of the sand lost was re-deposited and the gap is now reduced to 415 feet in width. To allow of my studying the action of the groynes, etc., etc, thoroughly, I remained some time in Cochin, and, from the observations made, I am still of opinion that all further lengthening of the experimental stone groyne should cease, and that in lieu thereof at the apex of the spit of sand gained, which projects 50 feet beyond the groyne, a sand-bag groyne in a parallel direction with the stone groyne be constructed to, say, a length of 100 feet, which is a manageable one, and will not run into very deep water. It is found from work done at the Cruz Milagre Gap that as fast as a groyne of this description is formed, sand to a known proportionately greater length than the groyne is deposited to low tide level within the space recessed from the ebb-current by it, thus a groyne being completed to 100 feet in length projects a spit of sand about 21 feet beyond its own length to low tide level, at the apex of which another groyne may be thrown out, and so I propose to carry out this work by an echelon, or parallel system of equi-distant groynes, and I calculate four groynes will complete the filling or reduce the gap within such limits as to allow of its being easily closed. Should such be necessary (as recommended by Mr. Robertson, the Harbour Engineer,) I have arranged to effect this closing by a sand-bag dam, constructed in layers all along the bottom of the remaining opening, the dam being raised by degrees to low tide level, which, when once reached, can in a few

hours be raised to beyond high tide level, and exclude the tides hereafter I have found that immediately a layer of sand-bags is laid anywhere across the gap, the sand seawards is deposited level with the layer, the interstices between the bags filled in, and much sand is driven over the line of sand-bags and trapped in the hole behind on the backwater side, and thus a perfectly water-tight dam can be expeditiously and securely formed, to construct anything with piles or modulus in such a "mill race," as the flow through the gap resembles at ebb-tide, is, in my humble opinion, simply impossible.

3 The enclosed contoured survey and section, marked A, illustrates the work the experimental groyne has done, and the mode of taking advantage of the experience gained to carry out the work in the way I have described is shown in survey marked B. No such contoured survey having been taken of the beach and perimeter of the gap before the construction of the experimental groyne in the first instance, I regret I am unable to give accurately the quantity of sand deposited by the action of the groyne, but so far as I am able to calculate very roughly from some of the old sections taken, for every cubic yard of stone in the groyne from 30 to 40 cubic yards of sand has been gained. The estimate submitted with my letter No 246, dated 24th February 1872, amounting to Rupees 15,277, for closing the gap, etc, will probably be more than sufficient for the work to be carried out in the manner I propose, but including the cost of the protective works rendered necessary by deferring the work till after the monsoon, I think the whole amount will be required, and request it may be sanctioned, to submit a correct estimate for so new and experimental a work is next to impossible, I will, however, as it proceeds, take care that most careful accounts of detailed items of expenditure be kept in order should it succeed that data may be framed therefrom for works of a similar nature that may be required elsewhere.

4 With reference to paragraph 3 of G O under reply, Government having requested me to re-consider the necessity of constructing groyne* A1, I have to

* On Survey Plan No 4

report that when I submitted the estimate for the groyne it appeared to me, from the effect of the groynes generally on the coast, that a groyne at this point was very desirable in order to hold the beach that had, as reported by me, been gained, but I have watched the effect of groynes A and B during the north-west wind which prevailed just as it did at exactly the same time as last year, when so great an erosion of the coast took place, and finding that these groynes continue to hold the beach gained, I think the question of the final constructing or not of the groyne A1, may safely be delayed for another year.

5 In regard to the wishes of Government on the question of lengthening the groynes D and E, I have considered the subject well, the object of lengthening these groynes is to hold the beach between D and E and E and F, and keep the edge of the coast here in a well curved line to the entrance of the harbour, closely examining the action of the groynes already constructed at Cochin, I find on the coast line groynes run out at right-angles with the shore into the sea cause a beach equal to their length to form between them, and they hold this beach well, even during the most destructive wind (the north-west), but little sand is removed from between them, though up to the very end of the groynes sand is washed

away, it is only in certain exposed points, where the sea is troubled and the waves appear to come from all directions, that stone revetments between groynes are found to be necessary, the point marked in pencil on the plan returned with the G O under notice is one of these, and was securely revetted last year; to revet the line pointed out from the end of groyne D to the base of groyne F, being 901 feet, would cost a large amount of money, and for the reasons given I doubt if such revetment is necessary. I therefore respectfully adhere to my former opinion that all that is required is to lengthen groynes D and E as estimated for.

6 The whole of the other work estimated for and sanctioned has been put in hand, and directions have been issued to do the work simultaneously. I saw the works both seawards and inside the backwater all laid off before I left Cochin, and issued clear instructions in writing on the whole subject to the Range Officer, whose head-quarters as already reported by me in my letter No 36, dated 28th May 1872, has been removed as a temporary measure to Cochin, in order that he may devote greater attention to these works.

7. I observed while at Cochin that certain groynes had been erected inside the harbour by private individuals at the angles of the island known as "Aspinwall's," they were, when I saw them, small groynes which could do no harm, but as a general principle I pointed out the impropriety of allowing such works, which might be of a dangerous character, being carried out, to the Conservator of the Port, who informed me that having no jurisdiction he could not interfere in such matters, as much of the backwater is in the Cochin State, further proving the necessity of some early arrangements being effected with reference to paragraph 6 of my letter printed with G O under reply, in which I observe I omitted to add that the bed of the backwater to the Cochin shore should also be acquired by Government.

8 Since leaving Cochin the advisability of Government possessing the whole harbour has been more fully developed, it having been reported to me that the private gentleman now possessing "Aspinwall's" island had laid out a groyne to be constructed at the north west of the island to such a length as, if built, would doubtless turn the flood against the weak spit of sand lately so much increased by the pile groyne f, and probably sweep away what Government at such a heavy cost is trying to preserve. Immediately the report and survey reached me, I addressed the British Resident of Travancore and Cochin on the subject, pointing out the danger likely to accrue from such a structure, and requesting him to take measures at once to prevent its construction. Further, I have just received a report from the Range Officer noting that, during a very high tide, which occurred a few days ago, the sea had overtopped the crest of the beach about quarter of a mile north of the Cruz Milagre Gap in the Cochin State, and exactly in the way pointed out by me in my letter printed with G O, No 1,567, of 12th June 1871, breached the spit of sand between the sea and backwater to a width of several feet, prompt measures were taken by the Overseer of this department on the spot, and the breach immediately closed with a sand-bag dam and the crest of the coast raised as has been done south of the Cruz Milagre Gap.

9 I beg to enclose a memorandum giving the estimates and sanctions to date, showing the allotment made by Government, etc, etc, the expenditure on

Proceedings of the Madras Government Public Works Department,
24th July 1872.

each estimate, the balance remaining, etc, etc, by which Government will observe that ample funds are forthcoming to complete the works sanctioned and now reported on.

10. I regret exceedingly I was not at the time I submitted my last report able to furnish mounted surveys, etc, but the orders of Government on this subject will not be lost sight of in future.

11. In regard to lithographing Mr O'Shaughnessy's Survey, I respectfully recommend that such should be deferred until the works now in hand are completed, when I hope to be able to revise the Survey of the Harbour as it actually then exists.

Memorandum showing the amount of Estimates sanctioned for the Cochin Harbour, etc, Works, the expenditure already incurred, and the balance of allotments remaining to be spent.

Name of Work	No and date of G. O. sanctioning the work	Amount of Estimate	Expenditure	ALLOTMENT FOR EACH WORK		Balance of unexpended allotment.	Remarks.
				Amount	No and date of G. Os. sanctioning the allotment.		
Cochin Harbour Works, stone pitching north beach at Vypeen.	1871-72 G O, No 161, of 26th May 1871.	RS 3,000	RS A P *1,966 7 0	RS A P 1,967 0 0	G O, No 1,567, of 12th June 1871, and G O, No 78, of 11th May 1872	RS. A. P	*Excludes Rs 1,185-6-8 spent in previous year.
				3,510 0 0	G O, No. 1,567, of 12th June 1871, and G O, No 885, of 3rd April 1872, and G O, No 3,173, of 16th December 1871		
Groynes at the Cruz Milagre Gap at Cochin	G O, No 3,055, of 4th Dec 1871	24,824	20,389 8 5	10,000 0 0	G O, No 1,567, of 12th June 1871, and G O, No 100, of 11th Sept 1871, and G O, No 29, of 6th November 1871	†6,776 4 5	{†In addition to this amount the Cochin Government have to pay, after 15th August next, Rs 6 106-1-0, vide G O, No 3,173, dated 16th Dec 1871
				15,000 0 0			
Re-constructing and improving the existing groynes and for carrying out certain protective works at Cochin.	G O, No 1,567, of 12th June 1871	23,380	24,019 3 2	28,510 0 0	Item No 100 of the Provincial Budget for 1872-73	18,497 10 0	†Up to April 1872.
				5,675 0 0			
Extending the stone groyne at Cruz Milagre Gap at Cochin and closing gap and Harbour Works at Cochin	1872-73. G O, No 1,125, of 2nd May 1872	15,277	†1,272 1 9	10,000 0 0			
				7,000 0 0			
		30,360	44,408 11 7	22,675 0 0			
				51,185 0 0			
				20,000 0 0			
				1,502 6 0			

COMBATORE, 8th June 1872. W. FAREWELL, Lieut-Colonel, S.C.,
Offg Supg Engr, 7th Division.

Total amount now available for expenditure.

RS. A. P.
6,776 4 5
18,497 10 0
6,106 1 0
31,379 15 5

Proceedings of the Madras Government, Public Works Department,
24th July 1872.

Proceedings of the Madras Government, Public Works Department,
24th July 1872.

No. 374.

ORDER THEREON, 24th July 1872, No 1,757.

CIVIL WORKS, No. 12.

THE Government sanction the estimate of Rupees 15,277 for closing the Cruz Milagre Gap submitted with

Lieutenant-Colonel Farewell's former letter, and approve of his proposal to carry out the work in the manner described in paragraphs 2 and 3 of his letter under review, by a series of parallel groynes, in echelon, as shown in the sketch marked B.

2. The prolongation of groynes D and E, as originally proposed by him, may be proceeded with on the sanction already given, good reason being shown in paragraph 5 for not incurring the heavier expense of revetting between these groynes and on to groyne F.

3. Paragraphs 7 and 8 will be communicated to the Resident of Cochin, with a recommendation that no private individuals be permitted to throw out projecting groynes into the backwater except where such can be satisfactorily shown to be required for protection of their land. Such protection inside the backwater can generally be secured by revetments along the high water line, projections beyond which must lead to accretions which, if multiplied, may seriously affect the area of the tidal basin.

4. In the memorandum appended to the letter note is made of the sums at present available for the work remaining to be done, and it will be more convenient to keep them separately assigned as below, namely, Rupees 20,000 Budget Item No 100 for work to the extent of Rupees 22,360 out of a sanction of Rupees 30,360. Rupees 6,776-4-5 and Rupees 6,166-1-1 (available on 1st August) balances of contributions by the Cochin Cirkar, total Rupees 12,942-5-6 for closing the Cruz Milagre Gap, on a sanctioned estimate of Rupees 15,277.

5 The Government rely on the Superintending Engineer's watching this expenditure with care, and not allowing the groynes to be unnecessarily lengthened, but stopping them as soon as they appear to have secured the object in view in their construction. For which reason gradual progress with all is preferable to completion of each singly.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Officiating Superintending Engineer, 7th Division.
,, Controller of Public Works Accounts.
,, Resident of Travancore and Cochin.
,, Marine Department.

Exl. S. T. Austin.

1/2 145

Suppl. Engineer's Office
Cochin 24th June 1872

From,
The Superintending Engineer,
7th Division

To,
The Secretary to Government
D. P. W. & Harbours

Sir,

On the 21st of April I communicated to you the

Enclosures 5. Officially communicated to you the State of the Cruz Milagre gap works at Cochin, noting that the experimental groyne had ceased to act in the way desired, that the gap had suddenly widened, that I had consequently directed the further lengthening of the groyne to be stopped, and every precaution taken to preserve the beach that had been gained, by the action of this groyne and to prevent the gap being cut any deeper. I ordered that its perimeter should be lined with sand-bags and stone, and I further noted my impression that, under the circumstances reported, there was not time to close the gap before the monsoon, and in accordance with your own views expressed when discussing the subject with me some ten or fifteen days before, proposed to defer the work until after monsoon. In reply, you informed me that Government approved of the

suggestion to delay the filling of the gap until after the monsoon, and I arranged accordingly.

2. Having reached Cochin on the 27th April, I have the honor to report that I inspected the works in progress at the Cruz, Chilagre gap which were being carried out as directed by me, and I ascertained that the cause of the sudden widening of the gap was in consequence of the wind having for some days blown fresh from the North West driving a heavy sea against the beach, the reflux waves of which cut away the required shore behind the groynes very considerably, but immediately the beach exposed was properly rebuilt at the point of erosion, and the wind changed to the west and south, much of the sand lost was redeposited & the gap is now reduced to 415 feet in width. To allow of my studying the action of the groynes &c &c thoroughly I remained some time in Cochin, and from the observations made I am still of opinion that all further lengthening of the experimental stone groyne should cease, and that when there is at the apex of the spit of sand gained which projects 50 feet beyond the groyne, a sand bag groyne in a parallel direction with the stone groyne be constructed to say a length of 100 feet which is a manageable

amount with not greater than 200 deep water. I have found from work done at the Cruz, Chilagre gap that as fast as a groyne is of this description constructed, sand is known proportionately greater in length than the groyne is deposited to low tide level within the space recessed from the shore current by it, thus a groyne being completed to 100 feet in length projects a spit of sand about 21 feet beyond to seaward length to low tide level, at the apex of which another groyne may be thrown out, and so I propose to carry out this work by an echelon or parallel system of groyne distant groyne and I calculate to groyne will complete the filling, or reduce the gap within such limits as to allow of its being easily closed. Should such be necessary (as recommended by Mr. Robertson the Harbour Engineer) I have arranged to effect this closing by a sand bag dam constructed in layers all along the bottom of the remaining opening, the dam being raised by degrees to low tide level which when once reached, can in a few hours be raised to beyond high tide level and exclude the tides hereafter. I have found that immediately a layer of sand is laid is laid anywhere across the gap, the sand seawards is deposited, level with the layer, the interstices between the bags filled in and much sand is

driven over the line of sand bags and
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to construct any thing with piles or modulus
in such a mill race as the flow through the
gap resembles at ebb tide; is in my humble
opinion entirely impossible.

3rd The enclosed contour survey and
section marked A illustrates the work the
experimental groynes had done, and the mode
of taking advantage of the experience gained
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Survey Plan 1872

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attention to these works.
I observed while at Cochin
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shore should also be acquired by Govt.
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17th
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pleted, when I hope to be able to revise
the survey of the harbour as it actually
then exists -

I have the honor to be,
Sir,
Your most obedient servant,

Wm. K. Fiske
Chf. Surveyor

19/12/20

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No. 2867.
The City Engineer
J. L. Lincoln

The Secretary to
Govt & Co.
of India
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Rice 10 } June, 172.

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Reports on the
Subject of Each
Monthly Work.

- 1757 - 24 July 72

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The Government
sanction the estimate of
Rs 15,277 for closing the
Landy Milage Gap sub-
mitted with Lieutenant
Colonel Farewell's
former letter, and approve
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Sketch marked B.

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23W
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In the Memo. appended to the letter note is made of the sums at present available for the work remaining to be done; and it will

be more convenient
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Rs 20,000 Budget Item
No. 100 for work to the
extent of Rs 22,360 out
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Rs 6776-4-5; and Rs 6166-1-1
(available on 1 August)
balances of contributions
by the Cochin Sarkar
total Rs 12,942-5-6
for closing the Cruz
Milage Gap, on a
sanctioned estimate
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The Government
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25N
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-tion of each singly.

G.W.

To the Insp. of Engineer 7th Div with four plans & one memo
" Controller
" Resident of Cochin
" Marine Dept

Recd. 29/7/72

Ch 2867

bt. of 1872 Madras.

PUBLIC WORKS.

The Office of the Secy. to Govt.
7th Division

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363+364

Nos. 073+074

Cranghulapre Gap - The
estimate of Rs. 15,277
for closing the Cranghulapre
Gap ~~is~~ mentioned with
remarks—