

(1) Number of pages 1(2) Date of repair 1(3) Initials of the Referencer 1

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 1449

Press
Mis.

184

Dated 12

6

1872.

Not to be folded or roughly handled

No. 184.

Under date the 11th June 1872, No. 1,449.

CIVIL WORKS, No. 16.

THE Government have already expressed to Mr. Robertson, through the Government of India, their appreciation

of his valuable Report on the Harbours of the Madras Presidency, and now proceed to pass the necessary orders thereon.

2. The only two harbours at which important works are recommended are Mangalore and Cochin, both well known to the Chief Engineer, and the Government fully concur in the recommendations made by him, in the memorandum herewith appended, for carrying into effect Mr. Robertson's views with some slight variation.

3. A sum of Rupees 7,000 from Port Funds is accordingly placed at the disposal of the Superintending Engineer of the 7th Division for collection of materials during the monsoon, and construction of a training groyne at the Goorpoor gap immediately after it; and he will submit complete estimates of the total probable cost of closing the gap in time to admit of the work being done some months before the monsoon of 1873, so that the deposit between the gap and the harbour mouth shall be acted on by the current of the Goorpoor river, and the danger of monsoon floods caused by the same diminished as much as possible.

4. As stated in Colonel Walker's memorandum and detailed in papers accompanying G. O., No. 1,125, of 2nd May, all Mr. Robertson's suggestions as to protective works at Cochin, Vypeen, and Cruz Milagre, have already been acted upon by the Superintending Engineer of the 7th Division. Lieutenant-Colonel Farewell will in due course proceed to supply the detailed drawings and estimates for the works intended by Mr. Robertson nearly to double the depth of water over Cochin bar. The Government are unable just now to carry out Colonel Walker's suggestion of instituting a Cochin and West Coast Canal Range, but order the following arrangements to be made, as the best means available for strengthening the hands of the Palghaut and Mangalore Range Officers, namely, the transfer of Supervisor Vyapoory Pillay, now under orders for Coondapoor Range, to the Palghaut Range, of which he can take charge, freeing Assistant Engineer Grime for the Cochin work, and the promotion of Overseer DeMello to rank of Supervisor vice Cowley dismissed, and his posting to the Coondapoor Range now held by Assistant Engineer Pringle in addition to his own.

5. Of the minor works of improvement suggested by Mr. Robertson for Cannanore and Beypore, the Superintending Engineer of the 7th Division will be good enough to submit plans and estimates.

6. The attention of the Master Attendant at Madras (Administrative Department) is called to the requirements of the port of Calicut, to which he will be so good as to attend, reporting when they shall have been met.

7. The subject of inland water communication along the West Coast will be disposed of separately at a later date, in connection with a scheme now before Government involving its development by private enterprise.

8. Looking at the character of the bay into which the Paumben passage opens, as well as the tortuous nature of the channel, Mr. Robertson reports that it would be out of all question to attempt to make the pass fit for large ships; or indeed deeper than 12 feet at low water of spring tides. The attention of the

Superintending Engineer of the 8th Division is called to Mr. Robertson's remark that the season was being lost for blasting operations for want of a regular supply of powder; and Mr. Dalrymple is requested to report on the character and cost of the lights stated to be required at Point Calimere and the Crocodile Rock.

9. The remarks in page 53 on one if not two safe and commodious anchorages, close to the locality of the new ship canal between India and Ceylon, proposed by Sir James Elphinstone, are full of interest.

10. The Superintending Engineer of the 6th Division will have plans and estimates prepared for lengthening the Pier at Negapatam 150 feet beyond monsoon low water line, for deepening and fixing the south side of the outlet, and for dredging the harbour, as recommended at pages 55 and 56 of Mr. Robertson's Report. It is observed that he approves generally of the Report of the Committee of 1860.

11. The Government have had frequent remonstrances addressed to them on their neglect of Cocanada, which is acquiring considerable importance as a place of trade. Mr. Robertson's Report is discouraging, but it is useful as furnishing a reply to the frequent memorials addressed to Government, and as preventing waste of money on the various projects which have been submitted. Copy of this part of his Report will therefore be communicated to the memorialists.

12. The Master Attendant of Madras will carry into effect Mr. Robertson's recommendations, that the whole length of channel from Cocanada to the entrance of Coringa river should be buoyed off; and he will report on the cost of the dredging operations to be undertaken at Coringa and Cocanada bays, of a light boat off Hope Island, and of the cost (with maintenance) of a steam tug for the Master Attendant at Cocanada. The Superintending Engineer of the 1st Division will report as to the agency necessary for conducting the proposed survey of the neighbourhood of Hope Island and experiments as to currents; and the Cocanada Harbour works, suggested in page 73, will also be planned and estimated for.

13. The subject of a breakwater at Madras, on which the Chief Engineer has reported against the delay considered expedient by Mr. Robertson, has been reported on to the Government of India.

14. It is observed that Mr. Robertson makes no recommendations for works at Alleppy, Narakal, Quilon, Tuticorin, and Porto-Novo, either because none are practicable, or, if practicable, advisable, on account of disproportionate expense.

(True Extract.)

(Signed) R. F. OAKES, Captain, R.E.,

Acting Joint Secretary to Government.

To the Superintending Engineers, 1st, 4th, 5th, 6th, 7th, and 8th Divisions.

" Marine Department.
" Controller of Public Works Accounts.
" Master Attendant (Administrative Department).
" Chamber of Commerce, Madras.
" Do. Cocanada, with Extract.

Exd. S. T. Augustin.

MEMORANDUM BY THE CHIEF ENGINEER.

MANGALORE HARBOUR.—It is a satisfaction to me to find that Mr. Robertson coincides in the opinion which I formed and expressed many years ago as to the necessity of closing the Goorpoor gap, and I quite concur in his advice that the gap should be directly acted on by damming its mouth, instead of indirectly, as in 1856, by damming the river, and so restricting the tidal basin that the gap must have closed of itself. I have to point out, however, that the destruction of the dam of 1856 was not caused by any action of tide, but by a river fresh which came down on the night of the 30th April, the commencement of the work having been delayed too late for want of early sanction.

2. I do not agree with Mr. Robertson in one point, for I do consider it desirable to close the gap at once. Nothing could be better than his *modus operandi*, whether for the closing of the gap itself by a sand-bag dam or for gradual action on the shoals between it and the harbour mouth by a training groyne of slight material. I would commence with the second certainly as he recommends, but when the scouring action, which must inevitably ensue, has gone on for a sufficient time, I would proceed to the execution of the dam. It will be much easier to clear out the shoal between the two river mouths now than in 1858, as comparison of the two surveys will show that its length is reduced since that date by fully 1,000 yards, and the soundings show a great improvement also, and the danger of flooding above is proportionally decreased.

3. Reliable estimates cannot be made of the probable cost of this work till after the monsoon, when the river floods are over and the gap has settled down to its dry weather form. I would place the sum of Rupees 7,000, transferred from the Mangalore Pier, at the Superintending Engineer's disposal for collection of materials during the monsoon to the value of Rupees 5,000, namely, sand-bags, piles, bundles, and brush-wood, etc., and by September the Executive Engineer might commence the training groyne under instructions from Lieutenant-Colonel Farewell, who has lately been watching the progress and results of a similar work at Cochin, and will be able to tell him precisely how to act. By November, estimates for closing the gap may have been sent in and sanctioned, when I should hope that the Superintending Engineer would be able to find time to visit Mangalore, and have the work carried out under his own eye.

4. Lieutenant-Colonel Farewell will then also be able to prepare detailed estimates of the cost of carrying out Mr. Robertson's suggestions for fixing the north of the harbour mouth, when the propriety of acting on them may be considered. For my part, I do not think anything of the kind should be done. I believe that, so long as there are two outlets to the sea from the backwater which joins the Naitrawutty and Goorpoor rivers and tidal basin, so long will the outlet of the southern and much larger river tend gradually northward, either till it meets the northern gap (which is quite stationary), or, which I consider most probable and highly desirable, till a greater than usual monsoon flood bursts out a passage for itself near Oolaul, where the mouth was at the commencement of the century, when there is reason to believe that the harbour bar was much better than it has been ever since. Indeed, it is well known to have deteriorated the further north the outlet was.

5. Hence the primary necessity for closing the Goorpoor gap, when three natural forces, namely, the respective river streams acting from within and the tide water from without, will, by a natural dynamical law, fix the single outlet in a position which will be the natural resultant of the three forces, and so to be preferred to any artificial outlet against which one or other of them would be working detrimentally. Not but that there might possibly be a certain amount of shifting of the natural outlet according to the varying monsoon floods of the rivers, but works to control that fluctuation would be much less costly to construct and maintain than those which would be required to keep in its place an outlet not the resultant of natural forces.

6. It does not appear practicable to spare Mr. Pringle the services of an Assistant, as proposed by Mr. Robertson, but arrangements have been made for relieving him of the Coondapoor Range, which Lieutenant-Colonel Farewell once thought of doubling up with the Mangalore Range, an idea which he has now abandoned much to my satisfaction, and the work of Mangalore Range will not be so heavy this year as to prevent Mr. Pringle devoting much of his time to harbour observations and work.

7. COCHIN HARBOUR.—All Mr. Robertson's suggestions, as to the closing of the Cruz Milagre Gap and defence of the Cochin and Vypeen Coasts, have already been acted upon by Lieutenant-Colonel Farewell, to an extent of which he has reported the success and probable cost of work in continuation, and G. O., No. 1,125, of 2nd May 1872, which embodies my views, will show how thoroughly I approve of all that Mr. Robertson has recommended on the subject. That of increasing the depth of water over the bar is one with which I have not hitherto had to deal at Cochin, my attention having been confined to protective works. I have perused Mr. Robertson's remarks on the treatment of the bar with great interest, and, though hardly prepared to endorse his sanguine anticipation that, by the construction of training groynes of from 2,000 to 3,000 feet in length and by dredging, the present depth of 11 feet over the bar may be increased to 20 or 21 feet, I cannot in the least gainsay the general accuracy of his conclusion that "to strengthen the current and confine it till it arrives into deeper water, where the waves act with less effect on the bottom, is evidently the way to treat the harbour at Cochin."

8. I propose accordingly to call on the Superintending Engineer to prepare detailed drawings and estimates of two groynes, composed of rubble cores faced with concrete blocks, as I conceive that the use of both materials would lead to speed and economy of construction. Special assistance must be afforded him as well as funds for supervision of works already in hand, surveys and measurements of those to be undertaken, and preliminary investigation as to the cost of quarrying and moving rubble on a large scale, and of making concrete blocks, say, of 8 cubic yards (9 feet $\times$ 4½ $\times$ 4½) or half the dimensions of those used at Kurrachee. The same officer would hereafter be available for investigating the details of the improvements to canal communication along the West Coast, on which Mr. Robertson makes remarks of great practical interest. In fact I would create at once a Cochin and West Coast Canal Range, and provide for its cost by savings which I have no doubt the Controller will be able to indicate.

9. I am not of opinion that the erection of a bund across the backwater at Pallipport is necessary or even desirable. It would hamper existing traffic, and tend to accumulation of deposits, troublesome and costly to remove; and the tidal basin of Cochin is already so enormous that the proposed extension would not, by its additional action, benefit the bar to an appreciable extent.

10. MADRAS BREAKWATER.—Mr. Robertson has decided that a breakwater is the best expedient for obtaining shelter for shipping at Madras, but takes advantage of some loose reasoning of the Harbour Committee (with which he evidently does not himself agree) to demand further information as to the littoral currents, and quantity of sand in motion along the coast. I think that he has put aside the information already supplied without due cause; and that, had he argued upon it with the same perspicacity with which he confuted the notion of sand accumulating round piles of stone on the Armeghon shoal (see page 68), he would not have come to the conclusion that there was any danger of silting up behind the breakwater.

11. In point of fact he only comes to such conclusion on a false hypothesis of the Committee, not concurred in by himself, and opposed to the true conclusion to be arrived at from existing information as to currents and sand. This is to the effect on the one hand that at from 600 to 1,800 yards from the shore there are littoral surface currents, not exceeding one mile an hour in maximum velocity, and on the other that there is no current at bed of sea at seven fathoms, (beyond which it is proposed to construct the breakwater), and no loose movable sand beyond the six-fathom line. There is no reason whatever to doubt the accuracy of these observations; and it only remains to draw correct conclusions from them.

12. As Mr. Robertson says, there are two agents at work to move the sand, the surf acting perpendicularly to the shore and the littoral currents parallel to it; the former agitating the sand and causing it to be held in suspension, the latter moving it north or south according to the season. But there is not the slightest ground for imagining that the littoral currents beyond the six-fathom line are at all impregnated with sand; it is all dropped within that line. Hence there can be none to deposit beyond 7 fathoms, where the breakwater is to be. Hence also the fallacy of the Committee's reasoning against Mr. Fraser's project; their objection would be invalid against groynes reaching out beyond six-fathom water. Mr. Robertson has hit the true objection to his scheme, which is otherwise the best proposed after the breakwater project.

13. I deprecate, therefore, any postponement of the breakwater scheme on the score of further information being necessary as to currents and sand deposits. It is now matured sufficiently to be determined for or against on the simple grounds of its value compared to its cost. The Master Attendant could easily procure further information as to currents if necessary. As to the extent to which sand is moved, nothing but actual construction of a groyne out beyond six-fathom line would settle the question experimentally. But I maintain that for all practical purposes we have information enough; it has only to be argued upon as correctly as has been done by Mr. Robertson in the matter of a proposed breakwater on the Armeghon shoal. The argument in page 61 of the Report, that the removal of one motive agent, the surf, would cause the other agent to drop sand behind

the breakwater is fallacious, because it assumes that the littoral current will have sand in suspension; whereas it can have none outside six-fathom line in any case; still less behind the breakwater, where the agent, which agitates the sand and makes it movable, will be annihilated. Hence the Committee had reason to conclude, on the one hand, that the foreshore will be rendered steeper, but none, on the other hand, for apprehending its extension, as the littoral current freed from action of surf should tend to keep the foreshore clean swept of loose sand.

8th May 1872.

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

Exd. S. T. Augustin.

Memorandum

N^o 1449. *Memorandum*

Memorandum

*H
B
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JOS*

The Government have already expressed to Mr. Robertson through the Government of India, their appreciation of his valuable Report on the Harbours of the Madras Presidency; and have proceeded to pass the necessary orders thereon. The only two harbours at which important works are recommended are Mangalore and Cochin.

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and construction of a
travelling frame at the
Goospoor Jap immediately

9 2
after it. And he will sub-
mit complete estimates of
the total probable cost
of closing the Jap. It is
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work being done some
months before the
Monsoon of 1873, so that
the deposit between the
Jap and the Kachin
mouth shall ~~be~~ be
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of the Goospoor River
and the danger of monsoon
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same diminished as
much as possible.

As stated in Col.
Walker's Memorandum
and detailed in papers

accompanying L. O.
No. 425 of 2 May; all
Mr. Robertson's suggestions
as to protective works
at Pechin, Vyppen and
Craig Melagre, have
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upon by the Supr. Eng-
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The Government are
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11
~~suggestion of maintaining~~
~~a Pechin and West Coast~~
~~lateral range, and order~~
~~the following arrange-~~
~~ments to be made, as~~
~~the best means avail-~~
~~able for strengthening~~
~~the range of the Pechin~~
~~and Mandatone ranges.~~
~~Efficient viz. the transfer~~
~~of Supervisors Lyapong, Pella,~~
~~and other to the Pechin~~
~~range to the Pechin~~
~~range, of which~~
~~he can take charge~~
~~in immediate relief~~
~~of the Pechin~~
~~range. App. Engineer~~
~~for the Pechin~~
~~range. And the promotion~~
~~of Quagga to the rank~~
~~of Supervisor vice~~

Corley dismissed and
his packing to the mda-
kar range now held by
Apt. Ins. Pringle in
addition to his own.

Of the Minor Works
of improvement suggested
by Mr. Robertson for Can-
narore and Mysore, the
Sdys. Engineer of the Dist.
will be paid enough to
survey the lines and esti-
mate.

The attention of the
Master Attendant at
Madras (Administrative
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requirements of the
Port of Calcutta, to which

15 11
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The subject of the
British Water Commission
along the West Coast
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at a later date in connection
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the character and cost of
the lights stated to have
been at Point Calumet
and the Rock.

The remarks in page
53 on the if not too
safe and commodious
anchorage close to the
locality of the new

What does
this mean?
A. A.

515
Stop of canal between Lake
and Bay ^{proposed} ~~proposed~~ by
Sigsbee. ~~Alphinstone~~ ^{Alphinstone} are
are full of interest is
and the Superintendents
of the Division will have
plans and estimates pre-
pared for lengthening
the Pier at the gap between
154 feet high and 1000 ft.
low water line for deepening
and fixing the ^{with} south
side of the outlet, and
for deepening the harbours
as recommended at pages
55 and 56 of Mr. Robertson's
report. It is observed that
he approves generally of
the report of the Committee
of 1860.

The Government have

had frequent remonstrances
addressed to them on their
neglect of Canada which
is acquiring considerable
importance as a place of
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port is discouraging but
it is useful as furnishing
a reply to the frequent
Memorials addressed to
Govt and as preventing
waste of money on the
various projects which
have been submitted.
Copy of this part of his re-
port will therefore be
communicated to the
Memorials.

The Master Attendant
of Madras will
carry into effect Mr.

I don't see ex-
pediting of sending
the Master Attendant
to Coronada. He &
Major Fisher are
certain to come into
disagreeable collision
I should not encourage
the Master Attendant
in making tours. He

17
~~Report on the economical sta-
tion that the whole length
of Channel from Coronada
to the entrance of Praya
River should be bought off
and he will report on the
cost of the dredging opera-
tions to be undertaken
at Haringa and Coronada
Bays of a light to be off
Nape Belachan and of the
cost (with maintenance)
of a Steam Tug for the
Master Attendant at Co-
Canada. It is understood
to be his intention shortly
to proceed to the Northern
Parts and these points
should specially engage
his attention here.~~
The Prof. Registrar of the

Division will co-operate
 to the Agency need for
 with Mr. Watrymple in
 every way in leaving
 from him of the proposed
~~provision~~
 date of his visit. The
 proposed survey of the
 neighborhood of Napa
 Island and experiments
 as to ~~currents~~ ^{currents} should
 be as their attention
 and be reported on as
 to the state of the Agency
 required to carry them
 out and probable cost
 and the Cocanada Har-
 bor. ^{Suggested in page 78}
 works will also
 be planned and esti-
 mated for.
 The subject of a
 Breakwater at Madras
 on which the Chief Engineer

can be more usefully
 employed in his
 office at Madras

I agree. It will be
 better to ~~leave~~ suit
 this paper
 JH

The subject of a
 Breakwater at Madras
 on which the Chief Engineer

has reported against the
 delay considered expedient
 by Mr. Robertson has been
 reported on to the Govt. of
 Madras.

It is observed that
 Mr. Robertson makes no
 recommendations for
 works at Allepy, Karakal,
 Lulon, Tuticorin and
 Porto Novo, either because
 none are practicable, or,
 if practicable, advisable,
 on account of dispropor-
 tionate expense.

C. W.

150
 14

- 1. To Secy. to Govt. 1.4.78: 7. & 8. Dec.
- 2. Marine Dept.
- 3. Controller.
- 4. Master Attendant (Administrative Dept.)
- 5. Chamber of Commerce, Madras.
- 6. Do. Cocanada, with Extract.

Despatch 10/11/78-entire
 being copies of the Memo. and
 of the order according to charges.

The following is a list of the
names of the persons who
were present at the meeting
of the Board of Directors
of the Company, held on
the 1st day of January, 1880.
The names of the persons
who were present at the
meeting of the Board of
Directors, held on the 1st
day of January, 1880, are
as follows:

1. J. H. Smith
2. J. H. Smith
3. J. H. Smith
4. J. H. Smith
5. J. H. Smith
6. J. H. Smith
7. J. H. Smith
8. J. H. Smith
9. J. H. Smith
10. J. H. Smith

11. J. H. Smith
12. J. H. Smith
13. J. H. Smith
14. J. H. Smith
15. J. H. Smith
16. J. H. Smith
17. J. H. Smith
18. J. H. Smith
19. J. H. Smith
20. J. H. Smith

Accepted for publication
2000



Print this out
+ send it to
my parents.

Q. c. 312 May 1872
130 May 72 Q. 312

the child leaves that too

Memorandum by the Chief Engineer

Mangalore Harbour.

They live across the
border line
and do not
belong to either
side. They are
the people of
the border.

Gen. With as I did.
Robert with 2 more
to forward money to
with 2 others. The
price of my cotton
until he has been able
to with the paper.

It is a satisfaction
to me to find that Mr. Ro-
bertson coincides in the
opinion which I formed
and expressed many years
ago as to the necessity of
closing the Goospor Gap
and I quite concur in his
advice that the gap should
be directly walled in by
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1856 by damming the
River and so restricting
A. R. E.

the tidal basin that the gap must have closed of itself. I have to point out however that the destruction of the dam of 1856 was not caused by any action of tide, but by a river fresh which came down on the night of the 30 April, the commencement of the work having been delayed too late for want of early sanction.

I do not agree with Mr. Robertson in one point for I do consider it desirable to close the gap at once. Nothing could be

~~and unreasonably~~
I think the necessary
arrived in the
mean: shd be adopted

As regards the
proposed plan for the
construction of a
Breaker Sea at
Madras, I think the
time has come when
the case should be
brought before the
Govt of India, with a
view to the provision of
the necessary funds, as
part of the charge for
"Public Works Extension".
The Reports of the
Commissioner and of Mr. Pitt
with full details of the
nature of the work and
its estimated cost would
of course be laid before the
Govt.

... better than his ...
operands. Whether for the
closing of the gap itself by
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21
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till September the Executive
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der instructions from
Supt. J. Farnell, who
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a similar work at Lochin,
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him precisely how to act.
By the way, estimates
for closing the gap may
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neer would be able to
find time to visit Man-
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work carried under his
own eye.

Lieut. Col. Farewell
will then also be able to
prepare detailed estimates
of the cost of carrying out
Mr. Robertson's suggestions
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I do not think anything
of the kind should be
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long as there are two
outlets to the sea from
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and Gasport rivers and
Lidab Basin, so long
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29
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 natural resultant of
 the three forces; and so
 so be preferred to any
 artificial outlet against
 which one or other of
 them would be working
 detrimentally. Not
 but that there might
 possibly be a certain
 amount of shifting of
 the natural outlet ac-
 cording to the varying

as a whole and so

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It does not appear
 practicable to spare Mr.
 Pringle the services of an
 Assistant as proposed by
 Mr. Robertson but arrange-
 ments have been made
 for relieving him of the
 Sandapour Range which
 Lieut. Col. Farewell once
 thought of doubling up
 with the Mangalore Range
 an idea which he has now abandoned
 much to my satisfaction and the
 work of Mangalore Range will be
 so heavy this year as to pre-
 vent Mr. Pringle devoting

much of his time to Har-
bour observations and
work.

At Mr. Robertson's
suggestions as to the closing
of the Cruz Milagre Gap,
and defence of the Cochin
and Typhoon Coasts have
already been acted upon
by Lieut. Col. Farewell,
the air extent of which he
has reported the success
and probable cost of
work in continuation,
and G. O. No. 1125 of 2 May
1872, which embodies my
views will show how
thoroughly I approve of
all that Mr. Robertson
has recommended on
the subject. That of

Cochin Harbour.

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increasing the depth of water C,
over the Bar is one with which I
I have not hitherto had to
deal at Cochin, my attention
having been confined to
protective works. I have
perused Mr. Robertson's re-
marks on the treatment
of the Bar with great interest,
and though hardly prepared
to endorse his sanguine
anticipation that by the
construction of training
groynes of from 2 to 3000
feet in length and by
bridging the present depth
of 11 feet over the bar
may be increased to 20
or 21 feet, I cannot in
the least gainsay the
general accuracy of his
conclusion that

"to strengthen the current
and confine it till it
arrives into deeper water
where the waves act
with less effect on the
bottom is evidently the
way to treat the harbour
at Cochin."

I propose accordingly
to call on the Super Engineer
to prepare detailed
drawings and estimates of
two groynes composed of
rubble core faced with
concrete blocks, as I con-
ceive that the use of
both materials would
lead to speed and economy
of construction. Special
assistance must be af-
forded him as well as
funds for supervision

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of works already in hand,
survey and measurements
of those to be undertaken
and preliminary investi-
gation as to the cost of
quarrying and moving rub-
ble on a large scale, and of
making concrete blocks say
of 8 cubic yards (8 ft. x 4 ft. x 2 ft.)
or half the dimensions of
those used at Kurrachee.
The same Officer would here-
after be available for in-
vestigating the details of
the improvements to be
carried out along
the West Coast on which
Mr. Robertson makes remarks
of great practical interest.
In fact I would create
at once a Cochin and
West Coast Canal Range

and provide for its cost by
savings which I have no
doubt the Controller will
be able to indicate.

I am not of opinion
that the erection of a
pier across the
harbour at Pallipattin
is necessary or even de-
sirable. It would hamper
existing traffic and tend
to accumulation of de-
posits, troublesome and
costly to remove; and the
tidal drain of Cochin is
already so enormous that
the proposed extension
would not by its addi-
tional action benefit the
harbour to any appreciable
extent. Indeed, in 1881, the
harbour was so full of

Madras Breakwater.

Mr Robertson has
decided that a Breakwater
is the best expedient for
obtaining shelter for ships
lying at Madras, but takes
advantage of some loose
reasoning of the Harbour
Committee (with which he
evidently does not him-
self agree) to demand fur-
ther information as to
the littoral currents, and
quantity of sand in motion
along the coast. I think
that he has put aside the
information already sup-
plied, without due cause;
and that, had he argued
upon it with the same
perspicacity ^{cacety} with which he
computed the motion of
sand accumulating round
piles of stone ^{on the} Armaghian ^{the}

Shall (see page 18) he would
not have come to the con-
clusion that there was any
danger of sitting up behind
the backwater.

In point of fact he
only comes to such conclu-
sion on a false hypothesis
of the Committee, not con-
curred in by himself,
and opposed to the true
conclusion to be arrived
at from existing informa-
tion as to currents and
sand. This is to the ef-
fect, on the one hand, that
at from 600 to 1800 yards
from the shore there are
littoral surface currents
not exceeding one mile
an hour in maximum
velocity, and in the

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that there is no current at
ted of less than 7 fathoms,
(beyond which it is pro-
posed to construct the Break-
water); and no loose move-
able sand beyond the
7 fathom line. There is
no reason whatever to doubt
the accuracy of these ob-
servations; and it only re-
mains to draw correct con-
clusions from them.

As Mr. Robeson
says, there are two agents
at work to move the sand,
the surfacing perpendicular
to the shore and the
littoral currents parallel
to it; the former agitating
the sand and causing it
to be held in suspension,
the latter moving it north

or least according to the
reason. But there is not
the slightest ground for
supposing that the littoral
currents beyond the 6
fathom line are at all
impregnated with sand.
It is all dropped within
that line. Hence there
can be none to deposit
beyond 7 fathoms where
the Breakwater is to be.
Hence also the fallacy
of the Committee's reason-
ing against Mr. Fraser's
project; their objection
would be invalid against
grayses reaching out be-
yond 6 fathom water.
Mr. Robertson has hit the
true objection to his scheme
which is that the

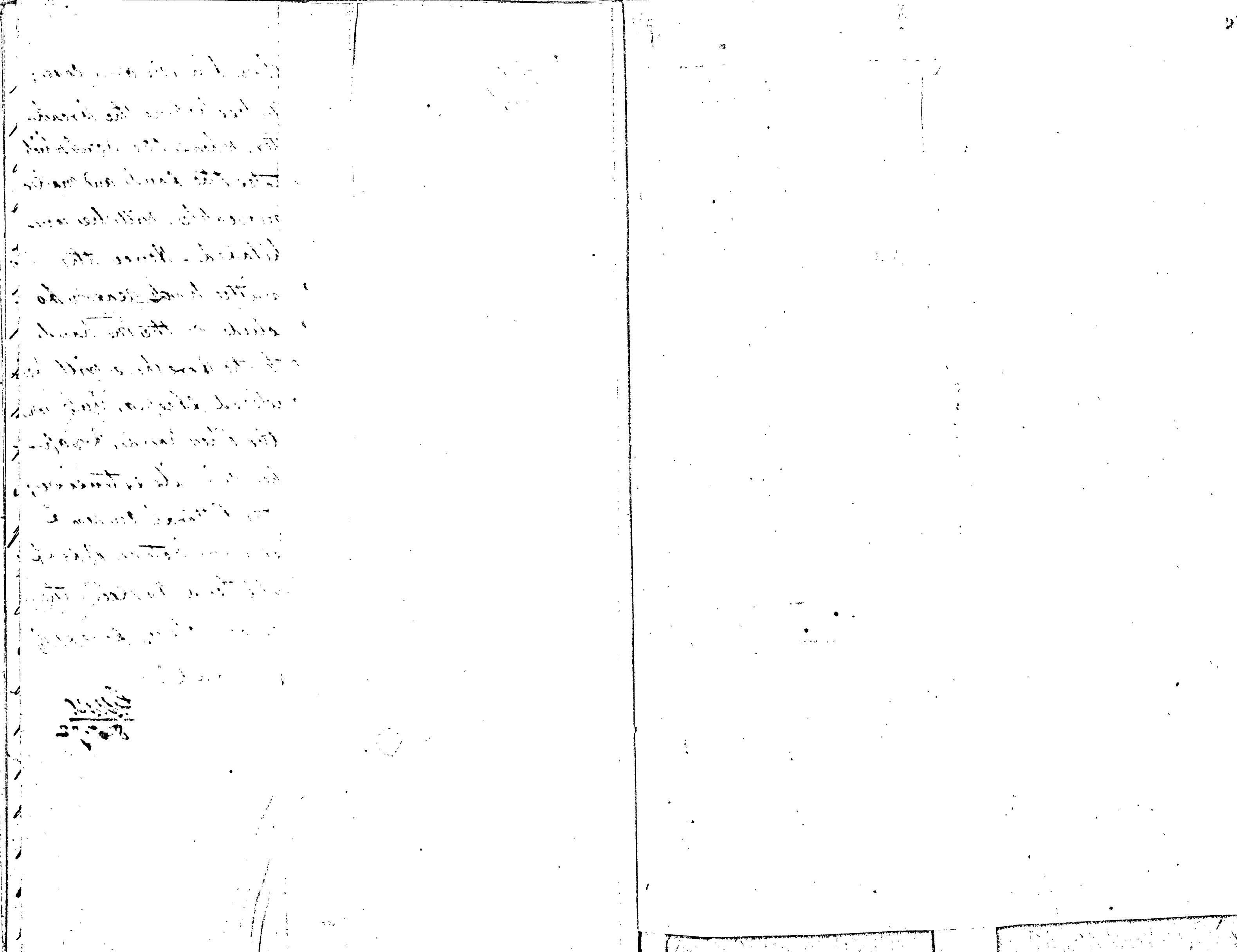
best proposed after the
Breakwater project.

I deprecate therefore
any postponement of the
Breakwater scheme on the
score of further information
being necessary as to cur-
rents and sand deposits.
It is now matured suffi-
ciently to be determined
for or against on the sim-
ple grounds of its value
compared to its cost. The
Master Attendant could
easily procure further in-
formation as to currents
if necessary. As to the ex-
tent to which sand is
moved, nothing but
actual construction of a
grayse out beyond six
fathom line would settle
it.

the question experimentally.
But I maintain that for
all practical purposes
we have information
enough, it has only to
be argued as cor-
rectly as has been done
by Mr. Robertson in the
matter of a proposed Break-
water on the Armagh
Shoal. The argument in
page 51 of the Report that
the removal of one motive
agent, the surf, would
cause the other agent to
drop and behind the
Breakwater is fallacious,
because it assumes that
the littoral currents will
have sand in suspen-
sion. Where is it to
have none outside of

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fathom line, in any case;
still less behind the break-
water, where the agent which
agitates the sand and makes
it moveable, will be an-
nihilated. Hence the
Committee have reason to
conclude on the one hand
that the foreshore will be
rendered steeper, but none
on the other hand, for ap-
prehending its extension;
as the littoral current
freed from action of surf
should tend to keep the
foreshore clean swept of
loose sand.

C.M.W.
8.5.72



Govt. of 1872 Madras.

PUBLIC WORKS.

To The Superintendent Eng^{rs}
1st 4th 5th 6th 7th
and 8th Divisions

Dated

Recd.

Encl.

G. O. 12th Dec 72, No. 1449.

Order

Nos. 182

Harbours of the Madras
Presidency. Passing orders
on Mr. Robertson's report

8-2-13 ✓
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G. O. (Printed).

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