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MADRAS RECORD OFFICE

Government of Madras

Public works. DEPARTMENT

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Dated	17-3	1873

Not to be folded or roughly handled

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*Proceedings of the Madras Government, Public Works Department,
17th March 1873.*

No. 399. Read the following Proceedings of the Government of India in the Public Works Department, (Buildings and Roads—Miscellaneous,) dated Fort William, 30th December 1872, No. 523 B. C.

Mr. Parkes' project for the formation of a close Harbour at Madras.

Read the following Despatch and enclosures :—

From the Secretary of State for India, to the Government of India, dated 21st November 1872, No. 107.

HEREWITH is transmitted for your Excellency's consideration, in connection with other papers on a similar subject forwarded to you by the Madras Government, copy of a letter* from Mr. W. Parkes relative to a project for the formation of a close harbour at Madras.

* Dated 28th October 1872.

From W. PARKES, Esq., M.I.C.E., to the Under Secretary of State for India, dated 28th October 1872.

I UNDERSTAND that the question of affording some artificial shelter to the roadstead at Madras is about to be considered by the Secretary of State.

A few months ago I gave some attention to this subject, and after consultation with Captain A. D. Taylor, I. N., who is so well acquainted with the locality in his late capacity of Marine Surveyor in India, I prepared a project, which I sent out on the 23rd August last to His Excellency the Governor of Madras.

I submitted my project to some Members of the Council of India and others interested in, and acquainted with, Madras; but I did not at that time bring it officially before the India Office, as I was aware that it was not usual for the Secretary of State to take the initiative in matters of this description.

Now, however, that His Grace's attention has been directed to the question from the proper quarter, I think it may be to the convenience of the authorities for me to submit a duplicate of my project (enclosed herewith) in anticipation of the probable reference of it to His Grace by Lord Hobart in due course.

I may mention that the following gentlemen among others have carefully examined the project and conferred with both Captain Taylor and myself personally upon. They have all expressed themselves as prepared to support it in preference to any of the plans hitherto proposed :—

Mr. J. J. Franklin, R. N., late Secretary of Marine Board at Madras.

Mr. P. Macfadyen, of the Firm of Arbutnot and Co. of Madras, Chairman of the Madras Chamber of Commerce, and a Member of the "Breakwater Committee."

Captain J. H. Taylor, the Senior Commander in Messrs. Green's service, now commanding the *Viceroy* screw-steamer.

I may add that, although I have thought it better to submit the project in the identical form in which it was submitted to Lord Hobart, the subsequent information I have received would justify conclusions even more favourable to the principles of the design.

Note by WILLIAM PARKES, Esq., M. I. C. E., on the formation of a Harbour at Madras.

THE exposed state of the Madras anchorage has long been felt as an evil for which a remedy ought to be provided, and an impetus has been given to the question by the accounts of the loss of life and property in the late severe cyclone.

2. Some months previous to that disaster, Mr. Robertson, Harbour Engineer for India, had visited the place, and after informing himself of the local circumstances and requirements, has made a report which contains a suggestion for remedying, or at least mitigating the evil, and an estimate of the cost of the work he proposes.

3. I should not have considered it right to have put myself forward in this matter if I had not been convinced that Mr. Robertson's Report would have the effect of retarding, rather than advancing, the object in view by suggesting difficulties which I believe to be unreal.

4. Mr. Robertson's estimate for the work he recommends is, I am confident, fully double what it need cost, and the scheme itself must, I think, appear to the majority of persons who look at it from a practical point of view so incomplete, that it would, if carried out, involve the construction of supplementary works on a scale not much less than that of the original one, before any substantial advantage could be obtained.

5. I should fear, therefore, that the only deduction likely to be drawn from Mr. Robertson's Report is, that the evil is practically irremediable on account of the enormous cost of the remedy. The real facts of the case warrant no such conclusion.

6. I am aware that my authority to speak on the subject will be questioned, on the ground that I have not personally visited the place, and I admit that this fact renders it necessary for me to be careful not to overstep those limits within which conclusions, based on data within my knowledge cannot be materially modified by such local considerations as can be properly weighed only on the spot.

7. I think, however, that such limits in this case are unusually wide. The physical conditions are remarkably simple, and I have a great advantage in the fact that Mr. Robertson has himself by his local examination cleared the ground and excluded from the question complications which can only be eliminated by such a professional inquiry. On the ground so prepared for me by Mr. Robertson, I formed a strong impression as to the right course to be adopted, but I should not have felt justified in pledging myself to it as a positive recommendation, if I had not had the further advantage of submitting my first crude ideas to Captain A. D. Taylor, one of the most experienced Surveying Officers of the late Indian Navy, and an authority second to none on the hydrography of this part of the coast of India. Captain Taylor's information has served to confirm my own previous impression, and I am authorized by him to say that he entirely concurs in the recommendations which follow. Indeed, in the form in which I am about to present them, they may be considered as made jointly by Captain Taylor and myself, though, as the subjects on which we are individually qualified to speak are different, we could not so conveniently embody the expression of our views in a joint statement. He has, however, favoured me with a statement of his opinion on the nautical part of the question, which will be found appended.

8. The recommendation put forward by Mr. Robertson is for a straight breakwater, 2,000 yards long, 1,200 yards from, and parallel to, the shore in a depth of 7 fathoms. (The rise and fall of tide is so small as to be no element in the question. It is given as 3½ feet at springs in the Admiralty Tide Tables, but Captain Taylor says this is a very extreme range.) Such a breakwater Mr. Robertson estimates at £1,140,000, or allowing 15 per cent. for contingencies at £1,311,000. As he gives the grounds of his estimate, I have been enabled to form an opinion upon it and my conclusion is that it is very unnecessarily high.

9. Mr. Robertson takes as his model the Portland breakwater, which is a mere mound of rubble-stone which the sea has been allowed to wash down till the slopes have become permanent. Taking a mound of such a form and dimensions, calculating the quantity of stone required for its formation, and dividing this quantity into the estimated cost, I find that Mr. Robertson has assumed that the stone will cost (including staging, pier from shore, and I presume, circular heads of masonry, but exclusive of the 15 per cent.) about 8 shillings per ton.

10. Now I readily admit that the Portland breakwater is a noble and successful work, and that it might be a proper model for another breakwater, if such had to be constructed under similar conditions. But I unhesitatingly deny that it is a proper model to adopt under conditions so different as are those of Madras. The stone at Portland cost, I believe, about 2 shillings per ton, instead of 8 shillings as estimated at Madras. Do the resources of Engineering science suggest no means of modifying the form of structure so that the total cost may not also be quadrupled?

11. A somewhat similar problem was presented to me when it was determined to construct the Manora breakwater at Kurrachee, and the solution then arrived at by the Superintendent of the Works (Mr. Price) and myself is with certain modifications applicable to Madras. The Manora breakwater, which has now advanced 800 feet from shore, has been subjected without material damage to much heavier and more continuous seas than a similar work would be subjected to at Madras, and it is in every way efficient as a breakwater.

12. The principle is to form of the rubble-stone (which at Madras would be so costly) only a comparatively small submerged mound, the top of which is below the action of the waves, and to raise upon this a wall with vertical sides composed of large concrete blocks, each 27 tons weight. It is upon this wall alone that the sea has any action, and although the action is very violent, the great weight of the blocks is sufficient to withstand it.

13. Applying this principle to Madras, we should require, as compared with the Portland system, only about one-fourth the quantity of rubble-stone to form both the submerged mound and the bulk of the concrete for the superstructure, and the extra cost of cement and of labour in making and setting the blocks would still leave a large saving in favor of this principle. Taking as the basis of my estimate 8 shillings per ton as the cost of rubble-stone, whether in submerged mound or in concrete, and the cost of cement, and labour in making concrete and in setting the blocks the same as at Kurrachee, making also ample allowance for plant and preliminary works based on Kurrachee experience, I find that the cost of a breakwater of the same length and in the same depth as Mr. Robertson proposes, would be £566,000, or with 15 per cent. contingencies £650,900, being about one-half of Mr. Robertson's estimated cost.

14. Mr. Robertson estimates six years as required for the construction of the breakwater after the completion of the pier, which he proposes to make for running out the stone upon. On the concrete block system it could be completed in three years after the completion of the pier, or including the pier, say four years as against seven.

15. I submit, then, the conclusion that in considering the merits of Mr. Robertson's proposal for a breakwater the cost may be taken at two-thirds of a million, instead of one and a third million, sterling, and the time occupied at four years instead of seven.

16. But I have now to show that even with these advantages the scheme is an unpromising one, as compared with a rival proposal which Mr. Robertson somewhat summarily rejects.

17. At the time of Mr. Robertson's visit, a report had recently been made by a Committee, of which the late Colonel Carpendale was President, which treated of the relative merits of a detached breakwater and a "close harbour." I have not had an opportunity of seeing this report, but it appears by a quotation from it made by Mr. Robertson that the majority of the Members, though on all other grounds preferring a close harbour, decided in favour of a detached breakwater in extent and position similar to that subsequently recommended by Mr. Robertson, on the sole ground that they considered the close harbour would silt up. Colonel Carpendale, the President, did not concur in this, but maintained his preference for a close harbour, and Mr. Robertson himself thinks there would be "as much, if not more, danger of shoaling in the case of a breakwater as of an enclosed harbour," giving his preference to the former, on the alleged ground that it would afford more deep water shelter in proportion to the cost. But he makes his recommendation subject to such farther information as may be obtained "as to the littoral currents and the quantity of sand in motion on the coast," as to the former of which he says there is "hardly a scrap of evidence."

18. But to my mind this very absence of evidence is the strongest possible testimony against the existence of a littoral current of such strength as could affect the present question. If there were so strong a current, it would be one of the most prominent and notorious features of the Madras Coast. The evidence quoted by Mr. Robertson, and confirmed by Captain Taylor of a well known weak surface current to leeward in either monsoon, seldom running more than a mile an hour, though under rare exceptional conditions increasing to three miles an hour, proves conclusively the absence of any special movement of a kind unusual on a coast of this character. I am confident that there need be no hesitation in entirely disregarding these supposed littoral currents as vehicles for carrying sand along the line of shore.

17th March 1873.

19. The motion of sand along the coast by the oblique stroke of the breaking wave is a more important matter, but when Mr. Robertson expresses a desire for more information on this point, it is natural to ask how such further information is to be obtained. There is no doubt that the movement, whatever may be its extent, is confined to the belt of surf which fringes the coast, the width of which is said to vary according to the season from 300 to 450 feet, and in a less degree perhaps to a belt a little outside of it. It may be confidently affirmed that it does not extend to the contour of 30 feet depth, though it may possibly extend to 20 feet. Any deductions drawn from the effect produced by groynes which do not extend into the unbroken water are of little use, and an experimental groyne which would afford reliable evidence would be in itself a considerable work.

20. This being the case, it would appear that the testimony afforded by analogy should be examined before direct experiment is appealed to. Now the testimony of the places which are most similar to the Madras Coast, where the experiment has really been fairly tried, is, so far as I am aware, invariably to the effect that the quantity of sand or beach accumulated to windward of a groyne carried into deep water is not excessive or unmanageable. Ports Said and Dover may be mentioned as instances which differ in almost every other respect but agree in this, that the accumulation to the windward of the piers, though considerable, is not so great as to threaten to envelope the pier heads for generations to come. When the time does arrive, posterity will no doubt be in a position to grapple with the difficulty.

21. The position of the question at Madras appears then to be this: It is admitted that if a solid pier were run out from the shore, the beach movement of sand would be stopped by it, and an accumulation on one or both sides would be the consequence, but as to the amount of this accumulation there is no definite means of judging. One party think it will be overwhelming, the other do not; the former opinion is supported by hypothesis only, the latter analogy. Nothing short of actual experiment can conclusively decide the question.

22. The success of the detached breakwater scheme is equally with that of the close harbour, dependent on the quantity of sand in motion by the oblique action of the surf not being excessive. Mr. Robertson says truly that the quieting of the waves on the beach would produce as effectual a stop to the movement of sand as a solid pier. Every wave would drive sand into the shelter, and there would be nothing to take it out again, so that the anchorage would be subject to a constant process of deterioration. I have already expressed my entire disbelief in the agency of a littoral current in moving the sand along the coast, and can see no ground for the suggestion that such a current would carry out sand which the wave action would bring in.

23. I have now given the fullest prominence to the one legitimate doubt on physical grounds as to the success of a harbour at Madras, and I have shown that that doubt cannot be finally solved except by trial on a practical scale. A solid pier run out from the shore into 20 or 25 feet of water would bring the question to a practical test, by showing how much sand would be collected in a single season. Such a pier would ultimately form part of the complete scheme if the result of the experiment encouraged its further prosecution, and if it did not, the only loss would be the cost of the pier itself. Still, the experiment itself would be too costly to be advocated without a strong probability of a favourable result, but I think such probability is amply afforded by the analogy of similar situations. Taking the case of Port Said alone, I can imagine no unfavourable conditions at Madras which did not exist in a greater degree at that place, and yet the pier there is perfectly effectual in protecting the harbour from wave-driven sand.

24. I think, therefore, that though this one doubt may justify hesitation in embarking in large immediate outlay, the probability of a favourable result is so strong that it is not premature to consider the principles of a complete scheme.

25. I have no hesitation in giving a preference to what is called a *close harbour* over a detached breakwater. I cannot admit any fear of its shoaling, except from the remote possibility of the beach extending to the pier heads and entrance, which it could do only from an action which I agree with Mr. Robertson in saying would be equally, if not more, fatal to the detached breakwater, if it be so to either. As to Mr. Robertson's assertion that a breakwater would give more

sheltered area, I confess myself unable to understand his meaning. Taking into account the completeness of the shelter afforded by the close harbour and the consequent facility for mooring the ships more closely together, I consider the superiority very materially the other way.

26. The accompanying sketch shows (in yellow) the position of Mr. Robertson's detached breakwater, and (in red) my own idea of a "close harbour," would cost almost exactly the same money, namely, £560,000, or with 15 per cent. contingencies £644,000. The system of construction for the piers would be the same as that described for the breakwater, and though the total length is greater, there is a saving from a portion of them being constructed in shallower water. The time required for completion would be about the same, namely, four years.

27. I have adopted this particular form, position, and dimensions for the harbour, not because I pledge myself to the opinion that they are the most suitable, but because from the quality in scale and cost with the breakwater which has been recommended by those who are more familiar than myself with the local requirements, it is more fairly comparable with that project. If the principle be accepted, there is great scope for variety in the arrangement of details.

28. It may be useful to point out the accommodation and facilities which would be afforded by such a harbour. It is obvious from the proportion which the enclosed area bears to the width of entrance (450) feet that the water will be almost as smooth as in a dock whatever be the state of the sea outside. The existing pier might be used as a quay for vessels to come alongside to discharge and load, and additional jetties and quays could be made as required. In the deep part of the harbour there would be space for 28 or 30 of the largest class of merchant ships to swing at their moorings, besides those alongside quays. Smaller vessels would be berthed nearer shore, and might be moored head and stern in tier as in the Thames and elsewhere where the shelter is complete.

29. The piers which enclose the harbour would not in the first instance be available for ships to lie alongside, but if further accommodation were required they could be made so by carrying out new piers on the same system in the direction of dotted lines. These new piers would then shelter the old piers, the vertical sides of which could, at a small expense, be made available as quay-walls and backed to any required width with sand or earth to form quays on which sheds and warehouses might be erected and trade carried on on the modern system. As another step in advance the new pier might itself be brought into shelter by another further along the coast and converted into a quay-wall, a second independent harbour being thus formed. This facility of extension, as trade requires it, is an important advantage.

30. I would repeat that the estimate of cost (as respects its largest items, the rubble-stone) and the scale of the design are adopted rather with a view to comparison with Mr. Robertson's project than as being based on any information of my own. Mr. Robertson himself appears to think stone might be obtained at a cheaper rate, and, if so, both his and my estimates would be reduced; in fact, his would be reduced in a greater proportion than mine, and if stone could be got at 2s. 6d. per ton, instead of 8 shillings the two systems of construction would be equal in cost and the superiority on the ground of cost would then be on the side of the breakwater over the close harbour. But such a low rate as 2s. 6d. is hardly likely.

31. As to the scale of the design, I believe that within very wide limits it might be adapted to the amount that could be raised, and my expectation is that a design considerably smaller than that I have drawn would be more suitable to the existing state of the trade. Such a design would, of course, be equally capable of extension, when required, as a larger one. But it should be borne in mind that there is a relative economy in the larger scheme, as the accommodation increases in a higher ratio than the cost.

32. If such a harbour, as I have described, were constructed, it is obvious that a material saving would be effected in the cost of landing and shipping cargoes, and in the time required for those operations. The risk to shipping would be reduced, and the facilities for repairs would be increased. All these advantages represent a direct saving of cost per ton of goods shipped and landed, and that saving might be appropriated to the payment of interest on the outlay. If this

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were sufficient for the purpose, the financial question would, I presume, be solved, and if it were not, there would still remain certain indirect advantages to the important interests of the town and surrounding country which are always more or less conferred by increased facilities of communication. These might be held to justify here, as they have been elsewhere, a charge upon the public revenue, but this is a question rather of administrative policy than of engineering, or even of finance, and which requires for its solution an intimate knowledge of the local circumstances of the country and of the trade.

Remarks by CAPTAIN A. D. TAYLOR, Indian Navy.

THE great advantage of having Mr. Robertson's Report, with a few glimpses therein of the opinions of the Breakwater Committee, leads me unhesitatingly to prefer Mr. Parkes' idea of an enclosed harbour. The Committee have placed their opinion on record as follows:—

"If it were possible to construct an enclosed harbour which should be secure from the danger of shoaling up, we should not hesitate to recommend it in preference to a breakwater. It would be greatly superior in every respect. The piers would be constructed from the shore and at far less expense, in proportion to the material used, than the breakwater; the accommodation for shipping, and the facilities for landing and shipping cargo would be greatly superior to those afforded by an open harbour.

To this I would add that smooth water accommodation for landing and shipping cargo would be entirely provided under the first cost of the enclosed harbour, and wharves might be constructed in smooth water; whereas with a breakwater all such accommodation would be an additional and quadruple expense, all piers for landing and shipping cargo requiring to be constructed in the open sea, and subject to havoc from (if not east winds) at least from those strong north winds which usher in the Madras cyclones and from the S.-E. winds at their tail.

From a nautical point of view, let us consider the breakwater question. Say it is complete, and several vessels are moored between it and the shore. The approach of a cyclone is indicated; the north wind hourly increasing in force gives warning that the vortex bears due east from Madras and is advancing directly upon that place. Under such conditions the wind will remain at north till the centre of the storm arrives; when that has passed, (with that awful half hour of calm, which "makes the boldest hold his breath for a time" in harmony with a hushed wind), and the cyclone is still travelling westward, the wind will come up from the south; if travelling more to the S.-W. the wind will be S.-E. What now becomes of all the smaller craft? How will the landing piers stand it? The small craft should have been sent to leeward on the rising of the north wind, to guard against the contingency of their parting from moorings and falling athwart the bows of the larger ships. Thus, after the passage of the vortex, when the wind has chopped to the S.-E. or south, and the storm-wave comes on, they are found to windward. In the scramble to escape back through the shipping the foreseen contingency happens. Where are they now? Does the reader say, "this is mere hypothesis." Then let him listen to the chronicle of meteorological events published at Madras—

"Madras is occasionally subjected to various hurricanes, generally in the early part of May, or the end of October. They seem to travel up from the E.-S.-E., and progress rapidly in a W.-N.-W. direction till they touch the land, and then they assume a west or sometimes a W.-S.W. course. Their centres generally come right on to the port of Madras." * * * "Their diameters are about 150 miles, and they revolve in a direction contrary to the hands of a watch, as do all cyclones north of the Equator. When the hurricane's centre comes right on to Madras, and thence takes a west course, the wind is first at north, increasing in violence for a few hours and then a lull, or awful calm for half an hour or so, when the hurricane re-commences furiously from the exactly opposite quarter, south. Usually the gale commences about N.-N.-W., showing that the vortex of the cyclone bears about E. N.-E. Vessels, therefore, warned by the barometer, the hollow-breaking surf, the threatening sky, and the signals of the watchful Master Attendant

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should at once put to sea. The course to steer, and fortunately it is one which the wind permits is S. S.-E. to S.-E. In a few hours the vessel will probably have the wind moderate at west, and may, in fact, it has been done, sail round the cyclone, the wind veering to south and then to east. Vessels at first steering east to get way from the land have run right into the vortex of the hurricane! The only danger in a southerly course is from the storm-wave setting a ship on shore. If the gale commences N. N.-W. at Madras, and ends at S.-E., as has often happened, it shows that the centre has taken a W. S.-W. course, and passed a little to the south of the town, but if it ends at S.-W., it shows the centre has taken a W. N.-W. course, and the vortex passed to the north of Madras."

We have ample reason then for thinking that the breakwater system has few advantages to offer nor is mine an isolated judgment. In a paper about Madras by my brother Captain J. H. Taylor (Messrs. Green and Co.'s oldest Commander), his opinion is recorded that "from the exceptional bad weather caused by hurricanes or cyclones, no breakwater would offer real security for ships."

Under the alternative system of an enclosed harbour, complete shelter is provided for both large and small craft. The Committee say that the shoaling of the harbour would certainly result from the construction of any solid piers or groynes from the shore. I know no reason why we should anticipate such a result unless pains were taken to bring it about by dilatory action in constructing the piers; thus if 200 or 300 feet of each pier were completed, and then for want of funds a halt of an entire year was made, we might expect some sand to be brought from both north and south, and left on the foreshore on the site of the proposed harbour between the piers. Tardiness in their construction before the zone of surf has been passed would be productive of mischief. But if both piers are rapidly carried out beyond the surf of ordinary weather, the littoral currents will not suffice to carry it past the pier heads, but merely a small growth of the beach, outside the piers and towards their ends, will be caused thereby. A very rapid filling up of such an angle was prognosticated as the result of constructing the breakwater at Port Said, but time has shown that the operation of nature is very slow, and that the increased velocity given to the littoral current by the prominence of the pier suffices to carry on what sand is held in suspension by the agitated waves and past the entrance of Port Said. So would it be with a prominent enclosed harbour at Madras, and I cannot share the fears of those who expect otherwise.

ORDER.—Ordered that a copy of this despatch and of its enclosures be forwarded to the Government of Madras in the Public Works Department for consideration.

(Signed) D. SCOTT,
Asst. Secy. to the Govt. of India.

From the Assistant Secretary to the Government of India, Public Works Department, (Buildings and Roads—Miscellaneous,) to Colonel G. W. WALKER, R.E., Secretary to the Government of Madras, Public Works Department, dated Fort William, 27th February 1873, No. 90 B.C.

I AM directed to invite attention to this office No. 523 B. C., dated 30th December last, regarding Mr. Parkes' project for a close harbour at Madras, and to inquire if an early report on the subject may be expected.

No. 399A.

Telegram from the Secretary of State, London.
(Here enter No. —, dated 6th March 1873.)

No. 399B.

Telegram from the Governor-General.
(Here enter No. —, dated 11th March 1873.)

17th March 1873.

No. 400.

ORDER THEREON, 17th March 1873, No. 830.

CIVIL WORKS, No. 26.

ORDERED that the following letter
be sent :—

(Here enter No. 831, dated 17th March 1873.)

(True Extract.)

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

Secretary to Government.

Erwin Delaney R Sec of State

I have respect to Parker & some with
 him as of me with & new to
 determine the same. The same
 about the & last mode of
 providing & shelter for shipping —
 I know of the & same as there
 in which he was employed to
 construct the same.

Copy sent to the Govt.
of India of the 1st March

Copy sent to the Govt.
of India of the 1st March

Telegram

(11)

Mr. Parker wanted
here in September Govt.
A of India approve-

Mr. Governor
Madras, To Secretary to the
Govt. of India
London W.M.

Lad Hobart to
Vicary. ~~Lord Northbrook~~ ~~General~~ 13

Your private letter of the 6th.

We propose at once to send
^{as being best authority:}

for Parker, so that we may

decide finally as to nature

& cost of the work. I shall ^{then} ~~then~~

send you complete financial

estimate. Our Post-Trust

Bill is ready. Please

sanction sending for Parker

by telegraph.

Hobart

Public Works Department

Telegram from the Governor General,
dated 11th March 1873.

Forwarded with
reference to the Draft letter
to the Government of
India now in circulation.

G.W.

J.P.S.

Telegram to the
Governor General
on 11th March 1873
A. Andru
11.3.73
Dist. Sect.

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Memorandum, by the Chief Engineer

Mr. Parkes's
note on the formation
of a harbour at Madras,
deals with two separate
subjects -

- 1st The principle on
which a Breakwater
should be constructed.
- 2nd The construction
of a closed harbour
instead of a detached
Breakwater.

Breakwater.

It is observed
that Mr. Parkes' Note
was originally drawn
up on the information
gathered from Mr
Robertson's Report,
but that he has not
in any way modified
it after being supplied
with the Breakwater
Committee's Report.
The objections to depo-
siting the materials
of a Breakwater direct
from a Pier communi-
cating with the land
have not been entered
into by him. There
is no doubt but that
- 64 -

19 11
by adoption of the
mode of procedure
made use of at
Murrachee an im-
mense amount of
material will be saved,
which ought to lead
to economy and ra-
pidity of execution,
both very desirable
objects. It is very
expedient therefore
that Mr. Parkes
should visit Madras
and endeavour to
realize on the spot
the force of the objections
against direct deposit
of materials from a
Pier; and to what
extent

extent they, if valid, -
would influence his
calculations. He would
then be in a position
to estimate pretty accu-
rately, with the experi-
ence gained at Hurra-
chee, the rates at which
the lower portion of the
Breakwater could be
deposited of rough gra-
nite blocks, and the
upper portion built up
of 27 Ton masses of
Concrete.

As to design,
Mr Parkes is opposed
both to the former Com-
mittee and to Mr
Robertson; entirely
disbelieving

(21) 12
disbelieving in the
existence of a littoral
current or other Agency
adequate to the moving
of sand in such
quantities, and so
quickly, as to extend
the line of shore
as far as the extreme-
ties of any groynes
that may be thrown
out from it, within
a moderate time.
Even should such a
contingency occur in
course of time, he
has no doubt but
that it could be
met, and its conse-
quences effectually
dealt

description of work; but
he prefers a breakwater,
and states that if a
closed Harbour be con-
structed its mouth
will have to be defended
by a breakwater.

That there is
action of current and
surf combined, of a
very decided nature,
along the coast of
Madras no one who
knows the place can
doubt. The effect of
the Vessels wrecked
in May 1872 in acting
as groynes, causing
accumulation on one
side and erosion of
beach

27
the Monsoon currents,
as well as to obtain
information as to
the cost of materials,
carriage, and labour.

Should an open
Breakwater eventually
be determined on it
would be desirable
that the economy of
construction advocated
by Mr Parkes should
be availed of to add
to its length and place
it in deeper water,
rather than simply
to reduce its cost.
Should a closed Har-
bour be finally ap-
proved of, it is pro-
bable that its shape
will

will take that of two
groynes projected in
to six fathom water,
headed by, but not
connected with, a
breakwater in 7 fathoms or more,

so that there shall
be 2 openings north
and south not ex-
posed to the direct
action of the Ocean
swell.

G.M.W.

beach on the other,
has been manifest to
the latest residents.
It is moreover known
that the effect of groynes,
thrown out with that
view in front of Fort
St George, has been
to reclaim from the
Sea a sufficient width
of beach whereon to
form a broad road to
the way. But it is also
known that such
reclamation takes up
only a small portion
of what was former-
ly dry land extending
considerably to sea-
ward of the Fort.
That

That there are considerable forces in existence acting on the sand cannot therefore be doubted, but the precise nature of their action has not been systematically noted so that practical deductions may be drawn therefrom. It is very desirable that any Harbour Engineer who may be consulted as to the design and execution of a Harbour at Madras, should reside there throughout the season to watch the effects of the changes of the

Public Works Department
Proceedings of the Madras Government
Read the following:

From,

The Government of India - (H. E. L. 523 B. C. dated 30th Decr/12)

" do do. (" " 90 B. C. dated 27th Feby/13)

Telegram from the Secretary of State, London. } (" " dated 6th March/13)

Telegram from the Governor General - 11th Nov.

Ordered that the following letter be sent.

No 83L

To
The Secretary to the
Government of India.

P. M. D.

Sir,

With reference to
the Proceedings of
the Government of
India dated 30th Decr
1872, No 523 B. C.,
forwarding for con-
sideration a letter
from Mr. W. Parkes,
relative to a project
for the foundation of
a close harbour at
Madras, and to your
further communication
of

W. P.

W. P.

W. P.

W. P.

of the 24th Ultimo No.
90 B. L. I am di-
rected to forward
herewith a Note by
the Chief Engineer
D. D. M. on the subject,
and to state that His
Excellency the Governor
in Council agrees with
Colonel Walker in
considering it expedient
that Mr. Parker should
visit Madras and in-
vestigate the question
of the best design and
method of construction
of Harbour Works
at that place, on the
spot. The opportunity
of Mr. Parker's visit
to Madras may also
advantageously

32
I would add
that it is most important
that the provisions of the
shelter for ships in
the roadstead
Madras should be improved
be deferred, and as
much delay has
already taken place
in the project, I am
also to report that
I should be
visiting off the coast
that for some time
decide upon a campaign
in the near future,
the suspension of the
service of the
Dec. of the
any made by telegram
The letter
Mr. Parker
the letter
in which he was
advantageously he avail-
ed of to obtain his
advice in connection
with the details of the
Harbour Works pro-
posed at Cochin.
And I am accordingly
by to request that the
Right Honble the
Secretary of State
may be moved to send
that gentleman out
to this Country.
I am to add that
the Chief Engineer
delayed the submission
of his report under
the impression that
it would not be re-
quired until the
financial question
connected

connected with the
Project, which is still
pending, was settled -

referred in respect
to the same to the
Board of

GMW.

transmission

W. H. H.

I enclose the last
paragraph of this letter.

It tends to complicate

the matter - and after

all this has been

the delay requires

apology

Yours truly

W. H. H.

Enclosure

17.3.1873

17.3.1873

17.3.1873

17.3.1873

17.3.1873

830
17.3.1873

He-S. depts 17/3/73 with memo
by the Hon. Secy. Mr. D.
P-C depts 3/4/73 with copies
of the above