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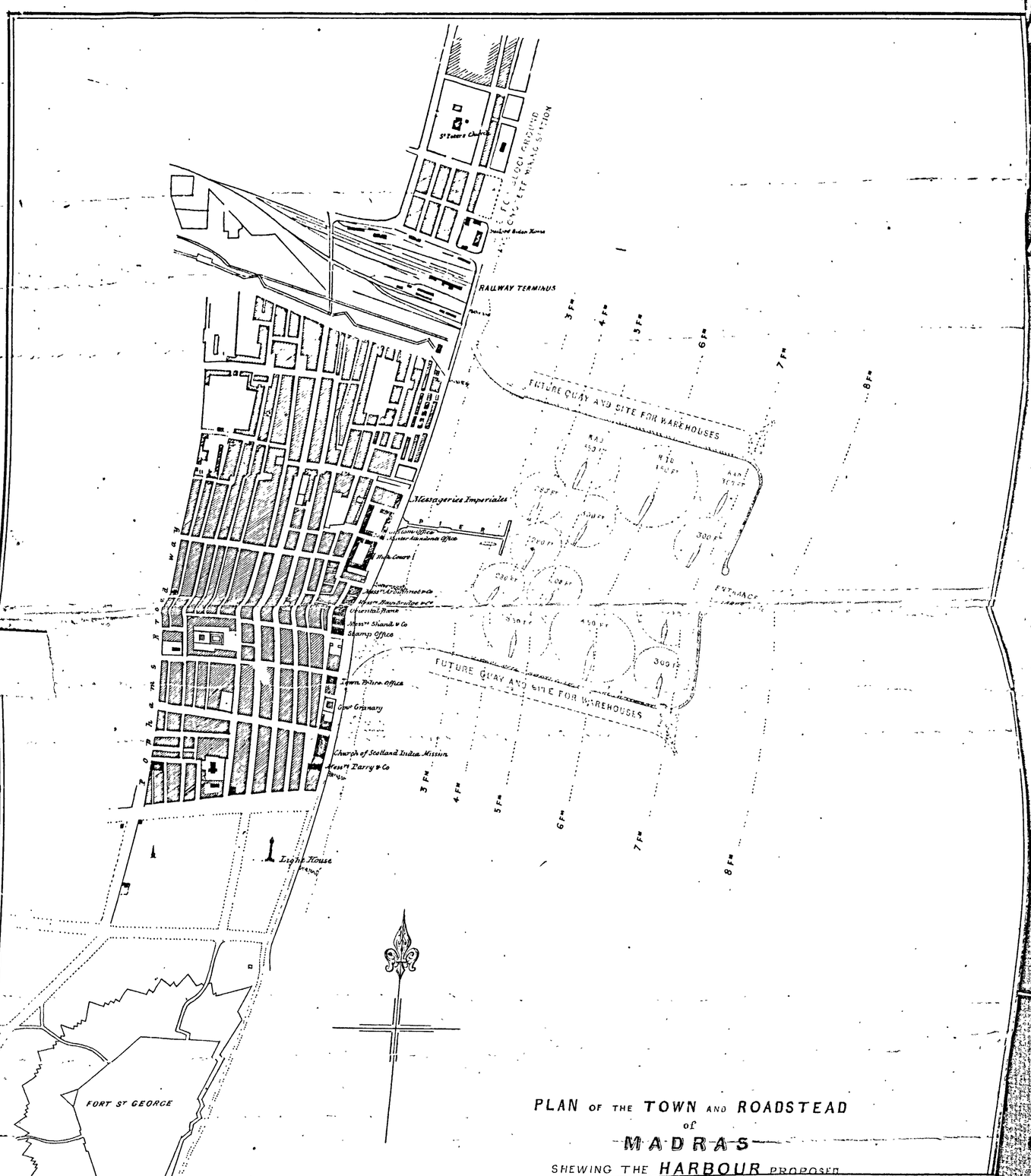
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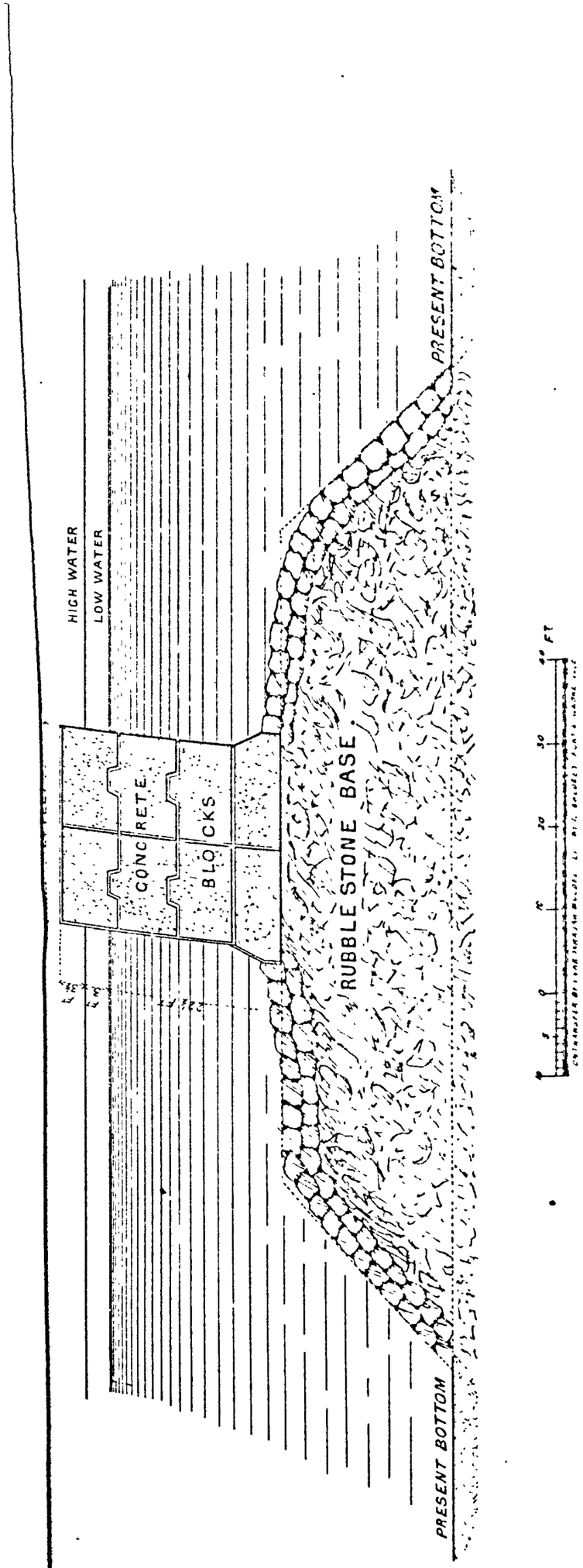
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PLAN OF THE TOWN AND ROADSTEAD
OF
MADRAS
SHEWING THE HARBOUR PROPOSED



REPORT

ON THE

FORMATION OF A HARBOUR AT MADRAS,

BY

WILLIAM PARKES, M. Inst. C.E.

From W. PARKES, Esq., M. Inst. C.E., to the Secretary to Government, Public Works Department, Fort St. George, dated Madras, 4th November 1873.

Sir,

In accordance with instructions given to me by the Secretary of State for India, at the request of the Government of Madras, I arrived at this place on the 29th September, and was engaged for the five following weeks in prosecuting such personal inquiries, observations, and investigations as I considered necessary to enable me to submit to you my conclusions as to the best mode of providing shelter for shipping.

2. Sources of information.—I have received every possible assistance from the officers of all the Government Departments to whom I applied, from those of the Madras and Carnatic Railway Companies, and also from several of the leading merchants of the place, and from the Secretary of the Chamber of Commerce. I have also had opportunities of conferring with the Commanders of several of the ships lying in the roads at the time of my visit, and have received from them valuable information on nautical points.

3. Previous study of the question.—It is right that I should state at the outset that my attention had been given to the subject for sometime previous to my receiving official instructions to report, and while in England I had the advantage of repeated conferences with Captain A. D. Taylor, I.N., an Officer of great experience and eminence as a Marine Surveyor of this coast, and also with Mr. J. J. Franklin, R.N., for many years Secretary of the Marine Board of Madras, as well as with other gentlemen of local experience then in England.

4. Invitation to visit Madras.—As a result of the information thus obtained, I felt myself justified in submitting to His Excellency the Governor of Madras, in August 1872, some remarks, in which I called in question the correctness of certain conclusions which had then recently been laid before the Government and were under its consideration. It was, I believe, in consequence of this that I was invited to undertake a personal investigation of the whole question on the spot. In doing this, however, I have subjected all my previous conclusions to the most rigid tests, and though those which I have now to submit are substantially the same, yet I am enabled to base them on information locally obtained, and I can put forward my recommendations in a more complete form, and my estimates of cost and of results to be obtained with greater confidence.

5. BLACKWOOD'S HARBOUR AND INLAND DOCKS.—I have not thought it necessary to devote much time to considering the details of two proposals which, in former times, have met with some support, because it appeared to me that neither was calculated to effect the object in view. These are, first, the removal of the trade of Madras to some locality, such as Blackwood's Harbour, more favored by nature; and, second, the formation of inland docks and basins.

6. BREAKWATER AND CLOSE HARBOUR.—The two proposals between which the choice now lies are, first, a breakwater entirely detached from the shore, and parallel to it; and, second, a harbour formed by piers running out from the shore into deep water, and termed a "close harbour."

7. The former of these systems is advocated from two totally different and independent points of view, and, so far as I am aware, no one (unless the Master Attendant, whose recorded opinion I shall presently quote at length, be an exception) advocates it on both grounds.

8. BREAKWATER COMMITTEE. The Committee appointed by Government in 1868, known as the Breakwater Committee, reported in January 1869, as follows, paragraph 40:—"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 to the latter 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 in an open harbour. But we consider that all these advantages would be rendered nugatory by the shoaling of the harbour, which would certainly result from the construction of any solid piers or groynes from the shore; and we are strongly of opinion that a breakwater is the one work from which any real improvement is to be hoped." Such is the view held by one class of advocates for the breakwater system.

9. MR. ROBERTSON.—Mr. Robertson, Harbour Engineer for India, says, (Reports, first series, p. 62):—"I have come to the same conclusion as the Committee, but from entirely different reasons. I have shown that there *may* be as much, if not more, danger from shoaling in the case of a breakwater as of an enclosed harbour; but taking all the circumstances connected with Madras into consideration, a breakwater appears to me to be preferable to an enclosed harbour. For an equal sum of money it will give much more *deep* water shelter than a harbour; it will create a considerable length of sufficiently smooth water at the coast line to enable boats to land or to come to jetties, and vessels can enter and quit more easily from behind a breakwater than through the one entrance of a harbour."

Thus, in Mr. Robertson's view, the shoaling objection would, if valid, be equally fatal to either system; but his opinion as to its validity, though not expressed, is, I cannot but think, very clearly implied to be in the negative.

10. SIR ARTHUR COTTON.—Sir Arthur Cotton in the able and suggestive paper he gave me before I left England, and which the Government at my request has printed and distributed, is less reticent. He argues from facts within his own experience that the along shore movement of sand is not sufficient to interfere with the success of an enclosed harbour, but he prefers the breakwater on grounds very similar to those expressed by Mr. Robertson, being mainly of a nautical character. Similar views are, I believe, held by others whose opinions are entitled to every consideration.

11. FEAR OF SHOALING, GROUNDLESS.—I agree with Sir Arthur Cotton that the fear of shoaling either in the case of a breakwater or of an enclosed harbour is groundless, and I agree with the Breakwater Committee in their opinion as to the superior advantages of an enclosed harbour.

ADVANTAGES OF BREAKWATER EXAGGERATED.—I further think that both classes of advocates of the breakwater have much over-estimated the advantages to be derived from it. I have now to give my reasons for these conclusions.

12. GROUNDS OF FEAR AS SHOALING NOT DEFINITELY GIVEN.—First, as to the fear of shoaling. The Breakwater Committee and the professional witness, by whose opinion

they appear to have been mainly influenced, Colonel (now Major-General) C. A. Orr, R.E., have expressed their conclusions upon this point in the most emphatic and confident terms. But in searching for the grounds of these conclusions one cannot but be struck with the comparatively hesitating and indefinite terms in which those grounds are expressed. The Committee, in their remarks on Mr. Fraser's project for a close harbour, say:—"We consider there is strong reason to conclude that if a beach is extended a hundred yards by means of groynes, it might be extended a hundred yards further by continuing the process, and in each case a new line of beach being formed precisely similar to the original beach, there would appear to be nothing to prevent the shore being extended to any amount that might be desired."

13. COLONEL ORR.—Colonel Orr passes over the matter very lightly in his evidence; but in a memorandum by him appended to the report, he says:—"It is evident to all who have had opportunities of studying the circumstances of the Madras beach, that any obstruction opposed to the currents must necessarily have the effect of arresting the passage of the sand which is in constant movement by the combined action of the surf and those currents, and of causing it to accumulate to windward of the obstacle. The accumulation would, at first, form merely an extension of the beach seaward in the angles between the training walls and the shore; but it would ultimately, I have no doubt, carry the line of the coast to the outer end of those walls, and close the entrance between them."

14. PERIOD REQUIRED FOR ADVANCE OF COAST LINE NOT ESTIMATED.—The natural process is, I believe, correctly described by Colonel Orr, but evidently the practical conclusion depends upon the meaning we are to attach to the indefinite term "ultimately." Does this refer to a future time to be reckoned by years, by generations, or by centuries? I presume that neither the Committee nor Colonel Orr can have meant to assert that the second hundred yards would accumulate as fast as the first, the third as the second, and so on. They cannot have failed to take into consideration that every hundred yards of advance of the beach involves a greater depth of water to be filled, and a greater length of coast to be covered by the triangular accumulation, and consequently a slower rate of advance for every successive hundred yards. But evidently they can have made no attempt to form even an approximate estimate of the decreasing rate of advance.

15. RATE OF ADVANCE DECREASING.—I might quote many instances of groynes, piers and other obstructions carried out from sandy beaches, similar to that at Madras, in which the rate of advance has been rapid at first, but in a few years so slow as to place the ultimate extension of the sand to the head of obstacle in so distant a future as to render it practically no element in the question. It might be urged with respect to any one instance that the circumstances are different to that of Madras, but the cases are now so numerous as to throw the *onus probandi* on those who assert that Madras is an exceptional case. In some of the cases there were predictions of the same nature and as positive as those given in regard to Madras, but in every instance they have been signally falsified. There are plenty of instances of *small* groynes being buried and *small* harbour entrances being choked by sand driven along the beach as Colonel Orr describes; but in every case in which piers on a large scale have been carried out, the advance of sand has been left far behind. I spent much time before I left England in investigating the history of all the cases of which I could find any record, and satisfied myself that the general rule is as above stated, and that Madras might legitimately be concluded to be subject to the same rule, unless reason could be shown for its being an exception.

16. SIR ARTHUR COTTON'S EXPERIENCE.—Upon this point the evidence of Sir Arthur Cotton is of the highest value. He had constructed groynes on the beach at Vizagapatam, and had carefully watched and recorded their effects. Those effects were of the same character as I have described above, and Sir Arthur had subsequently an opportunity, while Chief Engineer at Madras, of comparing the circumstances of that beach with those of Vizagapatam. He saw no ground for supposing them to be materially different, and unhesitatingly applied his Vizagapatam experience to the case of Madras.

17. Records of effect of Groynes.—Since my arrival at Madras I have gone a step further. I have searched the whole of the records in the office of the Chief Engineer in connection with the accumulation of sand by the groynes constructed some years ago. I found it reported that when the groynes were short the spaces between were quickly filled with sand, but when they were longer, one season was not sufficient for the accumulation. On one occasion in 1857 an estimate was made by Captain Rawlins, the Engineer in charge of the groynes, of the quantity of sand accumulated in a season by the groynes in front of the fort, and by that opposite the light-house, and those opposite Messrs. Arbuthnot's and the Custom-house. The area was in the aggregate 22½ acres, and the depth 3 to 4 feet, and the spaces were not filled. Taking this, therefore, as a measure of the quantity of sand which could be arrested in one year, I found that in order to fill in a triangular area of similar form between the coast and a pier extending 1,200 yards from shore, a period of 180 years would be required.

18. Experience of other places.—This result though of course only approximate, is so completely in accordance with the experience of other places as to remove all doubt that the accumulation of sand at Madras will not be so rapid as to cause any practical inconvenience to a harbour formed by piers running out from the shore. I may mention three cases in which definite results have been obtained:—At the harbour of Great Yarmouth, on the east coast of England, exposed to a drift of sand from the northward, that drift was arrested for forty years by a pier less than 200 feet long; at the port of Bayonne in France, situated at the southern extremity of a line of several hundred miles of sandy coast, exposed to the heavy north-westerly seas of the Bay of Biscay, works constructed just within the shore line 300 years ago are now 1,200 yards inland; at Port Said, exposed to a constant drift from the westward, the experience of ten years furnishes data, according to the Admiralty Chart of 1870, for the conclusion that 150 years will elapse before the wave-driven sand can pass the pier head, which is now 2,200 yards seaward of the present coast line.

19. Supposed Advantages of Breakwater.—I stated in paragraph 11 that I considered the advocates of the breakwater had over-estimated the advantages to be derived from it. This conclusion is not based on the examination of any definite estimate of such advantages, for none such has been put on record, but rather from the statements of existing evils which it is assumed the breakwater would remedy. The nearest approach to an estimate is that given by Mr. Robertson and quoted in paragraph 9, viz., that it would give more deep water shelter than an enclosed harbour of the same cost, and that it would create a considerable length of sufficiently smooth water at the coast line. Sir Arthur Cotton considers that "the breakwater would leave the space behind it exposed to a ripple from northerly or southerly winds, but *not to any swell.*"

20. Want of data for estimating effect of Breakwater.—These are certainly very vague estimates on which to base a recommendation for so large an expenditure, but that they are not more precise is due to the fact that there exists no experience, and even no theory on which such an estimate could be based. Mr. Thomas Stevenson, in his valuable treatise on Harbours, states that he has "been unable to find that a single observation or experiment of any kind has been made upon the subject." That there will be some shelter behind a breakwater lying parallel or nearly so to the ridges of the advancing waves, we cannot doubt; but there are absolutely no means of judging better than the merest guesses to what extent the deflected waves will roll in through the wide spaces at either end, and what length of breakwater would be necessary to prevent them from meeting in the space between it and the shore and creating cross and confused seas more troublesome to ships, and more dangerous to boats, than the regular swell of the ocean. Where the length of breakwater is sufficient to allow the waves entering from either end to spend themselves, and leave a space between, in that space there will be complete shelter. Whether the length of 2,000 yards is or is not sufficient for this purpose, I cannot say positively. If I were to hazard a guess, it would be that it is insufficient.

21. Direction of Seas.—So far I have assumed that the seas will advance upon the breakwater from that direction which gives it the greatest advantage, that is at

right angles or "broadside on," or in the case of Madras from the eastward. But it is evident that to a sea setting from the northward or the southward the breakwater would be "end on" and of no use whatever. Probably no great force of sea ever comes from these quarters, but I am informed that during the north-east monsoon the waves, though breaking nearly parallel to the shore, have, at the distance at which it is proposed to place the breakwater, a direction much nearer to that of the wind which raised them, and would therefore strike the breakwater very obliquely. This would reduce the width of the sheltered area, and the sheltered part of the beach would be somewhere near the light-house instead of opposite the business part of the town. A work which would offer so little protection during the annual foul weather season would not do much for the port.

22. Comparative shelter of Breakwater and closed Harbour.—From what I have said of the uncertain character of the shelter to be obtained from a breakwater such as proposed, it will be easily understood that I cannot bring to any definite test Mr. Robertson's opinion that it would provide more deep water shelter than a closed harbour of the same cost. I will, however, for the moment assume that the shelter would be as complete as its advocates appear to think. On such an assumption the number of ships that could be moored on the same system would be about equal in the two cases. On the most favorable assumption the breakwater will not therefore give the superior accommodation claimed for it.

23. Effect of Hurricanes.—Sir Arthur Cotton says that this question of shelter for shipping is not to be settled by what happens in a hurricane. In this I quite agree. I doubt whether any plan would give absolute immunity from danger during such exceptional times, still it is desirable to ascertain precisely what are the dangers to which shipping are exposed at such times, and what will be the effect of works intended for their protection in more ordinary times.

24. Description of Hurricanes.—I think, with this view, it may not be without use for me to present, in a more definite form than is ordinarily accessible, the leading features of the hurricanes which occasionally visit Madras. It does not fall to the lot of many persons to be eye-witnesses of more than one or two of these severe storms, and this partial experience is apt to lead, either on the one hand, to a too hasty generalization, or on the other, to an equally hasty conclusion that the phenomena manifested are incapable of being definitely classified.

25. Observatory records.—To enable me to do this I have been favored by Mr. Pogson with not only a sight of the very complete meteorological records of the Government Observatory, but also with his personal assistance in extracting from them the leading features of the several storms which have occurred since 1787, a period of over three-quarters of a century.

26. Three classes of Hurricanes.—I give in an Appendix the extracts which we made, and I now submit the general conclusion to be drawn from that statement. A very little study of it will show that the storms may be divided into three distinct classes, and the generally accepted theory of revolving storms or cyclones, identifies these classes as those in which the centre of the storm passes respectively over Madras, or south, or north of it.

27. First class—central.—Storms of the first class occurred in October 1797, May 1811, October 1818 and October 1836. In all these cases the wind commenced at or near north, blew for some hours with great force, then there was a lull of half an hour or less, and then it blew again with equal violence from the south. In no case, except perhaps in 1811, as to the particulars of which there appears to be some doubt, did the wind come at any time from the eastward.

28. Second class—centre south of Madras.—Storms of the second class, centre south of Madras, occurred in December 1807, November 1846, November 1848, May 1850, November 1861, November 1865, and May 1872. In each of these seven cases the same course was followed: the wind rose at about north; then gradually increasing in force it veered towards east, maintaining its force. After passing east it gradually fell, and by the time it arrived at south was either very light, or merged in the ordinary periodical wind.

29. THIRD CLASSS—CENTRE NORTH OF MADRAS.—Storms of the third class, centre north of Madras, occurred in November 1787, May 1788, March 1820, May 1820, May 1827, May 1841, May 1843, October 1846, May 1851, and November 1856. In these ten cases the courses of the wind were much less regular than in the two preceding classes. It kept rapidly shifting about with apparent irregularity through the *western* half of the compass, never during the height of the storm being in the *eastern* half, except on one remarkable occasion (October 1846), and perhaps one or two other of the earlier ones, when it made a rapid circuit of the whole compass round by west, north, east, and south.

30. SUMMARY—It thus appears that in only one out of the three classes (with the one exception just noted) did the wind blow from the east, in only one from the south with any force, but in all from the north. I may add that strong winds never blow from the eastward at Madras, except at the tails of the one class of cyclones.

31. PREPONDERANCE OF NORTHERLY WINDS.—DIRECTION OF WAVES.—This statement shows that in extraordinary as well as in ordinary weather there is a great preponderance of strong northerly wind. During ordinary times it is the north north-east wind of November and December alone, or rather the sea raised by it, which interferes in any serious degree with the trade of the port as carried on on the present rude system. It is of course from the waves rather than from the wind that shelter is required, and these no doubt in the gradually shoaling water advance from a more easterly quarter, but the assumption that they come from a direction nearly at right angles with the proposed breakwater is not borne out by the information I have received. If the question between a breakwater and an enclosed harbour depended upon this, it ought to be made the subject of more systematic observation before assigning any precise weight to the argument, but I have no hesitation in saying that a roadstead exposed to the most prevalent and strongest *winds*, even irrespective of the direction of the heaviest *seas*, cannot be considered to be effectually sheltered.

32. Having now shown that the only objection to an enclosed harbour which has been put forward as fatal, is groundless, and that the advantage to be derived from a breakwater are very uncertain as to their extent, and on the most favorable assumption very incomplete, it only remains for me to describe the work which I consider most suitable to the locality and the circumstances.

33. PRINCIPLES ON WHICH DESIGN IS BASED.—In determining upon the scale of my design, I have endeavoured to keep in view the following principles: first, that it should be sufficient for, but not in excess of, the present requirements of the trade; second, that it should be capable of extension if it should become necessary to provide for an increase of trade, or greater accommodation for shipping; and third, that the outlay upon it should not render necessary increased expenses in the trade of the port, so as to enhance the cost of goods exported or imported, or throw any permanent burden on general or local revenues.

34. Whether this last condition is absolutely necessary it is not for me to say, but, if it can be fulfilled, it is undoubtedly a desirable one, as it would render the undertakiing at least self-supporting if not pecuniarily profitable.

35. SOURCE OF REVENUE.—The source to which I look for revenue to pay interest on the necessary outlay is the appropriation of the saving which may undoubtedly be effected upon the expenses to which the trade is exposed by the present rude system of landing and shipping cargoes. This is not only very costly in itself, but it subjects the cargoes to much damage in their passage between the ship and the shore; and by the slowness, awkwardness, and uncertainty of the operation, causes great detention of the ships. The removal of all these evils may be represented by a money value which may, in some form or other, be carried to the credit of a harbour revenue.

36. PRESENT SYSTEM VERY EXPENSIVE.—In what particular form the charge should be levied is for the present an immaterial question. I am now only concerned to show that such a saving is possible, and that it would be on a scale commensurate with the required interest on the capital to be sunk. In proof of this

I would refer to the accompanying table which shows the comparative cost by official tariff of landing and shipping cargo at Madras, as an open roadstead and at Kurrachee, a smooth-water harbour. The charges for lightering to and from the roads outside the harbour at Kurrachee (now however never incurred) are given to show their general coincidence with the Madras charges under similar conditions:—

Comparison of the Cost of Landing and Shipping Cargo at Madras and at Kurrachee from Official Tariffs.

—	Madras. Fair Weather.*	Kurrachee. Harbour.	Kurrachee. Roads.
	RS. A. P.	RS. A. P.	RS. A. P.
Imports.			
Piece goods per 100 bales	34 6 0	25 0 0	35 0 0
Grain per 100 bags	11 0 0	4 0 0	10 0 0
Beer per 100 hogshds.	45 12 0	15 0 0	25 0 0
„ per 100 barrels	22 14 8	10 8 0	20 0 0
Iron per ton	1 14 0	0 12 0	.....
Coal and coke per ton	1 6 0	† 0 12 0	.....
Exports.			
Cotton and wool per 100 bales	27 8 0	12 0 0	20 0 0
Grain per 100 bags	11 0 0	3 0 0	10 0 0
Oil per 100 hogshds.	45 12 0	12 0 0	20 0 0
Ghee per 100 dubbers	11 0 0	8 0 0	18 0 0
Hides per 100 bales	34 6 0	20 0 0	40 0 0

* RS. A. P.

Boat	2	8 0
Police Peon	0	8 0
Tarpaulin 4—(occasional)	0	1 0
	2	12 0 for 2 tons.

† Exclusive of cooly hire for discharging from lighters.

37. COST AT MADRAS WITH A HARBOUR.—I believe the actual charges at Madras with a smooth-water harbour would be less than at Kurrachee, as at the latter place the distance for lighterage is from two to three miles, whereas at Madras it would be about half a mile, and also the supply of skilled-boatmen is more limited. I have based the Madras charges on the tariff for Masula boats to the beach. The charge to the pier is less by the amount of pier due, which equalizes the cost to the trader. If the pier were enclosed in a harbour, ships would come alongside of it and discharge direct, and so would save lightering altogether, thus giving to the pier an advantage equal to that given to the beach-landing system. I am informed that some merchants have contracts with the Masula boatmen at less than tariff rates, but, on the other hand, there are frequent extra rates, so that the traiff may be taken as a fair average.

38. ESTIMATED AMOUNT OF SAVING.—I believe that in assuming the saving in landing and shipping operations, and other consequent expenses, at *a rupee per ton of goods*, I am under the mark, but assuming this figure, and applying it to the lowest estimate given of the number of tons landed and shipped last year, *viz.*, 275,000, we may rely upon a revenue derived from savings only of £27,500. This would pay interest at 4 per cent. on £687,500, at 4½ per cent. on £611,000, and at 5 per cent. on £550,000.

39. ESTIMATED COST OF WORKS.—A harbour made according to the accompanying plan would cost £565,000, including 10 per cent. for contingencies and 5 per cent. for superintendence, and therefore seems to be within the resources of the trade of the port. It is intended to be formed by piers running out from the shore 500 yards north and south respectively of the present screw-pile pier, enclosing a rectangular space of 1,000 yards long by 830 yards wide, or 170 acres, with a depth at low water of from 3 to 7 fathoms, and consequently available for European ships of all sizes,

with a further space of a quarter of that area with a depth less than 3 fathoms, available for boats, lighters, and native craft.

40. ACCOMMODATION IN HARBOUR.—Such a harbour would contain 13 ships of various sizes, from 4,000 to 700 tons, secured closely to fixed moorings, and able to swing, each in its own circle, clear of one another, also three ships alongside the pier, making 16 in all. If the ships were more closely moored so as to swing clear of the next ship's mooring, but not of the entire circle she would describe in swinging, the number would be increased threefold. This I am myself satisfied might be done with safety, since ships would be completely cut of from the strains and unequal disturbances of swell and current, and acted on only by wind. But this is rather a matter for the consideration of the nautical authorities, and its determination is not urgent.

41. ACCOMMODATION FOR MAXIMUM NUMBER NOT REQUIRED.—Taking, however, 16 ships as the limit of the capacity of the harbour, I am informed that more than this number have been in the roads at one time on certain extraordinary occasions. I do not think, however, that it would be wise to incur the expense of providing for a repetition of such extraordinary contingencies. In the first place they are not likely to occur again unless as a consequence of a great increase of trade, because the effect of the increased employment of steamers is to facilitate the despatch of vessels from the port and leave room for others, and this despatch will be further facilitated by the improved system of landing and shipping cargoes. In the second place, such a press would only occur during the most busy season, which is also the fine season, when ships would be as safe as they are now outside the harbour, but would have the advantage of the improved system of lightering to facilitate their despatch. I therefore think that the additional expense which would be incurred by enlarging the harbour, so as to contain the maximum number of ships on record, would not produce any commensurate advantage.

42. POSSIBLE EXTENSION OF ACCOMMODATION.—But though I do not think it would be wise to incur expense in anticipation of increased trade, a policy which has often defeated its own object by crippling the immediate resources of the port, it is yet of the highest importance to be prepared for future extensions whenever increased trade or other circumstances may demand it. This has been specially kept in view in designing both the plan of the harbour and the details of construction.

43. SECTION OF PIERS.—It will be seen by reference to the section of the piers appended that they are proposed to be formed of a submerged mound of rubble stone from the natural bottom to a depth of 22½ feet below low-water. Above this they will consist of two solid walls of concrete blocks laid close together so as to form one wall 24 feet wide. This is very similar to the system followed in the case of a breakwater lately completed at Kurrachee.

44. NOT IN THE FIRST INSTANCE AVAILABLE AS QUAY WALLS.—The two faces of such a pier are of such a character that ships might come alongside them, but it would be useless for them to do so, because the with of the pier, 24 feet, is insufficient for the purposes of a quay, and that on the weather side of the harbour would be exposed to the sea washing over it. To make the piers available as quays in the first instance would involve an additional cost, for which I do not think there would be an immediate equivalent.

45. QUAYS TO BE ULTIMATELY FORMED.—But I look forward to this as a second step, which in due time will be very advantageous. The pier as first constructed would be a mere sheltering breakwater. When the trade requires more accommodation, I propose to form another similar sheltering breakwater at a distance of, say, 100 yards from the first, and parallel to it, as shown by the dotted lines on the plan. The original pier would then be so far removed from the breaking sea that ships might lie alongside without inconvenience; and the space between the two parallel piers being wholly or partially filled up, a wide quay would be formed, on which goods might be landed and on which sheds and warehouses might be built, and thus greatly improved facilities for carrying on the business of the port would be provided. Such a quay wall would accommodate six or seven ships alongside of it in addition to those swinging at moorings.

46. FURTHER EXTENSION OF WORKS AS MAY BE REQUIRED.—Should the extension of trade require still further accommodation, a second harbour similar to the first could be formed north or south, one side being already provided by the pier and quay of the first harbour. For the present, however, it is enough to consider the merits or demerits of such a scheme as the present trade of the port is adequate to support.

47.—FACILITY FOR ENTRANCE AND EXIT OF SHIPS.—I have already said that the principle of a closed harbour has been objected to on nautical grounds, and the preference given to a detached breakwater, because ships can enter or quit more readily in any wind. This argument would apply with still greater force in favor of the proposal to leave the roadstead in its present exposed state, for I fear there is no getting over the objection that every obstacle to the entrance of waves is, to a certain extent, an obstacle to the passage of ships. A ship, however, is more easily guided than a wave, and the objection, whatever it may be worth, becomes simply a question of the cost of employing steam-power. It is, however, in my opinion, worth very little.

48. OBJECTIONS URGED BY THE MASTER ATTENDANT.—In order to give the fullest prominence to the objections made, on nautical grounds, to the principle of a closed harbour, and especially to the special form I have adopted, I append a report by Mr. Dalrymple, the Master Attendant of Madras, commenting on my first proposal, but in terms which are equally applicable to the present :—

"I have the honor to acknowledge receipt of the papers specified in the margin, and to offer a few remarks on the project for the formation of a close harbour at Madras.

"2. I shall first deal with Mr Parkes' letter and his able "Note" in a nautical point of view, without presuming to touch on the engineering phase of the question.

"3. In paragraph 11 of his "Note" he is, I think, in error in assuming that at Kurrachee there is a heavier sea than at Madras. In cyclones and gales of wind on this coast the storm-waves cannot be surpassed.

"4. With reference to paragraph 21, I have only to state that, according to our experience and my own personal observation, every groyne, which has been run out from the old sea wall, viz., the "DeHavilland's Bulwark," has carried the beach along with it, the longest groyne being about 400 feet in length, and consequently, as the shore has gained on the sea, the line of surf has moved out in proportion; and it is a question yet to be solved how long this same natural action of the elements will continue as similar works are pushed on seaward.

"5. In regard to paragraph 23, I cannot see that the position of Port Said and its natural advantages added to the Suez Canal are at all analogous to those of Madras, which are simply nil; the attraction of the latter port being its cheapness and easiness of access, it being an open roadstead.

"6. I concur with Captain Taylor in some of his opinions; yet my own opinion is this that, if we are to have a gigantic work for the protection of the shipping, a breakwater is the best. It is thus far a certainty—the roadstead inside of it cannot silt up, and it will be a protection from the heavy break of the sea in a gale, when the wind is dead on shore, which is the time of peril to shipping.

"7. The success of an enclosed harbour is supposed by numbers to be an impossibility; at all events, it must be problematical.

"8. I may also remark that during a gale, while a ship could run in under the lee of a breakwater for shelter from the *heavy sea*, she could not run into such a harbour as that proposed by Mr. Parkes.

"9. With reference to "memorandum by the Chief Engineer" and his letter to the Head of the Marine Department, dated 5th April 1873, No. 128, I entirely agree with his views on the subject. If there is to be a harbour, it will be an imperative necessity to have the entrance protected by a breakwater; otherwise in a gale the heavy sea will roll in, and the ships in that confined space will grind each other to pieces, being in a much worse position than in an open roadstead.

"10. I also entirely agree with the Chief Engineer regarding the nature and extent of our littoral currents, and in his judicious recommendation that Mr. Parkes should reside in Madras for a year or so to watch the currents, &c.

"11. I may remark that these are at times so very strong that the boatmen will not float their boats unless the strong current flag is flying at the Master Attendant's flagstaff, which entitles them to double hire. I think this is pretty conclusive evidence that these currents exists.

"12. With reference to the last paragraph of letter referred to, in the event of a harbour being constructed, tug-steamers will be required to tow the ships in and out of the harbour in

fine weather, and it will depend on the space, which will be decided on for the inside area of the harbour, as to the number of ships which can be berthed alongside the jetties and moored head and stern in the basin.

"13. In conclusion, I may observe that, while I give the preference to a breakwater as a more suitab'e work for this port than an enclosed harbour, and while I fully admit that it would alter greatly for the better the character of the roadstead, it is yet to be borne in mind that, should any costly works be carried out, the interest of the outlay must be provided for by an increase of rate of port dues; and in these days of railway progress, and consequently increased facilities of communication to and from out-ports, is it not to be expected that, in the circumstances, a considerable proportion of the Madras trade would too probably go elsewhere?"

49. Remarks on the Master Attendant's Report.—With respect to paragraph 3 of the above report, my statement of the comparative force of the sea at Kurrachee and at Madras was based on information obtained from persons well acquainted with both coasts; but the principles of my design are in no way dependent upon its being correct (see paragraph 61 further on).

50. I have already entered fully into the subjects touched upon in paragraphs 4 and 5.

51. With regard to paragraphs 6 and 7, it is remarkable that, considering the number of existing close harbours in all parts of the world, the success of the principle should be deemed problematical, while a scheme, for which there is not a single precedent to be found in nature or art,* should be pronounced certain of success.

52. The opinion given in paragraph 8 will, no doubt, have its due weight. I will only state here that it is opposed to that of every nautical man with whom I have conversed on the subject, and that, as a matter of fact, ships do continually enter harbours similar to that I have proposed in very heavy seas.

53. As to Mr. Dalrymple's proposed breakwater to shelter the entrance, I do not myself think it would be either necessary or an improvement,† and this is the opinion of most of the competent persons with whom I have conversed on the subject; but it is a mere matter of detail, which may best be settled by actual trial of the effect of the entrance without a breakwater. As to the ships in the harbour grinding one another to pieces, I need only refer to the plan which shows how they would be moored.

54. With regard to paragraphs 10 and 11, I may remark that I do not question any of the *facts* given me by the Master Attendant and other competent persons as to the littoral currents. I only maintain that they do not present any difficulty to the construction of a harbour, or to its use when constructed. As to the nature of these currents, and as to their having no effect whatever on the bottom outside the line of surf, I believe Mr. Dalrymple and myself are entirely agreed. This being the case it is difficult to see what object would be gained by my spending a year or so in watching currents, &c., which are already so familiarly known to Mr. Dalrymple and others, and it is admitted have little or no bearing on the question.

55. I entirely agree in the principle laid down in Mr. Dalrymple's last paragraph that an increase of port expenses would be detrimental to the trade of Madras, but I have shown that the plan I propose can be carried out without any such increase.

56. Entrance to Harbour.—Having now stated the grounds on which I venture to think that the objections to the general principle of an enclosed harbour are untenable, I proceed to consider a point of detail which has been made the subject of some discussion. I allude to the position and form of the entrance or entrances.

57. Comparative advantages of one and two Entrances.—The plan which I submit as being, in my opinion, on the whole the best has an entrance 150 yards wide, facing east by south. The alternative plan is to have two entrances at or near the outer angles of the harbour. The one undisputed advantage of this latter plan is that vessels could enter or leave by one entrance or the other with any wind. The one undisputed disadvantage is that, inasmuch as a sufficient space must be kept clear in the neighbourhood of each entrance for ships to bring up after entering the harbour, the space required for the second entrance would be lost as mooring ground.

* I cannot admit the resemblance suggested by Sir Arthur Cotton between a breakwater, a mile long, and the formations known as "barrier reefs" generally extending for many miles.

† See paragraphs 61 and 62 further on.

58. For the Entrance and Exit of Steamers and Ships.—These two considerations are inseparable from the very principles of the two systems, and the respective evils cannot be averted by any arrangement of detail. We can only endeavour to estimate their relative value. The disadvantage of the double entrance is simply this—a sacrifice of one-fifth or one-sixth of the capacity of the harbour. The disadvantage of the single entrance will be different for different classes of vessels. For *steamers*, the most important class, it would be *nil*. *Large sailing vessels* could enter or leave without steam power with the wind in 18 out of 32 points of the compass. In the remaining 14 points either way a steam tug would probably be required. But it must be remembered that with on-shore wind a large outward-bound ship would probably take a tug to get an offing quite independent of the question of clearing the harbour, while to an inward-bound ship, with an off-shore wind, there would be at least smooth water and good anchorage till she could be towed in.

59. For Native Craft.—*Native craft, outward bound*, could certainly sail out of the entrance whenever they could beat off the shore, and *inward-bound*, with an off-shore wind, they could bring up, if unable to enter the harbour, on the more sheltered side, north or south, and either discharge there or warp in at leisure. I, therefore, cannot estimate the disadvantage of having only one entrance as being of much practical importance to any class of vessel.

60. For protection from Seas with one Entrance.—More importance has probably been attached to another objection, which, however, I cannot admit as undisputed, viz., the danger from heavy seas from the eastward rolling into the harbour. Those who urge this objection are probably not fully aware of the effect produced upon such seas when they enter a harbour. They are immediately dispersed, and the extent of reduction is not, as in the case of an open breakwater, a matter of speculation, but it is one of exact calculation.* Captain Biden, the former Master Attendant, estimates the maximum height of wave at Madras at 10 feet. Such a wave entering the harbour would be reduced to 1 foot 9 inches before it reached the piers or the beach. A wave 15 feet high (the maximum measured at Kurrachee), would be reduced to 2 feet 7 inches—neither very formidable.

61. With two Entrances.—Whether the two entrances would admit more or less swell with an easterly sea would depend on their width and form. If equally accessible to vessels as the eastern entrance, they would, I believe, together admit more sea, and the reductive power of the harbour would be less, as each wave would spread over only one right angle instead of two right angles.

62. Effect on Seas from different Directions.—With the north-east monsoon swell the eastern and northern entrances would be about on a par, but the former would have more reductive power. If the tranquillity of the harbour were inversely proportioned to the duration and force of the wind to which the entrances are respectively exposed, the easterly one would have a marked advantage over either of the others separately, and of course in a far greater degree over the two together,† but the easterly seas are the heaviest and most dangerous, and go far to counterbalance

* Stevenson on Harbours.

† *Abstract compiled from Observatory Records.*

Wind.	—	1870.	1871.	1872.
N. by W.—N. N. by E.—N.N.E. N.E. by N.	Duration .. Mean rate	1,741 hours 7·2 miles	1,213 hours 6·6 miles	1,360 hours. 7·35 miles.
E. by N.—E. E. by S —E.S.E. S E. by E.	Duration .. Mean rate	1,124 hours 5·7 miles	1,192 hours 5·7 miles	1,215 hours. 5·8 miles.
S. by E.—S. S. by W.—S.S W. S. W. by S.	Duration .. Mean rate	1,420 hours 7·6 miles	1,483 hours *7·85 miles	1,339 hours. 8·4 miles.

this advantage. On the whole, however, I am of opinion that the balance of advantage is on the side of the single entrance facing east by south.

63. Details of Execution—Granite.—I have now to offer a few explanations as to the details of the mode of carrying on the work. The great bulk of the material required is of course stone. I have visited St. Thomas' Mount and Palaveram to the south, and the Red Hills, Avady, Umbatoor, and Seetapetty on the west of Madras. In the former direction the material is granite, and might be brought in any quantity by the Carnatic Railway now under construction, but it is so exceedingly hard that it would be very expensive to quarry, and would probably come out in blocks of inconveniently large size. I, therefore, discard this source of supply.

64. Laterite.—At the other places the material is laterite, of which the best quality would be very suitable for those parts of the work where great hardness is not essential, such as the curved approaches to the piers, which I propose to carry over the shifting sand near the shore, as simple embankments of rubble stone, and for the rubble bases of the piers themselves. The Breakwater Committee very wisely rejected the use of this material, as in their section it would be exposed to the destructive action of the waves, for which it is not sufficiently hard. In my section it will not be so exposed, and with due care in selection it may be used with perfect confidence.

65. Conveyance by Railway.—A branch from the Madras Railway at Umbatoor, nine miles from Madras, running northward for about two miles, would cut through an ample supply of this material, which the Railway Company would bring to the very site of the works.

66. Tritany Granite for Concrete.—For the bulk of the concrete I have estimated for a better material, granite from Tritany, fifty miles from Madras, but I think it not improbable that even for this purpose laterite would answer, and, if so, a saving on the estimate would be effected.

67. Beach Railway.—A line of railway would require to be laid along the beach for the conveyance of the stone to make the curved approach to the south pier, and for the concrete blocks for the superstructure of the pier itself, but the whole of the rubble stone for the bases of both piers would be placed in boats (probably steam hopper barges) at the north pier so that after the curved approach was completed, the traffic along the beach railway would be very limited.

68. Concrete-mixing Station and Stacking Ground.—There appears to be no difficulty in a portion of the beach north of the Railway Station being occupied by the necessary concrete-mixing establishment and ground for making and stacking the blocks. Branch railways would, of course, be laid for the conveyance of materials.

69. Time of Completion.—The first operation would, of course, be the formation of the curved approaches. These might be commenced immediately, and while they are in progress the necessary plant and machinery could be collected. The actual building of the piers could be completed in three years, or, say, four years from the time of the approaches being commenced.

70. Remarks on Estimate.—The estimate of £565,000 is, I consider, a safe one, and is based on a fair allowance for the increase of ordinary rates which generally accompanies the execution of so large a work. In the event, however, of the work being placed in the hands of any other Engineer a new and entirely independent one should be framed by him, but I see no reason why it should exceed mine.

71. Survey required.—Before any works are commenced, it is most desirable that a new and detailed survey of the Roadstead should be made, the soundings of which should be referred to a permanent mark on shore. The level of mean sea should also be accurately determined, and, where the rise and fall of tide is so small, I think the mean sea level would be a better datum than that of low water. The surveys on which I have based my calculations and drawn my plans are rather vague, and but for the extreme simplicity of the natural features of the coast would

have been insufficient. I believe, however, that neither design nor estimate can be materially affected by any possible corrections that may be made, but an exact record of the existing state of things is imperative before works which may effect a change in them are commenced.

72. Conclusion.—In conclusion, I have only once more to express my acknowledgments of the uniform courtesy with which I have been received by every one with whom I have come in contact in the prosecution of my inquiries and the readiness with which every information and assistance has been afforded to me. If I mention no names it is because I should not know where to stop.

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

WILLIAM PARKES.

APPENDIX.

Cyclones and other Storms at Madras recorded at the Government Observatory.

1787, 11*th November.* Centre *North* of Madras.	Wind at noon on 10th, N. Midnight N.N.W. 11th, sunrise, N.W. Noon N.W. After sunset violent and veering all round the compass. 12th, sunrise, S.S.W. Noon S. 13th sunrise, calm.
1788, 7*th May.* Centre *North* of Madras.	Sunrise N.W. Noon N.W. Midnight N.W. 8th, sunrise, W. Noon W. Midnight S.S.W. 9th, sunrise, S.S.W. Noon S.S.E. Midnight, calm.
1797, 27*th October.* Centre at Madras.	Began from northward, veered to N.E., blew with uncommon violence three hours; about noon suddenly shifted to south, and was almost as violent as before.
1807, 10*th December.* Centre *South* of Madras.	Began from N., veered to southward of E. and slackened gradually.
1811, 2*nd May.* Probably central at Madras.	Began from N., blew equally strongly from E.S.E. and S., but details not given. Not felt 40 miles from Madras.
1818, 24*th October.* Central at Madras.	Began northerly, then a lull of half an hour. Then from south with greater fury. The most violent storm then on record.
1820, 30*th March.* Centre *North* of Madras.	Commenced from N.E., veered to N., N.W. and S. W., but at last quarter gradually slackened. More violent to northward than at Madras.
1820, 9*th May.* Centre *North* of Madras.	Commenced at N.W., shifted to W. Worse than storm of October 1818.
1827, 7*th May.*	Strong wind from S.E.
8*th* „	Early morning strong gale from N.E.
9*th* „ Centre *North* of Madras.	From sunrise strong gusts from E. to S. till 10 A.M. when nearly ceased. At sunset blew from W.N.W., and during the night a gale from N.W. Subsided in the morning of 10th. This storm longer in duration, but not so heavy as preceding ones.
1830, 2*nd December.* Centre *South* of Madras.	A stormy day, but at Cuddalore, 100 miles south of Madras, a very violent storm.
1836, 30*th October.* Central at Madras.	Very violent. First from north, then a lull of 30 minutes, then with increased fury from south. Much more severe than those of 1818 and 1820 as shown by barometer.
1841, 16*th May.* Centre *North* of Madras.	A gale of extraordinary violence. At 9 A.M. N.N.E., 10 A.M. to 5 P.M. north. Then for an hour varying from N.E. to N.W. At 6·20 P.M. approaching a hurricane from N., at 7 to 7·30 from W. to N. 7·45 south-westerly, a violent gale. 8 to 9, S.W. to N.W. and shifting even to S., approaching a hurricane. Thence subsided remaining at S. to S.W. calm after 7 A.M. on 17th.
1843, 22*nd May.* Centre *North* of Madras.	N. to N.W. for 24 hours previous. From 7 A.M. till 1 P.M. continually shifting from N.W. to S.W. and back.
1846, 20*th October.* Centre *North* of Madras.	Began at 11 A.M., wind W.N.W., then at 1 P.M. due W., remained between W. and W.S.W. till 8 P.M., force increasing to 8 lbs.* Then back to W. rising to 13 lbs. Then rapidly veered round the compass by E. and S. till at 7 A.M. on 21st, direction S.S.W., force 7½ lbs. Then gradually fell, direction being S. by W.
1846, 25*th November.* Centre *South* of Madras.	At 5 P.M. N.E. force 5 lbs. At 7·30 E. by N. pressure 26 lbs., then instrument broke. At 7 A.M. calm due S.
1847, 13*th October.* Pure Northerly gale, not cyclonic.	During the day wind N.W. and N., for ¼ hour, at 8·45 P.M. changed to E. of N. then remained due N. for the rest of the gale having a maximum force of 12 lbs. at 6 A.M. Subsided at 3 P.M. returning N.W.

* From 1846 to 1856 the force of the wind is given in lbs. on a square foot. Subsequently its velocity is given in miles per hour.

1848, 1*st November.* Light centre *South* of Madras.	Began before sunrise, N.N.W. under 5 lbs. At 2 P.M. N.N.E. At 7·30 N. E. 6½ lbs., at 4½ A.M. on 2nd wind E. and dropped to 1½ lbs.
1850, 24*th May.* Centre *South* of Madras.	At 10 A.M. light at E. by N. increasing till 1·30 P.M. E.N.E., maximum at 2 P.M. E.S.E. (12 lbs.) at 4 P.M. dropped to 5 lbs. S.E. by S.
1851, 4*th May.* Centre *North* of Madras.	At 11 P.M. (3rd) 5 lbs. N.W. by N. At 3·30 A.M. increasing in force from W. At 5·30 A.M. maximum force 17½ lbs. direction W. At 9 A.M. dropped to 10 lbs. S.W., diminishing at S.S.W. Calm at S.
1856, 20*th November.* Centre *North* of Madras.	Began at 4 P.M., direction N.N.E., (5 lbs.) At 9 30 P.M. N.E. (8 lbs.) steady till 2 A.M. 21st (12lbs.) Then veered northward, maximum force 17 lbs. At 4·30 A.M. N. by E. Then back to W. of N. dropped to 5 lbs. by 9 A.M., direction N.W.
1864, 18*th November.* Light centre *South* of Madras.	At 3 P.M. N. by W. (25 miles) steady till 9 P.M. Then veered to N.E. by N. and N.E., by 9·45. Continued to increase till at 2 P.M. it was 28 miles per hour, and it dropped from thence as wind veered to the south.
1865, 26*th November.* Centre *South* of Madras.	Began on 26th at 8 A.M. from N.E. by N. speed 25 miles, then gradually increasing all day till at 9 P.M. it was N.E. by E. with speed of 43 miles. Then decreased as it veered to S.E. by 6 A.M. and thence to south, where it dropped.
1872, 1*st May.* Centre *South* of Madras.	Wind northerly for two days previously. Blew steadily but with gradually increased force from N. to N.N.E. till midnight. Then increased rapidly up to 8 A.M., being then 53 miles, direction N.E. By 9·30 veered to E. Then gradually working towards the south, dropping to 14 miles at 8 P.M., and then remaining steady in direction and force from S. to S.S.E. for several hours.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th November 1873, No. 2725B.

Civil Works.

Read the following paper:—

From W. PARKES, Esq., to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Ootacamund, 4th November 1873.

In handing you the enclosed Report on the formation of a Harbour at Madras, I have the honor to solicit the orders of Government as to my further stay at Madras.

2. Beyond some few secondary matters, which will not occupy me longer than the time necessary for your reply to this, I have nothing to detain me in the way of obtaining information.

3. I am however of opinion, judging from the marked interest manifested by many of the leading merchants of Madras at the recent meeting of the Chamber of Commerce which I attended, that some anxiety will be felt by the mercantile community as to the result of my inquiries, and I think it would further the object of Government if I were authorised fully and freely to explain my views to them before I leave Madras.

Order thereon, 7th November 1873, No. 2725B.

Ordered that the following letter be sent:—

(Here enter No. 2725c, dated 7th November 1873.)

(True Extract.)

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

Exd. A. F. Goodall.
Spare Copies

CIVIL WORKS.

Govt. of {1873} Madras.

PUBLIC WORKS.

Dated November, 7th.

Issued

Recd.

Encl.

G.O., 7th November 1873, No. 2725B.

NOVEMBER.

Madras Harbour.—Passing orders on letter from Mr. Parkes submitting his Report on the formation of a Harbour, and requesting instructions as to his further stay in Madras.

PUBLIC WORKS DEPARTMENT.

Civil Works.

No. 2725c.

FROM

COLONEL G. W. WALKER, R.E.,
Secretary to the Government of Madras,
Public Works Department,

To

W. PARKES, Esq., M. INST. C.E.

SIR,—I am directed to inform you, with reference to your letter of the 4th instant, giving cover to your Report on a Harbour for Madras, that, in the opinion of His Excellency the Governor in Council, it is desirable that you should remain at Madras for a time, in case of any further information or explanations respecting your Report being found necessary.

2. His Excellency the Governor in Council can have no objection to your explaining more fully to the Chamber of Commerce, if you think fit, the views you appear to have already laid before them. You will however of course understand that you are not at liberty to furnish either the Chamber of Commerce or the Press with a copy of your Report to Government.

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

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

OOTACAMUND,
7th November 1873.

Exd. A. F. Goodall.
Spare Copies

CIVIL WORKS.

Govt. of (1873) Madras

PUBLIC WORKS.

To

W. PARKES, Esq., M. Inst. C.E.

Dated November, 7th.

Issued

Recd. *Encl.*

G.O., 7th November 1873, No. 2725c.

NOVEMBER.

Intimating it is desirable that Mr. Parke
should remain at Madras for a time, an
that he is not at liberty to furnish th
Chamber of Commerce or the Press with
copy of his Report on the formation of
Harbour at Madras.

For Orders 13

Letter from Mr. Parkes
submitting Harbour Report.

Mr. Parkes who appears
to be of opinion there
would be no occasion to
prolong his stay at Mad-
ras beyond Wednesday
next, the 12th instant, by
which date he presumed
that he would have
corrected the Proof of his
Report, which has been
sent down to be printed.
He requested the Secretary
to ascertain and let him
know whether he was at
liberty to go then.

Mr. Parkes was inform-
ed that it was not Lord
Hobart's wish that his Report

should be communicated by him either to the Chamber of Commerce or the Press - It might be well in replying officially to this communication, to define the extent to which he is at liberty to explain his views to the former body -

Lyons
5-11-73

I believe Mr Parkes has already explained his views to the Chamber of Commerce and there can be no objection to his explaining them more fully if he thinks fit, on the same

manner as he has already done

It does not however follow that Mr Parkes is to reject that Report did per se a very fair Report. But in regards the Rep, it is clear that the Report ought not to be communicated per Parkes, and whether it shd be communicated by him will be matter for consideration

Mr Lyons 5/73

I should think it desirable that Mr Parkes should remain at Hioga for a time, in case we should wish for any further information or explanation respecting his Report

Ootakamund. 6th Nov.

Sir I am directed to in-
form you, with reference
to your letter of the 4th
instant forwarding covers
to your Report on a Har-
bour for Madras, that
in the opinion of H.E.
the Govr in Council it
is desirable that you
should remain at Ma-
dras for a time; in case
of any further informa-
tion or explanations re-
specting your Report
being found necessary-
being informed, by the usual com-
munication on the subject

×C/23338

received from the Cham.
ber of Commerce, viz. their
letter of the 6th Aug 1872,
the Mercantile commu.
nity of Madras do not
appear to be warmly in.
terested in any scheme
for the improvement of
that Port, under present
circumstances, but
H.E. the Govr in Council
can have no objection
to your endeavouring
to raise such an interest
amongst them, by ex.
plaining more fully
to the Chamber of Com.
merce, if you think
fit, those views you ap.
pear to have already
laid before them - Pro.
vided always, that

on no account shall co.
pies of your former
Report to Govt be obtain.
ed or given to any one.

I have the honour to be
Sir
Your most obedt Servant
C.H. Walker Ld. R.E.
Secy to Govt. P.W.D.

To W. Parker Esq Madras

Ootacamund
4th November 1873

Sir,

In handing you the enclosed report on the formation of a Harbour at Madras, I have the honor to solicit the orders of Government on my further stay at Madras.

Beyond some few secondary matters which will not occupy me longer than the time necessary for your reply to this, I have nothing to detain me in the way of obtaining information -

I am however of opinion, judging from the marked interest manifested by many of the leading merchants of Madras at the recent

The Secretary to Govt. &c.
Public Works Department

meeting of the Chamber of Commerce which I attended that some anxiety will be felt by them mercantile community as to the result of my enquiries, and I think it would further the objects of Government if I were authorized fully and freely to explain my views from to them before I leave Madras.

I have the honor to be
Sir
Your most obedient Servant
W Parkes

P. W. 1873. Depart.
Pub. Works Dr. Nov.
No. 611.6.

From.

W. Parkes Esq.

Dated 4th Nov. 73
Rec'd 10th Novr 73

Submitting his Report on the Gornalick of the Harbour at Madras & requesting instructions in connection therewith, & his further stay at this place—

No 2725 Dated 25th Nov. 73

No 2725 Dated 25th Nov. 73
Ordered Map to be returned
Letter be kept—
H.S. Bo

No 1246
D. 10. Nov. 73

19

No. 2725 C

To. F. Parkes Esqr. Lt. Col. Asst. C.E.

Sir

I am directed to inform you, with reference to your letter of the 4th Instant giving cover to your Report on a Harbour for Madras, that in the opinion of His Excellency the Governor in Council it is desirable that you should remain at Madras for a time;

and

in case of any further information or explanations respecting your Report being found necessary.

His Excellency the Governor in Council can have no objection to your explaining more fully to the Chamber of Commerce, if you think fit, the views you appear to have already laid before them. You will however of course understand that you are not at liberty to furnish either the Chamber of Commerce or the Press with a copy of your Report

to

to Government.

Lyon

I think that it would be desirable that we should be in possession of the Chamber's views of Mr Parkes proposals and also learn shortly by letter & have seen reason & reconsider their letter of July last

HH

Letter accepted
for Executive

—

Ch 6116

Govt. of {1873} Madras.

PUBLIC WORKS.

To W. Parkes Esqre Insp.r G.l C

Dated

Recd. Encl.s

G. O. 7th Nov.r 73, No 2725 B

2725 A

No. 1245-1249 & 1246

Madras Harbour. Forwg

orders on letter from Wm. Parkes

Esq.re submitting his report on the

formation of a harbour

& requesting instructions

as to his further

stay in Madras.

Intimating it is de-

sirable that Wm. Parkes

should remain at

Madras for a time

that he is not at liberty

to furnish the Chamber

of Commerce or the Port

with a copy of his

report on the formation

of a harbour at Ma-