Date taken out.	For what purpose.			Initials of Referencer.	Date returned.	Initials of Attender.
	Department.	C. No.	Year.			

Marine (1898) Department.

Mad Pros

G.O., No. 10 Marine

Dated 3rd January 1899 ~~1898~~

R

[Despatch Abstract.]

Development of the Madras Harbour

Reporting to refer the Whole question of the ——— to the Home Govt, with the advice of Sir Alexander Rendel may be decided as to the most suitable measures to be adopted for the Improvement of the Harbour.

Requesting to be favoured with the opinion of Sir Alexander Rendel on the various measures proposed for the development of the Madras Harbour.

16/2/99

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

Government {1899} of Madras.

MARINE.

Recd. } 1899. *Enclosures*

Regd. } *Spare copies*

G.O., No. 10, 3rd January 1899.

JANUARY.

Development of the Madras Harbour

Resolving to refer the whole question of the — to the Home Government, in order that the advice of Sir Alexander Rendel may be elicited as to the most suitable measures to be adopted for the improvement of the harbour.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

Read—again the following papers:—

G.O., No. 110, Marine, dated 11th February 1898.

Read—the following papers:—

Note by Mr. F. J. WILSON on estimate for constructing a boat basin in connection with the Madras Harbour prepared in accordance with G.O., No. 834, Marine, dated 1st December 1896.

The Madras harbour has now reached a crisis in its history, and its future success will very much depend on the general plan of development which must now be decided on. The order quoted above merely calls for an estimate for a form of improvement, and it is clearly intimated, in the letter of the Chairman of the Harbour Board accompanying the order, that the intention of the Trustees was to postpone the consideration of the general question of development and to confine themselves to the consideration as to the means that should be adopted to improve harbour facilities at a moderate cost.

The danger of adopting this course is that the Trustees may find themselves committed to a line of action which may afterwards be much regretted, and it is considered that it will not be a waste of time to review the whole history of the harbour from the time it was first thought of, up to the present day. This is the more necessary from the fact that the harbour as it now exists is the outcome of a project which failed in its original intention, and is not the *complete* realization of any scheme projected by any one of the numerous authorities who have been consulted on the subject. It is not the harbour originally designed by Mr. Parkes, as it has no quays for ships nor jetties for lighters. It is not the harbour so strongly advocated by the large number of authorities consulted in India and by Sir Nowell Salmon's committee of 1887, as it has no north-eastern entrance. It is not the harbour advocated by Sir John Hawkshaw's committee of 1884, as it has an entrance of 516′ 6″ instead of 450 feet and as it has no docks or basins for the protection of small craft, which became a part of this scheme as explained in Secretary of State's despatch published in Proceedings of Madras Government, No. 3128 W., dated 19th December 1884; and it is not the harbour advocated by Sir Alexander Rendel, the present Consulting Engineer, who has more than once declared his opinion that the present work is merely an entrance to a harbour yet to be made. In fact, the two breakwaters which have been constructed are only part of a scheme, and too much care cannot be bestowed on the method of completing it.

It is now nearly thirty years since proposals were made with the object of providing Madras with a "safe and convenient harbour"; several schemes were projected, but the two which received most consideration were, 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."

In 1873, Mr. W. Parkes was sent out by the Secretary of State for India, and spent five weeks at Madras in personal investigations to enable him to come to some conclusion as to the best mode of providing shelter for the shipping. In his report dated 4th November 1873, Mr. Parkes gives his reasons for advocating a close harbour with an eastern entrance, and it being considered by the Secretary of State for India that the question was too large to be dealt with only on financial grounds, Mr. Parkes' proposals were subsequently sanctioned and carried out with very

little alte[ration] Mr. Parkes evidently contemplated that his harbour with an entrance 450 feet wide would secure sufficiently still water to enable vessels within the harbour to lie alongside wharves or quays. In his original plan he shows three ships alongside the iron pier, and he also contemplated ships being able to lie alongside of the two masonry piers, intending his rubble base to be 22 feet below low water. The rubble base has actually been made only 22½ feet below what is called DeHavilands' M.S.L. or only 18½ feet below the lowest tide now recorded; the depth is, therefore, insufficient to admit of ordinary sized steamers to get close alongside of the piers, even were the water still enough. Mr. Parkes thought that the piers might be unsuitable for wharves, by reason of seas breaking over from the outside and consequently suggested that wharves might be formed by adding a wall on the outside, but he did not apparently consider that there would be any difficulty in ships lying alongside the piers, owing to insufficient depth or disturbance of the water inside the piers.

$$X = \frac{H\sqrt{b}}{\sqrt{B}} - \frac{\left(H + \frac{\sqrt{b}}{\sqrt{B}}\right)^4 \sqrt{D}}{50}$$

Where

H = Height of wave at harbour entrance.
b = Breadth of entrance.
B = ,, of harbour at place of observation.
D = Distance from entrance to place of observation.
X = Height of residual wave at place of observation.

All dimensions in feet.

He calculated from a formula of Mr. Stevenson's that a 10 feet wave entering the harbour would be reduced to 1′ 9″ before it reached the piers or the beach or a 15 feet wave to 2′ 7″.

Sir Andrew Clarke in 1878 found fault with Mr. Parkes' proposals for not providing for wharves; he said that wharves formed such an integral portion of any harbour which would be of real practical value to Madras, that he could not omit such an important item from his estimates. Mr. Parkes replied that wharves were not wanted immediately, but it would be sufficient to employ large cargo boats which would land cargo at cheap shallow water jetties run out from the shore, and the construction of such jetties was sanctioned and started, when the outer arms of the harbour were destroyed by the storm of November 1881.

The results of this storm were sufficient to demonstrate that Mr. Parkes' anticipations in regard to the effect of the harbour with an eastern entrance towards securing still water were far too sanguine. The entrance had been made 550 feet wide, but it is on record in the report of the Master Attendant on the storm, that all the cargo boats in the place were wrecked, the beach ravaged, and the low level jetties (then in course of construction) utterly swept away before a block had fallen from the walls. It was clear that the original design for constructing low level jetties in the harbour to enable large lighters to land goods must be abandoned, and it was more than doubtful whether even in ordinary weather the original design would secure sufficiently still water to enable a ship to lie alongside a wharf or quay. Many eminent opinions were taken, and a committee consisting of Sir John Hawkshaw, Sir John Coode and Professor Stokes was appointed by the Secretary of State for India in July 1882 to decide what should be done. The decisions of this committee and the correspondence that took place on the subject are given in Volume No. CCVI of Selections from the Records of the Government of India, Public Works Department. This committee, after dealing with the section which should be adopted in restoring the damaged breakwaters, recommended that the entrance be made 450 feet wide instead of 550 feet as originally constructed. The local nautical authorities objecting to less width than 500 feet, a committee was appointed by the Madras Government which proposed to reform the harbour with a north-eastern entrance, which, while meeting the requirements of all the nautical authorities consulted, would, it was thought, secure the desired stillness of water. The home committee rejected this proposal on the grounds that it was proposed to meet the cost of the north-eastern entrance by reducing in some

Vide Minutes of evidence taken before committee appointed by Secretary of State for India in 1887, question 997.

measure the provisions originally recommended by them, that the entrance would be difficult for vessels to enter, and that for a time if adopted, there would be two entrances. On a further representation being made to the Secretary of State for India, his conclusions were given in Proceedings of Madras Government, No. 3128 W., dated 19th December 1884, and were that the eastern entrance should be maintained and through which the larger vessels should have no difficulty in getting out to sea when a severe storm was threatened, and as regards the smaller craft, the provision of docks or basins in the accretion to the south of the harbour would protect them from danger. It will be thus seen that with the decision to retain the eastern entrance all idea of providing quays or wharves inside the harbour was given up and a boat basin or dock became an integral part of the design.

Up to 1886 the Madras harbour works had been dealt with in the Public Works Department, but in that year the Harbour Trust Board was constituted and in 1887 Captain Taylor, who was a strong advocate of the north-east entrance scheme, again raised the question in a letter to the Chairman in which he brought prominently to notice how exposed the harbour was with an eastern entrance. The Madras Government was strongly supported by the Government of India in asking for a reconsideration of this question, and in Government of India despatch No. 25, dated Simla, 16th May 1887, it is said that the difference of opinion on the subject of the position of the harbour entrance "may be said to have been the difference between the opinion of Sir John Hawkshaw's committee in which Mr. Parkes concurred, and the opinion of all persons or bodies in India who were interested in the harbour or who have been officially or professionally consulted concerning it." Among those who maintained an opinion favourable to an alteration in the site of the entrance were—

The Madras committee of local professional gentlemen which reported on 30th June and 22nd September 1883.
The Madras Chamber of Commerce.
The Professional Advisers of the Government of India.
Mr. G. L. Molesworth.
Colonel H. A. Brownlow, R.E.
Colonel N. S. Trever, R.E.
All Commanders of first-class steamers using the port of Madras who had been consulted.
The local nautical authorities.
The Madras Government.

The Government of India went on to say that the opposition of the Madras Government and of all Madras local authorities, to the eastern entrance had their entire concurrence.

The result of these representations was the appointment of a committee by the Secretary of State for India consisting of—

Vice-Admiral Sir Nowell Salmon, V.C., K.C.B.
Sir John Coode, K.C.M.G.
Rear-Admiral Sir George S. Nares, K.C.B.

The minutes of evidence taken before this committee are very instructive and interesting reading to any one concerned with the future of the Madras harbour. The list of witnesses examined includes, the Consulting Engineer, the Superintendent of the Harbour Works, Generals Sankey and Shaw-Stewart (late Chief Engineers of the Public Works Department), and two foremen of the Harbour Works, three officers of the Royal Navy, Captain J. H. Taylor (Port Officer of Madras) and seven Captains of mercantile steamers and the Senior Madras Pilot. In their report the committee say "It is agreed on all hands that, owing to the frequently disturbed "state of the water, the facilities for landing and embarking passengers, cargo, &c., "offered by the harbour are very much restricted, nor would it be feasible for the "same reason to use without serious interruption wharves and jetties along the shore "line, or to keep in safety within it such improved lighters, tugs and other harbour "craft, as would greatly increase its value as a trading port * * * * . The

"confused sea within the harbour is attributed by all who have given evidence to "the nearly constant swell from the eastward which runs in through the present "entrance and being deflected from the side walls causes what is described as a "'nubbly sea' or 'joggle of a sea' and in bad weather as being like 'a boiling pot.'" The committee approved of a north-east entrance to cost about Rs. 25½ lakhs over the cost of completing the harbour with an eastern entrance.

On the Board being called on by Government to submit an estimate for a north-east entrance as recommended by the committee, Mr. Pogson (who had succeeded Mr. Thorowgood as Engineer to the Board) submitted a modified scheme for a north-east entrance marked IV-A., at a cost of Rs. 21½ lakhs. This design was framed with the avowed object of completing the harbour with an eastern entrance according to Mr. Parkes' design in the first place, to put it to the test, so that should the water with an eastern entrance be found "smooth enough for shipping," improvements inside the harbour could then be made to secure, the safety of "cranes, lighters, sailing ships and native craft in cyclones." If the water were not found smooth enough, then his design IV-A. would be proceeded with. As this design only involved the removal of a portion of the end of the north pier, Mr. Pogson proposed to complete the pier as sanctioned up to a certain point, and beyond this to the end to omit the wave breaker blocks. The Board thought this scheme the most expeditious and economical that had been proposed and it had the approval of Sir G. Molesworth.

Sir Alexander Rendel, who had succeeded Mr. Parkes as Consulting Engineer, deals with this proposal in his report published in Proceedings of Madras Government, No. 1737 W., dated 1st July 1889, he objected to the portion of the north arm being only made up to a temporary section pending a settlement of the position of entrance and says:—

"This brings me to the vexed question of the position of the entrance, and here it appears to me that, so long as the question of its ultimate position remains undetermined, there will be vacillations and delays, and perhaps mistakes ending in disasters, and that it is highly desirable to set the question at rest as soon as possible. For my part I cannot believe that the science of marine engineering is in so low a condition that a point of this kind can only be determined by an experiment which contemplates the possibility of our having to resort to the costly process of taking up several hundred feet of breakwater. And I feel it so necessary that the question should be settled at the earliest possible moment once and for ever, that, at the risk of being thought too ready to express an opinion upon it, I do not hesitate to say that, in my judgment, the eastern entrance as at present designed is a proper one, is a better one than any alternative which as yet been proposed, and is the best which, under present circumstances, can be devised.

"To make a harbour secure at the expense of its accessibility, which to my mind is what the best of the north-east entrances yet proposed would do, is a worse fault than to make it accessible at the expense of its security, because we can, as a rule, improve the security by internal works and we cannot improve the accessibility except by costly alterations which will diminish the security.

"The simple fact, in my judgment, is, that the present scheme for a harbour at Madras will make no harbour worth the name at all. What it does make, is a satisfactory entrance to a harbour yet to be designed within it.

"A harbour, it seems to me, is of little value to Madras unless it provides a quay wall alongside which ships may lie as in a dock, and take in or discharge their cargoes in perfect quiet and security, and there seems no difficulty in providing such a quayage at a cost which the result would fully justify. But, be the cost what it may, it seems to me that Madras is worth a safe and commodious harbour.

"The type of harbour to which Madras belongs is very much that of Whitehaven, a copy of the chart of which I append to this report. Many years ago I was Consulting Engineer to this harbour, and I know it well. We have here an outer harbour, forming an approach, and nothing but an approach, to two inner harbours, each so enclosed by quays that ships lie undisturbed within them, with a space between them opening directly on to the outer harbour, and forming a beaching ground for ships and waves. It would be easy to devise a similar scheme for Madras, which would give it, say, 60 acres of enclosed dock (gates of course are not required), 9,000 feet lineal of wharfage, and 40 acres of quay space, enough to make it a first-class port for a very large trade, or, if it be preferred, the adjacent shores outside the harbour might be utilized for the purpose, and of course a combination of both ideas is possible. I claim no priority in suggesting either plan. Mr. Parkes has, I believe, roughed out the latter idea; Mr. Thorowgood, the former, quite independently of me. But I may say, as a corroboration of their views more than anything else, that the first of the two schemes I have now suggested I broached

when the harbour was first proposed; and I may add that, if it be adopted, the entrance might be kept at the width originally given to it of 500 feet, which is by no means more than it should be."

To this report the Board replied that the additional cost of the north-east entrance proposed was Rs. 21 lakhs and that proposals for docks would not be much less costly, while the advantages of docks over a north-east entrance would require to be demonstrated. If the eastern entrance does not give sufficiently still water then Sir Alexander Rendel might be asked to personally inspect the harbour and avour the Board with his views as to the best method of completing the harbour so as to ensure smooth water. The Trustees were of opinion that Mr. Pogson's plan, No. IV-A, was the best that had been proposed.

Proceedings of Madras Government, Nos. 2652-2653 W., dated 23rd September 1889.

After the very decided opinions expressed by Sir Alexander Rendel in his report of 1889 already quoted, and although the Trustees had expressed their unanimous approval of Mr. Pogson's IV-A scheme this invitation to Sir Alexander Rendel to inspect and advise does not show that firm conviction that a north-east entrance was the only solution to the difficulty, that had been previously and so frequently urged from India.

Sir Alexander Rendel inspected the harbour in February 1890 and recommended the piers being completed to their full section with a 500 feet entrance, but as there was a possibility of the end of the north pier being removed, it was proposed not to provide the north pier with a caisson head like the south pier. In his report, dated the 28th November 1890, Sir Alexander Rendel says: "But the expenditure upon it" (*i.e.*, the harbour) "will not in my "opinion end with the completion of the present scheme. A mere harbour of refuge "is not wanted at Madras; what it seems to me is wanted there, is a good "commercial harbour and a commercial harbour in which vessels discharge goods "into or load goods from boats which themselves load and discharge on a foreshore "of sand is not worth the name—at any rate is not worth the sum which will have "been spent on the Madras harbour by the time it is finished on even its present "plan." That Sir Alexander Rendel's opinion was, that the ultimate development of the harbour must take the form of an inner harbour or dock is perfectly clear from his report, and the decision to complete the eastern entrance in order to give it a trial can only be taken as an indication of the abandonment of the strong position previously taken up on the subject of providing a north-east entrance. It must be remembered that an eastern entrance 550 feet wide had already been given a trial, as this was practically finished in 1881 and unless the evidence given before Sir Nowell Salmon's committee is to be set aside, then this entrance did not give sufficiently still water even in ordinary weather, and the only question which really had not been put to the test was, whether the stronger and higher sections of the new arms would stand a first-class cyclone. It can hardly have been hoped that a narrowing of the entrance of 50 feet would make any material difference in the amount of ocean swell coming into the harbour through an eastern entrance.

Proceedings of Madras Government, No. 426 W., dated 16th February 1891.

In March 1891 the Secretary to the Board submitted proposals for constructing a deep water ship dock in the sand to the south of the harbour, which are dealt with in Proceedings of Madras Government, No. 347 M., dated 4th August 1891. The papers published with these proceedings make it quite clear that the Board had abandoned the idea of a north-east entrance, as being a necessary alternative to maintaining an eastern entrance and constructing an inner harbour or dock. The question of constructing a dock or inner harbour is not discussed as an *alternative* design for completing the harbour but as a possible improvement. The term "completion of the harbour" is apparently used to mean the completion of the two breakwaters with an eastern entrance and the strong and influential opinions expressed in the years following the storm of 1881, and the evidence taken before Sir Nowell Salmon's committee appear to have been lost sight of as the construction

of low-level quay walls inside the harbour with its eastern entrance is again proposed. In accordance with this change of opinion as regards a north-east entrance, when the estimate to carry out Sir Alexander Rendel's recommendations was prepared, it is observed, that provision was made in that estimate for wrought iron caissons for *both* the north and south piers and for capping to the north pier. As the removal of a high monolithic mass of concrete contained in a wrought iron caisson would be a very costly and troublesome undertaking and looking to the possibility of part of the north pier having eventually to be removed to suit the No. IV-A scheme, Sir Alexander Rendel has recommended a block pier head for the north pier. This provision for a caisson for the north pier was sanctioned however without remark, but in commenting on the estimate Sir Alexander Rendel repeats that if the harbour is to be made really commercially useful a further and much large sum than provided in the estimate will have to be spent on it.

Proceedings of Madras Government, No. 718 W., dated 13th March 1891.

Proceedings of Madras Government, No. 430 W., dated 12th February 1892.

The Board's rejoinder to this is contained in Proceedings of Madras Government, No. 3011 W., dated 2nd November 1892, in which all that is said on the subject is, that the Trades Association is strongly in favour of docks, but that the Chamber of Commerce is not unanimous and considered "the time had not arrived to discuss the question."

In 1893 Mr. Pogson proposed to make the entrance 520 feet wide instead of 500 feet and this alternation was approved by the Board and agreed to by the Secretary of State.

Proceedings of Madras Government, No. 1017 W., dated 13th April 1893.

In his report on the harbour works for the quarter ending 31st December 1892, Mr. Pogson brings to notice that the north pier would be finished before the south pier and as "apparently no doubt now "exists as to which is to be the final "entrance to the harbour it would be "more economical to complete both piers with caissons without delay and look "to docks for any further improvement necessary." Mr. Pogson draws attention to the fact that the cost of finishing off both piers with caissons had been already included in the estimate and sanctioned, and as the iron work was already on the works, it was only necessary to "record sanction to finish off both piers with the "caissons already supplied as soon as opportunity occurs." As a final proof that the Board had by this time resolved to drop the north-east entrance the Engineer's report was forwarded to Government with the Chairman's letter, No. 4495, dated 15th March 1893, with absolutely no comment whatsoever on this subject, although other paragraphs of the Engineer's report are taken notice of. The north pier caisson was subsequently set and a lighthouse built on the top of it.

Proceedings of Madras Government, No. 1018 W., dated 13th April 1893.

In 1895 the Secretary to the Board having brought up the question of the construction of a boat basin south of the harbour a strong representative committee was appointed by Government to consider the question of improving the means which the harbour provides for working the trade of the port. The Government nominees on this committee were—

Proceedings of Madras Government, No. 47 M., dated 9th February 1895.

The Hon'ble Colonel J. Pennycuick, R.E., President.
The Hon'ble Mr. A. T. Arundel.
Mr. F. R. Upcott.

The Collector of Sea Customs and the following bodies were represented:—

The Harbour Trust Board.	The South Indian Railway Company.
,, Chamber of Commerce.	,, Municipal Commission.
,, Trades Association.	,, Kolar Gold Field and Mining Board.
,, Madras Railway Company.	

This was no doubt a strong committee, but although the order appointing it was a Marine order the Marine Department was not represented. There was not a single nautical representative on the committee nor was the Military Works Department represented. The proceedings of this committee are published in a separate blue book from which it would appear that the best site for a shallow boat basin was carefully considered, and the committee also had before it the subject of connecting the harbour with the Buckingham Canal as well as that of the management of custody of goods landed in connection with the Customs office and the Harbour Trust Board. The question as to the merits or demerits of a shallow boat basin does not appear from its report to have been considered by this committee at all, although at its first meeting one of the members appears to have enquired as to the cost of constructing docks eliciting from the Secretary the information that estimates for docks had ranged from 30 to 86 lakhs of rupees. The committee appears to have started on the ground that the construction of two breakwaters with an east entrance completed the harbour sanctioned by the Secretary of State 20 years previously, and the main question placed before this committee appears to have been the selection of a site for a particular form of "improvement" to this harbour. The plan selected by the committee is that known as A_1. It consisted of walling off the south-west corner of the harbour to form a boat basin with an entrance for a canal at the north-west corner connected with low-level wharves and a quay.

This proposal is entirely at variance with the conclusions derived from the evidence taken before Sir Nowell Salmon's committee, and with the opinions expressed as to what was to be expected with an eastern entrance by all the eminent authorities consulted in the years following the storm of 1881. No reference whatever is made to these opinions and to this evidence in the committee's report, and one is led to suppose that they had been lost sight of. If it had been intended purposely to reject the conclusions come to by Sir Nowell Salmon's committee and by other authorities one might have expected some reference to have been made to the fact.

On the committee's A_1 scheme being submitted to the local Marine officers Captains Powell, Hewett and the three Harbour Masters, nautical objections were at once raised to it. They objected that the scheme would reduce the space for the berthing of steamers, that the wall would create a backwash preventing the sternfasts of steamers holding, and a preference for a basin to the south of the harbour was expressed. A modified plan was then made reducing the size of the boat basin, and this plan was submitted to Government and sanctioned; but it does not appear to have been submitted to any nautical authority, and it is on record that it passed the Board in the absence of the only nautical member. This scheme was not put in hand immediately pending the question of funds being settled and objections to it were again considered. Mr. Austin, the Chairman of the Board, who had relieved Mr. LeFanu, addressed Government on the subject in his letter published in Proceedings of Madras Government, No. 884, dated 1st December 1896. He brought to notice that the nautical authorities were not in favour of the scheme, that the proposed boat basin in the south-west corner of the harbour must be abandoned, as apart from the nautical objections to it, it was totally inadequate to meet the requirements of the port. That it was necessary to take immediate action for providing better facilities for the landing of coal. That the Board did not consider that the time had yet arrived to provide a ship dock in connection with the harbour but that when this time did come, the sand to the south of the harbour was the best place for it. To meet these requirements, the Board proposed to construct a boat basin in the sand to the south of the harbour. As the Board's Engineer was absent on leave, it was requested that the estimate might be prepared by the Public Works Department.

Proceedings of Madras Government, No. 119 M., dated 2nd February 1896.

Government observed that the Board now proposed in modification of all previous proposals, to limit their attention for the present to the construction of a boat basin outside the south arm of the harbour and within the sand which had accumulated to the south-west, and ordered the Executive Engineer, Buckingham Canal division, who was under separate orders preparing an estimate for a canal to connect the harbour with the Cooum to prepare the estimate for the boat basin in communication with the Harbour Engineer. This is the estimate which is now under review, and the foregoing is a history of what has led up to it from the time the Madras Harbour was first thought of.

Proceedings of Madras Government, No. 834 M., dated 1st December 1896.

What has taken place therefore may be briefly summarised as follows. In 1875 it was recognised that Madras required a safe and convenient harbour which was of too large a nature merely to be dealt with on financial grounds. A plan was adopted which was intended to be complete in itself and would secure sufficiently still water to enable ships to lie alongside of quays or lighters alongside of ships and jetties. In 1881 it had been recognised that the form of harbour with an eastern entrance would not secure the safety of small craft during a storm, nor admit of the construction of low-level jetties within the harbour. In the enquiries which followed the storm of 1881, it was shown that Stevenson's formula for waves did not apply to the Madras Harbour owing to insufficient length, and it is given in evidence that the ocean swell as evidenced by the surf on the Madras coast was almost constant, and that the line of the swell never deviated from a line parallel to the coast by more than 30°. That with an eastern entrance water would never be smooth enough for a ship to lie alongside of a quay and in fact, that to secure water still enough to enable ships to lie alongside of a quay or even lighters to lie comfortably at all times on both sides of a ship or at jetties, it would be necessary, either to have an entrance which would be protected by an arm from the ocean swell, or to construct an inner harbour leading into the outer harbour. The Board has selected the latter alternative by rejecting the former, and nullified the advantages of Mr. Pogson's IV-A scheme over the other north-east entrance schemes by finishing off the north pier with a solid concrete head in an iron caisson. The question then arose whether the inner harbour should be merely a shallow boat basin for lighters and small craft or a dock for ships. The boat basin was selected because it was thought that it would be cheaper, that it would not prevent the dock being made afterwards, and that it was the best means practicable to meet the requirements of the port.

The term "boat basin" however is somewhat elastic, and it is clear that at different times it has been used to denote different things. The main distinction understood between a boat basin and a dock when used in connection with the Madras Harbour is that the former should only be deep enough for lighters and that the latter should be deep enough for steamers. Mr. Parkes' ideas of a boat basin are given in his report published with Proceedings of Madras Government, No. 3128 W., dated 19th December 1884. It was to be a mere excavation in the sand without wharf walls with an entrance 60 feet wide covered by a jetty or arm 300 feet long running out into the harbour. He proposed that in the first instance the basin would be a mere place of shelter, but that a boat wharf would soon be established on the landward side. As the sand accretion advanced seaward he contemplated the basin being widened in that direction, so that in course of years its seaward margin would be so near deep water in the harbour as to suggest the possibility of a ship entrance. Now this is clearly not the sort of boat basin contemplated by the Trustees, nor would it by any means meet the present requirements of the port. One of the chief objects of the basin asked for is to take immediate action to facilitate the landing of coal which it is proposed to store on the seaward side of the basin. This involves the immediate construction of a wharf wall on the seaside and metalling the surface of the sand which metalling alone is estimated to cost over half a lakh of rupees. Beyond this "hard" for coal it is necessary to provide a stone revetment to protect it from storms. Another object of the basin asked for by the Board, it is understood, is to enable goods to be landed

expeditiously and to be handled in sheds alongside the basin conveniently situated and connected with the railway. It is desired to do away with the present iron pier, the platform of which is 18 feet above M.S.L. involving an unnecessary amount of cranage. Both sides of the basin proposed by the Board therefore require to be provided with wharves. During the last year the Board has had before it proposals for enabling horses and troops to be landed on the north pier direct from the steamer, and an estimate amounting to Rs. 17,000 was actually sanctioned for works to enable this to be carried out. Behind this proposal there is no doubt a vague hope that this will lead to other classes of cargo being landed direct from the ship. Petroleum in bulk is already pumped through a pipe along the north pier and applications for more pipes have been received. Several other proposals have been made and considered with the object of enabling steamers to land cargo direct and in fact it is quite certain that deep water quays against which ships may lie form one of the requirements of the port.

The latest decision to form a boat basin in the sand south of the harbour appears to involve the following requirements :—

(*a*) The boat basin must be of so moderate a cost that its abandonment would not stand in the way of the construction of a more expensive inner harbour or dock in the near future or it must be of such a nature as to fit in with future proposals.

(*b*) It must provide immediate facilities for the landing of coal and other goods, that is, it must have wharf walls or quays, a coal hard, railway connections and sheds.

(*c*) The form of its entrance must not involve the construction of an arm into the harbour which would interfere with the ships berths and cause a dangerous backwash, two schemes having already been objected to by the nautical authorities on this account.

(*d*) The Consulting Engineer for Railways strongly advocates that the shore side of the basin should be parallel to the line of railway and the beach road.

The estimate prepared by Mr. Pogson in communication with the Executive Engineer, Buckingham Canal division, for a basin as shown in the sketch alluded to in the Chairman's letter accompanying G.O., No. 834 M., dated 1st December 1896, amounts to Rs. 8,73,667, and this does not include shedding or fencing. If the sheds shown on the plan alongside the basin were included in the estimate, this, at Rs. 25 per square yard of area covered, would amount to another 5 lakhs or altogether nearly 14 lakhs. With the view of ascertaining what reductions could be made in this amount, and as the estimate requires alteration in some respects a revised estimate for a boat basin has been prepared by the writer. This estimate amounts to Rupees 8,47,239 without sheds, or Rs. 10,47,239 including four sheds 300 ft. × 60 ft. The following alterations have been made.

First as to the walls : the nature of the sand to the south of the harbour, which has been examined by boring, makes it clear that a comparatively heavy section of wall is a necessity. It is reported that at some distance below the surface the sand takes a slope of from 1 in 7 to 1 in 10. Assuming an average natural slope of earth from bottom of basin to surface of 3 to 1 and that the backing is composed of wet sand weighing 118 lb. per cubic foot, a section has been drawn out which fulfils the ordinary conditions of stability and costs less than the section provided in the original estimate. As weight in the interior of the wall is the only factor affecting stability, and the thickness of the curbs is considered sufficient to stand blows likely to be sustained from lighters and with a view of reducing cost, it is proposed to fill the interior of the curbs with sand and rubble except for a plug of concrete at the bottom. To meet the views of the Consulting Engineer for Railways, the shape of the basin has been altered. The charge of Rs. 66,200 or half the estimated cost of the dredger *Wenlock* has been omitted from the estimate, as it is considered that the machine forms part of the harbour equipment. The item parapet of old blocks as protecting arm has been increased to include the value of the blocks, as the blocks referred to are, it is supposed, part of the surplus stock of blocks remaining over from the harbour construction and their value should be credited to that estimate.

The provision for revetting the eastern boundray along the shore has been increased to provide for a bank of stone as shown on the section. The block moulds, trucks and sand waggons are taken as a permanent charge against the estimate, as it is not safe to assume that they will be of any value on completion of work. No charge has been included in this estimate for the use of the stationary engine, crushing and concrete machinery, but some charge should properly be made. As to the protecting arm, Mr. Pogson himself doubts whether a length of 200 feet is sufficient, and any one who has watched the complex wave which courses along the south arm at present, must think his doubt well-founded, and provision is therefore made for making this arm 300 feet long which was the length contemplated by Mr. Parkes. As to shedding the boat basin would obviously be incomplete without this ; the area of shedding shown in Mr. Pogson's plan would cost about 5 lakhs, but sheds 120 feet wide seem more than can be necessary. This is the width of the sheds provided at the Albert Docks in London, which are in two spans of 60 feet. Provision is therefore made in this estimate for sheds along the north and west sides of the basin 60 feet wide, which would cost 2 lakhs. Further shedding could be added if required.

No other methods of materially reducing this estimate of 10½ lakhs can be thought of ; the estimate is probably a good deal more than expected by the Trustees, and will be too much money to think of expending on a mere temporary work. It involves the construction of a protecting arm jutting out into the harbour for at least 300 feet. It occupies the site which, in the opinion of the Board, is the best site for a future dock, and it does not meet with the requirements of the port, that is to say ; (1) it does not provide any means for facilitating the landing of horses or troops ; (2) as regards facilitating the landing of coal, all that it would do would be to provide a place of shelter for larger lighters than now used, but at present the Board possesses no means of ensuring that these larger lighters would be built and used ; (3) the distance that goods would have to be boated would be slightly greater than at present ; and (4) theoretically, at any rate, the disturbance of the sea at the ships berths would be if anything greater than now.

Seeing then that this proposal for a boat basin is no more free from objection than any one of the ten schemes considered by the committee of 1895, let us see what the objections are. The ten schemes considered by the committee of 1895 are divided into three groups :—

(1) Four designs for boat basins in the reclaimed land to the south of the harbour.

(2) Four designs for boat basins inside the water area to the south-west of the harbour.

(3) Two plans for boat basins in connection with the proposed Buckingham Canal connection on the north side of the harbour.

The third group may be left out of consideration as the northern canal has now been abandoned and there remain only the other two classes. The objections to the first class (to which class the estimate under review belongs) are that the schemes all occupy ground that may be required for docks and that they involve the construction of a protecting arm in the harbour which will interfere with the berthing of steamers, and tend to increase the disturbance of water at the ship berths. The objections to the second class are, that they all without exception involve the construction of walls in the harbour which will tend, even to a greater degree than the protecting arms of the other class, to increase the disturbance of the water within the harbour, and thus interfere with the berthing of ships. Mr. Pogson has proposed a further boat basin scheme which has not been submitted to Government for making a boat basin in the sand on the foreshore within the harbour arms, but even this scheme reduces the length of the harbour which, accord ing to the evidence of General Sankey, is so important a factor in lessening the waves which enter the eastern entrance, and it has the further objection of leaving insufficient space between the basin and the Beach road for buildings, sheds, &c. It will be observed that all these schemes are for boat basins, and they are all open

to the objection that although estimated to cost from 6 to 11 lakhs of rupees excluding buildings and sheds, &c., they none of them meet the want of quays alongside which ships may lie, and on the other hand each one of them in some degree contains a provision which may be expected to increase the disturbance in the harbour and to leave the trade of the port further off than ever from the great desideratum *still water* which has been the object aimed at ever since the harbour was thought of.

In commenting on the estimate for a small boat basin in the south-west corner of the harbour, which was sanctioned for Rs. 6,63,558, but which was subsequently objected to, Sir Alexander Rendel says :—

"In a report which I made some years ago, I stated that in my opinion the present harbour was little more than an entrance to a harbour yet to be made. Of course a boat basin will not put Madras in the position of Bombay or an English port of any importance, for it will still be necessary for ships to discharge their cargo into and receive from boats in the open harbour which must be often at least inconvenient even with a north-east entrance. But I do not wonder at the Trustees hesitating whilst the harbour is untried in respect to the stability of its works and open to question in respect to the maintenance of its depth to do more than is absolutely necessary for the necessities of the moment. Therefore, as a sheltered basin and a quay for boats will remedy the worst part of the present disadvantages of the port, I think the Trustees have determined wisely."

This together with the fact that the estimate had been sanctioned by the Local Government, appear to be Sir. Alexander Rendel's reasons for approving of a boat basin scheme. But the scheme criticised has since been pronounced to be totally inadequate, and every other scheme for a boat basin has been objected to on one score or another. The inconveniences of the present system are probably more than realized by Sir Alexander Rendel. The quantity of coal lying at the bottom of the harbour, lost during the process of unloading, is now so large that it will be necessary to dredge it up to prevent ships touching in the coaling berths, and packages, sometimes of considerable value, are frequently dropped into the sea or damaged. Complaints against the harbour are frequent, and although improvements have been talked of for years, nothing is done. The conclusion one is driven to is that no boat basin that can be devised will effect an improvement in the present disadvantages of the port commensurate with the cost involved, and which will not be a bar to still further improvement, and it remains to be seen what are the reasons for postponing any longer the execution of some form of improvement which will provide still water and quayage for ships.

In 1891 the Secretary to the Board submitted proposals for constructing docks and Government asked for the opinions of the Presidency Port Officer, the Chamber of Commerce and the leading firms in Madras. These opinions were published in the following February. The Presidency Port Officer, one firm* and the Trades Association were in favour of the immediate construction of docks. This Association advocated the subject being taken up boldly and deprecated the question being postponed until the harbour was completed or until the effects of a cyclone upon the arms had been experienced. The Chamber of Commerce was not unanimous on the subject, but suggested that the results of a cyclone should be awaited. The Chamber admitted, however, the immense advantage which docks would be to the trade of the port and asked for a quay wall to facilitate landing and shipping of cargo. Three other firms ask for improvements, but would postpone the question of docks. One firm confines itself to saying that the trade of the port could not bear the burden of a dock.

P.M.G. No. 347, Marine, dated 4th August 1891.

P.M.G. No. 48, Marine, dated 3rd February 1892.

* Messrs. Wilson & Co.

The consensus of opinion five years ago was apparently in favour of the ultimate construction of a dock. Some of the opinions were in favour of immediate construction, and the others only advocated postponement on the assumption that less expensive improvements were feasible and would be carried out. In 1895 the Engineer to the Board reported on the shoaling taking place to the south of the harbour and at the entrance, and Sir Alexander Rendel, while expressing the

opinion that the shoaling could be dealt with by a sand pump dredger or if not by that of a new form of entrance, admitted the wisdom of carrying out a form of improvement to meet the necessities of the moment. The reasons for postponing the consideration of the provision for quayage for ships therefore appear to be that this form of improvement although desirable would be too expensive and that less expensive improvements which would meet the necessities of the moment could be carried out. It is admitted in short on all sides that improvement in some form or other is urgently wanted, but it is strongly urged that no improvement should be allowed to be undertaken haphazard, and without a general plan of development leading up to the ultimate object admitted to be so desirable, viz., quayage for ships. After the most careful and exhaustive consideration of many different boat basin schemes it is clear that the construction of any boat basin such as has been proposed in later years, no matter where situated, would not meet the necessities of the moment and would not bring us any nearer to our ultimate desire but on the contrary. It seems to be inevitable that some interference with the berthing of ships in the outer harbour must occur in the carrying out of any scheme that can be devised either for a boat basin or for an inner harbour for ships, but as in the case of a ship basin this objection would only be a temporary one, it has not the same force in connection with a ship basin as it has in connection with a boat basin, and it is considered that this fact should not deter us from entering on any form of improvement which is really a step towards our ultimate aim, although that scheme which interferes least with the present working of the port is the best, other things being equal.

Putting aside the proposal made by Mr. Cecil Scott in 1885 to make a 36-acre dock on the site of the present High Court Buildings, there are seven plans including quayage for ships or docks which have at different times been drawn out by Mr. Pogson. Two of these were submitted with estimates by the Chairman of the Board to the Chief Engineer in 1892, with an intimation that the Trustees were not then prepared to accept either of them without further discussion and opinion. The amounts* of these estimates could be largely reduced by omitting the provision for graving docks and substituting present rates for dredging, much reduced since the introduction of pump dredgers, and in other respects. In the larger of these plans ten ships of from 400 to 500 feet long are shown as well as two graving docks. As a matter of fact, however, the length of vessels visiting Madras range from about 250 feet to 430 feet, the length of the P. and O. S.S. "Simla." The B. I. S. N. S.S. "Golconda" is only 422 feet long. The present accommodation of the harbour is only for nine ships, and it is unnecessary to provide for quayage at once for so large a number, more especially if it can be arranged to leave some open berths in the outer harbour. Neither of these schemes admit of gradual development such as is aimed at, and have protecting arms projecting well over steamer berths Nos. 1 and 2. The third plan is for forming a dock of about 24 acres by running out a groyne to the south of the present south break-water enclosing a space to form a dock. This has the objection that the eastern and southern sides of the dock would be directly exposed to the sea, and is also larger than is necessary to start with. Of the other four plans, two Nos. 4 and 5 are for a 22-acre dock formed by walling off the south-west corner of the harbour and the other two Nos. 6 and 7 were made when it was proposed to connect the Buckingham Canal with the harbour by an entrance at the north-west corner. One of these No. 7 is for a series of tidal basins and moles, formed in the shore half of the present harbour, and this plan it would appear was shown to Sir Alexander Rendel about 1895. This plan merely shows a possible scheme of ultimate development, but apart from its providing a canal entrance from the north instead from the south, no details of wall sections are shown, nor does the plan show how it is proposed to carry out the work without interfering with the present business of the port. As several schemes have already been rejected on the ground of this interference, it becomes necessary to carefully consider this point before making a new proposal and to enter into every detail practicable. With this object the following have been taken as data on which to found any scheme of development including quayage for ships for the harbour under present circumstances.

* Rs. 55, 36, 289 for 13 acre dock.
,, 96, 65, 434 for 36 do.

(*a*) The water in the present harbour is not sufficiently still to allow of a ship lying close alongside of a deep water quay, although in fine weather a ship can be moored sufficiently close to a quay in some parts of the harbour to enable a long gangway being placed from the quay to the ship as has been done in the landing of horses on the north pier. The ship, however, is not still, and even in the finest weather this process is attended with some risk. Quite recently the ship moved away from the pier and the gangway dropped into the sea. Usually there is a movement backwards and forwards of some feet.

(*b*) Owing to the level of the rubble base of the piers being only 18½ feet below lowest tide, and in some places less, a steamer has to lie about 40 feet away from the present piers and to enable these piers being used as quays it would be necessary to construct vertical faced quay walls to the proper depth at the edge of the rubble base.

(*c*) The best site for a ship basin in the first instance is on the sand accretion to the south of the harbour.

(*d*) The narrower the entrance to any basin opening into disturbed water is made, the greater is the stillness of water secured inside the basin. It is found at the port of Marseilles that 50 metres or 164 feet is the width which it is well to give passages which steamers have to traverse under their own steam, as this width enables the officer in the middle of the bridge of a large steamer to see the two walls and thus to estimate his position in the passage.

(*e*) To enable a vessel to move through such a passage made in the south arm of the present harbour, she must enter from under the lee of a protecting arm about 900 feet long. This assertion is based on the fact that there is at all times in the present harbour, with an eastern entrance, a wave of translation of more or less intensity according to the state of the sea outside, and that when a vessel is coming under the lee of an arm or entrance, there is a time when part of the vessel is exposed to the action of this wave, and part is not; free space is therefore required in water protected from this wave to steady the vessel, and get her pointed in the right direction, before she actually makes the entrance; 900 feet or about two or three steamers' length is allowed, this being about the length allowed in the 13-acre dock plan, and accords with the nautical evidence given before Sir Nowell Salmon's committee when the length of protecting arm for a north-east entrance was being dealt with.

(*f*) Ships are at present moored in the harbour in five fathoms below DeHavilland's M.S.L. It seems hardly necessary to make the depth of a still water basin or quayage for ships more than that of the Suez Canal. This is 8½ metres or 27·88 feet. The lowest tide in Madras is 3·59 feet below harbour works datum, or DeHavilland's M.S.L. It is considered, therefore, that a depth of 31½ feet below DeHavilland's M.S.L. is sufficient depth in a still water basin or a little more than that at the 5-fathom line shown on the harbour plans.

(*g*) The protecting arm and entrance to a basin must, therefore, either be beyond this line, or the bottom of the present harbour dredged within the present 5-fathom line.

(*h*) As the shore ends of the present break waters are founded at a less depth than this, dredging cannot be carried out in the harbour until they are protected by walls constructed in front of the existing work.

(*i*) Increasing the depth of the harbour by dredging, involves the removal of a portion, at any rate, of the present iron pier, it being uncertain how deep the existing piers have been screwed, but presumably not more than is necessary for its stability.

(*j*) At present, the harbour has berths for nine steamers, although berth No. 1 is only now suitable for small vessels owing to the shoal that has formed in the south-west corner of the harbour. Any scheme of development decided on should therefore, if possible, not interfere with the berthing of at least eight steamers during execution.

Vide list of steamers attached.

(*k*) The length of the ships using the harbour ranges from 231 feet to 446 feet.

(*l*) Sand at present finds its way through interstices in the south arm. This may be stopped either by additional work in front, or in rear of the present wall, or by grouting. Any proposed quay or works along the south arm will therefore serve this purpose, as well as that for which it is primarily designed.

(*m*) At the present time, with the exception of a certain quantity of coal, there are not many classes of goods which it is required to place directly from the ships into railway waggons. Elaborate railway connections are not therefore, at present, required. It is well, however, to provide for possible development in this direction in the future, and for convenience of railway connection the Consulting Engineer for Railways strongly urges (i) that the shore side of basins or direction of quays on that side should be parallel to the present Beach road, and (ii) that ample space should be allowed between the quays and the present railway.

(*n*) As it has been objected in connection with docks for Madras, that as the place is only a port of call and not a terminal port, and that, in consequence, the commanders of vessels calling at Madras with only a small amount of cargo for the port would object to the delay which would be incurred by entering a dock, it is desirable that any scheme of development adopted, should, in the first instance, at any rate, provide open berths for vessels, as well as quays, and that some of the quays should be easily accessible.

(*o*) The following special tools and plant are available or will be so shortly :— The hopper steam dredger "Wenlock" of 400 tons hopper capacity now being converted at Calcutta into a pump dredger. It is estimated that she will be able to deal with 1,600 tons or 32,000 cubic feet of sand per day. Sir Alexander Rendel estimated that a 500-ton dredger, working under Madras conditions, should be capable of filling itself with sand, to transporting its cargo to a sufficient distance outside the harbour, discharging it, and again taking up its place in the harbour, at two hours at the most. This, with an 8-hour day, represents four trips, and the same is therefore taken for the "Wenlock," (20 cubic feet are taken as equivalent to a ton). Mr. Deas on the Clyde found that quicksand as taken from the buckets weighed 121 lb. per cubic foot, and Mr. Fowler on the Tees found that sand weighed 112 lb. per cubic foot.

Vide his note embodied in proceedings of Madras Government, No. 813 M., dated 23rd November 1896.

Wheelers tidal rivers, p. 229.

An all-round steam travelling crane weighing 147 tons designed to lift a weight of 40 tons at a maximum distance of 35 feet from the edge of the pier or staging on which it stands.

A complete set of stone-crushing and concrete mixing machinery with 30-ton block waggons and Goliath cranes for lifting blocks into the waggons.

On a consideration of these data, the following scheme of development has been drawn out :—

First stage.—Dredge away the shoal along the south pier which causes the breaking wave along that arm up to a point 900 feet from the shore end. From this point, commence a mole 42 feet wide composed of two walls with a rubble hearting 500 feet long, and having by this means secured sufficiently still water to work in, then construct in front of the south pier for this 900 feet a quay wall, founded at a sufficient depth to admit of subsequent dredging along the whole of this length to 31½ feet below datum. At a distance of about 540 from the shore end of this wall, a length of 164 feet should be made up temporarily, to be subsequently removed to form an entrance to a basin. Carry out a similar wall along the first 600 feet of the north pier and for 100 feet shorewards from the present end. The outer length of 400 feet to the full depth of 31½ feet and the inner 300 feet gradually lessening in depth. These walls would form quays. Then dredge back the 5-fathom line as was sanctioned in the estimate of 1896, transferring the business of the port from the iron pier to the quays. When this was done, the present steamer berth No. 1 would have to be abolished, but perhaps a small berth could be made in the extra space made available by the dredging, between berths Nos. 4 and 5 and the shore, and there would be three deep water quays alongside which a steamer could lie, provided the water were still enough. These would, at any rate, be better than anything that has hitherto existed to enable steamers to unload on a quay or than bringing

ships up alongside the north pier as is done at present. Assuming that only berth No. 1 was interfered with, you would have instead a choice of three, if not four, other places—two on either side of the harbour—which would vary in their condition according to the direction of the ocean swell.

Second stage.—Continue the mole by adding 400 or 900 feet in all and construct the 17-acre basin shown on plan No. 4, with its entrance 164 feet wide. This would accommodate six or seven ships in the basin, and at least one ship in ordinary weather alongside the mole, in addition to the open berths in the outer harbour. The dock would be certainly and immediately used by vessels with full cargoes for Madras, such as coal ships or horse ships, and the Clan line ships importing iron, the owners of this line having already asked that docks should be made. It would remain for importers of other goods to demand that their goods should be landed safely on a quay, instead of being tumbled into lighters or into the sea. The importers of goods will have in fact to overcome the opposition that may be expected in the first instance from those interested in the present boat business and probably from the shippers of certain classes of goods. When this had been effected, there would arise a demand for an extension of quayage which brings us to the third stage.

Third stage.—This might be effected by running out another mole from the shore 250 feet wide, and distant 1,000 feet from the south arm quay, connecting the mole with the south arm quay by another quay wall, lengthening the eastern mole from 900 feet to 1,400 feet, and dredging out the basin so formed to 31½ feet below datum. This is similar to part of Mr. Pogson's 1895 design for tidal basins within the harbour area; the basin would not be so protected as the inner basin, but it would not be constructed until after experience had been gained as to the effect of the 900-feet mole. It would accommodate another six ships. The alternative to this stage would be an extension of the inner basin, but this would cost more.

A fourth stage is the construction of two moles from the shore and from the outer end of the north pier quay, to form a powder and petroleum basin provided with special apparatus for dealing with fire, as well as being subject to special rules.

It will be observed that the work included in the first stage consists, for the most part, of work which has already been sanctioned or approved, although not yet put in hand. The estimates sanctioned in 1896 and approved by Sir Alexander Rendel include the two quays at the north and south arms, with this difference that the quays were to be shallow quays only and were placed at a greater distance from the north and south piers. The dredging back of the 5-fathom line was sanctioned, and the protecting arm 500 feet long now proposed takes the place of the arm of the proposed boat basin. The dredging away of the shoal along the south pier has been approved by the Trustees.

Detailed plans and estimates have been prepared for the works of the first two stages, and amount to about 12¾ lakhs for the first stage and another 25½ lakhs for the second stage as shown below:—

	Rs.
First portion of protecting mole	3,88,480
Quay wall, south side	3,12,000
Quay wall, north side	2,60,700
Dredging back 5-fathom line	2,04,547
	11,61,727
Contingencies	58,137
Establishment	58,136
Total ...	12,78,000
Extending protecting mole	2,36,800
Seventeen-acre tidal basin including coal hard, &c.	18,45,547
Sea face revetment	36,830
Sheds	2,16,675
	23,35,852
Contingencies	1,07,074
Establishment	1,07,074
Total ...	25,50,000

Endeavours have been made in drawing out this scheme, to eliminate anything which may give rise to controversy and to utilize to the fullest extent possible all the valuable ideas and proposals that have already been made and considered. Three plans have been made, the first showing the harbour as it exists at present with the proposals of the first two stages shown in red. On a second plan is shown the state of the harbour as it would be on completion of the first two stages and the third plan shows possible developments.

The general idea is based on the following considerations. The size of the dock is made sufficient to take six large steamers of the size of the well-known *Golconda*. The shore quay has been kept parallel to the railway to meet the views of the Consulting Engineer for Railways. The seaward quay is governed by the space available.

The angle which the protecting mole makes with the south pier is provided for a twofold reason: (*a*) it gives a better entry for ships than a mole at right angles to the pier, and (*b*) an opinion has been expressed that this form will secure calmer water at the end. The quay walls at the north and south piers are placed 130 feet back from the pier, to enable the foundations to be dredged out for a block wall, without undermining the existing piers. Mr. Pogson has informed the writer that the rubble base at these parts of the piers is irregular and that it would not be possible to construct walls by the method proposed for the dock wall. The proposal to dredge back the 5-fathom line is made, to enable the dock entrance to be brought closer in shore which is desirable for two reasons: (*a*) to secure sufficient space for a coal hard between the east wall and the sea, and (*b*) to interfere as little as possible with the existing steamer berths and so as not to lessen the length of the outer harbour which is a factor in determining its stillness. The design of the protecting mole is made only 42 feet wide so that the work can be done with the existing all round crane without staging, and as this width is sufficient for two lines of rails without sheds. The first purpose of this mole is to form a protection to the entrance to an inner basin, but on completion of the third stage, the inner face of the mole would become a still water quay, and it may be found that in all ordinary weather water will be sufficiently still for the inner face to be used as a quay even after the completion of the second stage. Its position is too exposed to be suitable for sheds and the design is therefore only made suitable for landing passengers, troops, horses or such cargo as would be put directly into railway trucks. The lines are so arranged, that only half the weight so supported would act on the backing, and the extra pressure thus brought on to the back of the wall would be counterbalanced by the vertical component due to the weight of the other half on the walls themselves. The walls as designed, fulfil the condition of stability that the resultant pressure falls within the middle three-quarters of the base. The toe of the outer wall might be strengthened with bags of cement concrete if necessary. The dock wall is of very nearly the same strength as that of a successful wall at Calais, its mean thickness being ·38 of the height against ·39 of the Calais wall. The method of construction proposed is the same as that adopted at Calais where the curbs were in some cases 23′×21′ 3¾″ instead of 22′×22′ at bottom, as designed for Madras. The thickness of the wall at dock bottom is ·506 of the height which is not considered too much, taking into account the nature of the sand and the loads to which a dock wall is subjected. The thickness at the base of the wall is 22 feet or ·45 of the extreme height. Provision has been made for five sheds 60 feet wide running along the northern and western faces of the basin. The canal entrance is shown at the south-west corner of the dock. If taken to the north-west corner it would involve a longer railway bridge, unless a double curve were made in the canal. No provision has been made for removing the iron pier, it being assumed that the cost of doing so will be covered by the value of the materials recovered. No credit has been taken for the value of block

The following are the thicknesses of some well-known dock walls:—

	Extreme height.	Thickness at base, per cent.
Liverpool Canada half tide basin	43′	·44
Do. Herculaneum dock.	39′	·46
Albert dock, London ...	38′ 6″	·47

that may be recovered from the portion of the south pier between the harbour quay wall and dock wall but as soon as the quay wall is built this block work could be taken up and used either in the mole or as an alternative to the rubble bank sea face and thus effect a saving. The sea face of the coal hard is proposed to be formed by a bank of random rubble. If blocks are available from the south pier these can be used as shown on the alternative section. A considerable number of concrete blocks are in stock being the surplus from the harbour construction works. These blocks should be used, but as their value should in that case be credited to the construction estimate no account of this is taken in making out the estimates.

Conclusion.

It has been shown that the original intention of a harbour for Madras was, to provide a safe and convenient harbour with quayage for ships, and that this intention has never as yet been definitely abandoned, although questions have arisen as to the best method of carrying it out. The outcome of all the advice and opinions that have been taken with regard to these questions has been, to select that method by which the present arms of the harbour will form an entrance to an inner still, water harbour or basin. Several expensive schemes estimated to cost from 55 to 96 lakhs of rupees having been proposed to effect this, and doubts having been expressed as to whether the entrance to the present harbour could be maintained and as to the stability of the outer walls, it has been proposed to postpone the completion of the harbour, and to carry out less expensive improvements which would meet the necessities of the moment. Eleven different schemes for boat basin improvements have been considered and rejected and the two estimates accompanying this note form the twelfth and thirteenth. These last are estimated to cost from 10½ to 14 lakhs of rupees according to the amount of shedding provided. It has been shown that they would not meet with the requirements of the port, and would interfere with the completion of the harbour. It has been shown that for the same sum a beginning might be made towards the facilitating of landing and embarking cargo and for about three times this sum or 38¼ lakhs works could be executed which would meet all present requirements and something more. Two years ago the Harbour Trust Board was prepared to spend nearly 21 lakhs on minor improvements, and to borrow money to meet this expenditure. The finances of the Trust must now be in a better condition than they were then, and the expenditure now proposed could be met in the same way. The Secretary to the Board has already shown in his letter published in Proceedings of Madras Government, No. 347 M., dated 3rd August 1891, how he estimated, that a dock due of one rupee per ton, would only take the place of present boat-hire paid by importers, and would return interest at 4½ per cent. on Rs. 66,66,666 assuming all the trade of the port to go to the dock. If only half this due were collected, or only half the trade went to the inner basin, it would almost cover interest on the expenditure of 33¼ lakhs at 4 per cent., but it is understood that the saving in boat-hire, &c., to importers by landing goods at a quay, would be considerably more than one rupee per ton, which would enable them to pay a larger due without paying so much as they do now for the present unsatisfactory arrangements of landing. It is also possible that the Trust could borrow at a less rate than 4 per cent.; this, however, is left for others to deal with, but it has seemed probable to the writer that the decision to postpone the consideration of an inner deep basin for ships in favour of a shallow one, may be largely due to exaggerated ideas as to the expense of the one and as to the cheapness of the other. If the proposals involving an expenditure of 38¼ lakhs are feasible and sufficient, as the writer believes they are, surely it would be better to spend this sum rather than to spend from 10 to 14 lakhs on a shallow basin, as well as other smaller sums on makeshift arrangements for landing horses and other goods on the present north pier. The writer being himself one of the Trustees who asked for a shallow basin has only come to this conclusion after a careful perusal of all the records available on the subject and after detailed examination of the cost of the different proposals. At the risk of being blamed for

re-opening a question that may have been considered to have been definitely settled, the writer has nevertheless thought it his duty to place before others the information leading him to his conclusion and the results of his enquiry, thinking that they may be swayed in the same direction. Should this not be the case then it seems reasonable that it should be shown beyond the shadow of a doubt either that the proposals cannot be executed for anything like 38¼ lakhs, or that, under present circumstances, the Harbour Trust cannot afford to spend the sum required.

There remains one more objection to the expenditure of any large sum on the Madras Harbour which it may be as well to touch on before concluding. It has been remarked that the Calcutta Docks are not a financial success, and that with such an object lesson before it the Board should not saddle itself with a debt, but it should be observed that the circumstances in Madras are entirely different. When the Kidderpore Docks were constructed in Calcutta, ship jetties were already in existence with warehouses and offices behind them. The Kidderpore Docks are closed non-tidal docks at some distance from the old established places of business, and it is understood also that there are difficulties in the approach. In Madras, on the other hand, we have not got a single jetty at which a ship can lie although it is much wanted, the proposed basin would be merely part of the Harbour into which vessels would go under their own steam through an open entrance, and, lastly, there are no sheds to speak of and the Custom-house is admittedly inadequate. The present harbour of Madras is an incomplete thing, unfurnished with the appliances and conveniences of many ports of minor importance.

This note may well be ended with the following extract from the "Pioneer" of recent date:—

"The coast line of Peninsular, India, is more than 3,000 miles in length, yet in this great extent of seaboard we have only three or, say, four ports, viz., Calcutta, Bombay, Karachi and Marmagoa, where large ocean-going vessels can lay alongside and load in all weathers. When we consider the steady growth of our railway system and the increasing pressure of the competition of other countries with our staple products, we must steadily keep in mind the need for bringing "free on board" prices to the lowest possible figure * * * * * * * Our backwardness with respect to the work of harbour improvements is astounding, and can only be accounted for by the antagonism of existing and vested interests * * * * * * * When we consider what has been accomplished and the amounts steadily expended on harbour work in the United Kingdom, and remember that almost all this has been achieved during the present century, it is impossible to believe that we have done our duty in India in this respect."

17th January 1898. (Signed) F. J. WILSON.

No. 16 I.

Note by the Chief Engineer for Irrigation.

G.O., No. 834, Marine, dated 1st December 1896, directs the Executive Engineer of the Buckingham Canal division (who was under separate orders preparing an estimate for a canal to connect the Cooum with the harbour) to prepare an estimate for a boat basin in connection with this canal in communication with the Engineer to the Harbour Trust Board.

Both these estimates have now been prepared, and at my request Mr. Wilson, who from having acted as Engineer to the Harbour Board in 1892, and from his position as Trustee and local Consulting Engineer to the Board has some personal knowledge of the harbour, has written a note on the subject of the boat basin estimate. It would appear that the estimate for a boat basin forwarded by the Executive Engineer, Buckingham Canal division, has been prepared entirely by the Harbour Engineer on the lines indicated in the sketch accompanying the order quoted above, but that it is not accompanied by any report, nor does it profess to represent what Mr. Pogson himself would recommend. It will be observed that, in addition to this estimate, Mr. Wilson has prepared two other estimates—one for a shallow boat basin similar to Mr. Pogson's estimate but revised in certain respects, and another for part of a scheme of general development of the harbour including quayage for ships—and Mr. Wilson's conclusion is that this latter is more in accordance with the requirements of the harbour than the former.

It is highly improbable, owing to the present financial pressure, that funds can be made immediately available for the canal estimate; but as the boat basin or the other scheme relates to the Marine Department and need not be affected by the execution or non-execution of the canal, Mr. Wilson's note and estimates, together with the estimate submitted by the Executive Engineer of the Buckingham Canal, may be transferred at once to the Marine Department for disposal. It is supposed that either one or other of the harbour schemes estimated for will be carried out, and it will not make any material difference to the canal estimate which is selected; only in the case of the deep basin being decided on, the Cooum canal will have to be a little longer.

20th January 1898. (Signed) W. HUGHES,
Chief Engineer for Irrigation.

Endorsement in the Public Works Department, Irrigation Branch, dated 27th January 1898, No. 521 C.

Read—the following papers:—

G.O., No. 834, Marine, dated 1st December 1896.

From the Superintending Engineer, II Circle, dated 9th September 1897, No. 179 B.C.

Note by Mr. F. J. Wilson, dated 17th January 1898.
Note by the Chief Engineer for Irrigation, dated 20th January 1898, No. 16 I.

No. 521 C.

Transferred to the Marine Department with reference to G.O., No. [illegible], dated 1st December 1896.

(Signed) [illegible] WILSON,
Under Secy. to Government,
27th January 1898. Irrigation Branch.

Note by the Acting Secretary to Government, Marine Department.

1. It seems certain that what Madras wants is an inner harbour, unaffected by the sea, in which vessels of all kinds can load and unload alongside quays, and to which vessels of all kinds and smaller craft can fly for refuge during stormy weather, with the certainty of complete security.

2. It seems also certain that the best place for this inner harbour is the sand accretion to the south of the harbour, because—

(1) There is no room on the north for quays, etc., and the cost of making a secure harbour there would be very heavy;

(2) All authorities consulted agree that the existing harbour is already too short for its width, that this feature is the principal cause in producing the "boiling pot" sea during stormy weather, and that it is therefore in the highest degree inadvisable to curtail or obstruct it in any way whatsoever.

3. The present proposal now placed before Government is to construct a boat basin only in this sand accretion to the south of the harbour, and Mr. Wilson in his able note on the subject objects to this proposal as being inadequate to the requirements of the port, and proposes instead the construction, in the above position, of a 17-acre dock suitable for vessels of all kinds, with a protecting mole extending into the existing harbour, and of two quay walls in the latter—one alongside the south, and one alongside the north arm.

4. For the reasons given in paragraph 1, I fully agree with Mr. Wilson's general proposition that it is sound economy to construct a dock once for all, rather than a boat basin which will not benefit larger vessels in the smallest degree, but I object to the manner in which he proposes to construct this dock, and to his subsidiary proposals.

5. I will take the three stages of construction given at page 14 of Mr. Wilson's note:

First stage.—He proposes to—

(1) dredge away the shoal along south pier to a point 900 feet from shore; and
(2) from this point construct a mole 42 feet wide and 500 feet long, extending from the south arm into the harbour, to protect the entrance to this dock;
(3) between this mole and the shore end construct a quay wall 900 feet long in front of south arm;
(4) construct a similar quay wall 700 feet long in front of shore end of north arm;
(5) dredge back the 5-fathom line to enable ships to lie alongside the above quay walls.

To (1) I have no objection.

To (2) I have a very strong one, because it will have the undoubted effect of making the "boiling pot" boil over still more and, as explained further on, I think it is quite possible that this protecting arm may be omitted altogether, as doing more harm than good.

I object also to (3) and (4) partly because they will curtail the harbour space—*vide* paragraph 2 (2) above—partly because, by Mr. Wilsons's own showing, the water in the harbour will rarely be quiet enough for vessels to lie alongside such quays—*vide* data (*a*) on page 12 of his note. Their construction would therefore, in my opinion, result in no practical benefit commensurate with their cost.

If (3) and (4) are not carried out, (5) is unnecessary.

6. *Second stage.*—Mr. Wilson proposes to—

(1) add 400 feet to the mole proposed in first stage (2);
(2) construct the 17-acre basin shown on plan No. 4, to accommodate 6 or 7 ships, with an entrance 164 feet wide, placed at 540 feet from shore end of south arm.

I object to (1) for the reason given in the last paragraph.

I agree with (2), but would make the basin large enough, in the first instance, to contain as many vessels as can now find berths in the harbour, *i.e.*, nine, and I would place its entrance so much further seaward as would bring the outer, *i.e.*, eastern, boundary of the basin on the present high water line, with the double object of enabling ships to enter the basin in a portion of the harbour which is already almost deep enough for the purpose (and to some extent protected by the curved portion of the south arm) and of obtaining ample room on the west (landward) side for storing goods. I do not see the object of storing coal between the basin and the sea, which is apparently one of Mr. Wilson's aims in placing his basin so far inland.

7. It may be objected that to place the external wall of the inner basin on the present water line will expose it to cyclonic waves, and require a higher and stronger wall than would otherwise be necessary. I grant this, but I think the objects to be gained, as stated above, are worth this additional expense, and the effect of cyclonic waves on this wall will tend to diminish as the sand accretion to south of harbour extends, as I fear it is bound to do for some considerable distance yet.

8. *Third stage.*—I would have no third stage, but make the inner basin large enough, in the first instance, to meet the requirements of the port for the next twenty-five years. Any additions necessary thereafter should be continued southward, and the south quay wall of the inner basin should be made capable of standing alone, and taking vessels along either side.

9. Now with regard to the entrance to this inner basin, Mr. Wilson proposes to place it at a distance of 540 feet from the shore end of the south arm, to make it 164 feet wide for reasons given at (*d*), page 12, and to protect it with a mole 900

feet long. For reasons given above, I would place it much further seaward, say 1,500 to 1,600 feet, from shore end. As to its width, it is a nautical question of which I am not competent to judge; it should, however, in the interests of peace and quietness inside, be made as narrow as is compatible with the safety of the vessels entering. The necessity for the protecting mole is also a nautical question, and I only speak about it with great diffidence. This excrescence into the existing harbour is so very objectionable in other ways, that I think the opinion of competent nautical men should be taken as to whether it is not possible for a vessel to enter this inner basin either under her own steam, or by warping, without a protecting mole. I have heard a great deal about the breaking wave running along the south arm, but I have never yet seen it, and I should have thought that, in any weather in which the vessels now enter the harbour, it was possible for them to make the inner entrance without protection, provided that it is placed as far as seawards as possible to enable it to obtain some protection from the curve of the south arm. I would provide the mole, of the length and section decided upon in the estimate, but I would not build it until it is proved to be necessary.

10. I am also not competent to judge whether an unimpeded entrance to the inner basin 164 feet wide (or even 100 feet wide) would give the practically still water therein which is absolutely necessary if ships are to lie alongside quays. It is probable that it would during the south-west monsoon, *i.e.*, for 8 months in the year, but not during the north-east monsoon; and it must be remembered that cyclones generally come from the northward. Still water might be, to a great extent, procured by a floating caisson in the entrance worked from winches or cranes on either side, and I have often wondered why something of this kind has not been tried at the present harbour entrance to check the insetting sea.

11. Having stated my objections to Mr. Wilson's proposals, I now offer my own views on the subject for consideration:

(1) I would commence by surrounding an area of 17 acres (or any area decided upon by those thoroughly acquainted with the requirements of the port) in the sand accretion to the south of the harbour with concrete quay walls on all four sides. They should be sunk to the requisite depth for a ship dock, like wells, in the form of hollow curbs, and then filled with dry rubble, or concrete as decided. The outer (eastern) wall should be capable of resisting the impact of a cyclonic wave, and high enough to keep anything more than heavy spray out of the inner basin.

The south wall should be built of a suitable section to stand alone, in the event of its being found necessary, at some future period, to extend the harbour. The west wall should be built parallel to the existing railway. The north wall should be built parallel to the south arm of the existing harbour, and at such a distance from it as to remove all danger of undermining it during sinking. The south arm cannot act as the north wall of the inner basin, because its rubble base is not sufficiently low to permit of the basin being dredged out to the necessary depth. This north wall would be continued to the proposed entrance and there stopped until the entrance is made.

(2) When the above four walls have been sunk to the required depth, remove all sand from the area enclosed to 3 feet below water level by hand, and deposit it on the beach to such a distance south that it would not be likely to interfere with any further harbour extension.

(3) When this removal by hand reached such a depth that dredging is necessary, remove enough of the south arm to admit the *Wenlock*, and continue the dredging with her, allowing her to deposit the sand out at sea or on land as found most convenient. If the *Wenlock* is too big for this job at the commencement, smaller dredgers, such as are used on the Gódávari, might be obtained.

This opening might be utilized for—

(*a*) making the connection of the north quay wall with the existing south arm;

(*b*) entrance of boats, lighters, etc., into the inner basin during stormy weather, so that the boat basin now contemplated by the Harbour Trust Board would be available long before the completion of the ship dock.

(4) Complete the excavation of the inner basin to the required depth, and, when it is approaching completion, widen the entrance to the width finally decided upon, and build the protecting mole, if found to be absolutely necessary.

12. The above proposals contain no engineering difficulty whatever and possess the advantage of non-interference during construction with the existing harbour or trade of the port.

13. I have not entered into the financial aspect of the question, because my proposals would be cheaper than Mr. Wilson's scheme, for which he has given detailed figures, and if the latter are pronounced to be within the financial powers of the Harbour Trust Board, my proposals will be still more so. They would also be simpler from an engineering point of view, because, with the exception of the entrance to the inner basin, the whole work would be carried on in still water. The first thing to be done, it seems to me, is to settle what we want, and then to see whether we can afford it.

14. If any extension of the harbour inland is considered financially impossible, I think something might be done to prevent the entrance of heavy waves into the existing harbour by a floating caisson or other contrivance.

15. I also think that the Board is bound to spend a considerable sum of money in the near future in protecting the foreshore north of the harbour, and this will have to be considered when the financial position is under discussion.

(Signed) W. B. deWINTON,
Ag. Secy. to Govt., Marine Department.

29th January 1898.

Order—No. 110, Marine, dated 11th February 1898.

The papers read above will be forwarded to the Madras Harbour Trust Board for such remarks and recommendations as they may desire to offer.

(True Extract.)

(Signed) W. B. deWINTON,
Ag. Secretary to Government.

To the Chairman, Harbour Trust Board, with enclosures as specified below:—

Revised estimate for a boat basin Rs. 10,47,239 by Mr. Wilson.
Estimates for Harbour development including quayage for ships Rs. 38,28,000 by Mr. Wilson.
Portfolio of plans.
List of ships using the harbour showing their lengths.
Copy of letter addressed to the Secretary to the Harbour Trust Board from Messrs. Cayzer, Irvine & Co.
Copy of letter from the Superintending Engineer, II Circle, No. 179 B.C., dated 9th September 1897, submitting to the Chief Engineer for Irrigation estimates for boat basin and harbour canal, with Mr. Pogson's estimate for a boat basin Rs. 8,73,667.

Read also the following papers:—

From J. N. ATKINSON, Esq., I.C.S., Chairman, Harbour Trust Board, Madras, to the Secretary to Government, Marine Department, dated 4th October 1898, No. 2485.

I have the honour to submit the following report on the subject of proposed Harbour Improvements, with especial reference to the papers communicated in G.O., No. 110, Marine, dated 11th February 1898. Those papers included two

estimates for boat basins and a scheme with estimates for a ship dock: and in addition to these the Harbour Trust Board has had under consideration several other schemes for both boat and ship basins and for additional piers.

2. With the view of assisting the Board to come to a conclusion on the subject, all material papers, including the minutes of the Trustees, were communicated to the Chamber of Commerce and the Trades' Association, and the opinions of those bodies have been considered by the Board.

3. The various views on the question may be broadly divided into two main groups. First, there are those who hold that for the trade of the port as it stands at present, and may be expected to stand for an indefinite time to come, and considering the financial position of the Harbour Trust Board, the present open harbour is sufficient, and all that is needed is some means of expediting the discharge of boats. It is pointed out that it is only the rare exception when vessels cannot find accommodation in the harbour; that when once moored discharge of cargo from the ship can proceed more expeditiously under present circumstances over both sides into boats and lighters than at a quay side; and that delay and inconvenience only arise when the boats reach the pier, where, owing to inadequate room, and consequently an insufficient number of cranes, the boats are often delayed for some hours before they can commence discharging their cargo. The arrangements on the pier are further stigmatised as inadequate, both cranes and trucks being, it is said, insufficient in number, and the former in power also.

4. To remedy these inconveniences various suggestions have been made ranging from the mere provision of more and more powerful cranes and trucks on the existing pier up to the construction of a boat basin capable of conversion hereafter, if the necessity should arise, into a ship dock. The object aimed at by the authors of these suggestions is to secure the prompt unloading of each boat as soon as it comes to hand, and their only doubt is as to what extension and improvement of existing arrangements is necessary. Some persons, probably a small minority, believe that nothing more is needed than an increase and improvement of the cranes and trucks on the present pier. Others think that one, or if necessary more, additional piers should be constructed, with proper equipment of cranes, trucks, &c., and the Board had plans and estimates prepared for two such additional piers. One obvious disadvantage of the present pier is its height above mean sea level, 18 feet, and it was proposed therefore that the additional piers should be lower by 6 feet.

5. Those who think that improved and increased pier accommodation is all that is at present required are probably a small minority, if for no other reason, because it is generally accepted that some basin must be provided for shelter of Harbour small craft in rough weather. But there is a large body of opinion, including the majority of the shipping agencies, in favour of restricting harbour improvements at the present time to the construction of a boat basin with the necessary equipment of cranes, sheds, &c. Numerous plans for boat basins have been considered at one time or another, both within the waterspread of the harbour, in its foreshore, and in the sand accretion to the south. It has been impossible to ascertain which of these finds greatest favour; but it may be taken as probably correct that the one upon which most attention has been concentrated, and which should be accepted as the type of most suitable boat basin is that numbered as Plan No. 2 in the file forwarded with the Government order under reply.

6. The above paragraphs have as briefly as possible set out the views of those who advocate the retention of the present method of berthing ships in the open harbour, and of discharging cargo by means of boats. These persons object to the construction of an expensive dock at the present time, but it is not clear that the majority of them are opposed to the adoption now of a complete plan of future development. At a meeting of the Harbour Board held on Friday, 30th September, a resolution in favour of some plan of development being adopted, was carried unanimously.

7. There is another large body of opinion which contends that the harbour, as it at present exists, is essentially incomplete; that a plan of future development should now be finally decided upon, and steadily worked up to. They object to the proposals referred to in paragraphs 3, 4 and 5 as mere temporary expedients to meet present wants and as likely, perhaps irremediably, to block the way of future improvements. They urge that the ultimate form of development to be aimed at is an inner harbour or ship's basin where vessels would lie at a quay, and that this is demanded alike for the safety of shipping the benefit of consignees and exporters, and the financial interests of the port.

8. It is hopeless to expect unanimity of opinion in the matter. The question has twice been referred to the Chamber of Commerce and Trades' Association. On the first occasion both bodies recommended the construction of a boat basin capable of conversion hereafter, if necessity should arise, into a ship dock: on the second occasion both bodies—the Chamber of Commerce by a majority of one—recommended the construction of an inner ship basin at once. At the meeting of the Harbour Trust Board on 16th September, a resolution in favour of a ship basin was proposed, but lost by 5 to 2, the representatives of the Chamber of Commerce and of the Trades' Association voting against the expressed opinions of the bodies they represent, and three members of the Board being absent. At the meeting of the Board held on Friday, 30th September, a resolution in favour of a ship basin was carried by 5 to 4.

9. Whatever be the form of improvement eventually adopted, the cost must be met by a loan raised under Act II of 1886; and unless the money market becomes much easier, the Harbour Trust Board will have to apply to Government for funds before the execution of any scheme can be put in hand. The amount of progress in the execution of the scheme adopted must therefore depend on the amount of money that Government may find it possible to place at the disposal of the Board.

10. Having regard to the great variety of opinion that exists on this question of harbour improvements, the Harbour Trust Board has resolved to lay the whole matter before Government and to ask it with the advice of its own Engineers and after consulting Sir A. Rendel to decide what should be the plan for future development of the harbour: and what part of the work should now be undertaken to remedy existing inconveniences.

11. It would be out of the question in this letter to repeat in full detail all the arguments for and against each proposal that has been mooted: but together with this letter I have the honour to submit a complete file of all minutes and materially connected papers, as stated in the annexed list.

12. This letter has been submitted to, and considered by, the Trustees, a copy of their resolution approving it is appended.

Extract paragraph 9 of Note by the Chief Engineer and Secretary to Government, dated 20th October 1898.

* * * * *

9. There is one alternative to a ship's dock which should, I think, be also placed before Sir A. Rendel for his decision, and that is the closing of the eastern and opening of a north-east entrance to the present harbour. This would involve the strengthening of the east face, and probably also of a portion of the north face, to render them impregnable to the attack of cyclonic waves. It would also mean the construction of quay walls along the western and part of the southern faces of the harbour, and dredging the latter up to them.

This scheme would have the great advantage of postponing, *sine die*, the silting in the entrance and within the harbour, and we have the evidence of many experienced sea-captains that the harbour would be as accessible as now, and that they would be content to stay there during a cyclone. Personally, if I was s[illegible] that the water in the harbour would be at all times sufficiently quiet for ships to lie alongside quays, I should much prefer this scheme to any other, beca[illegible]it

would render the harbour useful as it is, instead of being merely the entrance to an inner harbour, a somewhat bad fate for a work in which so much time and money has been spent, and because it would certainly offer much greater facilities for landing, shipping and storing cargo than the small dock proposed, and would attract all classes of vessels. But, if the necessary stillness was not obtained, and it is almost impossible to say beforehand with any certainty that it would be, one should have spent perhaps as much, if not more, on this scheme, than on an inner dock, and be still, on certain days, under the necessity of using boats for landing cargo. Its success is, therefore, uncertain, while that of a dock is certain, and it is best to be sure where large sums of money are concerned.

I would, however, as stated above, place this alternative before Sir A. Rendel for decision.

Order—No. 10, Marine, dated 3rd January 1899.

His Excellency the Governor in Council observes that, for some years past, the question of improving the Madras Harbour, so as to provide increased facilities for trade, has at intervals engaged the attention of the Harbour Trust Board and of the Local Government. The various measures proposed up to 1896 were referred to the Home Government for the opinion of the Consulting Engineer in London. Sir A. Rendel was of opinion that until the doubts which attached to the stability of the harbour and its immunity from the encroachment of sand were finally removed, the proposals then made were all that could prudently be undertaken.

2. The Despatch communicating these observations was referred to the Harbour Trust Board on 23rd November 1896 with G.O., No. 813, Marine.

3. Since that date the question of harbour improvements has been under almost continuous discussion by the Harbour Trust Board and its local professional advisers, and as there seemed no hope of unanimity of opinion as to the measures best calculated to attain the objects in view, the whole matter has been submitted to Government by the Board for such action as His Excellency the Governor in Council may consider best.

4. The following are the schemes which have now been laid before Government :—

(*a*) A boat basin—prepared by Mr. Pogson—estimate Rs. 8,73,667.

(*b*) A boat basin similar to Mr. Pogson's, but altered in some particulars and providing sheds in addition—prepared by Mr. Wilson—estimate Rs. 10,47,239.

(*c*) A 17-acre dock suitable for vessels of all kinds, with a protecting mole extending into the existing harbour, and two quay walls in the latter, one alongside the south and the other alongside the north arm—prepared by Mr. Wilson—estimate Rs. 38,28,009.

(*d*) A ship's dock as in (*c*) above, with the other works omitted or modified, and the methods of construction revised—as suggested by the Chief Engineer, Public Works Department.

5. As regards funds, the Board have receded from their original proposal to raise money in the open market. They intimate that unless the money market becomes much easier, they will have to apply to Government for financial aid before the execution of any scheme can be undertaken, and they point out that the progress of work will be limited by the amount of money that Government may find it possible to advance.

6. His Excellency the Governor in Council, after a careful review of the situation, is of opinion that, in the interests of trade and shipping, the development of the Madras Harbour is essential, and that a ship's dock in the sand accretion to the south of the harbour is the form which this development should take.

7. In view, however, of the differences of opinion among local Engineering authorities, and the magnitude of the interests involved, it seems necessary that the highest expert opinion should be obtained. His Excellency the Governor in Council,

accordingly, resolves to refer the whole matter to the Home Government in order that the advice of the Consulting Engineer to the India Office may be elicited as to the most suitable measures to be adopted for the improvement of the harbour, having regard to local conditions, with which Sir Alexander Rendel is believed to be fully conversant.

8. The following points are indicated for consideration in the event of a ship dock being recommended :—

(1) the size and shape of the dock.
(2) the method of its construction.
(3) the position and width of its entrance.
(4) the necessity or otherwise of a protecting mole.

9. The question of closing the eastern, and opening a north-east entrance to the present harbour, as an alternative to a ship's dock, adverted to by Mr. deWinton in paragraph 9 of his note recorded above, will also be referred to the Secretary of State for the Consulting Engineer's opinion.

(True Extract.)

(Signed) W. B. deWINTON,
Secretary to Government.

To the Presidency Port Officer.
" Chairman, Harbour Trust Board.

Exd. A. Rungasawmy Aiyangar.

APPENDIX.

(1) Letter No. 55, dated 21st April 1898, from the Chairman, Harbour Trust Board, to the Chairman, Chamber of Commerce, forwarding a series of minutes written by various Trustees, and other papers regarding harbour improvements (page 2).

N.B.—A similar letter was sent on the same date to the Chairman of the Trades' Association.

(2) Reply from the Chairman, Chamber of Commerce, dated 14th May (page 28).
(3) Harbour Trust Board's resolution No. 10, dated 27th May, upon G.O., No. 110, dated 11th February, and reply from the Chamber (page 28).
(4) Letter, dated 28th May, from the Trades' Association, supporting the views expressed by the Chamber of Commerce (page 29).
(5) Note by the Chairman, regarding the dissent, of Messrs. Black and Simpson, from the above resolution (page 29).
(6) Minutes thereon by Trustees (page 31).
(7) Resolutions 2 and 3 of 10th June 1898 (page 35).
(8) Letter from Mr. Wilson, dated Ootacamund, 5th July (page 35).
(9) Letter from the Chairman, Harbour Trust Board, to the Chairman, Chamber of Commerce, dated 5th August, again referring the question of harbour improvements to the Chamber with special reference to the financial aspect of the question (page 36).

N.B.—A similar letter was also addressed to the Chairman of the Trades' Association.

(10) Reply from Trades' Association, dated 18th August (page 40).
(11) Reply from the Chairman, Chamber of Commerce, dated 2nd September (page 40).
(12) Copy of resolution proposed by the Chairman at the Board's meeting held on 16th September negatived by 5 votes to 2 (page 41).
(13) Letter (in original) from 230 European and Native Firms and Traders, regarding proposed harbour improvements, requesting that a favourable consideration may be given to a wet dock scheme for reasons given (page 42).

Harbour Board's Resolution, No. 5, dated 30th September.

(14) Extract of Proceedings of the Trustees, No. 4, dated 30th September, with copies of resolutions then carried, referred to in paras. 6 and 7 of letter No. 2485, dated 4th October (page 1).

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(14)

EXTRACTS of Proceedings of the Trustees of the Harbour of Madras, at a Meeting held at the Offices of the Board, on Friday, the 30th day of September 1898.

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4. Read draft letter to the Secretary to Government, Marine Department, replying to G.O., No. 110, Marine, dated 11th February 1898, regarding proposed harbour improvements.

Read minute by a Trustee.

Read letter from Mr. F. J. Wilson, dated 29th September, giving notice that he intended to move a resolution regarding harbour improvements, and, if carried, that he would move a further resolution, both of which, with Mr. Wilson's letter, had been printed and circulated to all Trustees.

The first resolution was, after discussion, put by Mr. Wilson as follows :—

"That, looking to the fact that many forms of improvement to the Madras Harbour are postponed or hampered for want of a general scheme of development, the Board, as at present constituted, is of opinion that the time has now come to draw out and decide on some such scheme of development finally, irrespective of what items of work it should be decided to undertake immediately."

This was carried unanimously.

The question was then raised as to whether Mr. Wilson was in order in putting to the vote his second proposed resolution, as if carried it would practically reverse the vote upon the resolution proposed by the Chairman at the last meeting.

The Chairman ruled that Mr. Wilson was in order in putting his proposed second resolution, which was then proposed by him as follows :—

"That the Board, as at present constituted, is of opinion that the scheme of development of the Madras Harbour that should be decided on should take the form of an inner ship basin or dock in the sand accretion to the south of the present harbour of about the same size and general position as that of the design forwarded by Government to the Board for remarks with G.O., No. 110, Marine, dated 11th February 1898, provided that it can be constructed and fully equipped with sheds, cranes and all appliances required for a sum not exceeding 40 lakhs."

This was supported by Mr. Yorke, and on being put to the vote was carried by 5 to 4.

The draft letter to Government was then discussed, amended in various particulars, and approved as amended.

5. Letter from 230 European and Native Firms and Traders, regarding proposed harbour improvements,—having been circulated to all Trustees—was laid on the Board's table, and it was resolved that this letter be submitted to Government.

* * * * *

(True Extract.)

C. PINSENT,
Secretary, Harbour Trust Board.

(1)

From J. N. ATKINSON, Esq., I.C.S., Chairman, Harbour Trust Board, Madras, to the Chairman, Chamber of Commerce, Madras Harbour Trust, dated 21st April 1898, No. 55.

I have the honour to forward herewith a series of minutes written by various members of the Harbour Trust Board, and other papers as noted at foot on the subject of improvement of the Madras Harbour.

You will observe that there are the following three schemes before the Trustees:—

(1) A boat-basin, wherein coal, and general cargo would be landed and shipped.

(2) A boat-basin for landing and shipping general cargo only; to be supplemented by separate arrangements, the details of which have not been worked out, for landing coal.

(3) A ship dock, wherein coal, general cargo, horses, passengers, &c., would be landed and shipped direct from the ship on to a quay, and *vice versâ*.

I have the honour to request that you will kindly favour this Board with an expression of the Chamber's opinion on the relative advantages of the three proposals.

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1. G.O., No. 110, Marine, dated 11th February 1898.
2. Minutes by Trustees.
3. Chairman's notes.
4. Traffic Manager's letters Nos. 8859 P. and 9043 P., dated 8th and 18th March 1898.
5. Letters from the Deputy Port Conservator, dated 22nd March and 1st April 1898.
6. Letter from the Board's Engineer No. 8, dated 2nd April 1898.
7. Letter from the Board's Engineer No. 31, dated 15th April 1898.
8. Memo. from the Board's Secretary submitting Financial Forecasts.

G.O., No. 110, Marine, dated 11th February 1898, forwarding, for such remarks and recommendations as the Board may desire to offer, papers relating to the construction of a boat-basin for the Madras Harbour.

Minutes by Trustees.

As Mr. deWinton puts it, "the first thing to be done is, to settle what we want, and then to see whether we can afford it," but it seems to me that no sooner do we settle on some plan that we think will answer our requirements, then some other scheme is put forward, and the previous is described as unsuitable, so unless we make up our minds to stick to a distinct line of action nothing whatever will be done.

The scheme now put forward by Mr. Wilson is for a wet basin, with wharves for vessels to lie alongside of and discharge or load, and the Acting Secretary to Government in his note on the scheme remarks that he fully concurs in Mr. Wilson's view that "it is a sound economy to construct a dock once for all, rather than a boat-basin which will not benefit larger vessels in the smallest degree." Mr. Wilson is of opinion that "the dock would be certainly and immediately used by vessels with full cargoes for Madras, such as coal and horse ships and the clan line ships importing iron," and he thinks that "importers of other goods" would "demand that their goods should be landed safely on a quay instead of being tumbled into lighters or into the sea."

Now, it seems to me that as Madras is principally a port of call, and that steamers calling to discharge or take in passengers and cargo require quick despatch, a wet basin would seldom if ever be used by such vessels on account of the delay that would be experienced in entering and leaving it, and I would point out that it has been stated by the B.I.S.N. Co. agents at this port that the vessels of that Company could do as good a day's work, if not better, at Madras than at Calcutta, because they could work all hatches and discharge into boats on both sides. Possibly this could be also done in a wet basin, but the delay of entering, making fast, casting off, and leaving a wharf would, I think, deter the Captain or the Agents of a steamer requiring quick despatch from using a wet basin. Now, if the statement attributed to the agents of the steamers mostly using Madras Harbour is correct; a wet basin would be used, principally, by vessels arriving with horses and coal and iron—few others discharge full cargoes. Is it worth our while to expend about 38 lakhs to meet the requirements of these vessels? When we decided on the boat-basin scheme, the general opinion was, I believe, that it would meet all the requirements of vessels using the port. Before accepting the view that "it is sound economy to construct a dock once for all, rather than a boat-basin which will not benefit larger vessels in the smallest degree." I think that we should carefully consider whether the reasons given for constructing a dock are sufficiently weighty for us to accept. The scheme is recommended because it will mainly facilitate the discharging of horses, coal and iron. A boat-basin would also afford facilities, and the question appears to be, "would not the facilities afforded by a boat-basin for horses, coal and iron suffice?" When we accepted the scheme, we thought so, and I do not think that any good reason has been put forward to prove that our ideas on the subject were wrong. With the exception of coal and kerosine oil our import trade shows no noticeable increase—in fact it varies very little. Our export trade shows a tendency to decline, judging from the returns for the period April—December 1897. For kerosine oil no additional facilities appear necessary, and coal, horses and iron are the three principal items of our import trade requiring special facilities. Even, under existing conditions, horses are landed and shipped with few casualties and a horse ship does not arrive every day. With the facilities offered by the boat-basin scheme the requirements of the coal steamers would be met with as satisfactory as at most other ports where coal is discharged into lighters, I believe that even at Port Said coal is so discharged.

If the trade of the port is likely to increase to any great extent, and a probability of full cargoes being, as a matter of course, landed and shipped within a reasonable period, then, I think, we should be justified in constructing a wet dock, but as we do not know how the trade of Madras is likely to be

affected when the East Coast Railway is completed, nor whether any portion of our exports or imports would go to Vizagapatam on the harbour improvements proposed for that port being carried out, I think that we should be very careful about accepting a scheme which might end in leaving us with a veritable "white elephant" on our hands, and a load of debt. If it can be satisfactorily proved that the trade of the port is on a such a very certain footing as to warrant a large expenditure to meet future necessities, I think that we should be justified in providing a wet dock and wharves, but under existing conditions such a dock, in my opinion, is not required. Should, however, the dock scheme be accepted, there is one point which requires special attention, and that is, the site for, the coal hard. In the plans accompanying Mr. Wilson's proposals vessels with coal would discharge in the near vicinity of others discharging general cargo, and this is undesirable for obvious reasons, but the Acting Secretary to Government in para. 6 of his note remarks that he does not see the object of storing coal between the basin and the sea? Should the Trustees approve of a wet basin, then, all details connected with its entrance, the protection, if any, required for such entrance, and the places to be set apart for the discharging of coal, and general cargo should be reported on by a Special Committee of the Trustees. As a nautical man, I consider a protecting arm to the inner entrance necessary. I have my own opinion as to the best position for the entrance to an inner basin, but on this point the opinion of the pilots would be most valuable and they should be examined by the Special Committee.

(Intld.) H. A. S.
5-3-98

Mr. Wilson's resume of the harbour is most interesting, but it seems to me that the plans already before Government for a boat-basin as far to the west of the south groyne as possible meet all that trade at present requires, and that the time has not yet arrived for docks.

The proposals made by Mr. Parkes, as described by Mr. Wilson on page 9, could easily be modified, so that after the completion of the proposed boat-basin with wharf walls a separate dock for steamers could be built to the east of the boat-basin in the accretion, at some future time.

It is undesirable that coal and general cargo should be landed at or near the same place as proposed by Mr. Wilson, and if provision is to be made for landing coal direct on wharves, it should be landed to the north of the harbour, if general cargo is to be landed and shipped to the south.

For general cargo docks are not required, and, in my opinion, would not be generally used, coasting steamers at any rate would not have time to use them.

When shipping goods to Calcutta our consignees invariably stipulate for shipment by coast steamers as these do not use the jetties there, and Calcutta importers find it more expensive and less convenient to use the jetties than to take overside delivery.

The ships' agents are all of one opinion, viz., that as good a day's work can be done here as at any port. Ships can work all their hatches at both sides at one and the same time.

The pier is unable to cope with the traffic and if two additional piers were constructed, and some provision made for berthing larger cargo boats in rough weather, nothing more would be required.

As suitable protection for cargo boats would have to be in the form of a basin, it would be better to utilize it for landing cargo also, and so obviate the necessity of additional piers, which is the position the Trustees have hitherto taken up.

Mr. Wilson says on page 10 that the Trustees possess no means of ensuring that larger lighters would be built. The Trustees need not have the slightest apprehension on this point. So soon as protection is provided, larger cargo boats will be built. So soon as larger boats are built, the cost of landing will be reduced. At present owners of cargo boats run great risks and are naturally chary of adding to their stock or of building larger ones.

The pier is already unable to discharge fast enough the cargo boats that exist, and they cannot be used for landing coal as owing to their draft they are unable to approach near enough to the shore.

It is the necessity for landing cargo on the foreshore that has prolonged the existence of the Masulah boat and so maintained the high rates of boat hire, otherwise its occupation inside the harbour would have disappeared long ago.

Steamers larger than the "Golconda" (5,874) are being built, and it is unwise to assume that she is the maximum size of vessel that is likely to enter this port.

The British India Company have, I understand, estimates under consideration for steamers to call at Madras, that will carry 9,000 tons of cargo, and 150 passengers.

I think it would be wiser and safer for the Trustees to proceed with the boat-basin first as it will always be required for steamers which have not much work, whatever form the future development of the port may take. After the boat-basin is completed it will be quite time enough to consider the larger question of docks, in the mean time it will be affording accommodation for larger cargo boats.

The proposed pier from the north groyne for landing horses, which, I understand, will not extend beyond the rubble base, and therefore not reduce the water space in the harbour can be tried for landing coal, and if successful can be extended, or similar additional piers projected to enable several steamers to discharge at one time on the north groyne (which might require widening) direct without boats.

As Mr. Wilson has quoted an extract from the *Pioneer* which has the appearance of attributing sinister motives to those opposing what they consider to be useless expense, and except for coal, an absolute hindrance, I took the opportunity of sending the Managing Agents of B.I.S.N. Co., a copy of the memorandum kindly sent me by Mr. Wilson and asked for their views.

They replied that they quite concur with the opinion expressed in the above minute; and that they are not in favour of anything more than a boat-basin.

All through this question of increased accommodation suggestions have been made that the steamer agents are prejudiced against docks on account of interests they are supposed to have in the landing of cargo.

I do not know of a single firm of steamers' agents that owns boats in the Madras Harbour. If it be suggested that they would for selfish reasons prefer to continue the present system of landing, it must be taken for granted that they are prepared to sacrifice the interests not only of the steamers, whose interests they profess to represent, but their own separate interests as merchants of Madras, either for the sake of an illicit return commission from their boat contractor, or for a sentimental attachment to their Dubashes.

If it be proposed to build docks, and not to charge ships dock dues for their use, and to leave the fairway of the harbour open as it is at present so that steamers could use docks or not as they choose, then absolutely no reasonable objection to docks could be raised by agents.

Do the Trustees propose not to call on the ships to pay dock dues, that is to say, is it their intention to make instead a charge on goods passing through the dock in consideration of the boat-hire that would be saved? If this is the proposal and it is found that docks are not sufficiently used, then the harbour dues at present paid by the merchant will have to be enhanced to meet interest upon expenditure.

If docks are built, interest must be met either directly by the ship in the form of dock, or enhanced port, dues or by the merchant in the shape of enhanced harbour dues. If the docks are built and are not used, the whole trade of the port will be taxed for what the ship agents contend is a needless expenditure for general cargo, and I do not think that any merchant would be in favour of coal and general cargo being landed at the same place.

To enhance the port dues or add dock dues to a steamer's expenses I need hardly say will lead to higher freight and fewer ships, whilst the harbour dues we now pay press very heavily on many kinds of merchandise for which Madras has to compete with Bombay and coast ports.

If the ship be called upon to pay additional dues the agent's contention is that they do not want docks, as a ship can do as good work now without as with them.

All ships' want is improved facilities for the discharge of cargo boats, so that it will be possible for more boats to be employed at one time.

This has been the steamer agent's contention all through this controversy, and it is surprising that such efforts should be made to thrust docks on the shipping, when the smaller and more satisfactory scheme of a boat-basin already before Government will meet all the requirements of the port for general cargo.

(Intld.) C. B. S.
8-3-98.

In continuation of my minute of the 8th I have received the following from the Honourable Mr. M. C. Turner, lately a member of the Bombay Port Trust and now a member of the Calcutta Port Trust and a partner in Messrs. MacKinnon Mackenzie & Co., Calcutta, the managing agents of the B.I.S.N. Co.:—

(Intld.) C. B. S.
10-3-98.

NOTES on the Question for providing docks in Madras, by the Honourable Mr. M. C. Turner.

Three questions have to be considered in connection with this proposal—

Firstly.—Are docks required in view of the possible expansion of the trade of the port?

Secondly.—Is it possible that the revenue derived from export and charges on cargo plus dock dues on steamers using the docks would be sufficient to meet the interest on the outlay?

Thirdly—Is the present accommodation, such as it is, insufficient for the requirements of the port?

As regards the first point you are of course in a better position to speak than myself, but taking everything into consideration I should say that the trade of Madras was not likely to increase much. Cargo from the East Coast Railway will, I take it, possibly find its way down to Vizagapatam or be brought to Calcutta. Secondly, judging from what has happened here I should say that your receipts would, by no means, suffice to pay the interest on outlay. So far as I can see the result of building the dock in Calcutta has hitherto been the institution of a 4-annas tax on all exports and imports of general cargo and 2-annas a ton on the exports of coal, this in addition to a 4-annas per ton due on all vessels coming to Calcutta.

I very much fear that Madras will find itself burdened with additional taxes and tools when you have finished your docks which, in my opinion, you can well do without.

The present accommodation would, I think, be improved by a boat-basin especially if a wall could be built on the shore side well equipped with handy cranes suitable for discharging cargo from the boats. I would certainly not have coal worked in the same basin, I would keep the coal to the north of the harbour as at present and by running out jetties lightly built, I think you would do all that is required to meet the coal trade.

I entirely agree with Mr. Simpson's remarks. Further information as to the feasibility of Mr. deWinton's suggested closing the harbour entrance by a floating caisson would be of interest.

(Intld.) A. J. Y.
8-3-98.

I have endeavoured to keep an open mind on the question of docks and boat-basin, until I had seen the arguments *pro* and *con*; and having read Captain Street's and Mr. Simpson's minutes, I am decidedly in favour of docks, not only because the dock scheme is the logical sequence to the previous history of the harbour; but because facilities for landing and shipping at a quay are wanted now, and are not a mere future possible contingency.

There may be an extreme view that Madras will never need docks; but I doubt whether this would find many supporters; and Captain Street admits that "if the trade of the port is likely to "increase to any great extent, and a probability of full cargoes being, as a matter of course, landed and "shipped within a reasonable period, then I think we should be justified in constructing a wet dock." This is the general argument against docks, a doubt of the expansiveness of Madras trade, and therefore (1) of the necessity for docks, (2) of our ability to meet the cost. Mr. Simpson says much the same as Captain Street, "the time has not yet arrived for docks," and the Honourable Mr. M. C. Turner of Culcutta, whose note Mr. Simpson has kindly communicated, formulates three questions, which, if answered in the affirmative, would apparently satisfy him that docks are required.

I will take the questions put by Mr. Turner (slightly altered in form), as they succinctly state what are the pre-requisites to our deciding *pro* or *con* docks.

(1) Is trade expanding or likely to expand?

The Traffic Manager has dealt with this in a very interesting letter (circulated with another paper) No. 8859-P., dated 11th March 1898. I give here a table extracted from his letter.

Year.	Imports.	Exports.	Total.	Coal, coke and patent fuel.	Net tonnage excluding coal, &c.	Remarks.
	TONS.	TONS.	TONS.	TONS.	TONS.	
1887-88	210,979	106,207	316,986	15,492	301,494	
1888-89	201,597	89,203	290,600	29,085	261,515	
1889-90	246,659	112,525	359,184	34,368	324,816	
1890-91	288,537	103,435	391,972	48,890	343,082	
1891-92	347,401	88,939	436,340	49,027	387,313	
1892-93	277,843	85,938	363,781	67,875	295,906	
1893-94	285,251	98,660	383,911	82,302	301,609	
1894-95	285,276	104,188	389,464	99,166	290,298	
1895-96	330,697	99,074	429,771	134,452	295,319	
1896-97	385,605	102,941	488,546	150,659	337,887	
1897-98	432,418	82,582	515,000	170,000	345,000	

In regard to these figures Mr. Hutchence points out that in 1890-91 and 1891-92 trade was abnormally swelled by large imports of grain, those being famine years, also that in the current year 9,000 tons is due to excess of grain imports. But after making these allowances the figures seem to me most re-assuring and satisfactory, evincing a steady progress, though hampered by stationary exports. I can see no possible grounds for fear as to the future. The country is growing in population and wealth, new fields of cultivation and of industrial employment are being opened up every year, and in the normal process of events this must go on; and Madras must, in consequence, experience a steady increase in its trade, always provided those entrusted with the regulation and assistance of that trade, of whom the Harbour Trust Board is the chief, take care that with increasing demands improved facilities are given.

The figures in the statement above show that, even without coal, trade is expanding. There are fears that with the completion of the Bezwada-Madras Railway our coal trade will vanish. I don't think that this necessarily follows. But even if so, why need we despair of some other branch of trade supplying the deficit? Kerosine oil in bulk has made immense strides of late years, and in both cases, the coal and the oil trade, the sudden growth of the trade has been unforeseen.

The fears as to the damaging competition of Vizagapatam and northern ports are purely chimerical, about $\frac{3}{4}$ of the whole volume of Madras trade is its imports, and none of its imports go to any of the northern districts, except an infinitesimal amount of transhipped cargo. As to exports at the present time, the quantity of goods and produce brought by rail from places north of Bezwada to Madras is quite negligeable: and if any trade south of Bezwada which now finds its outlet at Madras is, after opening of the Bezwada-Madras Railway, diverted to northern ports, it can only be on account of, and directly due to, mismanagement in Madras, whether by the mercantile firms or the Railways or the Harbour Trust Board. On this point we need have no fears whatever, but rather hopes. The Bezwada-Madras Railway may bring more stuff, oil seeds, cotton, &c., to Madras from the western and southern parts of the Kistna district and from Nellore; it cannot possibly deprive Madras of trade. I do not myself anticipate that at first this new Railway will directly affect the trade of this port much. No doubt it will do so gradually and indirectly in the future, by opening up new tracts of country, and stimulating production.

It seems to me then that the statistics of our trade during the past ten years or so are encouraging; and I am confident that if we give every facility that is possible to trade, we are certain to see a large improvement in the future. On the other hand if we fail to advance with the times, we run great risk of seeing our commerce transferred to other ports.

(2) The next question is, whether the revenue to be anticipated from our improvements will repay interest on outlay?

Mr. Wilson's estimate is 38¼ lakhs. We can borrow at 4½ per cent. and the interest would therefore amount to Rs. 1,72,125. If cargo be discharged at a quay consignees would be saved all landing charges. I have no precise information as to what the landing charges amount to. For coal I believe it is Rs. 1·5 per ton; for grain 12 annas to one rupee a ton; and for other articles varying rates working out to approximately Re. 1 (one) per ton. These are not the only gains to importers by landing at a quay. There is the question of safety from damage in being lowered over the side into the lighter; and in being hoisted on to the pier; of risk of complete loss in the sea; of pilfering between ship and shore, and between shore or pier head and Customs sheds. All these are important pecuniary considerations, and I understand have a considerable effect on the rates of insurance on

goods consigned to and exported from Madras. The value of the trade may be stated at 12 crores of rupees per annum, and ½ per cent. saved on this would mean* Rs. 1,50,000 saved to the trade of the port.

It seems probable that consignees would gladly pay an all round rate of 12 annas a ton to be rid of the worry, the risk and the cost of present landing arrangements. That rate would on the average figures of trade for the past three years bring us in Rs. 2,44,551, which is far more than sufficient. A rate of 8 annas a ton would give Rs. 1,63,034, which is about Rs. 9,000 too little: but the deficiency would probably be more than made good by savings in porterage and preventive charges, since our present cooly establishments could be largely reduced. There is therefore no fear that we should not be able to bear the cost of docks, even if Madras trade remains stationary; and any such anticipations are groundless hallucinations.

(3) The last point raised by Mr. Turner is as to the sufficiency of our present accommodation. Mr. Simpson says that "the ships' agents are all of one opinion, viz., that as good a day's work can be done here as at any port, ships can work all their hatches at both sides at one and the same time." But he goes on to detract from this statement by complaining of the pier being unable to cope with the traffic, and admits that better arrangements are needed for discharging from boats and lighters. The sentence I have quoted above is rather in conflict with one further on in Mr. Simpson's note:— "All ships' want is improved facilities for the discharge of cargo boats, so that it will be possible for more boats to be employed at one time." If the ship is already working "all her hatches at both sides at one and the same time," she is presumably discharging as fast as possible, and therefore more boats will not accelerate matters. Again Mr. Simpson says that "consignees in Calcutta find it more expensive and less convenient to use the jetties than to take overside delivery." There must be something peculiar in Calcutta, otherwise consignees at every port in the world would follow the same plan; and the peculiarity is, I believe, that consignees generally have their own boats, and convey their goods away direct to their own godowns, to which water carriage is cheaper and oftener more convenient than by land.

There have been long and bitter complaints of the inconveniences of landing at Madras, and these complaints all are focussed round the boats. So long as cargo is discharged into boats, manned by the Madras boatman as we know him, so long will there be complaints of damage, loss, and pilfering. We want to get rid of the boatman altogether. It is he and his friends that causes the never-ending friction between ships' agents and consignees, friction which has given rise to muttered threats of boy-cotting on the one side and of raising freights on the other. Such a state of things cannot be healthy, and must injuriously affect the trade of Madras; and the one effectual remedy will be to provide a means of landing and shipping without the intervention of either boatman or landing dubash.

Mr. Simpson says that coasting steamers would not have time to use docks I have had the records looked into, and I find that on the average coasting steamers remain in the harbour from 14 to 22 working hours.* To get in and out of a dock would occupy about one hour.†

Much is said about the comparative convenience and quickness of discharge and shipping under present arrangements. But I have nowhere seen it noticed that by carrying on these operations in a dock alongside a quay, work could go on day and night. I have lately in an indirect way enquired of the Chamber of Commerce whether it would like night working to be started at this port. No reply has yet reached me, but from conversations I have had with various merchants, I learn that there is, generally speaking, a disinclination to ask for such a concession, because of the risks that attend night working of loss, damage and pilfering. These risks are, as pointed out above, bad enough in the day they would be much worse at night. And as Collector of Sea Customs I should probably find considerable difficulty in devising satisfactory arrangements to guard against smuggling. But if we had a dock, no boats, but discharge direct on to a quay, the whole premises enclosed in a suitable fence all these risks of pilfering, damage and smuggling would vanish or be reduced to a minimum; and there is not the slightest doubt that given such arrangements ships might be worked continuously day and night. This is a very strong argument in favour of docks. In such circumstances I believe even coasting steamers would be glad to enter the docks.

Neither Captain Street, nor Mr. Simpson have referred to the security a dock would afford in stormy weather. When the harbour works were commenced much was said of the necessity for a harbour of refuge. The harbour has been built and is looked on by mariners as a trap to be most carefully avoided in cyclonic weather. Now we have the chance of removing this reproach, and of at last fitting the harbour to serve one of the principal ends for which it was designed. It is our duty to embrace the opportunity.

Our late colleague Mr. Scott had sent in his resignation as a Trustee before the papers had reached him, and therefore he could not record any official minute. He however wrote to me as follows authorising me to make use of what he said:—

"The question as to how a basin can best be made must be left to the Engineers, but I do hope the Board will endorse the broad conclusion, that both Wilson and deWinton come to, and not spend money on works that cannot ultimately be fitted into a scheme for an inner dock basin. The only minute I have seen is Captain Street's, but I rather think he overlooks the point that Wilson brings out, viz., that the boat-basin would cost far more than we originally thought. In fact it seems to me that by a little judicious arrangement we shall get the nucleus of docks to hold steamers for practically the same expenditure that the facilities Captain Street contemplates would cost. I remember 2 or 3 years ago Mr. Pinsent took out some figures showing that by the saving in boat hire we could cheapen the port and at the same time provide interest and sinking fund on the capital required for docks. There would be other items of revenue, such as godown rent, when the scheme of warehousing on warrants is complete. I should be dead against any scheme that involved an increase of dues, but I hope and expect that you will be able to show that the reverse may be expected." This opinion, coming from one of such sound circumspection, carries great weight.

* *Vide* letter from Deputy Conservator printed on page 11.
† *Vide* letter from Deputy Conservator printed on page 12.

The Trades' Association some years ago gave an unqualified opinion in favour of docks; the owners of one of the principal lines of steamers trading with Madras has done the same; there is a general feeling that Madras Harbour is not advancing with the times, we are running a great risk of driving trade away from the port to complete the harbour and make it fulfil the objects with which it was designed, an inner basin is essential; we can well afford to construct such a basin, and therefore undoubtedly we ought to do it.

I have referred above to the loss that occurs between ship and shore, and I give here a statement showing for one week the number of cases of loss and damage of cargo, &c., during landing operations—

March	10th, Patiala	..	3 sleepers lost overboard.
,,	11th, Goalpara	..	4 do. do.
,,	12th, Neidenfels	..	5 cases do.
,,	,, Goalpara	..	11 sleepers do.
,,	,, Pier	..	1 case fell into the sea.
,,	13th, Oronsay	..	2 bags chalk lost overboard.
,,	,, Neidenfels	..	11 bars iron, 1 keg nail } do.
,,	,, Goalpara	..	1 sleeper do.
,,	14th, Neidenfels	..	3 bundles iron do.
,,	,, ,,	..	1 ,, steel do.
,,	15th ,,	..	38 bars iron do.
,,	,, ,,	..	Boat No. 40 loaded with iron sank along side ship.
,,	16th, Palitana	..	5 sleepers lost overboard.

The above is a pretty large tale of losses for one week, at a time when the sea has been like a mill pond. I am told that all these risks are discounted in insurance rates. In that case all I can say is that the elimination of the risks must produce a very substantial reduction in insurance rates.

My remarks above have been written on the double assumption (1) that Mr. Wilson's estimate of 38¼ lakhs could not be reduced, and (2) that the coal trade must vanish so soon as the Bezwada-Madras Railway is opened.

As to the first assumption it must be remembered that the estimate will, in any case, be only gradually worked up to, though, in my opinion, it is necessary to complete the inner dock or basin as early as possible; and there are certain parts of the estimate that may be found unnecessary, *e.g.*, the very long protecting arm.

Then as to coal, if we can pay our way without looking for any coal traffic, it follows that we shall be in a position to give up all dock dues on coal. In other words, we should relieve coal ships of all cost of discharging. It is not quite certain how much this would amount to. The Traffic Manager gives the figure as about Rs. 2 a ton, exclusive of the 8 annas dock dues, which would ordinarily be charged on all goods landed at the docks. Would this saving of Rs. 2 or 2-8 a ton on Bengal coal enable it to compete with Singareni coal?

(Intld.) J. N. A.
18-3-98.

I do not think there is anything conflicting in my statements as quoted in para. 3 by the Chairman.

If there is only one ship in the harbour, as good a day's work can be done as anywhere. If there are a number of ships, the work is limited not by the ship's capacity to discharge the cargo, but by the pier's capacity to discharge the boats. The ship can work all her hatches at once both sides, but if the boats cannot get back fast enough, it is useless her doing so. I thought this was well understood, and that this was the reason for a boat-basin being advocated.

I thank the Chairman for pointing out the omission to mention the dock's utility in rough weather under this heading. Mr. Turner writes me—

"You will be burdening the trade with a heavy debt, which will be a drag on Madras for years to come. The first big cyclone would probably play havoc with the vessels lying in dock, and then such a scare would be established that you would not get your dock used again."

I woald suggest that the various minutes and opinions might be sent to the Chamber of Commerce and Trades' Association with Mr. Wilson's memorandum as proposed, as the trade will have to pay the piper whatever is done.

(Intld.) C. B. S.
21-3-98.

The Chairman remarks that there is no reference in my minute of the 5th instant regarding the security a dock would afford in stormy weather. As I am unable to see that a wet-basin would afford any security during a cyclone to a vessel, I did not refer to the matter. It must be borne in mind that the force of wind during a cyclone is generally strong enough to force vessels away from their fastenings without the aid of the sea. The state of the shipping at Calcutta and Chittagong after a cyclonic storm has passed over these ports, proves what wind alone can do. I do not think that any Captain of a vessel would care to remain in the wet-basin, during cyclonic weather, and I do not see that the basin would offer any protection from the wind. If one vessel broke adrift, she would probably injure all others in the basin. It seems to me that Mr. Turner, of M. M. and Co., Calcutta, sees all the weak points of Mr. Wilson's scheme.

(Intld.) H. A. S.
21-3-98.

I have just read Captain Street's and Mr. Simpson's Minutes on G. O., No. 110, Marine, dated 11th February 1898, which forwarded to the Board for remarks and recommendations, the papers and estimates relating to the construction of a boat-basin for the Madras Harbour, and as Mr. Yorke entirely agrees with Mr. Simpson's remarks, these may be taken to be Mr. Yorke's reply to the G.O. under reference. The first thing that strikes me is that these gentlemen have misapprehended the entire point and requirements of the situation, for which I, as the writer of the note on the subject of the harbour, may be to some extent responsible. For this reason I wish to explain what has happened. It having been recognised by the Harbour Trust Board for many years past that something should be done to improve what are called "facilities" for handling cargo in the harbour, and more especially coal, many different schemes have been proposed and rejected one after another. No one of these schemes was ever thoroughly examined from all points of view or worked out in detail, and although the schemes were accepted by Committees or at meetings of the Board, it has happened over and over again that objections to the scheme selected have been brought forward either on points that were not considered at all at the Committee Meeting, or by persons or bodies who were not represented.

In November 1896 one of these decisions was come to in the usual way, the members of the Board were taken down to the south arm of the harbour, where they were shown a site for a boat-basin marked out by Mr. Pinsent, the Secretary. As a matter of fact, Mr. Pinsent had proposed a ship basin and, to the best of my recollection, the only reason why it was decided to have a boat-basin rather than a ship basin, was that the latter would cost too much, but no estimates were made out and the matter was not gone into in any detail so far as I recollect. This point was not in any way thoroughly examined, the resolution, if it can be called a resolution at all, was passed on the pier, and I very much doubt whether all the members present could have told you on leaving its exact terms. One thing however was clearly stated in the Chairman's letter forwarding the results of this meeting to Government, and this is that the Trustees proposed to construct a boat-basin in the sand to the south of the harbour "for providing better facilities for the landing of coal." The idea was to make a coal hard on the sea side of the boat-basin, and as the Board's Engineer was absent on leave, Government was asked to make the required estimate. What I myself contemplated was that the Government officer entrusted with its preparation would take the general idea and would work the whole thing out, getting instructions and collecting information from the proper authorities to enable him to fix such details as depth, exact position of walls, requirements as to shedding, position of entrance, &c., &c. As a matter of fact the estimate submitted to Government was prepared entirely by Mr. Pogson, and came up without any report to show on what ground the various details had been fixed. It fell to my lot to supply the deficiency, and my note on the estimate is the result. I had recently been put in the position of Consulting Engineer to the Board, and I thought it behoved me to take some extra trouble in the matter. Finding a difficulty in supplying adequate reasons for constructing the basin as estimated for, and knowing the manner in which the Board's request for an estimate had arisen, I prepared alternative estimates and worked out the cost per foot running of various classes of wharf wall; and in short endeavoured to place on paper every item of information which would enable a non-engineer to come to a sound conclusion as to what should be done to carry out what is, as I understand, the main object of all schemes, viz., to provide better facilities. Coming now to Captain Street's minute, I find him advocating the Board to adhere to a distinct line of action, and with this advice, I cordially agree, provided always that that distinct line of action has been decided on after mature consideration, and that it is clearly supported by sound reasons. This I hold has never as yet been done by the Board. I cannot accept the results of the meeting of November 1896 as a distinct line of action so decided on. If any further proof of this were needed, after what I have already said regarding the way this decision was come to, I have only to point to Captain Street's and Mr. Simpson's minutes. As I have said above, the decision then made by the Board was to construct a boat-basin in the sand to the south of the harbour, for providing better facilities for the landing of coal. The sketch given to the Government officers for guidance in preparing the estimate shows the coal hards on the sea side of the basin. Now Captain Street takes exception to coal being discharged on the sea side of a basin 850 feet wide, *a fortiori* he would object to coal being discharged on the sea side of a boat-basin only 400 feet wide. Mr. Simpson also objects to the boat-basin being used for coal at all. On this important detail, therefore, three prominent members of the Board do not now agree with the decision of the Board of November 1896.

Both Captain Street and Mr. Simpson make objections to the ship basin estimate; but I cannot see that either gentleman has clearly indicated what, in his opinion, really should be done. Captain Street says that when the Trustees accepted the scheme (I suppose him to mean Mr. Pinsent's sketch), they thought that "*the facilities afforded by a boat-basin for horses, coal and iron*" would suffice, and he does not think that any good reason has been put forward to prove that these ideas were wrong. Now I was one of those Trustees, and I most certainly never had any idea that a boat-basin would afford any facilities for landing horses, nor do I now understand in what way it would do so. As to affording facilities for coal, as I have pointed out above, if it is objectionable to discharge coal at the side of a basin 850 feet wide at one end and 600 feet at the other, it must be still more objectionable to discharge coal at the side of a basin only 400 feet wide at one end and 200 feet wide at the other. Two blacks do not of course make a white, and I am quite willing to admit that if the Board is ready to go to the expense, it would be better to have a separate landing place for coal, but half a loaf is better than no bread, and after all that has been said about affording facilities for the landing of coal, Mr. Simpson proposes that the proposed pier from the north groyne for landing horses *can be tried* for landing coal, and if successful can be extended, and that is all. Mr. Yorke agrees with him. I think this is practically no bread. Captain Street does not, so far as I can see, make any proposal at all for improving facilities for landing coal. I cannot express too strongly my disapproval of this proposal of Mr. Simpson's. If the Trustees want a landing place for coal against the north arm in the name of common sense, let us have a landing place designed for the purpose, taking into account the necessary railway lines, widening of the pier if necessary; but to suggest that the design should be made specially to suit one class of traffic, and to leave it to chance whether it will suit the most important traffic of all, seems to me the height of folly. Mr. Turner also suggests *light* jetties being

run out to facilitate the landing of coal. This is a somewhat better proposal, as he intends that the jetties should be specially designed to suit the purpose for which they are intended. The objection to this proposal is that they would be useless in rough weather, and judging from past experience might be destroyed by a storm. Another point is that before pronouncing on the merits or demerits of a proposal like this, the whole cost of the proposal, including all details, rails, &c., should be estimated.

Mr. Simpson says that he thinks that "the plans already before Government for a boat-basin" meet all requirements. The plans he alludes to are those, I suppose, sent to the Board for remarks. Both of them provide for coal being stacked on the sea side of the basin, and are very different from the boat-basin proposed by Mr. Parkes, which Mr. Simpson seems to favour. I would therefore ask Mr. Simpson which plan it is that he favours. I think the Board ought to give a definite opinion, and that it would be altogether insufficient to say that the Board was or was not in favour of docks, or was not in favour of a boat-basin. The Board has declared several times it was in favour of a boat-basin, but it has always happened that when details were gone into that some insuperable objection arise. I am strongly of opinion, therefore, that the only way of deciding the matter is for each member of the Board to state in writing what work he would propose as an alternative to any proposal which has been made, and to which he has an objection. None of the estimates sent to the Board seem to meet the views of either Captain Street or Messrs. Simpson and Yorke, and it remains for them to modify one or other of the schemes to suit what would meet their views.

I would not appoint a special committee, past experience of committee's decisions is not encouraging, but it might do good for the Trustees to meet purely for the purposes of interchange of ideas on this subject, and for discussion. The minutes hitherto written on the subject seem to have been confined to criticism of what is described as my scheme, but do not deal with any alternative. The Trustees asked Government to prepare an estimate for them on certain lines, and now they have got it. I do not recommend it myself, and no one has as yet expressed distinct approval of it. My opinion is that it is open to as many objections as all the other boat-basin schemes. The objections to my alternative seem to be mostly financial, but considering that something like 130 lakhs of rupees have been spent on the harbour, and that in any case it is necessary to spend another 10 to 14 lakhs at least, to object to the extra 20 lakhs or so seems to me like swallowing a camel and straining at a gnat. I have seen no argument as yet that a boat-basin is all that the port will ever want. It is generally argued that a boat-basin is good enough for the present, the dock will follow. I am inclined to doubt whether a boat-basin is good enough even for the present; but even if this were so, I hold the opinion that we should draw out a plan of development, now, as has been done at other ports.

(Intld.) F. J. W.
25-3-98.

In the remarks that I made a few days ago on Captain Street's and Mr. Simpson's minutes, I said nothing on the subject of Captain Street's last minute, which has reference to the amount of protection that a ship basin would afford to vessels in storms, because I was not then prepared to controvert the opinion of a Marine officer on a subject which might be held to be entirely a nautical one. On thinking it over, however, it occurs to me that there are some points in this minute which are fairly open to engineering and outside criticism, and as I hold that the best way of coming to a satisfactory conclusion on the subject under enquiry is for everybody concerned to say what he thinks, I make no further apology for the following remarks:—

The first point is the general statement that a ship basin would afford no protection from the effects of storms, as is evidenced by the results of storms at Calcutta. Now any one who has been to Calcutta must know what a very different scene is presented by the Hooghly than is ever likely to be seen in a Madras ship basin. Besides the steamers at the jetties, there are steamers moored in the stream. Sailing and other ships, I believe, lie sometimes three and four feet deep alongside of each other. The river has a treacherous current, which is notorious, and is subject at times to a tidal bore unless I am mistaken. The two cases do not seem to me to be parallel if it had been said that the Kidderpore docks afforded no protection in a storm. I could have understood the comparison, but I understand that the damage alluded to took place in the Hooghly.

The next point that appears to me to be open to criticism is that the effect of the wind alone is generally sufficient to break ships from their moorings alongside a quay. Now as an Engineer what occurs to me is to use what knowledge we have, to see why this should be so. This is what we know about wind pressure during the storm of 1881, which did such damage to the Madras Harbour. The greatest recorded velocity of the wind was only 33 miles an hour, and during the storm of 1872 it was 57 miles per hour. These velocities represent pressures of only 10·89 and 31·49 lbs. per square foot according to a formula adopted for reducing velocity to pressures, but this is not very reliable. These pressures are very low compared with what has been observed in other places. After the destruction of the Tay bridge, a special Committee was appointed by the Board of Trade to consider the question of wind pressure, and the rule recommended by this Committee was that a maximum pressure of 56 lbs. per square foot should be allowed for.

It should be understood, however, that this recommendation was made for a particular class of work, viz., large high level railway bridges in an exposed situation, and although pressures of 65 lbs. per square foot and over have been registered by wind gauges in the United Kingdom, the evidence derived from the upsetting of railway carriages and similar sources goes to show that the wind pressure on a surface, such as that of a railway carriage, seldom, if ever, exceeds from 3 0 o 34 lbs. per square foot. This is due to the negative pressure in rear of a thin plate, and to the fact that the average wind pressure over a large area is considerably less than the maximum pressure exerted here, and thereby an inpinging eddy on a small area, such as that of a wind gauge. Wind pressure on a surface near the ground is certainly less than on an elevated structure, and is not so great on a surface such as that of a ship's side as on a flat surface. Recent American experiments point to an allowance of 50 lbs. per square foot as ample for any large area, and I consider it would be a perfectly safe assumption to take this as the maximum wind pressure that could be brought to bear on a ship in a Madras basin.

The next thing to consider is the area that might be exposed to this pressure. The very worst case that can be conceived is that of a large steamer, being very lightly loaded and lying alongside of a quay with the wind blowing exactly at right angles to and away from the quay, and that this should occur when the water in the basin is at the highest possible level. To determine the amount of free board of vessels I measured the S.S. *Baron Cawdor* this morning, she was drawing only 11 feet of water and about half the length of the vessel was 22 feet above water and the other half about 25 feet, or an average of about 23½ feet. Something has to be added for funnel, rigging, &c. Take the case of the P. & O. S.S. *Simla*, one of the largest ships which has used the harbour, she is 430 feet long, and assume a depth of 28 feet over this length to represent the area of her side view including funnel, masts, rigging, &c. Assume the level of water in the basin to be 5 feet below the top of the quay, that is above high tide level, than the area exposed to a wind flowing off the quay would be 430 × 23 = 9,890 square feet, and the pressure on this area at 50 lbs. would be about 220 tons. Bollards can be made to resist a pull of about 400 tons, and these would be placed at 100 feet intervals along the quay. There would be four of these opposite the ship. The *Simla* probably carries at least 2¼ inches studded chain anchor cables, which would bear a proof strain of 91½ tons, so that all that would be necessary to secure the *Simla* from breaking away by wind pressure under the conditions I have assumed would be for this chain cable to be passed round a bollard at either end of the ship. We would thus get the strength of four chains holding the ship, which would take a pull of four of 4 × 91½ or 364½ tons without exceeding the proof strain against a required resistance of 220 tons. With 220 tons the actual strain on the cable would be $\frac{2}{4}\frac{2}{0}$ or 55 tons. This is, I am aware, over the usual working safe load, but the condition is not likely to occur more than once in the lifetime of a chain, and is well under the strain that the chain is subjected to each time that it is tested.

The ship would have her ordinary hawser moorings besides. The conditions I have assumed are worse than could reasonably be expected especially on the north-west and southern quays, as at these quays vessels would be sheltered to some extent by the sheds alongside the quays, and on the other quay there would probably be large heaps of coal. The pressure 50 lbs. per square foot that I have assumed is much greater than has been experienced on both occasions of the cyclones of 1872 and 1881.

In short, I cannot see that there is any engineering difficulty in securing a vessel to a quay to resist any wind pressure that can be conceived, and if vessels do break away from wind pressure alone, it can only be due to insufficient attention being paid to the moorings. In a Madras basin I would make it the duty of the Engineer and the Deputy Port Conservator to go round and inspect all the moorings on the approach of a storm, and, if necessary, there is no reason why special moorings should not be provided.

I have only alluded above to the force of the wind tending to cause vessels to break away as this was the point made in Captain Street's minute, but the possible force of waves is a very different matter. Waves have been known to give a blow equivalent to a ton per square foot or over 20 times the greatest wind pressure ever recorded.

The width of entrance to a basin which I proposed was 164 feet, this being the least width which a vessel can pass through with convenience under her own steam. I see, however, that Captain Aves recommends warping vessels in, and reducing the width of, the entrance. I only suggested a wide entrance, as I thought it would be objected to less on account of time employed in going in and out, but if warping is to be done, then I would make the entrance still narrower, say 80 feet, and would provide a recess for a caisson, the caisson itself might be provided subsequently if it were found that in rough weather the disturbance in the basin was inconvenient.

The entrance could thus be closed in such cases. There are several different types of caissons in use for closing entrances which I need not here describe, but their advantages over gates are the saving of room, in shortening the length of the entrance, the facility with which they can be maintained and repaired as compared with gates. The power they give of examining the sill and masonry of the entrance as more than one stop can be made for them, and what is a very important advantage, a caisson can be made to carry a road or line of railway across the entrance. There is no engineering difficulty therefore in making a ship basin at Madras a perfectly still water basin, if the open entrance is found insufficient, and as to the exposure of the site this is not more exposed than many other docks already in existence. The Leith-docks, for instance, are made on land reclaimed from the sea, and their position is almost identical with the proposed Madras site. It may be said that Leith is not exposed to such severe storms as Madras. It may be true that Leith is not exposed to such severe *waves*, but we have evidence as regards wind at the Forth bridge not many miles from Leith. At the Forth bridge the wind gauges have already registered pressures running up to 40 lbs., and in one instance to 65 lbs. per square foot, and in the latter case the momentary deflection of the spring would have been still greater if it had not been checked at that point by a fixed stop. The wind pressures at the Forth bridge that have been recorded are therefore a good deal larger than those recorded at Madras in the Cyclones of 1872 and 1881; and it is fair therefore to assume that a basin at Madras would not be exposed to any more risk from wind than the Leith-docks.

In my first minute I suggested that each member of the Board, who had any objection to any of the works proposed should suggest an alternative and go into the matter in detail, and it occurs to me now to say a few more words on this subject. Some of the minutes that have been written seem to imply that what has been proposed is to construct a dock at a cost of 38¾ lakhs, but I would invite a perusal of the estimates forwarded for remarks. Of this 38¾ lakhs, about 12¾ lakhs is for work which has, for the most part, already been approved by the Board and sanctioned by Government. Of the remaining 25¾ lakhs only 19 lakhs, are for the ship basin itself. Mr. Simpson, backed by Mr. Yorke, says that "it is surprising that such efforts should be made to thrust docks on the shipping when "the smaller and more satisfactory scheme of a boat-basin already before Government will meet "all the requirements of the port for general cargo."

Now, assume for the sake of argument that Mr. Simpson alludes to Mr. Pogson's estimate of Rs. 8,73,667, as he does not say which scheme he refers to, although he here says it will meet with all the requirements of the port if we are to judge from his own minute, he does not believe that it will

meet with all the requirements of the Port, but only that it will meet with some of the requirements. First of all he says coal and general cargo are not to be landed near the same place, but one should try the horse jetty for landing coal and if successful similar or additional piers should be made. He makes no proposal at all to meet the contingency of that plan proving unsuccessful. Again he says that if the boat-basin is made first a separate dock could be made to the east of the basin at some future time. With such a boat-basin, as estimated for, this could not be done. It, therefore, seems to me that the smaller scheme alluded to by Mr. Simpson is, according to his own showing, not what he really wants, and according to his own ideas does not meet with all requirements.

I would ask therefore for further detail, so that Mr. Simpson's proposals can be drawn out and estimated for. It is only by such detailed examination of any proposal made that we can arrive at a sound conclusion as to its merits.

(Initld.) F. J. W.
27-3-98.

The maximum rates of boat-hire sanctioned for Madras are as follows:—

TO AND FROM SHIPS OF ALL DESCRIPTIONS LYING AT ANCHOR WITHIN THE MADRAS HARBOUR.

Common Boats.

	RS.	A.	P.
Ordinary trip *	1	8	0
Transhipment	1	0	0
Ballast trip *	1	12	0
Water trip (from the beach)	2	0	0

Large Pier Boats.

Ordinary trip per ton	0	10	0
Transhipment per ton	0	8	0
Water trip	1	0	0

MAXIMUM MASULAH BOAT-LOAD.

Inside the Harbour.

Dead weight, 3 tons, not damageable by water.
Rice, sugar, grain and ginger, 30 bags.
General cargo, 2 tons, by measurement of 50 cubic feet per ton.
Large pier boats shall carry the ascertained practicable quantity of goods according to their size and measurement, as expressed in the licenses granted under Act X of 1889.

I have endeavoured to ascertain what are the actual rates charged to consignees, to enable us to see whether the subsitution of loading and unloading at a quay wall would actually cheapen work at the port or not.

I first addressed myself to the shipping agents, and received replies from Messrs. Binny & Co., Messrs. Gordon Woodroffe & Co., and Messrs. Volkart Bros., and the Agents P. & O. Co. These first replies were to the effect that the following is the scale of rates for landing cargo inside of the harbour, Rs. 1-8-0 per masulah boat trip for general cargo, excepting iron, which is charged at Rs. 1-5-6 per ton.

This did not help me, so I then enquired what was meant by "a masulah boat trip," and this elicited the information that—

"The tonnage of a masulah boat is approximately 2 tons for general (measurement) cargo and 2 to 3 tons for dead weight. The maximum quantity is not always carried and boat-hire is calculated at Rs. 1-8 per trip, *i.e.*, per boat load or portion thereof, from steamer to shore or *vice versa*."

"The rate charged for boat-hire either to the beach or to the pier is Rs. 1-8 per trip; masulah boats do not discharge at the pier except on special occasions."

"This rate covers risk of damage or pilferage while cargo is in custody of the landing contractors, and also any loss sustained through omissions on the part of Preventive officers to note the condition in which packages are discharged, the custom of the port being to hold that such packages are discharged in good order and the ship consequently not liable. The number of Preventive officers is deficient, one man frequently has to supervise two hatches."

"The rate of boat-hire on iron, viz., Rs. 1-5-6 per ton, includes landing on the beach above high water mark, at a spot fixed by the Harbour Trust officials. This rate was in force in 1885 when a Government order was issued directing that all iron be landed on the beach and has been in force ever since."

"The charge for boat-hire is so much per lighter at the rate of 10 annas per ton on the carrying capacity of the lighter and not at 10 annas per ton of cargo; the rate charged, viz., Rs. 9 per lighter, works out at about the same rate per ton cargo, as the average lighter capacity is about 14 tons."

"The rate per lighter appears to be in accordance with the Government schedule."

"The schedule of boat fares appears to have been drawn up on the basis of the maximum number of trips a boat can make, but the number of trips is limited by the inadequate arrangements for their discharge at the pier which prevents the boats obtaining full employment and consequently enhances the rates of hire."

I don't know whether the shipping agents were conscious that the actual charges levied on consignees were in excess of sanctioned rates, but in each case the reply contained a sort of apology to the above effect.

Meanwhile I had been prosecuting further enquiries from other business firms, and had received information, to which I shall refer directly, showing that as I expected the landing charges really charged are on the average up to at least Re. 1 a ton, and in the case of small consignments much

* Eight annas less if proceeding to or from the pier.

more. It is worth while to refer to the reasons assigned by the shipping agents for levying charges in excess of the sanctioned rates of boat-hire. These reasons are (1) that the rate covers risk of damage and pilferin‹ between ship and shore; (2) that it covers cost of carrying cargo landed above high water mark; and (4) that it compensates for the delay caused in unloading boats by the present inadequate arrangements at the pier. The Agents of the Clan Line add optimistically but dubiously, "If matters can be arranged whereby detention can be minimised and the boats are able to work a reasonable number of trips per diem, something might be done in the way of reducing rates." Now if we have a boat-basin reasons Nos. 1 and 2 will still remain, No. 3 will vanish; but No. 4 may still be alleged, whether rightly or wrongly, and in any case whatever be the increased facilities afforded by a boat-basin, we may be perfectly sure that the rates of boat-hire will not thereby be reduced. On the contrary, it seems to me quite on the cards that pretexts will easily be found,—the increased distance will serve well enough—for increasing the rates.

Now as to the actual rates paid by consignees, I annex a table compiled from information from many of them, showing what rate per ton they have been billed for—

		Rs.	A.	P.
Binny & Co. piece-goods		1	1	11
Do. coal { boat-hire 0 12 0 / gunny bags 0 6 0 }		1	2	0
Wilson & Co.. all round rate (about)		1	0	0
Parry & Co. do. (do.)		1	0	0
Dymes & Co. average rate		1	5	1
G. W. Deane & Co. average rate		0	12	10
Leighton & Co. do.		1	5	9
Wrenn, Bennett & Co. do.		1	2	6
Vest & Co.		1	8	0
Addison & Co.		1	5	1
	10)	11	11	2
Average per ton ..		1	2	9

The following table will show approximately what was paid in landing and shipping charges by the trade of the port during the past and current years:—

	Rs.	A.	P.
1896–97—150,659 tons coal at Rs. 1-2-0	1,69,491	6	0
21,000 tons iron and steel at Rs. 1–5–6 ..	28,218	12	0
* 307,812 tons general cargo at, say, Rs. 1–2–0.	3,46,288	8	0
Total ..	5,43,998	10	0
1897–98—173,000 tons coal at Rs. 1-2-0	1,94.625	0	0
22,000 tons iron and steel at Rs. 1–5–6 ..	29,542	8	0
* 317,000 tons general cargo at, say, Rs. 1–2–0.	3.56,625	0	0
Total ..	5,80,792	8	0

Compare these figures with the rates that we ask the trade to pay.
We ask the trade to pay—

	Rs.	A.	P.
1896–97—150,659 tons coal free of dock dues	....		
21,000 tons iron and steel at, say, 10 annas ..	13,125	0	0
307,812 tons general cargo at, say, 10 annas ..	1,92,382	8	0
Total ..	2,05,507	8	0
1897–98—173,000 tons coal free of dock dues	....		
22,000 tons iron and steel at 10 annas	13,750	0	0
317,000 tons general cargo at 10 annas	1.98,125	0	0
Total ..	2,11,875	0	0

One is hard put to it to understand why men of common sense should prefer to pay $2\frac{3}{4}$ times more than a fair price for services rendered. And then it must be remembered that whereas the dock charges will, as trade expands, tend to decrease in the rate of incidence, there is not only no guarantee that boat charges will not increase: but every probability that this will happen: not only by direct enhancement due to the normal increase in cost of labour, but indirectly in consequence of refusal of the boatmen to work, or of strikes and the like. Recently there has been such pressure of work in the harbour that some of the masula boatmen refused to work after 3 P.M. and Messrs. Binny & Co. had to land coal out of lighters on the north arm. At Tuticorin, not many months ago, the cargo boatmen found it more profitable to trade along the coast, and the trade of the port was temporarily paralysed. At Negapatam the boatmen struck, because they did not like landing troops. What is now happening at Bombay may any day happen here: and while a strike among the coolies on shore working in a dock could probably be met and defeated, a strike among the boatmen would bring trade to a standstill, as actually happened here in 1894.

* Exclusive of bulk oil.

I know it is said that large as the amount paid for boat-hire seems, the shipping agencies do not make much out of it, as they have so many claims to meet on account of damage and pilfering. This is probably quite true; but what an absolute waste of money it is. These $5\frac{3}{4}$ lakhs of rupees are not productive expenditure, but represent either loss of valuable goods, or labour which is unnecessary. So that the present process of landing cargoes in boats, whether at the pier, the beach, or, as is proposed, at a boat-basin entails waste of time, labour and money. It is sheer waste from beginning to end, and why any business man should wish to continue it passes my comprehension.

Captain Street has referred to the fact that our imports progress but slowly, and that our exports show a tendency to decline. Is not this due solely to the fact that our landing and shipping arrangements are disgracefully behind the times? They are costly and bad. So bad that no tinkering with boat-basins will mend them. It is this and only this that enables other ports to compete with us on terms so favourable to them. Madras firms themselves hesitate between Bombay and Madras as their place of export, and I believe that ever so small an increase in the charges at this port would drive a large amount of stuff, all that comes from places beyond Cuddapah to Bombay. On the other hand, I have it on good authority that if we had a ship dock, and loading from a quay with charges reduced as we will reduce them, we should at once attract to us a large amount of trade that now finds its outlet at Cocanada.

There is another point in this controversy deserving of very careful consideration. The advocates of a boat-basin do not profess to offer a final scheme. They admit that the boat-basin is only a temporary make-shift. It is good enough for the present, and will stave off the necessity for building a dock for a few years longer. They say "the time has not yet arrived," not "the time never will arrive." But looking at the matter not now from the standpoint of cargo tonnage, but of numbers of ships visiting the port, it must be evident that the time undoubtedly has come to provide increased harbour accommodation of one sort or another. The following are the numbers of mercantile steamships visiting Madras in the past eight years; and the numbers that failed at first to find room in the harbour:—

	No.	Tonnage.	No room inside harbour.
1890–91	638	994,891	1 or 2 occasions.
1891–92	697	1,195,738	1 or 2 do.
1892–93	629	1,110,987	6 occasions.
1893–94	659	1,221,256	2 do.
1894–95	640	1,150,037	1 occasion.
1895–96	656	1,184,644	7 occasions, average of 6 hours each.
1896–97	662	1,180,664	6 occasions.
1897–98	..	....	8 do.

There can be no doubt that the numbers will go on increasing, and we must therefore increase our accommodation. It was only last year that the Deputy Conservator proposed to refuse admittance to the harbour to sailing vessels, because they occupy the moorings for so long a time. The Deputy Conservator was told to use his own discretion, and it is noticeable that since that time though various sailing ships have visited the port, none have entered the harbour, and none have carried away any cargo, so that for want of harbour room we are boycotting the cheapest freight to be had.

I say that it is certain that before many years are past Madras will either have committed commercial suicide, or she must increase her accommodation for ships. But if we are to construct a boat-basin now at a cost, say, of 10 lakhs (I take no account of the extra accommodation for coal and horse ships which Captain Street and Mr. Simpson wish us to provide, though those proposals would, I suppose, run us into a good many lakhs), we shall find ourselves burdened with "a veritable white elephant" in the shape of a boat-basin that will not supply our wants, and a debt of 10 lakhs at $4\frac{1}{2}$ per cent., which, for all the good it will have done us, might as well have been thrown into the sea. And it will be a much more difficult matter than to raise the wherewithal to build a ship's dock. Beware, therefore, lest the decision now to build a boat basin may not shut us out for ever from the possibility of extending our ship accommodation.

(Intld.) J. N. A.
28–3–98.

Mr. Wilson's note is a valuable and interesting addition to the existing literature on the Madras Harbour; and after its perusal, one cannot help being struck by the great divergence of opinion expressed by the eminent authorities who have been from time to time consulted in regard to developments and extensions.

When so many wise men have frequently been diametrically opposed to one another in their views as to what should, or should not, be done, it is hardly a matter of surprise that there has been much delay, and considerable hesitancy in adopting any definite line of action. The time has come, however, when a decided move should be made, and I hope this vexed and much discussed question will now receive final disposal.

In view of such variance in engineering and nautical expert opinion, on the proposals that have from time to time been put forward, I will confine my remarks to criticism of the scheme now laid before us by Mr. Wilson, from a purely commercial and financial point of view, concluding with a statement of what I consider is required to facilitate the landing and shipping of cargo at this port.

The first stage of Mr. Wilson's scheme is to cost Rs. 12,78,000, the second Rs. 25 50,000, or in all Rs. 38,28,000. This is the original estimate: can it be taken as final? Can we rely on securing a fully equipped and complete dock for an expenditure of $38\frac{1}{4}$ lakhs? Estimates almost proverbially have an unpleasant tendency to expand, and before launching out on a scheme of this sort, we should be well assured on this point.

Now for the first stage. What shall we get for the 12¾ lakhs it will cost? It does not appear to me to provide for any special improvement for the landing of coal, admittedly one of the most pressing wants of the port. We should have a mole of some 500 feet running out into the harbour, necessitating the abolishment of No. 1 berth, and nautical opinion has hitherto been opposed to any curtailment of space inside the harbour. Mr. Wilson certainly anticipates "that there would be three deep "water quays, alongside which a steamer could lie, provided the water were still enough." Is it likely the water will be still enough? I doubt it—the consensus of expert opinion is decidedly against it, and I think it is supported by practical experience.

In addition to the above there will be a quay wall in front of the south pier for 900 feet from the shore end, and a similar structure to the north side some 700 feet long.

The above is, so far as I can see, what we get for the 12¾ lakhs, and what practical benefit will it be for the trade of the port? I must confess I see very little. I do not see any use of the quay wall in front of the northern groyne, and I question if that to the south will be of any material assistance. So far, therefore, as the first stage is concerned, I fail to find that it can be of any real benefit. I quite approve of the policy of so planning improvements if possible, that they may be at some future time further developed if necessary, and I had hoped that by spending 12¾ lakhs now on the first stage, we would have secured such improvements as are necessary for the trade of the present time, leaving the future to decide whether the trade of Madras will ever warrant the construction of docks, and the fulfilment of stage No. 2.

It seems to me, therefore, the adoption of stage No. 1 necessitates the acceptance and immediate carrying out of No. 2 also, or else we shall have a half and half sort of scheme of not much value.

The question then arises, are docks necessary or required? I don't consider they are. The only condition under which the subject would merit consideration is, if it can be incontestably proved beyond the shadow of a doubt, that, not only would trade have to bear no extra charges, but that there would be a very material reduction in the existing rates, and also a reasonable margin allowed for unforeseen contingencies. It would, I think, be rash to accept the figures put forward as conclusive on that point. The Traffic Manager's estimates and forecasts I consider somewhat sketchy, and with a distinct tendency to be one sided. For instance, he can hardly expect any one conversant with the trade, to believe that because coal is landed in docks there will be no wastage. The expenditure is based on the "Estimated charges for this year" (presumably for the harbour as it stands) plus 4½ per cent. interest on 30 lakhs. This hardly seems sound reasoning. What grounds are there for assuming that no extra expenditure will be necessary? Is no provision to be made for repayment of the contemplated loan, or for repairs, renewals, and upkeep of the docks, wharves and sheds, has any allowance been made for dredging, an item I should say, likely be a serious one. The capital outlay is assumed to be only 30 lakhs. The estimates, as they stand, are 38, with a possibility, I might even say, a probability of being a good deal more before the work is finally completed. Interest is calculated at 4½ per cent.; it will, I think, be generally admitted that the future of the money market is so very uncertain, that it is open to grave doubt if funds could be raised on such terms. It is easy to show a saving to trade of about 5 lakhs by such rule of thumb estimates, as the above, I am unable, however, to accept them as a reliable and carefully compiled forecast of what might reasonably be expected to be the result of docks.

The Chairman's figures regarding the trade of the port during the past decade hardly warrant the sanguine view he takes of the position. If the abnormal trade of 1890–91 and 1891–92 is to be deducted the same rule should be adopted throughout, but no mention is made, for instance, of all the railway material imported in, 1896–97 for the construction of the Madras-Bezwada Railway, surely that is equally abnormal. I have no doubt, however, the figures will show an increase, but that is about all, and I fail to see where the great expansion of trade is to come from, which we are asked to look for by the construction of docks. What trade is being stifled for the want of them?

The comparative statements the Chairman gives, showing what is paid now for landing and shipping and what trade would be asked to pay if there were docks, are no doubt alluring, but upon what data are they compiled? He shows certainly how he arrives at the present cost of shipping, &c., but I submit it is fallacious, the figure he quotes is not the average rate, but the mean, as quantities have not been taken into the calculation, and I venture to remark that the cargo handled by the four firms mentioned at the bottom of the list given, and who pay the highest rates, bears a comparatively small proportion to the total tonnage of the port. The first two statements therefore cannot be accepted as reliable. As to the second, what the "trade is asked to pay." Being interested in the importation of coal, I should be delighted to think there was a possibility of importing it free of charges, and I can put no other construction on the phrase "free of dock dues." But I am afraid it would be unwise to be carried away by such an utopian idea as to think such a thing possible. It is here again very easy to say the trade is paying 2¾ times more than it might, for services rendered, and make up statements such as the above referred to, to support it; but I do not think the cost and contingent expenses of docks have been quite fully realised or allowed for. It would appear from the Chairman's remarks in his first minute, that he reckons on the interest on the loan being the only additional expense that will have to be covered, I fear not, and that being the case, all the estimates of what the trade will be asked to pay, may prove to be totally inadequate.

In addition to the many other objections to docks which have already been put forward by Mr. Simpson, and with which I agree, I would add the following words of Sir Alexander Rendel:—

"I do not wonder at the Trustees hesitating whilst the harbour is untried in respect to the "stability of its works, and open to question in respect to the maintenance of its depth, to do more "than is absolutely necessary for the necessities of the moment. Therefore, as a sheltered basin and a "quay for boats will remedy the worst part of the present disadvantages of the port, I think the Trus-"tees have determined wisely." The stability of the harbour has still to be proved, and it is a very weighty consideration to be kept in view.

The present "disadvantages of the port" are the want of facilities on shore for shipping into, and landing from, lighters or boats, and disposing of the cargo when it is landed. The existing pier is quite insufficient to meet demands, and it has also the disadvantage of being so high, necessitating a lift of, I suppose, about 20 feet. I consider the above drawbacks can be best overcome, by a series of low quays or jetties with the necessary shedding in close proximity to them.

I cannot but help thinking the most convenient position is inside the present harbour, keeping the coal to the north, and the general trade to the south, as it is highly desirable that coal should not be handled in the same basin with other goods. The objection to this suggestion will be of course that the space of the harbour must not be curtailed, but why should it be? Could not the whole work be kept within the 2 or 3 fathom line, excavating the foreshore if necessary?

What greater objection could there be to having a protecting wall to the jetties within the 2 or 3 fathom line to ensure calm water, than to a mole running out into the middle of the harbour? It has been remarked that the low jetties inside the harbour were washed away in 1882, but it must be remembered they were only partially constructed, and were not protected by a wall. The requirements for landing coal would be fully met by discharging in bulk into large lighters as is done at most places, notably Port Said, one of the largest coaling stations in the world; to do this low quays are necessary for the discharge of lighters, and unquestionably the most convenient site for the storage of coal is the north-west corner, where it is now, and I believe it is quite capable of being made suitable for all requirements. From the many plans that have appeared from time to time, I am inclined to think that a scheme something on the above lines could be carried out at a moderate cost, and I believe it would fully remove the disadvantages we are at present labouring under—and then, having ample facilities for working our steamers in the harbour, docks would not be required, as at present is the case in Calcutta; there they have docks, but regret they have ever been burdened with them!

I would support Mr. Simpson's proposal that all the papers should be printed and sent to the Chamber of Commerce for an expression of its opinion; it is a subject in which the whole of the Mercantile Community of Madras is interested, and it would be well now to bring its discussion to a final conclusion. I understand it is also to be sent to the Trades Association.

I deprecate any further minutes by Trustees, as if we are all going to continue answering one another there will be no finality to it. We have each had an opportunity of expressing our opinion, and the best thing to be done is to meet and interchange views and ideas, as Mr. Wilson suggests.

(Intld.) R. J. B.,
4–4–98.

From the Traffic Manager, Harbour Trust Board, to the Secretary, Harbour Trust Board, dated Madras, 8th March 1898, No. 8859-P.

I have the honour to acknowledge receipt of your memo. No. 3044-T. of this date, asking me to prepare a statement for the Chairman's information as to the increase or decrease of the trade of the port, and to submit the following, which, I would premise, deals only with the *tonnage* of the port, as I have no information as to the value of the trade.

The first statement shows the total tonnage landed at, and shipped from, this port during the past 11 years, and is as under—the tonnage for the present year 1897–98, being taken from 11 months' actuals and 1 month estimated:—

	TOTAL TONS.
1887–88	316,986
1888–89	290,600
1889–90	359,184
1890–91	391,972
1891–92	436,340
1892–93	363,781
1893–94	383,911
1894–95	389,464
1895–96	429,771
1896–97	488,546
1897–98	515,000

The above shows that the tonnage, as a whole, is steadily increasing.

The second statement divides the total tonnage during the same period of 11 years into imports and exports, and is as under, viz.:—

Years.	Import.	Export.	Total.
	TONS.	TONS.	TONS.
1887–88	210,979	106,207	316,986
1888–89	201,597	89,203	290,600
1889–90	246,659	112,525	359,184
1890–91	288,537	103,435	391,972
1891–92	347,401	88,939	436,340
1892–93	277,843	85,938	363,781
1893–94	285,251	98,660	383,911
1894–95	285,276	104,188	389,464
1895–96	330,697	99,074	429,771
1896–97	385,605	102,941	488,546
1897–98	432,418	82,582	515,000

Statement No. 2 shows that, while the import tonnage has largely increased, the export tonnage has declined, and the statistics maintained in this department shows that the decline has been principally confined to a few articles of export, viz., cotton, groundnuts, and jaggery; the rise in export tonnage last year being entirely due to the unusual quantity of jaggery snipped, viz., some 190,000 bags, while none has been shipped this year.

The increase in the column of the import trade is very marked, and the question naturally arises as to what articles of import the increase is due, and it is clear that the items of coal and coke from the great bulk of the increase, as will be shown in statement No. 3, in which the tonnage of these goods has been deducted from the total tonnage:—

Years.	Total tonnage.	Tonnage of coal, coke and patent fuel.	Net tonnage exclusive of coal and coke.
1887–88	316,986	15,492	301,494
1888–89	290,600	29,085	261,515
1889–90	359,184	34,368	324,816
1890–91	391,972	48,890	* 343,082
1891–92	436,340	49,027	* 387,313
1892–93	363,781	67,875	295,906
1893–94	383,911	82,302	301,609
1894–95	389,464	99,166	290,298
1895–96	429,771	134,452	295,319
1896–97	488,546	150,659	337,887
1897–98	515,000	170,000	† 345,000

* 1890–91 † 1891–92 These were years of great scarcity in Madras, amounting almost to famine and the heavy rise of import tonnage was due to abnormally large quantities of food grains imported amounting to 35,000 tons in 1890–91 and to 109,000 tons in 1891–92 against an average for the previous three years of only 16,000 tons.

For purposes of comparison as to whether the tonnage of the port, apart from coal, is increasing or decreasing these abnormal tonnages of grain, viz., 35,000 — 16,000 = 19,000 tons in 1890–91; and 109,000 — 16,000 = 93,000 tons in 1891–92, should be deducted from the net tonnage which has been done in statement No. 4 as under, viz.:—

	TONS.	
1887–88 ..	301,494	
1888–89 ..	261,515	
1889–90 ..	324,816	Average annual net tonnage after deducting tonnage of coal, coke and patent fuel and abnormal tonnage of grain imported during 1890–91 and 1891–92.
1890–91 ..	324,082	
1891–92 ..	294,313	
1892–93 ..	295,906	Average per annum .. tons 299,254.
1893–94 ..	301,609	
1894–95 ..	290,298	
1895–96 ..	295,319	Excluding coal, coke and patent fuel.
1896–97 ..	337,887	
1897–98 ..	345,000	Average per annum .. tons 326,068.

In examining and comparing the figures in statement 4, I would observe that the Board's revenue receipts remained almost stationary at about 4½ lakhs of rupees for a number of years, if the dues on the abnormal tonnage of grain mentioned above be excluded, but during the past three years there has been very satisfactory increases. During these three years the tonnage of coal imported has risen largely as shown in statement 3, and to see whether the rise in the total tonnage and consequent revenue receipts have been entirely due to increased imports of coal, I have taken the average net tonnage of the eight years prior to 1895–96 and also the average net tonnage of the three latter years, and find that the average tonnage of goods other than coal has been nearly 27,000 tons in excess of the average of goods during the previous eight years, when less coal was imported, and during the present year 1897–98 the excess net tonnage will amount to 45,000 tons, exclusive of 116,725 tons of coal landed in excess of the average tonnage of coal during the former eight years.

The above statements, I would submit, shows that the import tonnage as a whole has increased very satisfactorily, and also that there has been a moderate increase in the import tonnage of goods other than coal, during the past eleven years: while, on the other hand, it is to be regretted that the export tonnage has declined instead of increasing as might have been reasonably expected.

With reference to the Chairman's enquiry as to the relative cost to consignee of landing goods now in the harbour and in a dock, I would say that the cost of landing in a dock would be *nil*. I have no reliable information as to what the actual charges to consignee now are, but some three or four years ago I saw bills made against importers for landing charges, and these ranged from Rs. 1-8-0 to Rs. 2-8-0 per ton.

P.S.—The statement that 45,000 tons excess of goods will be landed during the present year—*vide* paragraph 6 above, may have to be modified, as grain in excess of last year's imports has been landed. Up to this date, viz., 11th March, some 9,000 tons excess has been landed, which would reduce the 45,000 tons to about 35,000 tons, unless a corresponding increase occurs in other goods, which may happen as railway stores and bulk oil are coming in.

From the Traffic Manager, Harbour Trust Board, to the Secretary, Harbour Trust Board, dated Madras, 18th March 1898, No. 9043-P.

I have the honour to acknowledge receipt of your No. 3028 T. of the 5th instant, forwarding for remarks, copy of G.O., No. 110, Marine, containing Mr. F. J. Wilson's note on estimate for constructing a boat basin and connected papers.

2. I have carefully read through the papers, and am strongly in favour of a dock rather than a boat basin. The first and, I would say, immediate requirement of the port is smooth water, quay walls at which steamers can moor, and where coal and other bulky goods can be handled without incurring the heavy charges for boat-hire, bagging and wastage, and also at which the very valuable exports of the port can be shipped with a minimum of risk of damage from sea or rain water.

3 The question as to where or how these quays are to be constructed is not a subject for me to remark on, but I would venture to remark, with reference to the last clause of para. 6 of Mr. deWinton's note, viz., "I do not see the object of storing coal between the basin and the sea," that one great advantage would be obtained by storing coal in this position, viz., an abatement of the coal nuisance. This would be effected by placing a width of 500 to 600 feet of water *between* the coal ships and heaps: and the business parts of the beach and High Courts, into which water all coal dust carried by the wind would fall and become *dead*, instead of being deposited on the ground to be picked up by the next eddy of wind and carried on and on till it became an unmitigated evil all over the beach. Another advantage would be that storage area would be provided on three sides of the dock instead of on two sides only as I understand from Mr. deWinton's note.

Regarding the question from a financial view, I think there need be no hesitation in spending 30 lakhs on docks. With an increasing tonnage—rising revenue, and some 6 or 7 lakhs cash on hand, the necessary revenue can be raised, not by increasing the cost to importers or exporters; but by very materially reducing the charges.

I would abolish the present elaborate schedule of rates and introduce first one charge, viz., Rs. 1-4-0 per ton on all goods landed or shipped. This charge to cover use of dock, harbour or roadstead, cranage, and porterage charges. Second, storage; and wharfage rates; leviable only after sufficient time has been allowed to enable goods to be taken if required. Third—Special rates—for horses, cows or bullocks, elephants, coin or bullion.

Proviso.—All goods not admissible into harbour 12 annas per ton. Such goods to be handled exclusively by consignee, as at present.

Minimum charge 4 annas.

4. I estimate this would bring in revenue as under—

		RS.
Landing or shipping charge on present tonnage 515,000 tons at Rs. 1-4-0	6,43,750	
Less 10,000 tons not admissible into harbour, 8 annas per ton	5,000	
		6,38,750
Storage, including bonded warehouse		35,000
Wharfage (as at present)		7,000
Special rates—Horses, coin, &c. (as at present)		12,000
Water supplied to shipping (as at present)		6,000
Interest on capital (as at present)		16,000
Total ..		7,14,750

5. The trade now pays about as under on 515,000 tons of goods, viz.,—

	RS.
Harbour dues in all its varied forms	5,90,000
Interest on capital (shown above as item of receipt)	16,000
Godown rent to Collector of Sea Customs	30,000
Porterage charges on all goods not porteraged by Trust, viz., all exports—Imports—Timber—grain and other coasting cargo landed on the beach .. .. about	75,000
Boat-hire lowest all round computation at 12 annas per ton	3,81,250
Bagging on 170,000 tons coal at 6 annas	63,750
Wastage of coal at 2½ % on 170,000 tons = 4,250 at Rs. 13-0-0 ..	55,250
	12,11,250
Deduct charges as above ..	7,14,750
Annual saving to trade ..	4,96,500

6. With reference to the rough estimate of receipts it has to be seen whether this is sufficient to meet the additional charges—

	Rs.
The estimated charges this year amount to	6,90,000
Add interest on 30 lakhs at 4½ %	1,35,000
Total income required ..	8,25,000

The following deductions have, however, to be made as a dock cannot be completed for at least two years, during which capital is repaid, thus reducing interest; and large savings would be effected in porterage labour—

	Rs.	Rs.
Capital repaid Rs. 2,00,000—Interest	9,000	
Saving in porterage labour probably	40,000	
		49,000
Net income required ..		7,76,000
The estimated revenue collections as shown above amount to.	7,14,750	
Add Port and Pilotage fund contributions	45,000	
		7,59,750
Deficit ..		17,000

7. The above are rough estimates framed from my knowledge of the trade of the port—and the receipts will, in all probability, be largely exceeded owing to increasing tonnage, while the interest charges are reduced yearly by Rs. 4,500. Such sums as may be needed for protective works to the north are provided for by the cash balance of 6 to 7 lakhs now in hand, which would also meet any small deficits which may occur till increased tonnage revenue balances expenditure.

9. In paras. 4 and 5 I have excluded Port Fund dues as not being directly paid by the trade of the port, and as I do not think it would be necessary to levy any charge from shipping above that now levied, and I would submit that if the Board can give the merchants of Madras good docks in which their valuable goods (worth over Rs. 1,20,000,000 a year) can be handled with a minimum risk of loss from wet, damage, and pilfering and save them a round 5 lakhs a year, they ought to be satisfied with the arrangement, which will, I am sure, compare favourably with any port.

10. The result of docks would be that charges, as a whole, would stand at $\frac{7}{8}$ of present charges while on coal, which requires special protection, the charges would be as under per ton :—

	At present. Rs.	A.	P.	In dock. Rs.	A.	P.
Bagging	0	6	0	....		
Boat-hire	0	12	0	....		
Harbour dues	0	12	0	1	4	0
Carrying and stacking	0	4	0	....		
Loading	0	2	0	....		
Entry of vehicles	0	1	0	....		
Wastage 2½ % at Rs. 13 per ton	0	5	2	....		
Total .. at present ..	2	10	2	1	4	0
Total .. at dock ..	1	4	0			
Saving ..	1	6	2			

11. A further saving on coal would be effected if importers could arrange to put the vessels into the Board's hands for discharge when alongside of the quays. The five annas per ton now paid for stevedore work could be done by the Board for two annas per ton, a saving of annas 3 per ton; increasing the saving to Rs. 1-9-2 per ton, to which may be added the port due at Calcutta, viz., 2 annas per ton which has been remitted; and the quicker discharge in a dock, viz., three or four days instead of eight to ten days as at present, should have the effect of reducing freights. Altogether I think a saving of Rs. 2 per ton can be effected on coal.

12. I have taken capital expenditure at 30 lakhs, as a large part of the work planned by Mr. Wilson will not be required for many years if at all, and would remark, that one very marked advantage of Mr. Wilson's scheme, is, that the work of building such length of the south protecting mole, as may be necessary, can be carried on simultaneously with the building of the eastern quay wall of the dock, and as soon as these two walls are built, or even while they are building, dredging operations can be carried on, and an opening made to admit ships to the east quay. The advantage of this is, that probably within six months of the commencement of the work, berthing space will be available for coal ships, and the port in a position to compete with Singarini, by the time the East Coast Railway is opened.

From the Deputy Conservator of the Port of Madras, to the Secretary, Harbour Trust Board, dated Madras, 22nd March 1898, No. 87-H.

With reference to your letter No. 477 (*a*), dated 12th instant, I have the honour to furnish, for the information of the Trustees, particulars as to the average number of working hours steamers remain at Madras.

(*a*) Clan Line Home steamers outward bound, 45¾ hours.
(*b*) B.I. Home Line do. do. 16½ hours.

(*c*) Clan Line steamers Homeward bound, 64¼ hours.
(*d*) B.I. steamers Homeward bound, 12¼ hours.
(*e*) *British India steamers.*
I. Bound north, 14½ hours.
II. Bound south, 22 hours.
III. For Rangoon *vid* coast, 54 hours.
IV. For Rangoon direct, 13 hours.
V. For Singapore, 24 hours.
(*f*) *Asiatic steamers.*
I. Bound north, 9⅔ hours.
II. Bound south, 20¼ hours.
III. Rangoon Mail *vid* Port Blair, 28 hours.
(*g*) *Messageries Maritime steamers.*
I. Bound north, 7 hours.
II. Bound south, 9½ hours.
(*h*) *Austrian Lloyds.*
I. Bound north, 8 hours.
II. Bound south, 8¼ hours.
(*i*) German steamers, 32 hours.
(*j*) Coal steamers, 115 hours.
(*k*) Tank oil steamers, 16¾ hours.
(*l*) Kerosine oil case steamers, 125¼ hours.
(*m*) Horse steamers, 27¼ hours.
(*n*) Steamers.
I. To Natal or Mauritius with emigrants, 60 hours.
II. With return emigrants, 9 hours.
(*o*) Royal Indian Marine steamers trooping, 24 hours.

From the Deputy Conservator of the Port of Madras, to the Secretary, Harbour Trust Board, dated Madras, 22nd March 1898.

Agreeably to the request contained in your letter No. 461 (*c*), dated 5th instant, I have the honour to offer the following remarks upon Mr. Wilson's note, or estimate for a boat basin and note thereon by the Acting Secretary to Government, Marine Department.

2. It certainly appears to me better to construct a ship dock than the boat basin proposed, provided that it can be done without curtailing the present water area, or increasing, to any appreciable extent, its turbulence. All that would be gained by a boat basin would be shelter for boats, and small harbour craft in bad weather, more accommodation for them, facilities for discharge and loading of boats, and increased accommodation space for cargo on shore. But the distance for boats to ply would be considerably increased, and boat-hire would not therefore be decreased. A ship dock would give *all* the advantages of the boat basin and *none* of the disadvantages, and, in *addition*, it would give the increased accommodation space for ships which is at present needed (and which will probably be still more needed every year) and ships inside it would have still water to discharge overside into boats, on one side, and the quay on the other—a manner of working which proved so satisfactory at the jetties in Calcutta.

3. If ships with coal, iron and other large cargoes were accommodated in a dock, they would not only get quicker despatch, but they would not as now, by occupying berths in the outer harbour for sometimes 2 weeks (for which no extra charge is made) exclude other vessels which require accommodation for only a day, or perhaps a few hours, and to which delay of a day is much more serious than to those with full cargoes for Madras. There would not be the enormous wastage of coal and loss of iron, and other cargo overboard from vessels in a dock. The 10,000 tons of coal estimated to be at the bottom of the harbour would be reduced to about 100 or so in the same period. Boat-hire would necessarily be greatly decreased for these vessels, and probably none incurred in the case of coal and iron; and even if boats were used, the hire would be reduced in accordance with the distance they had to travel.

4. The weight or quantity lifted in and out by dock cranes in a hoist would be three or four times greater than by the ship's derricks, and the amount of each lift by the ship's derricks overside into or out of lighters could be quite double the amount now discharged or loaded in the present harbour, as very much larger and more commodious lighters could be used, and they could lie quietly alongside, and there would not be nearly as many accidents to boatmen.

5. I have heard it stated, promiscuously, that ships can do a better day's work overside into boats than alongside a quay or jetty, and the statement has been made with reference to Calcutta and the jetties there.

I have had considerable practical experience of the two methods, and I have never understood how it was possible that this statement could be correct, and I question it.

One thing I do know, and that is that it was very much cooler, less dusty, and less noisy, and generally very much pleasanter on board in the stream than alongside the jetties, and there was every inducement for the ship's people to try to believe the above statement; and if docks are made here, this will be one of the reasons for opposition, though of course it would never be so disagreeable as Calcutta.

6. Some 23 years ago I saw a steamer of 1,100 tons loaded at Santos with bags of coffee in 16 hours. It was "backed" in. I do not think such despatch even to-day could be obtained working overside from boats!

7. As the accommodation for vessels would be so much increased by a dock, no Sunday work would be necessary, as it is now, owing to want of space for vessels, and the congestion on the iron pier; the present scandalous state of affairs for the landing and embarkation of passengers would cease, and the port of Madras would no longer be, as it is rightly termed at persent, "a one horse place."

8. Vessels in dock would no longer find it necessary for safety to proceed to sea in the event of a cyclone, and any disabled or unseaworthy vessels, which might happen to be in harbour, could be placed inside in safety, instead of having to remain, and take their *almost certain* chance of being wrecked in the outer so-called harbour. Steamers in this harbour are very often unprepared to proceed to sea under 48 hours' notice, owing to their engines or boilers being under repair or overhaul.

9. I consider Mr. Wilson's general idea as the best yet proposed, and the site selected as the best apparently available; but I would prefer one immediately to the west of the North Beach road on the site now occupied by the Sea Custom House, Port Offices, Commissariat Offices, &c., and its shape should be oblong or square, and it should be much larger, so as to allow of steamers steaming in and out of it.

10. I do not agree with Mr. deWinton's view that the entrance should be further seawards. In fact, if it could be done, I would advocate the entrance being still further inshore, *as far inshore as is possible to put it*, as it stands to reason that the further from the entrance to the present harbour, the calmer it must necessarily be, *i.e.*, the less swell there can be, and it is the *swell* which causes vessels to heave and range, and not the surface sea. The position of the entrance as advocated by Mr. deWinton is, in my opinion, the worst which could be chosen both as regards rough water and as interfering more with the present outer harbour. That some individuals may never have seen the breaking wave running along the south arm does not alter the fact that such a wave does frequently do so. I have very often seen it, sometimes high enough to break over the arm, and a great many other people have seen it too. I think that accommodation in the dock for six ships would be ample to begin with;—at all events for some years to come—and if later on more was required, it should be made by extension of the dock to the southwards if possible, *i.e.*, if the present proposed site be adopted.

11. I would, however, recommend the dock being made at least half as long again, for two reasons; first, so as to allow plenty of room for boat accommodation, and their loading, and unloading, at the further end, clear of the ships, and the part required for their being moved in, and to reduce the congestion in the entrance, which would ensue if they had to go outside to discharge; and, secondly, to give more room for ships to be manœuvred in, and to allow of an extra 2 or 3 to go inside if bad weather threatened. The sides of the dock should be parallel to each other.

12. It is absolutely necessary to have a mole to protect the entrance, and also to assist in docking and undocking ships; but I do not think it should be more than 400 feet long, and the entrance could be reduced to 100 feet wide.

13. Vessels would have to be warped in and out, but this would not take more than about an hour, after a little practice.

14. The present No. 1 berth would be abolished, and possibly No. 2, but with the 5 fathom line dredged back to where Mr. Wilson proposes, there would be ample room for two other berths, or four if the iron pier be removed. A vessel could not be placed close alongside (*i.e.*, touching) the north pier quay as shown on plan (marked "Goa"), but she could lay within 10 feet of it.

15. It would never do to have a ship in the position where "Rewa" is placed in the plan, as she would be in the way of vessels entering or leaving, and there should be no outside knuckle on the mole, it should be flush with the entrance.

16. It will be seen from the above that I am only prepared, at present, to advocate the first part of Mr. Wilson's scheme. It will be time enough to consider further developments when more dock space is required. It may be found eventually that *every* vessel will prefer to enter a dock, and have still water and safety, to remaining in the present so-called harbour, if only for a day.

17. Should it be decided to have a dock, I would recommend its being provided with *all up-to-date conveniences*, such as hydraulic cranes for each hatchway, hydraulic capstains for docking, electric light for working at night, &c., &c. There would be several small details to go into before a final plan could be adopted, and I would suggest that, if the Board decide to have one, the Deputy Conservater should pay a visit to a few well-known docks which are known to be in approved working order, and make notes of all points in connection with the working of the same.

18. Messrs. Cayzer Irvine & Co., a very practical and successful firm of ship owners, who are very much interested in the port of Madras, have advocated the construction of an inner dock, and I think that too great importance cannot be attached to this fact.

19. The reason the Calcutta Dock is not a great success, is because a dock was not necessary there, there being already ample facilities for vessels in the stream, where they had calm water and jetties, and where they were if not quite safe, very much safer from the effects of a cyclone than they are in the present harbour of Madras.

Those who were only interested in the despatch of their ships, naturally protested against docks, as unnecessary under the circumstances, and suggested that if they were compelled to have them, they should be at Diamond Harbour and not at Kidderpore, and thus obviate the necessity of vessels navigating the most dangerous portion of the river, and also giving greater despatch than could even be obtained in Calcutta—and minimising considerably the chances of wreck—but other interests were too strong, and the docks were made in the wrong place.

20. With a dock at Madras the expenses of moorings would be considerably reduced, if all vessels were accommodated in it, and rafts to land heavy weights, and the attendant expenses, would no longer be necessary.

Fire on boardship in dock could be extinguished much easier than under present arrangements, as she could be assisted by the shore hydrants.

21. With regard to the direction of cyclones, and the remark that they generally come from the northward, I must point out that this is entirely incorrect. Cyclones generally approach the coast from the E.S.E. to S.E. The first cyclonic *wind* comes from between N.N.W. and N.N.E. according to the direction of the centre of the storm. The *heaviest swell* comes from the direction of the storm's centre, and as the storm centre approaches the wind veers, until it ultimately blows from the opposite direction, and the *worst sea* would then be in the N.W. corner of the harbour, and not the S.W. I do not understand how a floating caisson across the present harbour entrance could materially assist in giving still water, even if it could be placed and kept there, which I very much doubt; and if this was possible, it would have to be removed so often, that it might for all practicable purposes be away altogether. Moreover, with an ordinary swell, it would soon be knocked to pieces and sunk, and only cause an obstruction in the entrance.

From the Deputy Conservator of the Port of Madras, to the Chairman, Harbour Trust Board, dated Madras, 1st April 1898, No. 105 H.

In reply to your letter No. 544 (*C*), dated 30th ultimo, I have the honor to inform you that I do not anticipate that vessels in a still water dock in the sand accretion to the south of the harbour would be likely to carry away their moorings by wind pressure in a cyclone, any more than they might be in the docks at Calcutta and other places.

I would, however, point out that it might be found eventually that in order to secure *absolutely* still water in the dock during a cyclone, that a sinkable caisson gate was necessary, and this should be provided for. It could be kept in the dock and only placed into position when considered advisable by the Deputy Conservator.

If ships broke adrift by wind pressure, it would be attributable to the lines not being sufficiently strong, and all that would be necessary would be to see that they were so, and supplement the ship's lines by others if required, and of which a stock should be kept for the purpose.

From the Engineer, Harbour Trust Board, Madras, to the Chairman, Harbour Trust Board, dated Madras, 2nd April 1898, No. 8.

In reply to your letter No. 968 (*E*), dated 30th March, I have the honor to say that I consider a ship would be absolutely safe in a dock to the south of the south pier in a cyclone, if properly moored, and for that purpose the Board's Deputy Conservator would naturally adopt the best means obtainable.

2. It is not a question of calculations of wind pressure, &c., but one of experience of how the wind has acted upon the water, in the present harbour since the capping was added, and on this point, the Harbour Masters remarked to me, as soon as the capping was added to the pier, how much it had reduced the wind pressure, upon the vessel when nearing the piers. Any one who has noticed how quiet the sea is within 800 feet from either head of the piers, and under the eastern arms, during a strong wind and high sea, must also have noticed, that the wind does not act upon the water, or vessels in the harbour until well across the harbour, and as a dock would be 800 feet wide, or one-quarter the width of the harbour; the vessels in dock would not be exposed to any thing like the wind pressure they now stand inside the present harbour.

3. I do not believe that a vessel *could* part a cable due to wind pressure alone, but it is the wave motion, *added* to the wind pressure which does the damage, by bringing sudden strains upon the cables which they are not calculated to bear such strains, but as the water inside a dock would be absolutely calm, or free from a wave motion in a cyclone, there would be no sudden strain upon a vessel's hawsers, &c. There are other docks exposed to strong gales, without accident to the vessels in dock, and there is no reason why Madras should prove otherwise, and therefore whoever has raised the question now referred to me, must have lost sight of the facts that there will be no heavy swell or wave motion in the proposed dock or extension to the Madras Harbour, and hence no danger to vessels in a storm. If the swell which now enters the Madras Harbour could not be prevented from entering a dock, it would be *no improvement on the present harbour*, and in that case, I would be the last to propose a dock for Madras; but fortunately still water *can be secured* in a dock at Madras; as easily, as elsewhere.

From the Engineer, Harbour Trust Board, Madras, to the Chairman, Harbour Trust Board, dated Madras, 15th April 1898, No. 31.

I have the honor to acknowledge the receipt of G.O., No. 110, Marine, dated 11th February, communicating a note by Mr. F. J. Wilson on a boat-basin to the Madras Harbour, forwarded with your letter No. 879 (*E*), dated 1st March 1898, for my remarks.

Plans will follow.

2. In the above Government Order Mr. Wilson has carefully gone through, and referred to all former reports and plans for Harbour Improvements, and placed before the Board many points which most of the trustees have not had the opportunity of studying. A perusal of this report will help them

to decide what form the Harbour Improvements should take, but beyond going over well-considered reports, no new facts or arguments have therein been put forward, and we are still face to face with the old questions:—

A. Is a dock required?

B. Are more berths for steamers required; if so, would they best be provided by dredging out the present harbour, or would it not be better to *extend* the harbour through the south pier, and there provide additional berths for vessels in absolute still water, with part of the walls so built, that they can be used as wharves, alongside, and upon which, vessels could discharge cargo, coal, &c., if necessary. By such an *extension* to the harbour, a boat-basin would be provided at no extra cost, and if wharves are in years to come proved necessary, they can easily be formed, and the extension converted into a complete dock.

C. Is a boat-basin all that is required for the present; if not, would not the Harbour Extension B provide the requirements of A and C?

3. Mr. Wilson's note is accompanied by a portfolio containing all my plans for docks and boat-basins, but one which was submitted in May 1893, and was recorded with the Board's Resolution thereon; this plan has not been included, but the suggestions by the Chief Engineer, Public Works Department, alluded to hereafter, are identical with that scheme.

4. With these plans Mr. Wilson now submits a plan for a dock which developes into the present harbour by cutting it up into a series of moles and projecting arms; thereby making it almost impossible for a vessel to steam into the dock without the additional expenditure and assistance of steam tugs, which is a point all schemes hitherto have carefully avoided.

5. The plan would appear to be the result of a combination of portions of nearly all the former schemes, with the result that it is not the best that can be designed, as it interferes with the present berths in the harbour, and is in direct opposition to the views the Marine authorities; and these serious objections have been carefully studied by the Chief Engineer, Public Works Department, in his criticisms upon Mr. Wilson's proposals, and in doing so, his recommendations are identical with the plans I submitted in 1893 for Harbour Improvements, and which I now reproduce as an accompaniment to this letter, having marked in red upon the plans the modifications I would now propose, leaving it to the future to prove whether extra wharfage is necessary. Until such time, the scheme can remain as an *Extension to the Harbour*, providing extra berthage in absolute still water, a low level jetty for customs, and a wharf for landing and stacking coal direct from the ship's side. My letter No. 74, dated 5th May 1893, clearly explains the advantages to be gained by placing the wet basin as far east as possible, *viz.*, in a line with the eastern wall of the south pier, and thereby carrying the entrance to a quiet, safe, and deep water corner of the present harbour, where no expensive and objectionable protecting arm will be necessary, and consequently a great saving in cost, easy entrance, and no interference with the present arrangement of berths in the harbour.

6. As to the details of construction and cost of any such work, I do not think these points should be considered, until it is decided, *what is required*.

When once it has been laid down, what the requirements of the port are, it will be a very simple matter for an Engineer to draw up a plan to meet all requirements, but until this has been done, no satisfactory plan can be decided upon.

7. Before considering any form of improvement, I must first ask the Board to bear in mind the shallowing difficulties it has to face, with reference to the Harbour Entrance, and the rapidly increasing accretion of sand to the south of the harbour. Any improvements to the harbour should be money spent in a right direction, and that can only be in some work which will assist in keeping stored up, well to the south of the harbour, all sand accreting from the south, and so prevent it reaching and shoaling up the entrance, beyond the powers of dredging. I have already said, and it is my duty to repeat, that I do not believe dredging alone can save the Harbour entrance from shoaling, and that a groyne to the south of the south pier must be built to keep back the sand. With the assistance of a groyne the dredger may be able to remove the sand being thrown up from deep water, but to expect it to remove this sand, as well as the sand travelling along the coast, is in my opinion, an impossibility, but it has been decided to give the dredger a fair trial, and I think the results should be awaited.

8. A severe cyclone in this monsoon will prove how much sand will have to be dealt with, as the bank or slope of sand from the south pier curve, to the south pier head, is already steeper than the natural slope of the bed of the sea from east to west, while the natural sea bottom from south to north is level, as shown by all the contours in every Marine Survey; and therefore this bank of sand must be deposited in the entrance, as soon as there is sea enough to remove it. In para. 6 of G.O., No. 813M., dated 23rd November 1896, the Right Honourable the Secretary of State for India remarks: "I agree "with the view taken in the Consulting Engineer's report that until the doubts which still attach to "the stability of harbour, and its safety from the *encroachments of the sand are finally removed*, the "present proposals are all that can prudently be undertaken for its improvement"—

and Sir Alexander Rendel remarks: "But I do not wonder at the trustees hesitating, whilst "the harbour is untried in respect to the stability of its works and open to question in respect to "the maintenance of its depth, to do more than is absolutely necessary for the necessities of the "moment." With the sand difficulty before us, I do not think the trust should undertake to construct a dock or even a boat-basin which will not help the sand difficulty, but an *extension* to the harbour is considered necessary, and if part of the money to be so spent can save the harbour from shoaling, it should be sanctioned at once, and the line taken should be—

Plan A. To run out the groyne of stone, colored green on plan, to stay the sand to the south of it, while the action of this groyne to the north of it, will be to scour away the sand, and deepen the now shoaling entrance. When the groyne has reached the line of the outer straight of the south pier, a wall of large and small rubble stone, in line with the south pier, and in continuation of it, would be formed, and capped with old

concrete blocks, to be removed from the south pier wave-breakers when so enclosed by the mound of stone. This groyne, and mound of stone, would together form a sea wall which would rise to at least 13 feet above sea level, and it would also be lined with blocks placed along it, to prevent the stone from being displaced, raising it 19 feet above sea level.

9. When this wall had reached the south pier, and enclosed a still-water wet basin, it would be deepened by dredging, to enable a water-tight quay wall being built inside, or west of the stone mound, and the space between the new wharf wall, and the sea wall, would then be filled up with stone, and the whole faced with concrete blocks, which would make a more massive wall than the present harbour piers. This modification in the original plan is necessary, as so much shoaling has taken place outside the south pier since 1893. When the basin has been formed, I would then cut through the south pier and provide a ship entrance without any protecting arm. This basin or extension to the present harbour would provide extra berths, coal wharves, and a low level customs wharf for lighters, &c., without interfering with the present harbour.

10. The stone groyne would also arrest the sand for many years to come, and when the shore line had reached the end of it, all that would be necessary would be to extend it seawards.

11. The groyne is placed to the south of the south pier, so as to be at a sufficient distance from the entrance, as to allow a vessel missing the entrance, due to current or other causes, and yet be able to steer clear of it, while its action would be to scour the sand past the entrance, and so assist the dredging operations which I believe would then be able to deal with what sand might escape round the groyne, during the extensions; but without a groyne, I do not believe that a dredger will be able to maintain the required depth at the entrance to the harbour.

12. The cost of the extension as per plan A will be about 24 lakhs, and that of the completed dock, plan B, 35 lakhs in all, while the estimate for the boat-basin in the sand to the south of the south pier will cost as much as 14 lakhs, without providing any additional berths or quayage alongside which vessels can lay; and there is the objectionable protecting arm, and the risk of boats being swamped in bad weather from waves reflected from the south pier and the protecting arm.

13. In my opinion, any boat-basin which has its entrance through the south pier should not be nearer the shore line than 2,000 feet from the root of the pier, or the boats will never be able to enter the basin during heavy weather in a north-east monsoon, in which case the trade of the port will be brought to a standstill.

14. The estimate I prepared for the boat-basin has been cut down by omitting the concrete filling within the walls, and a proposal has been made to fill in the curbs with stone and sand, instead of concrete; this is a mistake, as unless the curbs are filled with concrete, they will certainly crack in settlement, and the curbs being in pieces, the sand will at once wash out, and free the stone with it.

15. The wall being thus lightened, and split in two for want of a solid hearting, will be overturned; I therefore cannot recommend the work being carried out in the manner suggested, and would ask the Board not to be led into the risk of experimenting in walls too light for the work, and therefore in considering the boat-basin estimate, I would ask the Board to be prepared to sanction the original estimate for curbs properly filled with concrete, if a boat-basin is to be built, but I am of opinion an *extension to the harbour* is what is required, as it will answer all purposes for the present, and is capable of development as an extension to the Harbour, a boat-basin, or a dock if necessary.

Harbour as at present.

Date.	Balance of capital advances to be repaid.	Invested funds and cash.	Receipts.				Expenditure.						+ or —	Remarks.
			Interest at 3½ per cent. on invested funds.	Surplus port funds.	Harbour dues.	Total.	Interest on capital expenditure.	Ordinary average expenditure.	Maintenance and repairs.	Engineer's establishment.	Refund of capital advances.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
End of—	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1897–98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	
1898–99 ...	47,80,000	7,68,365	23,378	40,000	† 5,13,853	5,77,231	2,15,100	† 2,16,647	1,00,000	25,000	1,00,000	6,56,747	— 79,516	
1899–1900 ...	46,80,000	6,88,849	20,595	40,000	5,15,000	5,75,595	2,10,600	2,18,000	1,00,000	25,000	1,00,000	6,53,600	— 78,005	
1900–01 ...	45,80,000	6,10,844	17,865	40,000	5,15,000	5,72,865	2,06,100	2,18,000	1,00,000	25,000	1,00,000	6,49,100	— 76,235	
1901–02 ...	44,80,000	5,34,609	15,197	40,000	5,15,000	5,70,197	2,01,600	2,18,000	1,00,000	25,000	1,00,000	6,44,600	— 74,403	
1902–03 ...	43,80,000	4,60,206	12,593	40,000	5,15,000	5,67,593	1,97,100	2,18,000	1,00,000	25,000	1,00,000	6,40,100	— 72,507	
1903–04 ...	42,80,000	3,87,699	10,055	40,000	5,15,000	5,65,055	1,92,600	2,18,000	1,00,000	25,000	1,00,000	6,35,600	— 70,545	
1904–05 ...	41,80,000	3,17,154	7,586	40,000	5,15,000	5,62,586	1,88,100	2,18,000	1,00,000	25,000	1,00,000	6,31,100	— 68,514	
1905–06 ...	40,80,000	2,48,640	5,188	40,000	5,15,000	5,60,188	1,83,600	2,18,000	1,00,000	25,000	1,00,000	6,26,600	— 66,412	
1906–07 ...	39,80,000	1,82,228	2,514	40,000	5,15,000	5,57,514	1,79,100	2,18,000	1,00,000	25,000	1,00,000	6,22,100	— 64,586	Dues insufficient to meet expenditure. Capital exhausted.
1907–08 ...	38,80,000	1,17,642	603	40,000	5,15,000	5,55,603	1,74,600	2,18,000	1,00,000	25,000	1,00,000	6,17,600	— 61,997	
1908–09 ...	37,80,000	55,645	...	...	...	...	...	...	...	...	...	...	...	

Harbour with Boat-basin, costing Rs. 10,20,000.

End of													
1897–98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	
1898–99 ...	53,00,000	7,68,365	23,379	40,000	† 5,13,853	5,77,232	2,38,500	2,00,000	1,00,000	25,000	1,00,000	6,63,500	— 86,268	
1899–1900 ...	57,50,000	6,82,097	20,359	40,000	5,15,000	5,75,359	2,58,750	2,00,000	1,00,000	25,000	1,00,000	6,82,750	— 1,08,391	
1900–01 ...	56,50,000	5,73,706	16,566	40,000	5,15,000	5,71,566	2,54,250	2,00,000	1,00,000	25,000	1,00,000	6,79,250	— 1,07,684	
1901–02 ...	‡ 55,00,000	4,66,022	12,797	40,000	5,15,000	5,67,797	2,47,500	2,00,000	1,00,000	25,000	1,00,000	6,72,500	— 1,04,703	
1902–03 ...	54,00,000	3,61,319	9,053	40,000	5,15,000	5,64,053	2,43,000	2,00,000	1,00,000	25,000	1,00,000	6,68,000	— 1,03,947	
1903–04 ...	53,00,000	2,57,372	5,337	40,000	5,15,000	5,60,337	2,38,500	2,00,000	* 1,00,000	25,000	1,00,000	6,63,500	— 1,03,163	
1904–05 ...	52,00,000	1,54,209	1,647	40,000	5,15,000	5,56,647	2,34,000	2,00,000	1,00,000	25,000	1,00,000	6,59,000	— 1,02,353	Dues insufficient to meet expenditure. Capital exhausted.
1905–06 ...	51,00,000	51,856	...	40,000	5,15,000	5,55,000	2,29,500	2,00,000	1,00,000	25,000	1,00,000	6,54,500	— 99,000	

* Includes value of Dredger *Wenlock*. † Average 1893—98. ‡ Saving in labour, Rs. 18,000. § Rs. 50,000, sale of tools and plant.

Harbour with two subsidiary Piers, costing Rs. 8,20,000

Date.	Balance of capital advances to be repaid.	Invested funds and cash.	Receipts.				Expenditure.						+ or —	Remarks.
			Interest at 3½ per cent. on invested funds.	Surplus port funds.	Harbour dues.	Total.	Interest on capital expenditure.	Ordinary average expenditure.	Maintenance and repairs.	Engineer's establishment.	Refund of capital advances.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
End of—	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1897–98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	
1898–99 ...	52,00,000	7,68,365	23,379	40,000	† 5,13,853	5,77,232	2,34,000	† 2,16,647	1,00,000	25,000	1,00,000	6,75,647	— 98,415	
1899–1900 ...	55,00,000	6,69,950	19,934	40,000	5,15,000	5,74,934	2,47,500	2,18,000	1,00,000	25,000	1,00,000	6,90,500	— 1,15,566	
1900–01 ...	54,00,000	5,54,384	15,889	40,000	5,15,000	5,70,889	2,43,000	2,18,000	1,00,000	25,000	1,00,000	6,86,000	— 1,15,111	
1901–02 ...	53,00,000	4,39,273	11,861	40,000	5,15,000	5,66,861	2,38,500	2,18,000	1,00,000	25,000	1,00,000	6,81,500	— 1,14,639	
1902–03 ...	52,00,000	3,24,634	7,848	40,000	5,15,000	5,62,848	2,34,000	2,18,000	1,00,000	25,000	1,00,000	6,77,000	— 1,14,152	
1903–04 ...	51,00,000	2,10,482	3,853	40,000	5,15,000	5,58,853	2,29,500	2,18,000	1,00,000	25,000	1,00,000	6,72,500	— 1,13,647	
1904–05 ...	50,00,000	96,835	...	...	...	...	...	...	...	...	...	...	...	Dues insufficient to meet expenditure. Capital exhausted.

Harbour with two subsidiary piers and boat-basin, costing Rs. 18,00,000.

1897–98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	
1898–99 ...	57,20,000	7,68,365	23,378	40,000	5,13,853	5,77,231	2,57,400	2,16,647	1,00,000	25,000	1,00,000	6,99,047	— 1,21,816	
1899–1900 ...	65,70,000	6,46,549	19,129	40,000	5,15,000	5,74,129	2,95,650	2,18,000	1,00,000	25,000	1,00,000	7,34,150	— 1,65,780	
1900–01 ...	64,70,000	4,82,028	13,370	40,000	5,15,000	5,68,370	2,91,150	2,18,000	1,00,000	25,000	1,00,000	7,26,500	— 1,63,932	
1901–02 ...	‡ 63,00,000	3,16,248	7,568	40,000	5,15,000	5,62,568	2,83,508	2,18,000	1,00,000	25,000	1,00,000	7,22,000	— 1,65,280	
1902–03 ...	62,00,000	1,52,316	1,720	40,000	5,15,000	5,56,720	2,79,000	2,18,000						Dues insufficient to meet expenditure. Capital exhausted.

* Includes value of *Wenlock*. † Average 1893—98. ‡ Rs. 70,000, sale of tools and plant.

Docks, Rs. 40,00,000.

Date End of.	Balance of Capital advances to be repaid.	Invested funds and cash.	Receipts. Interest at 3½ per cent.	Surplus port funds.	Harbour dues.	Total.	Expenditure. Interest on capital expenditure.	Ordinary average expenditure.	Repairs and maintenance.	Engineer's establishment.	Refund of capital advances.	Total expenditure.	+ or —	Remarks.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1897–98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	
1898–99	47,80,000 / 10,00,000	7,68,365	23,378	40,000	† 5,13,853	5,77,231	2,30,000	2,18,000	1,00,000	25,000	1,00,000	6,73,000	— 95,769	
1899–1900	56,80,000 / 20,00,000	6,72,766	19,000	40,000	5,15,000	5,74,000	3,00,000	2,18,000	1,00,000	25,000	1,00,000	7,43,000	— 1,69,009	
1900–01	75,80,000 / 10,00,000	5,03,766	16,000	40,000	5,15,000	5,71,000	3,63,000	2,18,000	1,00,000	25,000	1,00,000	8,06,000	— 2,35,000	
1901–02 ...	84,80,000	2,68,766	8,000	40,000 § 3,20,000	5,15,000	8,83,000	3,82,000	‡ 2,00,000	1,00,000	25,000	1,00,000	8,07,000	+ 76,000	
1902–03 ...	83,80,000	3,45,000	12,000	40,000	8,35,000	8,87,000	3,77,500	‖ 1,80,000	1,00,000	25,000	1,00,000	4,82,500	+ 1,04,500	
1902–03 ...	¶ 82,00,000	4,49,500	15,000	40,000	8,35,000	8,90,000	3,69,000	1,80,000	1,00,000	25,000	1,00,000	7,74,000	+ 1,16,000	
1903–04 ...	81,00,000	5,65,500	18,000	40,000	8,35,000	8,93,000	3,64,500	1,80,000	1,00,000	25,000	1,00,000	7,69,500	+ 1,23,500	
1904–05 ...	80,00,000	6,89,000	20,000	40,000	8,35,000	8,95,000	3,60,000	1,80,000	1,00,000	25,000	1,00,000	7,65,000	+ 1,30,000	
1905–06 ...	79,00,000	8,19,000	25,000	40,000	8,35,000	9,00,000	3,55,500	1,80,000	1,00,000	25,000	1,00,000	7,60,500	+ 1,39,500	
1906–07 ...	78,00,000	9,58,500	30,000	...	8,35,000	8,65,000	3,51,000	**1,00,000 1,80,000	1,00,000	25,000	1,00,000	8,56,000	+ 9,000	
1907–08 ...	77,00,000	9,67,500	35,000	...	8,35,000	8,70,000	3,46,500	2,80,000	1,00,000	25,000	1,00,000	8,51,500	+ 18,500	
1908–09 ...	76,00,000	9,86,000	36,000	...	8,35,000	8,71,000	3,42,000	2,80,000	1,00,000	25,000	1,00,000	8,47,000	+ 24,000	
1909–10 ...	75,00,000	10,10,000	37,000	...	8,35,000	8,72,000	3,37,500	2,80,000	1,00,000	25,000	1,00,000	8,42,500	+ 29,500	
1910–11 ...	74,00,000	10,39,500	38,000	...	8,35,000	8,73,000	3,33,000	2,80,000	1,00,000	25,000	1,00,000	8,38,000	+ 35,000	
1911–12 ...	73,00,000	10,34,500	39,000	...	8,35,000	8,74,000	3,28,500	2,80,000	1,00,000	25,000	1,00,000	8,33,500	+ 40,500	Pilotage fees could be remitted Rs. 40,000.
1912–13 ...	72,00,000	11,15,000	40,000	...	8,35,000	8,75,000	3,24,000	††3,20,000	1,00,000	25,000	1,00,000	8,69,000	+ 6,000	
1913–14 ...	71,00,000	11,21,000	40,000	...	8,35,000	8,75,000	3,19,500	3,20,000	1,00,000	25,000	1,00,000	8,64,500	+ 10,500	
1914–15 ...	70,00,000	11,31,000	40,000	...	8,35,000	8,75,000	3,15,000	3,20,000	1,00,000	25,000	1,00,000	8,60,000	+ 15,000	
1915–16 ...	69,00,000	11,46,000	41,000	...	8,35,000	8,76,000	3,10,500	3,20,000	1,00,000	25,000	1,00,000	8,55,500	+ 20,500	
1916–17 ...	68,00,000	11,66,500	42,000	...	8,35,000	8,77,000	3,06,000	3,20,000	1,00,000	25,000	1,00,000	8,51,000	+ 26,000	
1917–18 ...	67,00,000	11,92,500	43,000	...	8,35,000	8,78,000	3,01,500	3,20,000	1,00,000	25,000	1,00,000	8,46,500	+ 31,500	
1918–19 ...	66,00,000	12,24,000	44,000	...	8,35,000	8,79,000	2,97,000	3,20,000	1,00,000	25,000	1,00,000	8,42,000	+ 37,000	
1919–20 ...	65,00,000	12,61,000	45,000	...	8,35,000	8,80,000	2,92,500	3,20,000	1,00,000	25,000	1,00,000	8,57,500	+ 42,500	Porterage dues could be remitted.
1920–21 ...	64,00,000	13,03,500	47,000	...	* 7,50,000	7,97,000	2,88,000	3,20,000	1,00,000	25,000	1,00,000	8,33,000	— 36,000	Rs. 85,000 deducted.
1921–22 ...	63,00,000	12,67,500	46,000	...	7,50,000	7,96,000	2,83,500	3,20,000	1,00,000	25,000	1,00,000	8,28,500	— 32,500	
1922–23 ...	62,00,000	12,35,000	45,000	...	7,50,000	7,95,000	2,79,000	3,20,000	1,00,000	25,000	1,00,000	8,24,000	— 29,000	
1923–24 ...	61,00,000	12,06,000	44,000	...	7,50,000	7,94,000	2,74,500	3,20,000	1,00,000	25,000	1,00,000	8,19,500	— 25,500	
1924–25 ...	60,00,000	11,80,500	43,000	...	7,50,000	7,93,000	2,70,000	3,20,000	1,00,000	25,000	1,00,000	8,15,000	— 22,000	
1925–26 ...	59,00,000	11,58,500	42,000	...	7,50,000	7,92,000	2,65,500	3,20,000	1,00,000	25,000	1,00,000	8,10,500	— 18,500	
1926–27 ...	58,00,000	11,40,000	41,000	...	7,50,000	7,91,000	2,61,000	3,20,000	1,00,000	25,000	1,00,000	8,06,000	— 15,000	
1927–28 ...	57,00,000	11,25,000	40,000	...	7,50,000	7,90,000	2,56,500	3,20,000	1,00,000	25,000	1,00,000	8,01,500	— 11,500	
1928–29 ...	56,00,000	11,13,500	40,000	...	7,50,000	7,90,000	2,52,000	3,20,000	1,00,000	25,000	1,00,000	7,97,500	— 7,000	
1929–30 ...	55,00,000	11,06,500	40,000	...	7,50,000	7,90,000	2,47,500	3,20,000	1,00,000	25,000	1,00,000	7,92,500	— 2,500	
1930–31 ...	54,00,000	11,04,000	40,000	...	7,50,000	7,90,000	2,43,000	3,20,000	1,00,000	25,000	1,00,000	7,88,000	+ 2,000	Harbour dues could be reduced.

* Includes value of dredger *Wenlock*.
† Average of 1893—98.
‡ Saving in labour Rs. 18,000.
§ Dock dues @ one rupee per ton.
‖ Labour saving Rs. 20,000.
¶ Sale of surplus tools and plant Rs. 80,000.
** Rs. 140,000 port dues remitted and charged against harbour dues.
†† Includes Pilotage expenditure charged to harbour dues.

C. PINSENT,
Secretary, Harbour Trust Board.

MADRAS, 18*th April* 1898.

From C. PINSENT, Esq., Secretary, Harbour Trust Board, Madras, to the Chairman, Harbour Trust Board, Madras, dated 18th April 1898, No. 228.

I have the honour to submit herewith, as directed, financial forecasts of receipts and charges (*a*) for the harbour as at present, (*b*) with boat-basin costing Rs. 10,20,000, (*c*) two subsidiary piers costing Rs. 8,20,000, (*d*) the two combined piers and boat-basin, Rs. 18,00,000, and (*e*) docks, Rs. 40,00,000.

2. In the previous forecast made in 1896, when it was proposed to issue a debenture loan to repay the advances outstanding due to Government, the balance of invested funds and cash at the end of the official year 1897–98 was estimated at Rs. 9,57,000; the actuals, after paying unexpectedly heavy demands on account of the Engineer's department, have proved to be Rs. 9,23,000 in round figures, including the value of the dredger *Wenlock*.

3. The first line, in all cases, for the purposes of the present calculations has been based on the budget estimate for 1898–99, and shows a deficit of Rs. 1,56,635.

4. In the previous forecast the income from harbour dues was stated at Rs. 4,95,000, rising to Rs. 5,60,000; it is now taken at Rs. 5,15,000, against an average for 1893—98 of Rs. 5,13,853. No allowance has been made for increase of trade, and in view of the possible loss of, or a great reduction in, the coal trade, it is open to question whether Rs. 5,15,000 is not too high a figure. Coal, however, will pay only 8 annas net, if the proposed reduction in porterage is sanctioned, and the income from that source is therefore only Rs. 80,000. The total estimated receipts from dues for the current year are Rs. 5,53,100 or Rs. 38,000 more than the average taken. If the receipts in future are maintained all round except in the case of coal, half the coal trade may be lost before the figure Rs. 5,15,000 becomes the actual income.

If the average income should prove to be under-estimated at Rs. 5,15,000, the financial position would be improved accordingly.

The average expenditure for the past five years 1893—98 has been Rs. 2,16,647; the sum of Rs. 2,18,000 has been taken.

Provision has been made to the extent of Rs. 1,00,000 for maintenance and repairs, and Rs. 25,000 for the Engineer's establishment. In the previous forecasts Rs. 40,000 to Rs. 46,000 only were provided. Dredging has now to be taken into consideration. The Engineer says Rs. 1,25,000 is not too much, but probably enough on the average.

5. Owing to this increase in expenditure, receipts under present conditions will prove inadequate to meet expenses, and, in ten years' time, harbour dues would have to be raised. With a boat-basin or subsidiary piers, or both invested funds are still sooner exhausted, and dues must be raised at earlier dates.

6. The boat-basin is taken as costing Rs. 10,20,000; but the Engineer informs me that it cannot be built for less than Rs. 14,00,000; if so, the position would be more unfavourable.

7. The subsidiary piers, suggested by the Chamber of Commerce, are stated as costing Rs. 8,20,000. It is impossible to say whether this is correct or how far out, in the absence of an estimate from the Engineer; who informed me that, if built like Gopalpore pier only 20 feet wide, the cost would be only Rs. 3,00,000; but on this width cranes could not be worked, there would be only two lines of rails, and the Traffic Manager says it would therefore be useless for general cargo. Again, the Engineer tells me that if the subsidiary piers are to be built as broad as the present pier, the two will cost not less than if did—£107,000 or say Rs. 15,00,000. I have merely split the difference, and taken loss Rs. 8,20,000.

8. In the case of docks Mr. Wilson's estimate is 384 lakhs; I have allowed 40 lakhs.

9. While with either boat-basin or extra piers, or both combined, harbour dues must, sooner or later, be raised, it is different in the case of docks.

Up to completion heavy deficits must occur, in consequence of additional payments for interest, the rate of which has throughout been reckoned at 4½ per cent.

10. On completion of the docks, I have taken a dock due of one rupee per ton on 320,000 tons of cargo imported and exported. This excludes the tonnage of coal, coke, and kerosine oil imported, and of salt exported, which articles might be exempted from payment of dock dues.

The managing owners of the Clan Line have suggested that a dock due should be levied as against the saving in boat-hire, and this is stated to be "one rupee per ton all round." The dock would, therefore, impose no extra charge on the trade of the port, and a large surplus revenue is at once the result of charging a dock due in lieu of boat-hire.

11. In dealing with this surplus I have suggested that port dues should first be abolished; this eliminates the item Rs. 40,000 surplus port funds from receipts, and adds also a charge of Rs. 1,00,000 to the expenditure, Port funds collected being about Rs. 1,40,000, paid by steamers. This should be popular with owners, and tend to the advantage of Madras as a port of call.

12. The surplus being still considerable, pilotage fees Rs. 40,000 could next be remitted, and the expenses of the Harbour Masters' establishment charged to revenue. These reductions, when feasible, have been approved in principle by the trustees.

13. The next reduction practicable would be porterage dues, and these to the extent of Rs. 85,000 are deducted from receipts in 1920–21.

14. Then comes a rather extended period of deficits; but notwithstanding previous reductions, it is to be noted that capital investments have been kept intact, and funds are ample to meet all requirements up to 1930–31, when 11 lakhs invested, and a small surplus revenue, a beginning might be made to reduce harbour dues, from the rate calculated since 1901–902, *viz*, Rs. 1–2–0 per ton, that is 12 annas as at present, and one rupee in lieu of boat-hire.

The above may be summarised as follows:—

If maintenance and repairs of the *harbour as at present* (*a*) is to cost on an average Rs. 1,25,000 per annum, the dues must be raised.

Boat-basin.—Rs. 10,00,000 (*b*) dues must be raised; and if the cost is to be Rs. 14,00,000, as stated by the Engineer, deficits to be met will be larger.

Subsidiary Piers.—(*c*) Dues must be raised, to what extent depends upon the cost of construction.

(*b*) *and* (*c*).—In the absence of exact information as to cost, that is, whether the boat-basin will cost ten or fourteen lakhs, and whether the piers will cost three lakhs or fifteen, these forecasts merely illustrate that harbour dues must be raised sooner or later; and in the case of the two combined (*d*) the necessity is emphasised.

Docks (*e*).—The estimate is 38¼ lakhs. Docks will pay their way and effect economy if 40 lakhs are spent; and if it is found necessary to construct a northern entrance, or incur other heavy capital expenditure, the surplus could be used for payment of additional interest upon outlay, instead of in reduction of dues.

P.S.—Since the accompanying calculations were made, and the above letter printed, the Order of Government upon the Budget Estimate for the current official year has been received, and as it is therein stated that no surplus Port funds will be available for transfer for the next year or two, owing to Lighthouse expenditure, and as Government has not passed the proposal to reduce porterage charges on coal, the forecasts will have to be modified as follows:—

Receipts.—Port funds *minus* Rs. 90,000, porterage on coal *plus* Rs. 41,000. *Charges.*—Sir Alexander Rendel *plus* Rs. 11,000. These alterations equal a net *minus* of Rs. 60,000 for 1898–99, to which must be added Port fund surplus *minus* Rs. 40,000 in 1899–1900. Total deduction, say, Rs. 1,00,000 in round figures, up to the end of 1899–1900.

This will exhaust the Board's invested funds sooner than shown in the forecasts for either boat-basin or extra piers, or both combined; but in the case of docks would merely postpone the suggested reductions in port and pilotage dues, and subsequently in porterage and harbour dues.

(2)

From the Honourable Mr. G. G. Arbuthnot, Chairman, Chamber of Commerce, Madras, to the Chairman, Harbour Trust Board, Madras, dated Madras, 14th May 1898.

Your letter No. 55, dated the 21st ultimo, forwarding certain papers referring to the Madras Harbour Improvements, and requesting an expression of the Chamber's opinion on the relative advantages of the three proposals of the trustees mentioned therein, has been under consideration by the Chamber. After due deliberation and discussion, the Chamber is disposed to support the view, broadly stated, that the time has not yet arrived for docks and that it is doubtful whether the trade of the port could afford to pay for such a luxury. In the Chamber's opinion, however, a boat-basin is urgently required, such as will afford facilities for the discharge of cargo boats and cheapen the landing of goods. It is nevertheless very desirable, the Chamber thinks, that this boat-basin should be constructed so that it could eventually be fitted in with a larger scheme for docks, should the construction of these eventually appear to be justified. As to how a boat-basin of the kind suggested could best be constructed, this is an engineering question which can only be decided by the professional advisers of the Board. The Chamber, however, trusts that, in any plan that is devised the arrangements for landing coal will be kept separate and distinct from those for landing general cargo so that the latter may not in any way suffer from coal dust.

In conclusion, the Chamber would be glad to have an assurance that before a final decision is arrived at, and before any plans are definitely sanctioned, a final opportunity will be given to its members and others interested to express their views with regard to the same.

(3)

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board, on Friday, the 27th day of May 1898.

* * * * *

10. Read letter from the Chairman, Chamber of Commerce, replying to reference No. 55, dated 21st April, regarding proposed harbour improvements.

Read minutes by Trustees.

G.O., Marine, No. 110, dated 11th February 1898, forwarding, for such remarks and recommendations as the Board may desire to offer, papers relating to the construction of a boat-basin in connection with the harbour was then again taken into consideration and discussed.

Resolved (*a*) that the Board, as now constituted, is of opinion that the landing of coal should not take place in proximity to other goods, and that therefore the two plans for boat basins now under consideration must be rejected on that account if for no other reasons;

(*b*) that the dues and charges now paid by the trade of the port cannot bear enchancement;

(*c*) that having regard to the increase in charges which must necessarily follow the construction of a boat-basin, the Board, as at present constituted, is of opinion that no boat-basin should be constructed (Mr. Black dissenting);

(*d*) that, before committing itself to a large scheme for providing docks, the Board determines to call for plans and estimates for erecting one or more subsidiary jetties with the necessary cranes, trucks, lines and connections with the Custom House sufficient to meet the deficiencies of the present arrangements on the iron screw pile pier;

(*e*) the question of landing coal will be considered in Committee.

(4)

Letter from the Trades Association dated 28th May 1898.

I have the honour to acknowledge your letter, No 54, dated the 21st April, inviting the opinion of this Association on the three schemes for the improvement of the Madras Harbour as detailed in the papers accompanying yours under reply.

I regret the delay in answering your reference owing to unavoidable difficulty in obtaining the views of *all* the Members of the Association. The papers you have sent have been very carefully considered, but they show such a divergence of opinion on the part of the Members of the Harbour Trust Board, the engineering experts, the representatives of the various steamship companies and the Members of the Chamber of Commerce, that it is a very difficult matter to decide what is the best plan for improving the admittedly defective facilities of the harbour for landing and shipping goods.

After due consideration, the Members of the Trades Association have come to the conclusion that the present trade of the port and the uncertain future effects of the East Coast Railway and improvements to northern ports on the imports and exports here, do not justify the expenditure that the dock scheme will involve.

The Members believe that a boat-basin to the south of the south groyne where goods could be landed direct on the quays according to the plan last adopted by the Harbour Trust Board (with possible modifications) would give facilities now wanting, or, as Sir A. Rendel puts it "a sheltered basin and a quay for boats will remedy the worst part of the present disadvantages of the port." It is, however, considered that other arrangements should be made for the landing of coal as it is obviously objectionable that this should be done in a basin where other goods are dealt with.

The Members desire to point out that the present delay in landing and shipping goods on and from the pier would be materially lessened if all the cranes (instead of two only as at present) were worked by steam. The use of hand-power cranes on the pier is an anachronism that should have been abolished long ago.

The Association believe that it does not pass the ingenuity of Engineers to construct a boat-basin at a moderate cost that could (should the need arise) be expanded into docks and they therefore are in favour of this scheme, in preference to the construction of docks.

There appears to be no finality in the proposals made for improving the harbour, for no sooner is one scheme adopted than another is brought forward, and it is greatly to be desired that something definite should be settled on and carried out without further delay.

(5)

Note by the Chairman:—

Mr. Black has said that his criticisms of the financial aspect of the proposal to construct docks remain unanswered. In what follows I have extracted the various criticisms and supplied the necessary answers as briefly and uncontentiously as possible.

Mr. Black's criticisms.	Replies thereto.
(1) "Estimates almost proverbially have an unpleasant tendency to expand, and before launching out on a scheme of this sort we should be well assured on this point."	(1) If the work, as estimated for, be given out to a respectable firm of contractors, there is good reason to hope that it will be completed for the sum provided.
(2) "Is no provision to be made for repayment of the contemplated loan?"	(2) Provision has been made, *vide* Secretary's forecast. Section 31 of the Harbour Trust Act runs as follows:—"No sum larger than one lakh of rupees per annum shall be at any time so repayable by the said Board to the said Secretary of State." Therefore no commencement can be made towards repaying the contemplated loan till the existing capital debt has been repaid.
(3) "Or for repairs, renewals, and upkeep of the docks, wharves and sheds."	(3) Provision has been made. Taking the actuals of the eight years ending 1897–98, the average amount annually spent on petty construction and repairs of all kinds was Rs. 25,495. This is exclusive of a large sum spent on the screw pile pier, which will, of course, not be maintained, if either docks or boat-basin are built. The amount provided in the forecast is Rs. 1,00,000, *i.e.*, nearly four times what has hitherto been spent. The heavy masonry of either dock or boat-basin will require next to no repairs.
(4) "Has any allowance been made for dredging?"	(4) This is included in the Rs. 1,00,000 provided for "Petty construction and repairs." Dredging is not likely to be a heavy item. When working at Pamben the *Wenlock* is said to have cost 2 annas 6 pies per cubic yard dredged. The cost should certainly be less at Madras The cost is made up of (1) fuel, (2) establishment, (3) contingencies.

Mr. Black's criticisms.

		Rs.	
1 Engineer	.. ..	100	
1 Sarang	.. ..	60	
2 Firemen at Rs. 30	..	60	
1 Pump Driver	.. ..	60	
1 Gauge Driver	.. ..	30	
1 Crane Driver	.. ..	25	
1 Sukani	.. ..	25	
6 Lascars at Rs. 15	..	90	
2 Hoppermen at Rs. 20		40	
1 Greaser	.. ..	20	
1 Assistant Pump Driver		30	
		540	× 12
			=6,480
Contingencies	.. ..		1,020
			7,500

(5) "The capital outlay is assumed to be only 30 lakhs."

(6) 'Interest is calculated at 4½ per cent.'; it will, I think, be generally admitted that the future of the money market is so very uncertain, that it is open to grave doubt if funds could be raised on such terms.''

Replies thereto.

When doing her own hoppering in a day of 12 hours the *Wenlock* consumes about 22 cwts. of coal. To be on the safe side 25 cwts. are taken. Allowing 20 working days per mensem, she will use $1\frac{1}{4} \times 20 = 25$ tons of coal per mensem, costing, say, Rs. 15 per ton = Rs. 4,500 per annum.

At Pamben the *Wenlock* had a very expensive establishment, including an Engineer on Rs. 300, and a gunner-carpenter on Rs. 150. The crew had provisions found. At Madras the establishment would be somewhat as in the margin. The total cost of working the dredger would then be—

	Rs.
Fuel	4,500
Establishment	6,480
Contingencies	1,020
Total ..	12,000

(5) This is obviously a mistake. In the Secretary's forecast an outlay of 40 lakhs is assumed.

(6) The necessary loan will be obtained, as always hitherto, from Government, which so long as it is satisfied of the soundness of the Harbour Board's proposals, will undoubtedly advance the necessary funds. Interest on such advances is fixed by section 30 of the Act at 4½ per cent. If Government will not advance the necessary capital, it will be impossible to proceed with any scheme of improvement.

In conclusion, I may point out that Mr. Black's criticisms, 1, 2, 3, 4 and 6 above, apply equally to boat-basin and docks: and that whereas any extra expenditure entailed by the former must be met by additional imposts on the trade of the port; in the case of docks there will be no additional impost until the extra expenditure exceeds the amount saved by abolition of landing charges.

(Intld.) J. N. A.
21-6-1898.

The greater part of Mr. Black's minute of the 8th June is taken up with arguments to show that the Board cannot afford a dock, but as it has been already acknowledged that any other form of improvement involving considerable capital expenditure will also involve an increase of dues, and as it is also acknowledged that some form of improvement or other is necessary, it seems to me that we should not abandon the idea of forming a dock until it is conclusively shown that the resources of the port are insufficient. I consider Mr. Black's arguments are not conclusive on this point as they are based on many assumptions.

First of all he assumes that no fully equipped dock can be made for less than 40 lakhs, and indeed, say, he thinks it not improbable that it might cost 60 lakhs, but I think it is quite unnecessary to be so sceptical as to the cost of a dock provided, we have a carefully prepared detailed estimate providing for everything that the Board wants. The large estimates referred to by Mr. Black provided for larger docks than now proposed, included provision for graving docks and showed no details which could be examined. The cost of dredging is less than it used to be owing to the introduction of pump dredgers. The estimate of Rs. 96,65,434 for instance was for a 36-acre dock including provision for *two graving docks*. The amount of the series of estimates which comprise what I have called the first and second stages and which are now before the Board for remarks is Rs. 38,28,000. All details are shown. Whatever is considered unnecessary by the Board may be struck out and provision made for any items that it is considered should be added. The scheme is, of course, only one out of many that could be made, and the cost of the scheme can no doubt be materially altered in either direction according to what is provided for.

It has been suggested for instance that the mole provided for is unnecessarily long, and that by moving the entrance further seaward the dredging provided for in the present harbour could be omitted. As to the matter of equipment I don't think there is any necessity to make a mere guess as to what should be provided, and the Board itself is in the best position to say what this should be. I have not unfortunately got copies of the estimates with me, but I may safely assume that the only equipment provided for in the estimates is that for sheds. It is for the Board to say whether the number and size of sheds provided is sufficient. The other items of a dock equipment are cranes, buoys, offices and railway lines. As to cranes all the latest constructed docks are provided with a hydraulic system with moveable hydraulic cranes. On the other hand many docks have not got such a system and are only provided with a few stationary cranes for lifting heavy weights; up to 12 or 13 years ago, at any rate I have it on the authority of Mr. Vernon Harcourt that most of the loading and unloading at Liverpool was done by the vessel's own steam winches. The Board is already possessed of a stock of cranes including an all-round crane to lift 40 tons which are, I presume, sufficient at present to handle the trade of the port. Renewals of this stock would be a revenue charge and need not find a place in a dock estimate. I think, therefore, that a hydraulic system need not be considered for the present and that it would be safe to provide for, say, 10 cranes at Rs. 7,000 each. Three buoys

moored in the centre of such a dock, as is estimated for, would be sufficient, and as some of the ship berths in the harbour would be taken up, it seems hardly necessary to make provision for these. As to offices the cost of the present offices might be added. As to railway lines, I have an idea that some provision was made, but allowing 2 miles of railway at Rs. 20,000 per mile should be ample. If we take Rs. 30,000 for offices, the sum to be added to the estimate of Rs. 38,28,000 is Rs. 1,40,000 or altogether Rs. 39,68,000. Fencing might perhaps be added, but the Board is going to fence in any case. I can think of no other equipment necessary, and I therefore see no reason for assuming that a dock equipped in this way and of the description estimated for should cost more than 40 lakhs. Any estimate should, of course, be carefully scrutinized by some one other than the estimator before being actually sanctioned. As regards rates, the only items about which there is any uncertainty are dredging and the sinking of curbs forming the walls, classes of work that have not previously been done in Madras. On the other hand, as I have indicated above, suggestions have been made which would reduce the estimate I have made out roughly, that by moving the entrance to about 1,100 feet from the shore and of the groyne, omitting the dredging in the harbour and the quay at the north side and by shortening the mole to 600 feet that with the items of equipment described above, the estimate could be reduced to something over 37 lakhs.

Under the circumstances, as the amount of the estimate is so important, I would suggest that the Board decide on a limit of expenditure which it *can* afford to pay for a dock of the size and description estimated for, and then to ask Government to obtain an opinion as to whether the present or any other scheme can be executed for the money.

As regards the fixing of this sum, I would point out that the financial prospects of a dock scheme have been greatly damaged by the decision of the Board to exclude coal from the dock, and my own opinion is that this is not necessary. The position of the coal wharf shown on the dock plan at present under consideration may be objectionable, although I think that the amount of inconvenience likely to be felt from coal dust has been exaggerated, but by an alteration of design I think a coal wharf could be so placed as to be of little or no objection at all. From a perusal of the plans of existing docks it would appear that in many cases coal and other goods are dealt with in the same dock although at different wharves. The plan of Great Grimsby Royal dock shows two coal drops at one end of the dock, which is only 500 ft. wide with sheds and warehouses along one side and which can hardly be connected with coal. The Newport dock Mon. is an oblong basin 2,500 ft. long and 500 feet wide, and one side is entirely occupied by coal hoists. There is a grain warehouse on the opposite side, and the value of the imports for 1883 at this dock was £956,934; this can hardly have been coal. I have drawn out a plan showing a coal wharf in which only one ship would be within 500 feet of the nearest coal ship and all the rest at distances up to 1,250 feet away. The plan is similar to that of the Tilbury dock and could be extended eventually to hold about ——steamers. The cost of work that I would suggest being done in the first instance I have roughly estimated to amount Rs. 43,12,550 including sheds, cranes, offices,and two miles of railway lines as before. The area of the dock is 23 acres. taking into account that at present about half the trade of the port is coal, and the cry for improvements was chiefly made on account of coal, and if the exclusion of coal is going to result in nothing being done at all, I think the point is worth considering. I submit the plan merely to show the sort of thing that might be done. A cheaper design might be made by making the dock smaller or omitting the construction of some part of the permanent dock walls at first. As regards dues and the consequent revenue which must be estimated in order to fix on a limiting sum for expenditure, considering the low figure that has been taken for tonnage, is it not going too far to allow only 10 annas a ton? Would it not be better to have a 12-anna or even a one rupee due than no improvement at all?

(*Initld.*) F. J. W.
15-6-98

Note by the Chairman, regarding dissent of Messrs. Black and Simpson to resolution No. 10(*c*) of last meeting, regarding proposed Harbour improvements.

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(6) *Minutes by Trustees.*

The Chairman seems to take up a strange position in regard to the boat-basin. I take it that he was quite prepared if a consensus of opinion had been in favour of docks to face the financial situation.

The opinion of the trade of the port has been unanimous that a dock, as being too expensive, is not required; but that a smaller and less expensive boat-basin, capable of development, will meet all requirements.

Apparently this either does not suit the promoters of the dock scheme, as they now turn round and say nothing can be done as we have no funds, although a boat-basin scheme is and has been before Government for years. It is a pity if all progress is to be scotched, because the trade of the port wish the Board to proceed more cautiously than some of the members of the Board would like.

The proposal for docks has for its object the development of the trade of the port. The development of the trade of the port will best be served in the opinion of those who should know by a boat-basin, therefore we must look to this development for the increased dues to meet the additional interest that will be required to cover expenditure on a boat-basin.

Until a boat-basin, large enough to hold the lighters and steam launches required for working the shipping is built, it is impossible to hope for any development at all.

(*Intld.*) C. B. S.
4-6-98.

As the Board have resolved not to have a boat-basin, I cannot see that any useful purpose can be gained by complying with the Chairman's invitation. If the Board is prepared to re-open the question, I shall be very pleased to give my views, meanwhile it seems to me the subject is dead.

(*Intld.*) R. J. B.
4-6-98.

With all deference to Mr. Simpson I fail to see that the position I have taken up in regard to the boat-basin is a strange one. I am still as firm a believer as ever in docks as the best, perhaps the only way to keep the trade of the port progressing. But I want to hear everything that can be said for and against both docks and boat-basin, and as it is quite certain that the question is, more one of finance than anything else, I wanted to hear how the advocates of a boat-basin proposed to meet the financial difficulty.

I cannot too strongly deprecate vague generalities in discussing the matter, what are wanted are exact statements of fact, and detailed estimates, and therefore I object to such expressions as "a less expensive boat basin capable of development" as used by Mr. Simpson, and to the Chamber's statement that the "boat-basin should be constructed so that it could eventually be fitted in with a larger scheme for docks." The opinion of the Engineers is that if you construct a boat-basin in such a way that without uprooting it altogether you can enlarge and deepen it into a dock, the cost will probably come pretty near to that of making a dock straight off in the first instance; while the additional expense necessary to convert it into a dock would make the gross cost much more than that of a dock. The important point is that no one can tell what such a convertible boat-basin would cost, until detailed estimates have been framed. What, therefore, is the value of opinions in favour of a convertible boat-basin on the score of economy, when investigation may show that such a boat-basin will be as costly as a dock? Suppose the figures were as follows:—(1) Boat-basin, pure and simple as estimated for, 14 lakhs. (2) Dock, pure and simple as estimated for, 35 lakhs. (3) Convertible boat-basin 25 lakhs. (4) Cost of converting boat-basin to docks, 25 lakhs.

Would the Chamber of Commerce still vote for a convertible boat-basin?

The question being mainly one of finance, I had careful forecasts prepared by the Secretary of the financial effect of constructing boat-basin, docks, and subsidiary piers. Except Mr. Black, who has said boldly, without giving reasons, that he cannot accept the figures in the forecasts, no one has offered a word of criticism on the forecasts; nor has any one attempted to frame an alternative forecast. The net result of my forecast, which stands unrefuted and uncriticised is, that with either boat-basin or piers, or both, the Harbour Trust Board has certain bankruptcy staring it in the face, and can only avoid this by a considerable enhancement of dues. Whereas with docks (charging a rupee dock due in lieu of landing charges), not only is bankruptcy avoided, but within 7 or 8 years of the commencement of the docks a commencement may be made towards the remission of dues, and this remission will thereafter go on steadily and progressively. So Mr. Simpson will see that, in the case of docks, there is no financial situation to be faced, except with open arms. I may mention one criticism of my forecast which was profferred to me by a leading partner in a leading firm, viz., that if he thought this remission of dues that I anticipate were to take effect immediately, he would be in favour of docks; but that as he did not see that any pecuniary benefit would accrue to him in his time, he preferred what he called the cheaper scheme. There is a good deal of reason in this view, since obviously it is equitable that the cost of harbour improvements should be apportioned as equally as possible between those who share in them, whether now or in the future; and therefore we ought carefully to take into consideration the advisability and equity of remitting charges now. I myself believe this to be the right course. Thus in my (or the Secretary's) financial forecast, a dock due of Re. 1 per ton was taken as the *datum*, it being held that the trade would willingly pay this in place of present landing charges. There is no reason why this dock due should not be very much less, the effect of reducing it being only to postpone remission of other charges (Port dues, Pilotage dues, etc.). I calculated elsewhere that assuming the cost of docks to be 35 lakhs, a dock due of 8 annas per ton would almost suffice to pay interest on that sum. It is open to us therefore to levy a dock due of anything from 8 annas upwards. And surely the substitution of an 8 or 9-anna due in lieu of present landing charges would be an immense boon to the trade.

Mr. Simpson thinks that the increased dues, necessary to meet the interest due on a loan for a boat-basin, will be furnished by the increase in the trade of the port which will follow the construction of a boat-basin. I do not admit that the construction of a boat-basin will facilitate trade. I believe that landing charges will be increased thereby. But putting that aside, I take it that it is not contended that a dock will not offer *better* facilities than a boat-basin. It will offer all the facilities of the latter, and something more. If then a boat-basin is likely to augment the volume of trade of the port, much more will a dock do so.

I hold strongly that we ought to fit the port for every branch of trade; and so long as we have no means of putting a ship alongside a quay, we are behind the times, and unprepared to meet trade requirements. The unexpected is always happening. Ten years ago no one could have foreseen the extent of our coal and oil trade. Is it impossible that other large import or export trades should appear? The Government is now doing its utmost to establish an iron industry. Whether the smelting be done locally with imported coal, or at Calcutta or elsewhere, the industry could not prosper, I imagine, unless there be means of running the ore or the iron alongside the ship.

I think it right to bring to the notice of the trustees a circumstance which may lead to considerable enhancement of the cost of maintaining the present harbour as the only accommodation for ships. A few days ago a vessel was moored outside the harbour; she dropped her anchor and proceeded to make a stern line fast to the buoy, but the moment strain came on the buoy, it carried away from its moorings. Examination has shown that both the buoys outside are unsafe, the chains by which they are fastened to the moorings having chafed on the sandy bottom so much as to render them incapable of bearing any strain. Repairs have been effected, but we have no appliances here for doing these repairs satisfactorily. The buoys inside the harbour are now being examined. It is believed that for one reason or another there is so much chafage that parts of the moorings will have to be renewed every three years. This will entail a heavy annual charge on the Board, the actual amount of which is now being calculated.

Mr. Simpson refers to the unanimous opinion of the Chamber of Commerce and Trades' Association in favour of a boat-basin. This opinion proceeds solely on the ground that the trade of the port cannot afford the expense of docks. I believe that these two bodies have entirely misunderstood the financial situation. They see that the estimate for docks is 35 lakhs and for boat-basin 14 lakhs; they

think that whichever scheme is adopted, this large capital outlay will have to be defrayed at once by an immediate charge of the trade of the port; and therefore they advocate the cheaper scheme. As a matter of fact, not one pie of this capital expenditure will be paid by any merchant now in Madras. The money will be raised by loan from Government, and this new loan will be added to that already existing; repayment will continue at the same rate as now, viz., 1 lakh per annum, so that repayment of the boat-basin or dock loan, whichever it is, will not commence till the existing loan has been paid off, say 49 years hence. Repayment of our capital outlay will go on automatically as now, without any one feeling it or knowing of it, and the present generation of merchants will reap the benefits of a loan to be repaid by their successors in the second and third generation.

All that we have to consider is how we can meet the charge for interest on the loan. It is so simple a matter that I cannot understand the possibility of two opinions on the subject. In the case of the boat-basin, in order to meet the charge for interest, we must make an immediate proportionate enhancement of charges; in the case of a dock we shall relieve the trade of the port of all landing charges (moderately computed at 1 rupee a ton), and in lieu thereof we will charge a dock due of from 8 annas to Re. 1 a ton. Actually we offer to construct a dock for nothing, and in addition to make a present to the trade of a sum that may amount to 8 annas per ton of cargo landed, and yet that misguided body says it does not want this, but prefers a boat-basin with all its inferior advantages, with an added charge of an uncertain amount for interest, and with the possibility of increased landing charges.

(Intld.) J. N. A.,
6-6-98.

I decline to discuss the question of a boat-basin for reasons already given.

I cannot, however, allow the Chairman's statement, that his financial forecast relating to the construction of docks "stands unrefuted and uncriticised," to pass unchallenged. I have already commented upon his figures, whether "baldly" or not, is a matter of opinion, the fact remains, no answer has been given.

The most recent estimate for docks, and they have been many and varied, is about 40 lakhs. 4½ per cent. on that amount is **Rs. 1,80,000,** to meet same the Chairman proposes to levy dock dues, anything from 8 annas to Re. 1 per ton. The existing rate of boat hire I should say is about Re. 1 per ton all round. In his minute, dated 28th March 1898, he bases his calculation on the tonnage of 97/8 with dock dues at 10 annas. Excluding coal, 10 annas per ton on 339,000 tons equals **Rs. 2,11,875,** which shows a saving of 6 annas per ton on what trade pays at present, and leaves a margin of **Rs. 31,000,** for contingent expenses.

I submit, however, that we cannot assume that 339,000 tons *will* pay dock dues, I am not singular in being of the opinion, that all steamers will not use the docks, some from preference, others from inability, as if the docks are full, rather than remain idle, discharge will be conducted in the harbour.

I consider a deduction of 25 per cent. none too much to meet the above, which would reduce the tonnage on which dock dues would be levied, to 254,250 tons, and likewise the revenue accruing from it, to **Rs. 1,58,906**; this would not even pay the interest, let alone the extra expenses I have already referred to in a previous minute, dues would have to be enhanced, and the Annas 6 the trade are expected to save by docks, would rapidly disappear.

The above is based on the assumption that docks will be built and *fully equipped* for 40 lakhs. Various estimates have been put forward from time to time, ranging from 30 to 80 or 90 lakhs, and I consider it would be rash and most imprudent not to allow for a substantial margin over and above the present estimate of 40 lakhs. If docks eventually cost 50 lakhs, the interest would amount to **Rs. 2,25,000.** Sixty lakhs would bring it up to **Rs. 2,70,000,** either contingency is anything but improbable, and the result is obvious. In the Chairman's optimistic views of his question after a comparatively short acquaintance with the trade of Madras, he persists in assuming that the interest on a loan is the only expense to be met, and ignores altogether contingencies which I consider require attention and providing for, *i.e.*, repairs, renewals, dredging, upkeep of sheds and wharves, &c. In his forecast 1 lakh is mentioned as necessary for the maintenance and upkeep of the harbour as it stands, and a like amount is considered sufficient when docks are added. Is this sound or is it reasonable? The conclusion I have come to regarding docks is, that the problematical saving in dock dues as compared with existing boat charges, is inadequate to justify their construction, and it is not improbable that eventually there will be no saving at all, and the trade of Madras may have to bear a heavier burden than it does at present. If the trade of Madras was being strangled, or its development impeded by want of docks, I consider there would be unmistakeable indications, which are at present wanting.

In addition, the Mercantile community of Madras are against docks, and, as I have said in another minute, the "disadvantages of the port" are "want of facilities on shore for shipping into, and landing from boats, and lighters, and disposing of the cargo when it is landed." I believe it is possible to overcome these drawbacks by the construction of one or two low jetties, an estimate for which we await.

I cannot refrain from remarking on the Chairman's alarming statement that the "Board has certain bankruptcy staring it in the face" even though we do nothing in the way of improvements, at least I gather so from the forecast. This deplorable state of affairs seems somewhat inconsistent with the Board's recent intention to abolish the charge of 4 annas for porterage on coal, nor does the Board's decision to acquire pipes for the landing of petroleum appear to be judicious. In such financial straits, importers might well have been allowed to continue to bear all expenses and responsibility connected with same.

It seems to be high time for the Board to investigate closely the financial position of the trust, and shape its course according to its means. I cannot but help thinking that, under existing circumstances, our engineering establishment is more than we can prudently stand, and the question arises whether it would not be possible to come to some arrangement with Government, or economise by amalgamating the engineering with other duties.

If bankruptcy is inevitable, one of two things is necessary, either an increase in revenue, or a curtailment of expenditure. The former would necessitate enhancement of dues, but before so serious a step as that is taken, outgoings should be subjected to the closest scrutiny.

(Intld.) R. J. B.
8-6-98.

The Chairman surely does not expect Mr. Black and me to make plans and estimates. If the question of a boat-basin is to be re opened, I shall be most happy to communicate my own opinion to the Board's Engineer

If the trade of the port is increasing, as the Chairman insists in a minute I quote below, without the facilities the trade of the port desire, surely it is reasonable to expect they will continue to improve if these facilities are given effect to. Instead the Chairman desires the trade to support a scheme which, as far as I can gather has only the support of himself and another official member who can hardly be expected to be familiar with our trade requirements.

If Government are prepared to find money on the easy terms the Chairman suggests for a dock, surely they will be equally complacent if asked for a smaller sum for a scheme that has the support of the entire mercantile community.

I am sorry if these are vague generalities, but they are surely as practical as providing for "the unexpected."

Again in regard to the opinions of engineers as to a convertible basin. Has our engineer been asked to prepare a plan on the lines suggested by the trade, and to frame an estimate, if he has, I should like to see it, at present I do not know how the 14 lakhs said to be required, is arrived at.

Attached to the same minute is one by Mr. Hutchence in which he says :—

"Regarding the question from a financial view, I think there need be no hesitation in spending "30 lakhs on docks. With an increasing tonnage—rising revenue, and *some 6 or 7 lakhs cash on hand*, "the necessary revenue can be raised, not by increasing the cost to importers or exporters; but by "very materially reducing the charges."

The following are from the Chairman's minute :—

"(1) Is trade expanding or likely to expand?

"The Traffic Manager has dealt with this in a very interesting letter (circulated with another "paper) No. 8859 P. dated 11th March 1898. I give here a table extracted from his letter—

Year.	Imports.	Exports.	Total.	Coal, coke & patent fuel.	Net tonnage excluding coal, etc.	Remarks.
	TONS.	TONS.	TONS.			
1887-88	210,979	106,207	316,986			
1888-89	201,597	89,203	290,600	15,492	301,494	
1889-90	245,659	112,525	359,184	29,085	261,515	
1890-91	288,537	103,435	391,972	34,368	324,816	
1891-92	347,401	88,939	436,340	48,890	343,082	
1892-93	277,843	85,938	363,781	49,027	387,313	
1893-94	285,251	98,660	383,911	67,875	295,906	
1894-95	285,276	104,188	389,464	82,302	301,609	
1895-96	330,697	99,074	429,771	99,166	290,298	
1896-97	385,605	102,941	488,546	134,452	295,319	
1897-98	432,582	82,582	515,000	150,659 170,000	337,887 345,000	

"In regard to these figures Mr. Hutchence points out that in 1890-91 and 1891-92 trade was "abnormally swelled by large imports of grain, those being famine years also that in the current "year 9,000 tons is due to excess of grain imports. But after making these allowances the figures "seem to me most re-assuring and satisfactory, evincing a steady progress, though hampered by "stationary exports. I can see no possible grounds for fear as to the future. The country is growing "in population and wealth, new fields of cultivation and of industrial employment are being opened "up every year, and in the normal process of events this must go on; and Madras must, in conse- "quence, experience a steady increase in its trade, always provided those entrusted with the regulation "and assistance of the trade, of whom the Harbour Trust Board is the chief, take care that with "increasing demands improved facilities are given.

"The figures in the statement above show that, even without coal, trade is expanding. There "are fears that with the completion of the Bezwada-Madras Railway our coal trade will vanish. I "don't think that this necessarily follows. But even if so, why need we despair of some other branch "of trade supplying the deficit? Kerosine oil in bulk has made immense strides of late years, and in "both cases, the coal and the oil trade, the sudden growth of the trade has been unforeseen.

"The fears as to the damaging competition of Vizagapatam and northern ports are purely "chimerical, about $\frac{3}{4}$ of the whole volume of Madras trade is its imports, and none of its imports go to "any of the northern districts, except an infinitesimal amount of transhipped cargo. As to exports "at the present time, the quantity of goods and produce brought by rail from places north of Bezwada "to Madras is quite negligeable: and if any trade south of Bezwada which now finds its outlet at "Madras is, after opening the Bezwada Madras Railway, diverted to northern ports, it can only be "on account of, and directly due to, mismanagement in Madras, whether by the mercantile firms or "the railways or the Harbour Trust Board. On this point we need have no fears whatever, but "rather hopes. The Bezwada-Madras Railway may bring more stuff, oil seeds, cotton, etc., to "Madras from the western and southern parts of the Kistna district and from Nellore; it cannot

"possibly deprive Madras of its trade. I do not myself anticipate that at first this new railway will "directly affect the trade of this port much. No doubt it will do so gradually and indirectly in the "future, by opening up new tracts of country, and stimulating production.

"It seems to me then that the statistics of our trade during the past ten years or so are encourag- "ing; and I am confident that if we give every facility that is possible to trade, we are certain to see "a large improvement in the future. On the other hand if we fail to advance with the times, we run "great risk of seeing our commerce transferred to other ports.

"My remarks above have been written on the double assumption (1) that Mr. Wilson's estimate "of 38¼ lakhs could not be reduced; and (2) that the coal trade must vanish so soon as the "Bezwada Madras Railway is opened.

"As to the first assumption it must be remembered that the estimate will, in any case, be only "gradually worked up to, though, in my opinion, it is necessary to complete the inner dock or basin "as early as possible; and there are certain parts of the estimate that may be found unnecessary, *e.g.*, "the very long protecting arm.

"Then as to coal, if we can pay our way without looking for any coal traffic, it follows that we shall "be in a position to give up all dock dues on coal. In other words, we should relieve coal ships of all "cost of discharging. It is not quite certain how much this would amount to. The Traffic Manager "gives the figure as about Rs. 2 a ton, exclusive of the 8 annas dock dues, which would ordinarily be "charged on all goods landed at the docks. Would this saving of Rs. 2 or 2-8 a ton on Bengal coal "enable it to compete with Singareni coal?"

I do not know what has happened during the past four months to make the Chairman take the gloomy view that "certain bankruptcy is staring the Board in the face."

(Intld). C. B. S,
9 6-98.

At the last meeting I accepted the view that a boat basin could not be constructed without an increase in charges, and that there would be no return as there would be little or no decrease in boat hire. With respect to a boat basin I am not satisfied that a due of 8 or 9 annas would meet the cost of upkeep as well as the interest on capital borrowed. It is assumed by those in favour of the wet basin scheme that the basin would be used by all vessels visiting the port, but we have no assurance that this will be the case. It might be used after a time, perhaps, by some of the coasters, but I think that these vessels, as a rule, would prefer discharging at moorings in the harbour. I notice that the Chairman draws attention in his note to the state of the moorings both inside and outside of the harbour. I do not know whether he believes that these moorings would be unnecessary on a wet-basin being constructed. The moorings outside are for vessels while discharging timber and powder, and other kinds of cargo not allowed to be discharged inside of the harbour. These moorings would have to be maintained whether a boat-basin is constructed or not, and I do not think that many of the moorings inside could be dispensed with.

Taking into consideration the views of the trade in respect to a wet basin, it seems to me that our best plan would be to drop the subject—at all events for a time—and to continue ourselves to meeting, as far as practicable, the deficiencies of the present pier arrangements.

(Intld). H. A. S,
10-6-98.

(7)

EXTRACT of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Friday the 10th day of June 1898.

2. Read note by the Chairman upon the dissent expressed to resolution 10 (*c*) by Messrs. Black and Simpson, and requesting that they would favour the Board with proposals to finance the boat basin they approve of without increasing the charges of the port.

Read minutes by Trustees.

Postponed pending receipt of estimates for jetties called for from the engineer.

3. Read letter, dated 28th May 1898, from the Chairman, Trades Association, replying to refer- ence No. 54, dated 21st April 1898, regarding proposed harbour improvements.

Recorded.

(8)

From F. J. WILSON, Esq. Local Consulting Engineer to the Harbour Trust Board, to the Chairman, Madras Harbour Trust Board, dated Ootacamund, 5th July 1898.

I have the honour to inform you that the letter of the Chairman of the Madras Chamber of Commerce, dated 14th May last, and certain remarks that have fallen from Trustees of the Harbour, have led me to consider, from an engineering point of view, how different proposals for carrying out improvements to the harbour could be carried out and at what cost.

My experience is, that engineering schemes which may, at first sight, appear not only practi- cable, but in every way advantageous, very often look very different when drawn out to scale and their cost estimated. I have consequently endeavoured to draw out, with rough estimates of cost, different schemes to meet with the requirements of the different proposals made so far as I am able; and as the results may possibly be of assistance to the trustees in forming a conclusion as to what should be done, I have the honour to submit the plans for your perusal.

What the Chamber of Commerce asks for, in the letter I have quoted is, a boat basin which will afford facilities for the discharge of cargo boats, and cheapen the landing of goods; and that this boat basin should be so constructed that it could eventually be fitted in with a larger scheme for docks. Two ways of doing this immediately occur to one. First to design a boat basin which could be con- verted into a dock without disturbing the working of the port, in which case the expenditure incurred

on the boat basin would not be thrown away when the conversion takes place; or secondly, to design a cheap boat basin which would answer present requirements and so situated as not to interfere with a separate dock being constructed hereafter. As regards the first way I have heard it suggested that walls might be made first of all deep enough for a boat basin, and when conversion was required they might be sunk deeper or in some way made suitable for a dock; but apart from the obvious objection that during the process of conversion the boat basin wall would be useless and alongside traffic interrupted, I think the suggestion is impracticable. To make a boat basin "convertible," therefore, it appears to me necessary to construct your boat basin wall as for a dock at once and only to dredge to the depth required for a boat basin to start with. I therefore designed as small and cheap a dock as would seem to suit requirements shown on plan A, this I estimate roughly to cost nearly 34 lakhs. I then cut off such portion of this dock as would form a boat basin. This I have done as shown on plan B, and which I estimate roughly to cost a little over 20 lakhs. If such a scheme were carried out, you would spend, therefore, 20 lakhs to begin with, and when you wanted a dock you would have to spend a further sum of about 14 lakhs, removing the piece of shallow boat basin wall marked A, B. None of the railway lines, sheds or equipment need be disturbed—whether under the circumstances it would not be better to spend the larger amount of 34 lakhs to start with is a matter for the Trustees to consider.

Coming now to the second way of interpreting the proposal of the Chamber of Commerce, one is immediately confronted with difficulties. A depth of 6 feet at low water is asked for, this is 9½ feet below De, H, M, S, L, the datum to which the fathom lines are referred. The entrance to the basin must be about 600 feet from the shore end of the present south pier. If a basin is made opposite this point, it will be right in the centre of the best site for a dock as shown on plan C. I have drawn this out and made a rough estimate of its cost, viz., Rs. 6,86,000, according to what I understand to be the suggestion of one of the Trustees. It does not seem, however, to meet the requirement of the Chamber of Commerce that it should be capable of being fitted in with a larger scheme for docks. For a certain period, at any rate during the construction of a dock, with a basin in this position, the basin sheds and appliances would have to be abandoned altogether. I then tried the effect of bringing the basin further west as shown on plan D. The result is not at all satisfactory. The estimate for the boat basin itself is a lakh more than the other. The basin is of a very awkward shape, and I doubt if it would cheapen the landing of goods. It has to be remembered that Government proposes to make a canal from whatever basin is constructed by the Harbour Trust Board to the Cooum. If a dock is made outside of this, one or two bridges would be required. It will be observed that these boat basin rough estimates are less than those already before the Board. This is due to the small size of the basins now allowed for.

On the whole, looking at the matter from an engineering point of view, if the construction of a dock in the sand accretion to the south of the harbour is to be taken into account at all, I would recommend something like plans A or B, or something on the same principle.

I think it is highly desirable in any scheme adopted that some line should be fixed on *now* for the main western quay, so that railway connections, buildings and other arrangements in its neighbourhood, such as roads, need never be altered as developments are carried out. If this is not done, as would be the case with a non-convertible boat basin, it is almost certain that minor improvements in connection with railways, roads, sheds, warehouses, fencing and such like, will either be hampered or be constructed to be subsequently pulled down. The only reason that I have taken this line so far out as 900 feet from the railway boundary on plan A is, that I wanted to put the entrance far enough out to avoid the necessity of dredging in the harbour and at the same time to keep the dock as small and cheap as possible. If it were not for the expense, I think the line, 400 feet from the boundary as shown on the 23-acre dock plan and 17-acre dock plan, would be enough and better for some reasons, one of which is that the quay would be further from the sea.

(9)

From J. N. ATKINSON, Esq., I.C.S., Chairman, Harbour Trust Board, Madras, to the Chairman, Chamber of Commerce, Madras, dated 5th August 1898, No. 1250.

Referring to your letter, dated 14th May 1898, I have the honour once more to invite the attention of the Chamber of Commerce to the question of harbour improvements. The papers that were forwarded with my letter No. 55, dated 21st April were voluminous, and dealt in a more or less desultory way with many aspects of the question; but it has become apparent that it is on financial grounds that the ultimate decision will mainly rest, and the Harbour Trust Board having had these under careful consideration, is of opinion that it is advisable to lay a statement of them before the Chamber of Commerce and invite a further expression of opinion thereon.

2. The schemes which this Board has had before it include several for ship docks; several for boat basins, whether for permanent use as such, or capable of conversion into docks; and a scheme for supplementary iron piers: and in approaching the consideration of each of these schemes, the Board has steadily kept in view two guiding principles which it believes are unanimously accepted by the trade of the port, viz., (1) that there must be no addition to the charges levied on trade in the port, and (2) that the place for landing and storage of coal must be, as far as possible, removed from that of general cargo.

3. This Board believes that in certain quarters misapprehensions exist as to the exact financial aspect of the various schemes of harbour improvement. In all cases, whatever be the nature of the scheme of improvement contemplated, the charges that will have to be defrayed by the trade of the port are as follows: (1) repayment of capital outlay, (2) annual charge for interest thereon, (3) establishment, (4) maintenance and repairs, including dredging.

4. The first of these need not be considered at all; the capital required will be raised by loan from Government under the Madras Harbour Trust Act (II of 1886), and in accordance with section 31 thereof no greater sum than one lakh of rupees can be repaid towards liquidation of capital debt due

to Government in any one year. Since, therefore, the existing debt is 49 lakhs, no charge can be made upon the trade of the port towards repayment of any capital outlay on any scheme of improvement of whatever kind till 49 years from now. It will be apparent also that, under the circumstances explained, the formation of a sinking fund is entirely uncalled for.

5. The rate of interest chargeable on a loan from Government is fixed by section 30 of the Act at 4½ per cent.; the amount annually payable will vary according to the capital cost of the scheme of improvement adopted. I offer a few further remarks on this below.

6. The charge for establishment will be, for all practical purposes, the same whether docks or boat basin be constructed; it will be higher if subsidiary piers be the form of improvement adopted.

Similarly the cost of maintenance, repairs and dredging will be approximately the same for either docks or boat basin. In either case there must be the same shedding, cranes, railway lines, and other appliances; and it is these that will make up nine-tenths or perhaps even ninety-nine hundredths of the bill for repairs and maintenance. The heavy walls, whether of dock or boat basin, will require practically no repairs. Since the completion of the present harbour the amount spent on repairs of the two walls is less than Rs. 100. The cost of dredging will vary according to the position of the basin excavated. This charge will not however, be a heavy one, and for all practical purposes the cost may be assumed to be the same whether for ship dock or boat basin.

The maintenance of an iron pier or piers will be more costly than that of either dock or boat basin. in the last eight years upwards of 1¾ lakh of rupees has been spent in repairs to the present iron pier. If masonry piers could be substituted for iron piers, the maintenance would probably cost less.

7. It will be apparent from the foregoing that, under the heads of repayment of capital outlay, establishment, maintenance and repairs, and dredging, the annual charge to be borne by the trade of the port will be practically the same whether docks, boat basin or masonry piers be constructed. There remains the question of interest on capital outlay. The advocates of a dock argue that, whereas in the case of a boat basin, the charge for interest can only be met by a direct impost on the trade of the port; if a dock be constructed, and dock dues charged on consignees in lieu of present boating charges, there will be no increased impost on the trade of the port, unless the charge for interest exceeds the amount of boating charges, that would have been levied on the goods loaded and discharged direct on the dock quay. On the other hand, it is argued that ships will not enter the dock, and cargo be loaded and discharged therein in sufficient quantity to cover the interest on capital outlay; and the Kidderpore docks are quoted as a warning. To this again it is replied that the Kidderpore docks are daily attracting increased tonnage; that ships' captains will prefer the safety and convenience of a dock to the open harbour, that consignees will insist on delivery direct from the ship on to the quay, and that exporters will prefer making shipment direct from shed to ship.

8. It is found that, during 1897–98, excluding all coal, coke, patent fuel, kerosine oil, whether bulk or case oil, explosives, timber, firewood, and also all coasting cargo, the total tonnage of both exports and imports handled in the harbour was 182,000 tons. Supposing there be an objection to coasting steamers into the inner harbour or dock, there is no reason apparent why this general foreign cargo should not be handled therein and a dock due of Re. 1 per ton on this quantity would more than cover interest at 4½ per cent. on a capital outlay of Rs. 40,00,000.

9. It may be worth while here briefly to refer to a contention that has been put forward by the advocates of a boat basin, viz., that, given safety for small craft in rough weather, the size of lighters will increase and the boating charges proportionately decrease. The advocates of docks answer that there is no guarantee that either of these consequences will ensue; that experience shows that, for discharge or loading in the open harbour at the ship's side, lighters of the present size and masulah boats are the most expeditious craft that can be devised, and that the number and size of lighters and boats must necessarily be regulated by the quantity of work to be done, since no business man can afford to let his capital lie idle in boats in excess of the number wanted.

10. In order to prevent any possibility of misconception, it may be as well to state that, for the use of the proposed ship dock, no charges of any kind would be levied upon the vessels using the same. Any vessel loading or discharging in the dock would pay pilotage and port dues under the Indian Ports Act exactly in the same way and at the same rate as she does at present for use of the outer harbour. She would pay no other due, charge or fee whatever for entering and making use of the inner basin or harbour, or ship dock by whatever name it be called. The cost of the dock would be met by a dock due levied at so much per ton on goods landed or shipped, and this due would be recovered from exporters or consignees. It would be an additional charge on exporters or consignees, but it would relieve them entirely of all boating charges, with the subsidiary charges in certain cases for watchmen, tarpaulins, moving coolies, &c. It is believed that to be relieved of these charges, exporters and consignees will gladly pay a dock due of Re. 1 a ton, which would suffice to pay interest on outlay up to Rs. 40,00,000, even assuming that the cargo handled is only foreign amounting to 182,000 tons annually.

11. The estimates for docks that have been under consideration range from Rs. 43,00,000 for eleven ships, to Rs. 34,00,000 for seven ships. It may be assumed that a dock of adequate capacity and properly equipped will cost from 35 to 40 lakhs.

The estimates for boat basins range from Rs. 20,00,000 to Rs. 7,00,000. A boat basin of adequate capacity and properly equipped will cost about 10½ lakhs.

The estimate for subsidiary piers has been scrutinised, as far as information available allows by the Board's Local Consulting Engineer, and a copy of his note is annexed.

12. In the above remarks it has been assumed that, in order to execute any new scheme of improvement, a loan from Government of the capital cost is essential; it would be impossible to finance any scheme by borrowing in the open market; and equally impossible to defray cost of construction from the Harbour Trust Board's cash balances.

13. In reference to the Chamber's suggestion that a boat basin capable of conversion into a dock should be the form of development adopted, I beg to point out that estimates and plans therefor have

been considered, and it is found that the initial cost will be as great or greater than that of a non-convertible basin, while the subsequent conversion into a ship dock would raise the cost higher than that of a dock of the same size and facilities constructed in the first instance.

14. I have the honour to enquire whether on a review of the facts now laid before you the Chamber of Commerce adheres to its opinion that a ship dock would be "a luxury," and that a convertible boat basin is the form of improvement that should be adopted.

Approximate Tonnage of the goods shown in the Administration Report for 1897-98, excluding kerosine oil in bulk and cases, timber, scantlings and firewood, coal, coke and patent fuel, dynamite and other explosives.

—	Total tonnage.	Less.	Net tonnage.	—
		Coal ... ... 35,771 Coke ... ... 385 Kerosine oil ... 24,463 Explosives ... 486		
I ...	156,556	61,105	95,451	Goods imported from Foreign Ports.
		Coal ... ... 100 Coke ... ... 1,073 Timber ... 990		
II ...	9,358	2,163	7,195	Stores imported by Madras Railway.
III ...	2,053	*Nil.*	2,053	Stores imported by South Indian Railway.
IV ...	8,335	*Nil.*	8,335	Stores imported by Bezwada-Madras Railway.
		Coal ... ... 137,560 Coke ... ... 2,426 Firewood ... 5,740 Kerosine oil ... 484 Timber ... 18,840		
V ...	254,264	165,050	89,214	Goods imported from Coast Ports.
VII ...	64,391	Coal ... ... 1,400 Coal ... ... 300 Kerosine oil ... 316	62,991	Goods exported to Foreign Ports.
VIII ...	29,704	616	29,088	Goods exported to Coast Ports.
IX ...	5,801	*Nil.*	5,801	Stores imported by Government.
X ...	2,416	*Nil.*	2,416	Stores exported by Government.
Total ...	532,878	230,334	302,544	

SUMMARY.

		TONS.	
Foreign Imports—			
Statement No. I.	General merchandise	95,451	
,, II.	Madras Railway Company	7,195	
,, III.	South Indian Railway Company ..	2,053	
,, IV.	Bezwada-Madras Railway	8,335	
,, IX.	Government stores	5,801	
			118,835
Foreign exports—			
Statement No. VII.	General merchandise		62,991
	Total Foreign Trade ..		181,826
Coasting—			
Statement No. V.	Imports	89,214	
,, VII.	Exports	29,088	
,, X.	Exports, Government	2,416	
			120,718
	Total Tonnage Foreign ..		181,826
	Do. Coasting ..		120,718
			302,544
Coal, coke, timber, firewood, kerosine oil, explosives			230,334
Total calculated according to average size of packages or tonnage when known			532,878

MADRAS, 2nd *August* 1898.

To

THE SECRETARY, *Harbour Trust Board.*

S. HUTCHENCE, *Traffic Manager, Harbour Trust.*

Note on estimates for Coal basin and Subsidiary piers, &c.

The estimates for a coal basin and electric transporter and those for subsidiary piers within the harbour, which have been sent to me for remarks, appear to have originated from two entirely separate causes. The preparation of the first set of estimates for the coal basin, &c., was due to the decision of the Board that no matter whether an inner harbour ship basin, dock or boat basin were constructed, coal must be dealt with separately. This requirement did not involve the construction of a basin to protect boats in a storm, but merely some arrangement which would facilitate the landing of coal in ordinary weather. The arrangement was to be in addition to an inner harbour or boat basin, and I don't think the Engineer can have had anything else in his mind when he prepared the estimates. The other set of estimates for subsidiary piers originated with a proposal of the Chamber of Commerce, and these also involved the construction of some protective basin in addition, as the piers themselves could not afford any protection to the dredger "*Wenlock*," and the improved lighters which it is held would be the outcome of having some place of protection to put them in, in bad weather.

It was with some surprise, therefore, that I discovered at the last meeting of the Board that there was an idea in some quarters that the proposed coal basin would be sufficient for protecting small craft, and that this basin, together with two subsidiary piers, was to be considered as a complete alternative to the construction of an inner harbour, dock or boat basin. To do this is to revive an idea that was finally rejected fifteen years ago, and before dealing with the details of the estimates sent to me, I would remind the members of the Board as to what happened in the years 1881-83. I think it was said by one member that the damage done inside the harbour in 1881 was due to the failure of the outer walls of the harbour, but this is not in accordance with the evidence given before Sir Nowell Salmon's Committee, nor with the Master Attendant's report on the results of the storm. The latter said that all the cargo boats in the place were wrecked, the beach ravaged and the low level jetties (then in course of construction) *utterly swept away before a block had fallen from the walls.* The Committee's report contains the following:—"It is agreed on all hands that owing to the frequently disturbed "state of the water, the facilities for landing and embarking passengers, cargo, &c., offered by the "harbour are very much restricted *nor would it be feasible for the same reason to use without serious interruption wharves and jetties along the shore line, or to keep in safety within it such improved lighters, tugs "and other harbour craft as would greatly increase its value as a trading port* * * * * *. The confused "sea within the harbour is attributed by all who have given evidence to the nearly constant swell from "the eastward which runs in through the present entrance, and being deflected from the side walls, "causes, what is described, as a nubbly sea or 'joggle of a sea' and in bad weather as being like a "boiling pot."

With such evidence before us, it is clear that any basin constructed within the harbour area to be relied on for protecting the harbour craft in bad weather should be very strongly made. It would be a very serious thing for the trade of the port surely, for all the lighters and other harbour craft, including the dredger, to be wrecked again, not only on account of the actual money loss involved, but in the damage to the reputation of the port that must follow any disaster of this kind. The coal basin, as now estimated for, is totally unsuited as a place of protection for harbour craft in bad weather. In the first place it is very small covering less than one acre. The dredger "*Wenlock*," which is 140 feet long, could only just get into it. (*Vide* scaled drawing herewith.)

The basin sanctioned in 1895 covered an area of 4 acres and was finally rejected for one reason, amongst others, that it was totally inadequate for the trade of the port. The north to south breakwater is a light structure only 12 feet wide, founded in a rubble bank only 5½ feet below lowest tide level and top only 7 feet above highest tide level.

The other quay wall has a parapet to this height of 7 feet above highest high tide level, but the level of the quay itself is only 1 foot above the highest high tide level. The situation of the coal basin itself at the root of the existing north pier is opposite one of the weakest parts of the whole existing breakwater. The breakwater has ere this shown signs of weakness at this point, and with a storm blowing from the north-east it is to be expected that the sea would break over this height of 7 feet above highest high water. In this connection I observe that the Engineer provided a parapet along the north pier at this point in his estimate for a canal entrance of 1895. The objection to putting up a parapet here is that it would interfere with the passage of the all round crane along the pier which may be required at any time to add to the wave breaker I see little or no reason why a breakwater running into the harbour at right angles to the north pier should be made of a lighter section than has been considered necessary for a similar arm proposed to protect the boat basin entrance in the south pier. Deducting dredging and other sundries which may not be necessary at the north, the protecting arm which Mr. Pogson proposed for the south arm was estimated to cost about Rs. 410 per running foot against Rs. 108 per foot for the arm now proposed for this breakwater at the north. I have not been supplied with information as to the method proposed for constructing this breakwater, but I understand that it is proposed to put down blocks for a width of 24 feet so as to carry the all round crane and then to lift a row of blocks on the inside. If this coal basin is to be built, I think it would be wise to allow in the estimate for these blocks being left, thus making a breakwater 24 feet wide and to found the blocks at 10 feet below low tide level instead of 5½ feet—a parapet could be added at any time afterwards, if found necessary. As regards the quay running out from the shore, I think it would be well to increase the depth of the block work of the outer wall and to raise the level of the quay to 5 feet above De Havilland's mean sea level, in which case the thickness of the inner wall should be increased to 7 feet. These additions would considerably increase the estimates, but not to the extent necessary to fit it to serve as a basin for protecting the harbour craft in bad weather. To do this it would be necessary to increase its size and cost to something like the boat basin sanctioned for Rs. 6,63,558 in 1895, which was to be constructed in the south-west corner of the harbour.

It follows from what I have said that, in my opinion, if open subsidiary piers are constructed that it would be necessary to construct a separate protective boat basin as well as the small coal basin, unless the latter is increased in size and cost to such an extent as would make the cost of the whole scheme considerably more than that of a fully equipped boat basin in the sand to the south of the harbour.

There remains Mr. Pogson's latest proposal to form a protective basin by means of a curved iron jetty filled in, as shown, to some extent with concrete, and which he estimates would cost Rs. 5,58,469 with a central jetty, or Rs. 4,37,246 without this central jetty. Without details of these estimates I cannot criticize the sufficiency of these provisions for the work shown on the plan, but if the jetty work is the same as that provided for the subsidiary jetties, it is cheap compared with similar work done at Tuticorin. Certain advantages are claimed for this proposal. It would appear at first sight at any rate to be a cheap scheme, however efficient it might be, but for a proper comparison of cost of the scheme with that of others, its provisions should be examined and compared with the other schemes. The following is the result of a comparison with the estimate for a boat basin to the south of the harbour :—

	Estimate. Rs. 4,37,246 for enclosing space near existing iron pier.	*Estimate.* Rs. 10,47,239 for boat basin south of the harbour.
Approximate water area available for boats ..	4 acres.	6 acres.
Available length of wharf wall for boats ..	1,000 feet.	3,900 feet.
Amount provided for sheds	58,102 rupees.	2,00,000 rupees.

The most important item in a dock or basin is the length of quay provided, and it will be observed that if the provision for sheds is excluded from the estimates, that the wharfage provided by the new scheme will cost Rs. 379 per foot, whereas in the other estimate the cost is Rs. 217 per foot; of the 1,000 feet of wharfage provided by the new scheme about 400 feet is that on the existing pier at the objectionable height of 18 feet above M.S.L. The 3,900 feet of wharfage provided in the old basin estimate is probably a good deal more than would be required; this is partly due to a length of canal and a Port Officer's basin having been included in the estimate; but I think this comparison is sufficient to show that you really do not get so much for your money in the way of wharfage in a basin of the description most lately proposed as in a basin formed in the sand.

As regards the design itself, it is of course open to all the objections already taken to structures projecting into the harbour. The top of the proposed curved jetty is only 7 feet above highest high water, and it is very much open to question whether it would afford sufficient protection to craft in any such storm as that of 1881. The quay itself would certainly be unapproachable and its stability depends on the absence of motion on a loose rubble bank only 8 feet below low water level. The scheme does not of course fit in with any inner harbour or dock. If carried out, railway lines, roads, fencing and buildings, such as the proposed Custom House, would be made to suit it, and there would all form hindrances to any future development. I think the proposal is a retrograde step and has little to recommend it.

(Initd.) F. J. W.
3-8-98.

(10)

From the Trades Association, Madras, to the Chairman H. T. Board, dated the 18th August 1898.

Docks and Boat Basins Scheme.

I have the honour to acknowledge your No. 1251, dated the 5th instant on the above subject and beg to reply as follows :—

At a meeting held on the 10th May 1898 to consider the above, the opinion of the members appeared to be pretty equally divided between the two proposals. A slight preponderance of feeling was, however, expressed in favour of the boat basins scheme, principally on account of its cost. It was ultimately decided to recommend this, in preference to the more expensive docks scheme. Several of the members, including the Chairman of the Association, were absent from Madras and had no opportunity of joining in the discussion. The original papers have again been circulated, together with the additional information furnished by the Chairman of the Harbour Trust, in his letter dated 5th August. At a special meeting of the members held yesterday, the 17th August, the proposals were again discussed. The respective merits of the two schemes were closely considered in every detail, and having regard to the important information not previously available, it was resolved to ask permission to withdraw the previous recommendation in favour of the boat basins, and to express an unqualified preference in favour of the more complete docks scheme, which in the opinion of the Association is not only likely to increase the trade of the port, but will materially reduce cost of both landing and shipping goods, and result in much less damage and loss to cargo generally.

(11)

From S. R. TURNBULL, Esq., Chairman, Chamber of Commerce, Madras, to the Chairman, Harbour Trust Board, Madras, dated 2nd September 1898.

I have the honour to acknowledge the receipt of your letter, No. 1250, dated the 5th ultimo, in which you again invite the attention of the Chamber to the question of harbour improvements and in which, after contrasting the financial aspects of the boat basin and ships dock schemes, respectively, you enquire whether, on a review of the facts therein stated, the Chamber adheres to the opinion in favour of a boat basin which it expressed in its letter of the 14th May.

In reply, I beg to state that your letter and its enclosures have been circulated amongst the Members of the Chamber, and the whole question has been carefully reconsidered in the light of the additional representations and arguments contained in those documents. There is no necessity to report to you in detail the different views that have been expressed on the subject. It suffices to say that a division of opinion has been found to exist amongst the members, and under these circumstances it has been thought advisable to lay before you merely the result of a long discussion that took place at a meeting of the Chamber, held on the 30th ultimo. At this meeting a resolution to the following effect was laid before the members :—

"The Chamber of Commerce is of opinion that the construction of docks is premature. It deprecates the expenditure of a further large sum of money until it is ascertained by experience what protective works, if any, are required for the entrance, as it considers that such works, if necessary, may have a very important bearing on the site and construction of docks should it be found desirable to build them hereafter. Meanwhile, the Chamber considers that the Harbour Trust Board should take early steps to remove the existing congestion of traffic on the pier, and give greater facilities for the loading and unloading of boats, which is the chief drawback to the port."

To this resolution, an amendment was proposed to the following effect :—

"The Chamber considers that the arguments in favour of an inner harbour or dock are conclusive, and advocates one being made."

In the usual course, the amendment was voted on first, and with the result that it was carried by a majority of one vote. Accordingly the substantive proposition was lost by the same majority.

It seems hopeless to expect that any unanimity of opinion on the subject will be attained, and the views of the Chamber as a body must be taken as being fairly represented in the resolution and in the amendment quoted above.

(12)

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Friday, the 16th day of September 1898.

2. Letters from the Chamber of Commerce and Trades Association, dated 2nd September and 18th August, replying to references respecting harbour improvements, having been circulated, were with G.O., No. 110, Marine, dated 11th February 1898, taken into consideration, and the Chairman moved the following resolution :—

1. That the Board has had under consideration the two estimates for boat basins, the estimate for a scheme of development including a ship basin and the other papers forwarded to the Board for remarks with G.O., No. 110, Marine, dated 11th February 1898.

2. That with the view of assisting the Board to come to a conclusion on the subject referred to them, the papers and minutes of Trustees thereon were forwarded by the Board, to the Chamber of Commerce and to the Trades Association, and the Board has considered their replies.

3. That, at the instance of the Chamber of Commerce, a proposal to construct a boat basin which should be capable of being converted into a dock has been considered, and that a proposal to meet the present requirements of the port by the construction of subsidiary piers within the harbour without any basin has also been considered.

4. That the Board is agreed that the time has come to adopt a final scheme for the complete development of the harbour in the future, no matter what portion of the work it should be decided to undertake immediately.

5. That for this reason and for the further reasons given below, the proposal to construct subsidiary piers and to put aside the consideration of further development, does not meet with the Board's approval. Subsidiary piers would be of little use by themselves, seeing that the harbour small craft would remain unprotected in heavy weather; they afford only a clumsy and expensive method of dealing with traffic, and their working is likely to be very seriously interfered with by railway arrangements.

6. That the Board cannot approve the proposal to construct now a boat basin capable of future conversion into a dock, not only for the reasons that have already influenced the Board to reject a boat basin altogether, but also because the construction of such a basin must cost more than a non-convertible basin.

7. The Board having already rejected the proposals for constructing non-convertible boat basins is of opinion that the best way to facilitate trade, to cheapen loading and discharge, to make the port a safe one, and thereby to attract shipping and cheapen freights, is to provide a ship basin or dock wherein ships can receive and discharge cargo direct at a quay, and simultaneously, if desired, into lighters on the other side.

8. That as the objections that have been raised to the construction of such a basin are apparently purely financial, the Board has had under consideration the financial aspects of constructing a ship basin and of constructing a boat basin. The Board considers that docks or a ship basin will entail no greater annual charges under the heads of maintenance and repairs, dredging establishment and repayment of capital than would a boat basin, as the shedding length of quays, dredging and establishment would be the same in either case. That the only difference between docks and a boat basin lies in the matter of interest on the capital expenditure, and that whereas in the case of a boat basin the charge for interest must be met by an impost on the trade of the port without any pecuniary set off, in the case of docks the charge for interest will be partially or wholly counterbalanced by the saving of all charges for boat-hire as well as by diminished loss of goods between ship and shore.

9. That for the above reasons the Board, as at present constituted, is of opinion that a ship basin of the same size and general position as that of the design forwarded by Government to the Board for remarks should be constructed, provided that it can be constructed and fully equipped with sheds, cranes and all appliances for a sum not exceeding 40 lakhs. In the matter of equipment the Board observes that only sheds have been provided for. The sheds provided are considered sufficient. As regards cranes, the Board considers that in the first instance it is not necessary to provide for a hydraulic system.

The Board already possesses the cranes shown in the accompanying list, and as most of the work of discharging and loading will be performed by hand, considers that this equipment will be sufficient. No provision has been made in the estimates for new offices; for this a sum of Rs. 35,000 should be added.

As regards the position and width of the entrance to the dock, the design under review places this 600 feet from the shore end of the existing south pier involving work inside the harbour estimated to cost some 8 lakhs. Mr. Wilson's objects in so placing it were to keep the new dock as far away from the sea as possible, and to suit proposed developments within the existing area of the harbour as shown in his plans of final stages. As it has been suggested by the Chief Engineer that whatever new work is added should be kept outside the existing harbour, Mr. Wilson has submitted to the Board two sketches with rough estimates in which the entrance is placed 1,000 feet from the shore end of the south pier, and the Board prefers this position to that originally proposed as it does away with the necessity for interference with the existing harbour. It has been also suggested by the Chief Engineer that the entrance should be placed still further seawards and a protecting mole omitted, but the cost of this proposal has not been estimated. If such a design can be drawn out to show that it would cost less, and be as efficacious as the omission of the protecting mole jutting out into the harbour has its advantages, the Board observes, however, that the further out to sea the basin is placed, the greater will be the cost of the sea face wall and the greater will be the exposure of the sea side quay to the violence of a storm.

As regards the width of the entrance, that proposed in the design under review is 164 feet with the object of allowing vessels to pass through it under their own steam. The Deputy Port Conservator has expressed the opinion that even with this width vessels will have to be warped in. Mr. Wilson suggests that if warping is to be resorted to, it would be better to make the entrance only 80 feet wide so that, if desired in the future the dock might be converted more easily into a closed dock by which not only greater stillness would be secured, but a greater permanent depth of water in the dock might be obtained. The Board as at present constituted is of opinion, that in the first instance, it is desirable to make the entrance suitable for vessels to enter under their own steam, with perhaps some assistance from a line thrown on to the quay.

10. The Board recognises the great weight which attaches to the opinions of the Chamber of Commerce and Trades Association, and notes from their final replies that while neither body, it is understood, is unanimous, both have decided in favour of an inner harbour or dock. The Board resolves to submit all material papers to Government, together with the letters from the Chamber and Trades Association, with a request that Government will decide after consulting its own Engineers and Sir Alexander Rendel what form the proposed dock or inner harbour should take and where it should be constructed.

11. In due course, so soon as a plan and estimate have been sanctioned by Government under section 64 of the Madras Harbour Trust Act, the Board will ask Government to move the Governor-General of India in Council under section 34 of the Act for his consent to an advance of the funds necessary for execution of the work.

12. That it is of urgent importance that a final decision be come to, and work commenced on, the scheme finally adopted at as early a date as possible, and the Board therefore respectfully solicits the early consideration of this matter by Government.

On being put to the vote this resolution was lost by 5 to 2, and it was then resolved that the Chairman is requested to draft a letter explaining to Government exactly how the matter stands.

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(13)

PETITION from the Merchants of Madras, to the Chairman, Harbour Trust Board, Madras.

With reference to the question of harbour improvements now under discussion, we the undersigned beg to approach you with an expression of our opinion, as we directly interested in the trade of the port.

2. Three schemes have been proposed by the Members of the Harbour Trust Board, viz. :—

(1) A boat basin.
(2) A boat basin which can be converted into a wet dock.
(3) A wet dock.

Each of these has its supporters and we have had the benefit of understanding all that has been urged in favour of each, but we beg leave to acknowledge our preference for the last scheme—a wet dock for this port.

The only objection of any importance that has been raised against this scheme (No. 3) is on the score of finance. We shall, however, endeavour to show, by a comparison of the relative advantages of the three schemes, that the wet dock scheme, if carried out, would be most economical and profitable to the trade.

3. *Boat basin.*—Taking the financial side of this scheme, we consider that the Harbour Trust Board would have to borrow at least 15 lakhs of rupees for this purpose. The interest on that loan and the cost of the upkeep of the basin would entail the levy of additional dues and consequently additional burden to the trade. As regards facilities for importing and exporting, we shall possibly be in the same position as we are, that is, absolutely at the mercy of the boat man and the landing contractor. The mitigating or minimising risk of damage to goods would not be any better. On the other hand, some among us consider that matters would get worse. For as packages are generally damaged not on board steamer, but in the process of being tumbled into boats or lighters, the greater the despatch with which a steamer discharges her cargo, the greater will be the damage. For the same reason, the greater the capacity of the boats, the greater also will be the damage to goods which

would be heaped in larger quantities. Lastly, as owing to the position of the basin, boats or lighters will have to ply a greater distance between the steamer and the basin, the probability is that boat hire will be enhanced. In any case the present state of matters would not improve in the least.

4. *A convertible Boat basin.*—All the above objections apply also to this scheme which has the further disadvantage of requiring about 30 lakhs, or twice the amount of the boat basin scheme. The burden to the trade would accordingly be proportionate. This scheme does not appear to be entitled to any consideration except out of deference to its proposers. It has nothing intrinsic to recommend it.

5. *A wet dock.*—It has been suggested that 40 lakhs would be required for this scheme, but as official estimates have a tendency to increase when the work is fairly in progress, we may, after allowing a margin for the unforseen, consider that 50 lakhs would be sufficient. Taking the safe minimum of cargo to be about 2,00,000 tons (excluding coal, kerosine oil, &c.) exported and imported in a year, we think that by charging dock dues on that quantity at the same rate at which the minimum boat-hire is now paid, *viz.*, Re. 1-2-0, the board would be able to pay interest on outlay. We base our calculations on the assumption, (1) that 50 lakhs would be required for the construction and full equipment of the dock, (2) that the trade of the port would remain stationary, and (3) that the coal trade would vanish as soon as Bezwada-Madras Railway is in full working order.

We anticipate, however, that with increased facilities for landing and shipping goods, there would be a corresponding increase in the trade of the port. It has been suggested that some steamers may not go into docks. That would, of course, mean a loss to the Harbour Trust Board in dock dues. If such a contingency should arise the Collector of Sea Customs can, under the powers vested in him by the Sea Customs Act and also in his capacity as Conservator of the Port, compel the steamers to use the docks in the interests of the consignees. However, we need not apprehend any loss in this direction, as it is improbable, what with the assurance that they would have to pay nothing and what with the facilities afforded, the steamers would refuse to go into docks.

6. We would accordingly urge that the wet dock scheme be viewed with favour, for even if a large outlay is required for the work, it will benefit the trade without additional dues or charges being levied.

The damage done to goods by their being tumbled into lighters and boats would cease. The people that suffer the greatest loss under present arrangements are importers of wine, spirits, glass, earthenware, cement, &c. Even strongly packed cases get smashed up and when compensation is asked, the steamer agents have a trite reply—"Frail packing"—and consequently the consignees are obliged to bear the loss. The confusion caused in landing of iron is another nuisance which would also require some attention. In fact, the supporters of the boat basin scheme appear to consider that all that is required are facilities for the steamers while seemingly they have no sympathy with the consignees at all.

We have, therefore, the honour to request that a favourable consideration be given to the advantages of the wet dock scheme.

A

ıIGN FOR A 10½ ACRE
ɔCK FOR MADRAS.

Scale 400 Ft. = 1 Inch

Rough Estimate

2500ft. Sea wall at Rs. 200 — — —

3620ft. Dock wall at Rs. 375 — — —

630ft. Mole at Rs. 600 — — — — —

1000ft. wall inside harbour
at Rs. 200 — — — — —

Excavation 35ft.
460000 × 35 at Rs. 10 per 1000Cft. —

4 Sheds — — — — — — — — — —

Offices — — — — — — — — — —

1¼ Miles rails at Rs. 20000 — — —

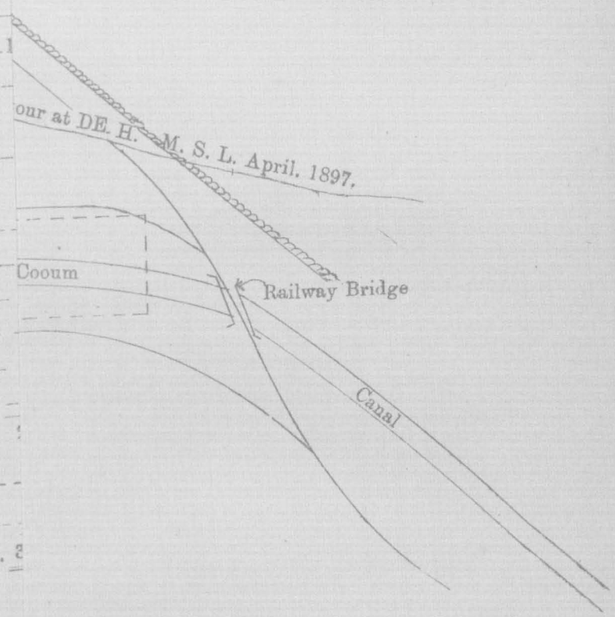
8 Cranes at Rs. 7,000 — — — — —

Metalling 5,570 Sqrs. at Rs. 6½ — —

Contingencies 5 per cent. }
Establishment 5 — do. — } — — —

Special tools and plant — — — — —

Total Rs. 3



(Signed) F. J. WILSON,
Local Consg. Engineer,
Madras. H. T. Board.

Zinco., Survey Office Madras.
1898

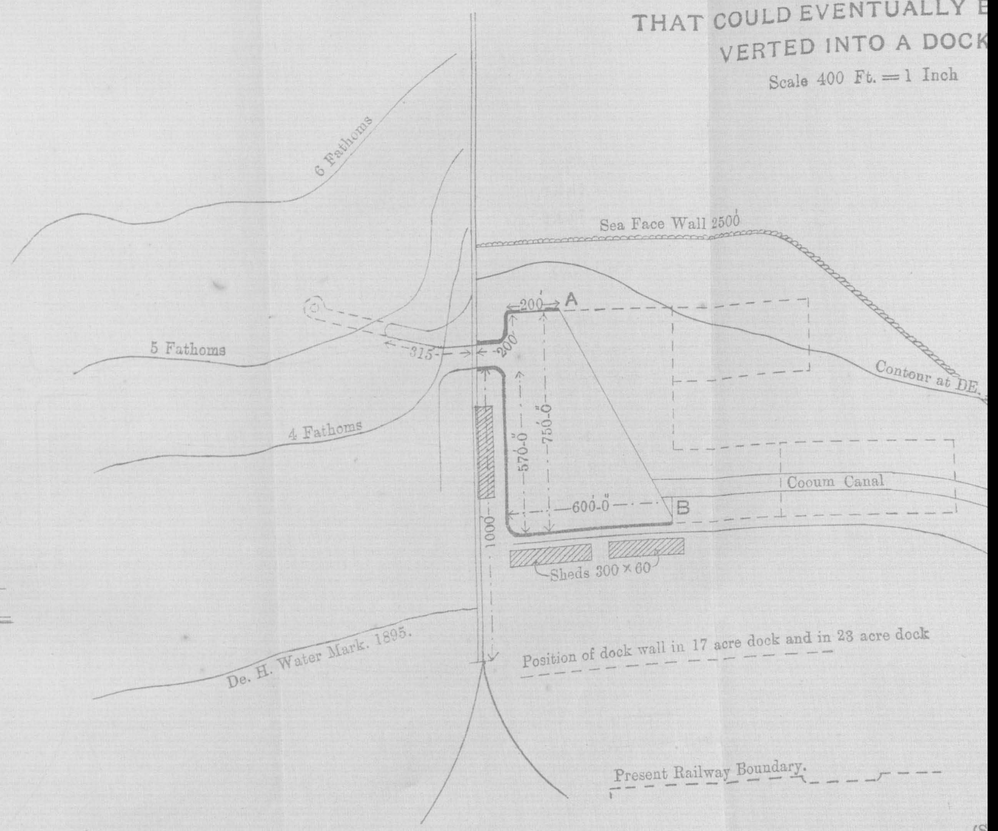
Reg: No. 4781
Copies. — 110

DESIGN FOR A BOAT BA
THAT COULD EVENTUALLY B
VERTED INTO A DOCK

Scale 400 Ft. = 1 Inch

Rough Estimate

2500ft. Sea wall at Rs 200	= 5,00,000
1470ft. Dock wall at Rs. 375	= 5,51,250
1000ft. Boat Basin wall at Rs. 70	= 70,000
315ft. Mole at Rs. 600	= 1,89,000
500ft. wall inside harbour at Rs. 300	= 1,50,000
Excavation	
400 × 750 × 13 at Rs. 10 per 1000 Cft.	= 39,000
3 Sheds	= 1,50,000
Offices	= 30,000
Metalling	
600 × 200 / 570 × 100 = 1770 Sqr. at Rs. 6½	= 11,505
	1,690,755
Contingencies 5 per cent / Establishment 5 per cent	= 1,69,075
Special tools & plant	= 1,50,170
Total Rs.	20,10,000



Dock wall ——————

Boat Basin wall ——————

Reg: No. 4782

Copies 110

PLAN OF A BOAT BAS

800 × 100

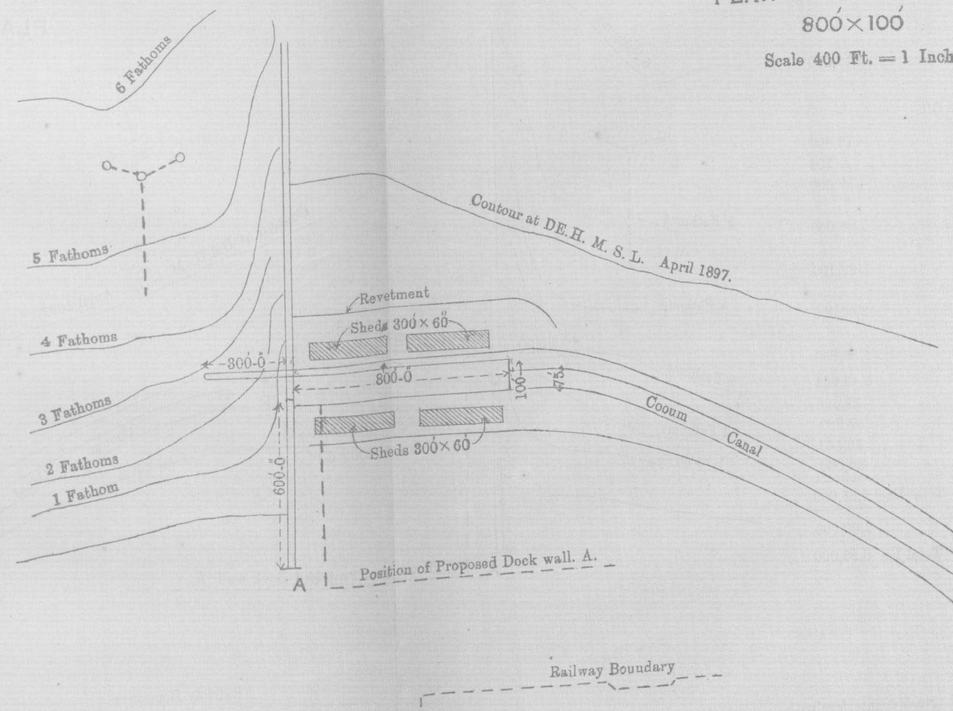
Scale 400 Ft. = 1 Inch

Approximate or rough Estimate

1700ft. of Boat Basin wall at Rs. 70		1,19,000
Excavation Say 20ft.		
10ft. at 2½ annas 10ft. at 4 do. } Say 8 Rs. per 1000 Cft.		
800 × 100 × 20 = 1600 units at Rs. 8		12,800
34 Stone Ballards 50ft. apart at Rs. 6		204
Block Moulds		7,000
Revetting Eastern boundary 1000ft. at Rs. 8		8,000
Metalling 200ft. each side of basin 1700 × 200 = 3400 Sqr. at Rs. 6-8		22,100
4 Sheds at Rs. 25 per Sqr. yds. of surface covered		2,00,000
Protecting arm 300ft. long and entrance as per estimate with Board		1,80,859
		5,49,963
Contingencies at 5 per cent		27,496
Establishment (Pogson's Estimate.)		37,980
Special Tools and plant		50,561
1 Mile Railway lines		20,000
	Total Rs.	6,86,000
Coal Jetty at North of Harbour say		2,00,000
	Total Rs.	8,86,000

N. B. A boat basin of this plan would greatly interfere with future construction of docks. If placed at line A. A. it would be (1) more expensive and (2) less accessible to boats.

Reg : No. 4783
Copies. 110



(Signed) F. J. WILSON,
Local Consg. Engineer,
Madras. H. T. Board.

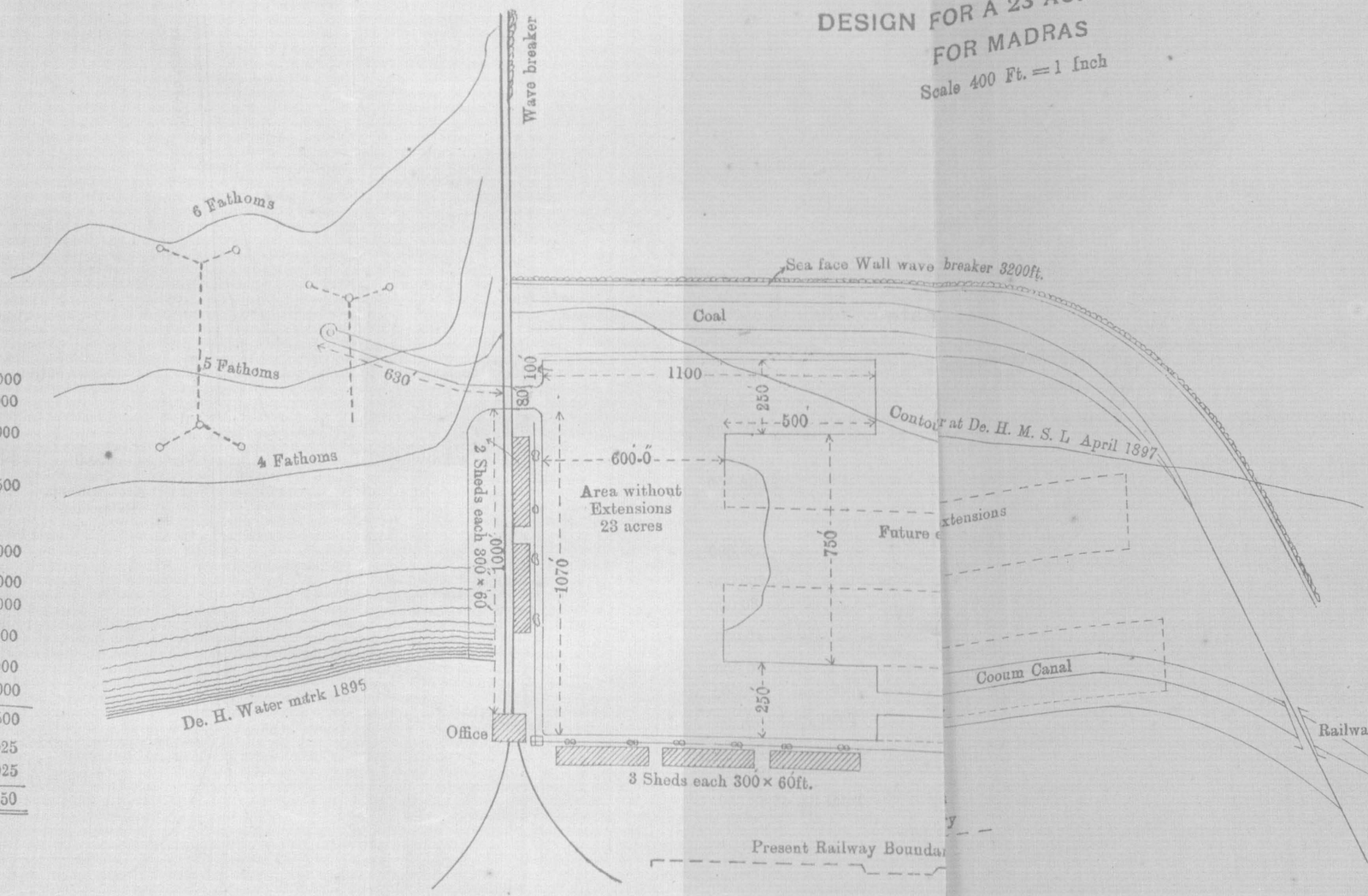
Zinco., Survey Office, Madras.
1898

DESIGN FOR A 23 ACRE DOCK. FOR MADRAS

Scale 400 Ft. = 1 Inch

Rough Estimate

3000ft. Sea Wall at Rs. 200	600,000
630ft. mole at Rs. 600	378,000
1000ft. Wall inside Harbour at Rs. 200	200,000
Average height 25ft. Dock wall 5340ft. at Rs. 375	2,002,500
Excavation. 35,000,000 Cft. at Rs. 10 per 1000 35ft. depth allowed	350,000
Sheds	250,000
Offices	30,000
2 Miles Railway lines at Rs. 20000 per mile	40,000
10 Cranes at Rs. 7000	70,000
Metalling Quays	50000
Total Rs.	39,70,500
Contingencies 5 per cent	196,025
Establishment 5 per cent	196,025
Total Rs.	43,62,550



(Signed) F. J. WILSON,
Local Consg. Engineer,
Madras. H. T. Board

Zinco., Survey Office, Madras.
1898

Reg: No. 4785
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GOVERNMENT OF FORT ST. GEORGE.

MARINE (1899) *DEPARTMENT.*

Letter to the Right Honourable the Secretary of State for India.

Dated 3rd January,

No. 1 of 1899.

REQUESTING to be favoured with the opinion of Sir Alexander Rendel on the various measures proposed for the development of the Madras Harbour.

MARINE DEPARTMENT.

Letter—to

The Right Honourable the SECRETARY of STATE for INDIA.

My Lord,

With your Lordship's Despatch No. 6 P.W., dated 29th October 1896, was forwarded for our information, copy of a report by Sir A. Rendel on the various measures, which had been proposed for the improvement of the Madras Harbour, for the purposes of trade, and for the prevention of the shoaling which the survey of 1895 had disclosed, both inside and at the entrance of the harbour. These measures have since formed the subject of much discussion by the Harbour Trust Board and its professional advisers. The Board has not, however, been able to arrive at any unanimity of opinion, such as would justify the carrying into effect of any particular measures. The matter has, accordingly, been referred by the Harbour Trust Board to Government for decision.

2. The various schemes that have been brought forward are briefly described in the accompanying copy of our Proceedings, No. 10, Marine, dated 3rd January 1899, and we have the honour to request that your Lordship will be so good as to obtain from Sir A. Rendel an expression of opinion on the measures proposed for the development of the harbour.

We have the honour to be,
My Lord,
Your Lordship's most obedient, humble servants.

(Signed) A. E. HAVELOCK.
(„) A. T. ARUNDEL.
(„) H. M. WINTERBOTHAM.

Fort St. George,
3rd January 1899.

Exd. A. Rungasawmy Aiyangar.

Draft.

Government {1898} of Madras.

MARINE.

Recd. } 1898. Enclosures

Regd. Spare copies

G.O., No. 110, 11th February 1898.

FEBRUARY.

Boat Basin for the Madras Harbour

Papers relating to the construction of a —, forwarded to the Harbour Trust Board, Madras, for such remarks and recommendations as they may desire to offer.

GOVERNMENT OF MADRAS.

MARINE DEPARTMENT.

Read—the following papers:—

Note on estimate for constructing a boat basin in connection with the Madras Harbour prepared in accordance with G.O., No. 834, Marine, dated 1st December 1896.

The Madras harbour has now reached a crisis in its history, and its future success will very much depend on the general plan of development which must now be decided on. The order quoted above merely calls for an estimate for a form of improvement, and it is clearly intimated, in the letter of the Chairman of the Harbour Board accompanying the order, that the intention of the Trustees was to postpone the consideration of the general question of development and to confine themselves to the consideration as to the means that should be adopted to improve harbour facilities at a moderate cost.

The danger of adopting this course is that the Trustees may find themselves committed to a line of action which may afterwards be much regretted, and it is considered that it will not be a waste of time to review the whole history of the harbour from the time it was first thought of, up to the present day. This is the more necessary from the fact that the harbour as it now exists is the outcome of a project which failed in its original intention, and is not the *complete* realization of any scheme projected by any one of the numerous authorities who have been consulted on the subject. It is not the harbour originally designed by Mr. Parkes, as it has no quays for ships nor jetties for lighters. It is not the harbour so strongly advocated by the large number of authorities consulted in India and by Sir Nowell Salmon's committee of 1887, as it has no north-eastern entrance. It is not the harbour advocated by Sir John Hawkshaw's committee of 1884, as it has an entrance of 516′ 6″ instead of 450 feet and as it has no docks or basins for the protection of small craft, which became a part of this scheme as explained in Secretary of State's despatch published in Proceedings of Madras Government, No. 3128 W., dated 19th December 1884; and it is not the harbour advocated by Sir Alexander Rendel, the present Consulting Engineer, who has more than once declared his opinion that the present work is merely an entrance to a harbour yet to be made. In fact, the two breakwaters which have been constructed are only part of a scheme, and too much care cannot be bestowed on the method of completing it.

It is now nearly thirty years since proposals were made with the object of providing Madras with a "safe and convenient harbour"; several schemes were projected, but the two which received most consideration were, 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".

In 1873, Mr. W. Parkes was sent out by the Secretary of State for India, and spent five weeks at Madras in personal investigations to enable him to come to some conclusion as to the best mode of providing shelter for the shipping. In his report dated 4th November 1873, Mr. Parkes gives his reasons for advocating a close harbour with an eastern entrance, and it being considered by the Secretary of State for India that the question was too large to be dealt with only on financial grounds, Mr. Parkes' proposals were subsequently sanctioned and carried out with very little alteration. Mr. Parkes evidently contemplated that his harbour with an entrance 450 feet wide would secure sufficiently still water to enable vessels within the harbour to lie alongside wharves or quays. In his original plan he shows three ships alongside the iron pier, and he also contemplated ships being able to lie alongside of the two masonry piers, intending his rubble base to be 22 feet below low water. The rubble base has actually been made only 22½ feet below what is called DeHavillands' M.S.L. or only 18½ feet below the lowest tide now recorded; the depth is, therefore, insufficient to admit of ordinary sized steamers to get close alongside of the piers, even

were the water still enough. Mr. Parkes thought that the piers might be unsuitable for wharves, by reason of seas breaking over from the outside and consequently suggested that wharves might be formed by adding a wall on the outside, but he did not apparently consider that there would be any difficulty in ships lying alongside the piers, owing to insufficient depth or disturbance of the water inside the piers. He calculated from a formula of Mr. Stevenson's that a 10 feet wave entering the harbour would be reduced to 1′ 9″ before it reached the piers or the beach or a 15 feet wave to 2′ 7″.

$$X = \frac{H\sqrt{b}}{\sqrt{B}} - \frac{\left(H + \frac{\sqrt{b}}{\sqrt{B}}\right)^4 \sqrt{D}}{50}$$

Where
H = Height of wave at harbour entrance.
b = Breadth of entrance.
B = „ of harbour at place of observation.
D = Distance from entrance to place of observation.
X = Height of residual wave at place of observation.
All dimensions in feet.

Sir Andrew Clarke in 1878 found fault with Mr. Parkes' proposals for not providing for wharves; he said that wharves formed such an integral portion of any harbour which would be of real practical value to Madras, that he could not omit such an important item from his estimates. Mr. Parkes replied that wharves were not wanted immediately, but it would be sufficient to employ large cargo boats which would land cargo at cheap shallow water jetties run out from the shore, and the construction of such jetties was sanctioned and started, when the outer arms of the harbour were destroyed by the storm of November 1881.

The results of this storm were sufficient to demonstrate that Mr. Parkes' anticipations in regard to the effect of the harbour with an eastern entrance towards securing still water were far too sanguine. The entrance had been made 550 feet wide, but it is on record in the report of the Master Attendant on the storm, that all the cargo boats in the place were wrecked, the beach ravaged, and the low level jetties (then in course of construction) utterly swept away before a block had fallen from the walls.

Vide Minutes of evidence taken before committee appointed by Secretary of State for India in 1887, question 997.

It was clear that the original design for constructing low level jetties in the harbour to enable large lighters to land goods must be abandoned, and it was more than doubtful whether even in ordinary weather the original design would secure sufficiently still water to enable a ship to lie alongside a wharf or quay. Many eminent opinions were taken, and a committee consisting of Sir John Hawkshaw, Sir John Coode and Professor Stokes was appointed by the Secretary of State for India in July 1882 to decide what should be done. The decisions of this committee and the correspondence that took place on the subject are given in Volume No. CCVI of Selections from the Records of the Government of India, Public Works Department. This committee, after dealing with the section which should be adopted in restoring the damaged breakwaters, recommended that the entrance be made 450 feet wide instead of 550 feet as originally constructed. The local nautical authorities objecting to less width than 500 feet, a committee was appointed by the Madras Government which proposed to reform the harbour with a north-eastern entrance, which, while meeting the requirements of all the nautical authorities consulted, would, it was thought, secure the desired stillness of water. The home committee rejected this proposal on the grounds that it was proposed to meet the cost of the north-eastern entrance by reducing in some measure the provisions originally recommended by them, that the entrance would be difficult for vessels to enter, and that for a time if adopted, there would be two entrances. On a further representation being made to the Secretary of State for India, his conclusions were given in Proceedings of Madras Government, No. 3128 W., dated 19th December 1884, and were that the eastern entrance should be maintained and through which the larger vessels should have no difficulty in getting out to sea when a severe storm was threatened, and as regards the smaller craft, the provision of docks or basins in the accretion to the south of the harbour would protect them from danger. It will be thus seen that with the decision to retain the eastern entrance all idea of providing quays or wharves inside the harbour was given up and a boat basin or dock became an integral part of the design.

Up to 1886 the Madras harbour works had been dealt with in the Public Works Department, but in that year the Harbour Trust Board was constituted and in 1887 Captain Taylor, who was a strong advocate of the north-east entrance scheme, again raised the question in a letter to the Chairman in which he brought prominently to notice how exposed the harbour was with an eastern entrance. The Madras Government was strongly supported by the Government of India in asking for a reconsideration of this question, and in Government of India despatch No. 25, dated Simla, 16th May 1887, it is said that the difference of opinion on the subject of the position of the harbour entrance "may be said to have been the difference between the opinion of Sir John Hawkshaw's committee in which Mr. Parkes concurred, and the opinion of all persons or bodies in India who were interested in the harbour or who have been officially or professionally consulted concerning it." Among those who maintained an opinion favourable to an alteration in the site of the entrance were—

The Madras committee of local professional gentlemen which reported on 30th June and 22nd September 1883.
The Madras Chamber of Commerce.
The Professional Advisers of the Government of India.
Mr. G. L. Molesworth.
Colonel H. A. Brownlow, R.E.
Colonel N. S. Trever, R.E.
All Commanders of first-class steamers using the port of Madras who had been consulted.
The local nautical authorities.
The Madras Government.

The Government of India went on to say that the opposition of the Madras Government and of all Madras local authorities, to the eastern entrance had their entire concurrence.

The result of these representations was the appointment of a committee by the Secretary of State for India consisting of—

Vice-Admiral Sir Nowell Salmon, V.C., K.C.B.
Sir John Coode, K.C. M.G.
Rear-Admiral Sir George S. Nares, K.C.B.

The minutes of evidence taken before this committee are very instructive and interesting reading to any one concerned with the future of the Madras harbour. The list of witnesses examined includes, the Consulting Engineer, the Superintendent of the Harbour Works, Generals Sankey and Shaw-Stewart (late Chief Engineers of the Public Works Department), and two foremen of the Harbour Works, three officers of the Royal Navy, Captain J. H. Taylor (Port Officer of Madras) and seven Captains of mercantile steamers and the Senior Madras Pilot. In their report the committee say "It is agreed on all hands that, owing to the frequently disturbed state of the "water, the facilities for landing and embarking passengers, cargo, &c., offered by the "harbour are very much restricted, nor would it be feasible for the same reason to use "without serious interruption wharves and jetties along the shore line, or to keep in "safety within it such improved lighters, tugs and other harbour craft, as would greatly "increase its value as a trading port * * * * . The confused sea within the "harbour is attributed by all who have given evidence to the nearly constant "swell from the eastward which runs in through the present entrance and being "deflected from the side walls causes what is described as a 'nubbly sea' or 'joggle "of a sea' and in bad weather as being like 'a boiling pot.'" The Committee approved of a north-east entrance to cost about Rs. 25½ lakhs over the cost of completing the harbour with an eastern entrance.

On the Board being called on by Government to submit an estimate for a north-east entrance as recommended by the committee, Mr. Pogson (who had succeeded Mr. Thorogood as Engineer to the Board) submitted a modified scheme for a north-east entrance marked IV-A., at a cost of Rs. 21½ lakhs. This design was framed with the avowed object of completing the harbour with an eastern entrance according to Mr. Parkes' design in the first place, to put it to the test, so that should the water with an eastern entrance be found "smooth enough for shipping," improvements

inside the harbour could then be made to secure, the safety of "cranes, lighters, sailing ships and native craft in cyclones." If the water were not found smooth enough, then his design IV-A. would be proceeded with. As this design only involved the removal of a portion of the end of the north pier, Mr. Pogson proposed to complete the pier as sanctioned up to a certain point, and beyond this to the end to omit the wave breaker blocks. The Board thought this scheme the most expeditious and economical that had been proposed and it had the approval of Sir G. Molesworth.

Sir Alexander Rendel, who had succeeded Mr. Parkes as Consulting Engineer, deals with this proposal in his report published in Proceedings of Madras Government, No. 1737 W., dated 1st July 1889, he objected to the portion of the north arm being only made up to a temporary section pending a settlement of the position of entrance and says:—

"This brings me to the vexed question of the position of the entrance, and here it appears to me that, so long as the question of its ultimate position remains undetermined, there will be vacillations and delays, and perhaps mistakes ending in disasters, and that it is highly desirable to set the question at rest as soon as possible. For my part I cannot believe that the science of marine engineering is in so low a condition that a point of this kind can only be determined by an experiment which contemplates the possibility of our having to resort to the costly process of taking up several hundred feet of breakwater. And I feel it so necessary that the question should be settled at the earliest possible moment once and for ever, that, at the risk of being thought too ready to express an opinion upon it, I do not hesitate to say that, in my judgment, the eastern entrance as at present designed is a proper one, is a better one than any alternative which as yet been proposed, and is the best which, under present circumstances, can be devised

"To make a harbour secure at the expense of its accessibility, which to my mind is what the best of the north-east entrances yet proposed would do, is a worse fault than to make it accessible at the expense of its security, because we can, as a rule, improve the security by internal works and we cannot improve the accessibility except by costly alterations which will diminish the security.

"The simple fact, in my judgment, is, that the present scheme for a harbour at Madras will make no harbour worth the name at all. What it does make, is a satisfactory entrance to a harbour yet to be designed within it.

"A harbour, it seems to me, is of little value to Madras unless it provides a quay wall alongside which ships may lie as in a dock, and take in or discharge their cargoes in perfect quiet and security, and there seems no difficulty in providing such a quayage at a cost which the result would fully justify But, be the cost what it may, it seems to me that Madras is worth a safe and commodious harbour.

"The type of harbour to which Madras belongs is very much that of Whitehaven, a copy of the chart of which I append to this report. Many years ago I was Consulting Engineer to this harbour, and I know it well. We have here an outer harbour, forming an approach, and nothing but an approach, to two inner harbours, each so enclosed by quays that ships lie undisturbed within them, with a space between them opening directly on to the outer harbour, and forming a beaching ground for ships and waves. It would be easy to devise a similar scheme for Madras, which would give it, say, 60 acres of enclosed dock (gates of course are not required), 9,000 feet lineal of wharfage, and 40 acres of quay space, enough to make it a first-class port for a very large trade, or, if it be preferred, the adjacent shores outside the harbour might be utilized for the purpose, and of course a combination of both ideas is possible. I claim no priority in suggesting either plan. Mr. Parkes has, I believe, roughed out the latter idea; Mr. Thorowgood, the former, quite independently of me. But I may say, as a corroboration of their views more than anything else, that the first of the two schemes I have now suggested I broached when the harbour was first proposed; and I may add that, if it be adopted, the entrance might be kept at the width originally given to it of 500 feet, which is by no means more than it should be."

To this report the Board replied that the additional cost of the north-east entrance proposed was Rs. 21 lakhs and that proposals for docks would not be much less costly, while the advantages of docks over a north-east entrance would require to be demonstrated. If the eastern entrance does not give sufficiently still water then Sir Alexander Rendel might be asked to personally inspect the harbour and favour the Board with his views as to the best method of completing the harbour so as to ensure smooth water. The Trustees were of opinion that Mr. Pogson's plan, No. IV-A, was the best that had been proposed.

Proceedings of Madras Government, Nos. 2652-2653 W., dated 23rd September 1889.

After the very decided opinions expressed by Sir Alexander Rendel in his report of 1889 already quoted, and although the Trustees had expressed their unanimous approval of Mr. Pogson's IV-A scheme this invitation to Sir Alexander Rendel to inspect and advise does not show that firm conviction that a north-east entrance was the only solution to the difficulty, that had been previously and so frequently urged from India.

Sir Alexander Rendel inspected the harbour in February 1890 and recommended the piers being completed to their full section with a 500 feet entrance, but as there was a possibility of the end of the north pier being removed, it was proposed not to provide the north pier with a caisson head like the south pier. In his report, dated the 28th November 1890, Sir Alexander Rendel says: "But the expenditure upon it" (*i.e.*, the harbour) "will not in my opinion end with the completion of the present "scheme. A mere harbour of refuge is not wanted at Madras; what it seems to me is "wanted there, is a good commercial harbour and a commercial harbour in which "vessels discharge goods into or load goods from boats which themselves load and "discharge on a foreshore of sand is not worth the name—at any rate is not worth the "sum which will have been spent on the Madras harbour by the time it is finished on "even its present plan." That Sir Alexander Rendel's opinion was, that the ultimate development of the harbour must take the form of an inner harbour or dock is perfectly clear from his report, and the decision to complete the eastern entrance in order to give it a trial can only be taken as an indication of the abandonment of the strong position previously taken up on the subject of providing a north-east entrance. It must be remembered that an eastern entrance 550 feet wide had already been given a trial, as this was practically finished in 1881 and unless the evidence given before Sir Nowell Salmon's committee is to be set aside, then this entrance did not give sufficiently still water even in ordinary weather, and the only question which really had not been put to the test was, whether the stronger and higher sections of the new arms would stand a first-class cyclone. It can hardly have been hoped that a narrowing of the entrance of 50 feet would make any material difference in the amount of ocean swell coming into the harbour through an eastern entrance.

Proceedings of Madras Government, No. 426 W., dated 16th February 1891.

In March 1891 the Secretary to the Board submitted proposals for constructing a deep water ship dock in the sand to the south of the harbour, which are dealt with in Proceedings of Madras Government, No. 347 M., dated 4th August 1891. The papers published with these proceedings make it quite clear that the Board had abandoned the idea of a north-east entrance, as being a necessary alternative to maintaining an eastern entrance and constructing an inner harbour or dock. The question of constructing a dock or inner harbour is not discussed as an *alternative* design for completing the harbour but as a possible improvement. The term "completion of the harbour" is apparently used to mean the completion of the two breakwaters with an eastern entrance and the strong and influential opinions expressed in the years following the storm of 1881, and the evidence taken before Sir Nowell Salmon's committee appear to have been lost sight of as the construction of low level quay walls inside the harbour with its eastern entrance is again proposed. In accordance with this change of opinion as regards a north-east entrance, when the estimate to carry out Sir Alexander Rendel's recommendations was prepared, it is observed, that provision was made in that estimate for wrought iron caissons for *both* the north and south piers and for capping to the north pier. As the removal of a high monolithic mass of concrete contained in a wrought iron caisson would be a very costly and troublesome undertaking and looking to the possibility of part of the north pier having eventually to be removed to suit the No. IV-A scheme, Sir Alexander Rendel has recommended a block pier head for the north pier. This provision for a caisson for the north pier was sanctioned however without remark, but in commenting on the estimate Sir Alexander Rendel repeats that if the harbour is to be made really commercially useful a further and much larger sum than provided in the estimate will have to be spent on it.

Proceedings of Madras Government, No. 718 W., dated 13th March 1891.

Proceedings of Madras Government, No. 430 W., dated 12th February 1892.

The Board's rejoinder to this is contained in Proceedings of Madras Government, No. 3011 W., dated 2nd November 1892, in which all that is said on the subject is, that the Trades Association is strongly in favour of docks, but that the Chamber of Commerce is not unanimous and considered "the time had not arrived to discuss the question."

In 1893 Mr. Pogson proposed to make the entrance 520 feet wide instead of 500 feet and this alternation was approved by the Board and agreed to by the Secretary of State.

Proceedings of Madras Government, No. 1017 W., dated 13th April 1893.

In his report on the harbour works for the quarter ending 31st December 1892, Mr. Pogson brings to notice that the north pier would be finished before the south pier and as "apparently no doubt now "exists as to which is to be the final "entrance to the harbour it would be more "economical to complete both piers with caissons without delay and look to docks for "any further improvement necessary." Mr. Pogson draws attention to the fact that the cost of finishing off both piers with caissons had been already included in the estimate and sanctioned, and as the iron work was already on the works, it was only necessary to "record sanction to finish off both piers with the caissons already supplied as soon "as opportunity occurs." As a final proof that the Board had by this time resolved to drop the north-east entrance the Engineer's report was forwarded to Government with the Chairman's letter, No. 4495, dated 15th March 1893, with absolutely no comment whatsoever on this subject, although other paragraphs of the Engineer's report are taken notice of. The north pier caisson was subsequently set and a lighthouse built on the top of it.

Proceedings of Madras Government, No. 1018 W., dated 13th April 1893.

In 1895 the Secretary to the Board having brought up the question of the construction of a boat basin south of the harbour a strong representative committee was appointed by Government to consider the question of improving the means of the trade of the port. The Government which the harbour provides for working nominees on this committee were—

Proceedings of Madras Government, No. 47 M., dated 9th February 1895.

The Hon'ble Colonel J. Pennycuick, R.E., President.
Do. Mr. A. T. Arundel.
Mr. F. R. Ollott.

The Collector of Sea Customs and the following bodies were represented:—

The Harbour Trust Board.
" Chamber of Commerce.
" Trades Association.
" Madras Railway Company.
The South Indian Railway Company.
" Municipal Commission.
" Kolar Gold Field and Mining Board.

This was no doubt a strong committee, but although the order appointing it was a Marine order the Marine Department was not represented. There was not a single nautical representative on the committee nor was the Military Works Department represented. The proceedings of this committee are published in a separate blue book from which it would appear that the best site for a shallow boat basin was carefully considered, and the committee also had before it the subject of connecting the harbour with the Buckingham Canal as well as that of the management of custody of goods landed in connection with the Customs office and the Harbour Trust Board. The question as to the merits or demerits of a shallow boat basin does not appear from its report to have been considered by this committee at all, although at its first meeting one of the members appears to have enquired as to the cost of constructing docks eliciting from the Secretary the information that estimates for docks had ranged from 30 to 86 lakhs of rupees. The committee appears to have started on the ground that the construction of two breakwaters with an east entrance completed the harbour sanctioned by the Secretary of State 20 years previously, and the main question placed before this committee appears to have been the selection of a site for a particular form of "improvement" to this harbour. The plan selected by the committee is that

known as A_1. It consisted of walling off the south-west corner of the harbour to form a boat basin with an entrance for a canal at the north-west corner connected with low-level wharves and a quay.

This proposal is entirely at variance with the conclusions derived from the evidence taken before Sir Nowell Salmon's committee, and with the opinions expressed as to what was to be expected with an eastern entrance by all the eminent authorities consulted in the years following the storm of 1881. No reference whatever is made to these opinions and to this evidence in the committee's report, and one is led to suppose that they had been lost sight of. If it had been intended purposely to reject the conclusions come to by Sir Nowell Salmon's committee and by other authorities one might have expected some reference to have been made to the fact.

On the committee's A_1 scheme being submitted to the local Marine officers Captains Powell, Hewett and the three Harbour Masters, nautical objections were at once raised to it. They objected that the scheme would reduce the space for the berthing of steamers, that the wall would create a backwash preventing the sternfasts of steamers holding, and a preference for a basin to the south of the harbour was expressed. A modified plan was then made reducing the size of the boat basin, and this plan was submitted to Government and sanctioned; but it does not appear to have been submitted to any nautical authority, and it is on record that it passed the Board in the absence of the only nautical member. This scheme was not put in hand immediately pending the question of funds being settled and objections to it were again considered. Mr. Austin, the Chairman of the Board, who had relieved Mr. LeFanu, addressed Government on the subject in his letter published in Proceedings of Madras Government, No. 884, dated 1st December 1896. He brought to notice that the nautical authorities were not in favour of the scheme, that the proposed boat basin in the south-west corner of the harbour must be abandoned, as apart from the nautical objections to it, it was totally inadequate to meet the requirements of the port. That it was necessary to take immediate action for providing better facilities for the landing of coal. That the Board did not consider that the time had yet arrived to provide a ship dock in connection with the harbour but that when this time did come, the sand to the south of the harbour was the best place for it. To meet these requirements, the Board proposed to construct a boat basin in the sand to the south of the harbour. As the Board's Engineer was absent on leave, it was requested that the estimate might be prepared by the Public Works Department.

Proceedings of Madras Government, No. 119 M., dated 2nd February 1896.

Government observed that the Board now proposed in modification of all previous proposals, to limit their attention for the present to the construction of a boat basin outside the south arm of the harbour and within the sand which had accumulated to the south-west, and ordered the Executive Engineer, Buckingham Canal division, who was under separate orders preparing an estimate for a canal to connect the harbour with the Cooum to prepare the estimate for the boat basin in communication with the Harbour Engineer. This is the estimate which is now under review, and the foregoing is a history of what has led up to it from the time the Madras Harbour was first thought of.

Proceedings of Madras Government, No. 834 M., dated 1st December 1896.

What has taken place therefore may be briefly summarised as follows. In 1875 it was recognised that Madras required a safe and convenient harbour which was of too large a nature merely to be dealt with on financial grounds. A plan was adopted which was intended to be complete in itself and would secure sufficiently still water to enable ships to lie alongside of quays or lighters alongside of ships and jetties. In 1881 it had been recognized that the form of harbour with an eastern entrance would not secure the safety of small craft during a storm, nor admit of the construction of low-level jetties within the harbour. In the enquiries which followed the storm of 1881, it was shown that Stevenson's formula for waves did not apply to the Madras harbour owing to insufficient length, and it is given in evidence that the ocean swell as evidenced by the surf on the Madras coast was almost constant, and that the line of the swell never deviated from a line parallel to the coast by more than [illegible]. That with an eastern entrance water would never be smooth enough for a ship to lie

alongside of a quay and in fact, that to secure water still enough to enable ships to lie alongside of a quay or even lighters to lie comfortably at all times on both sides of a ship or at jetties, it would be necessary, either to have an entrance which would be protected by an arm from the ocean swell, or to construct an inner harbour leading into the outer harbour. The Board has selected the latter alternative by rejecting the former, and nullified the advantages of Mr. Pogson's IV-A scheme over the other north-east entrance schemes by finishing off the north pier with a solid concrete head in an iron caisson. The question then arose whether the inner harbour should be merely a shallow boat basin for lighters and small craft or a dock for ships. The boat basin was selected because it was thought that it would be cheaper, that it would not prevent the dock being made afterwards, and that it was the best means practicable to meet the requirements of the port.

The term "boat basin" however is somewhat elastic, and it is clear that at different times it has been used to denote different things. The main distinction understood between a boat basin and a dock when used in connection with the Madras harbour is that the former should only be deep enough for lighters and that the latter should be deep enough for steamers. Mr. Parkes' ideas of a boat basin are given in his report published with Proceedings of Madras Government, No. 3128 W., dated 19th December 1884. It was to be a mere excavation in the sand without wharf walls with an entrance 60 feet wide covered by a jetty or arm 300 feet long running out into the harbour. He proposed that in the first instance the basin would be a mere place of shelter, but that a boat wharf would soon be established on the landward side. As the sand accretion advanced seaward he contemplated the basin being widened in that direction, so that in course of years its seaward margin would be so near deep water in the harbour as to suggest the possibility of a ship entrance. Now this is clearly not the sort of boat basin contemplated by the Trustees, nor would it by any means meet the present requirements of the port. One of the chief objects of the basin asked for is to take immediate action to facilitate the landing of coal which it is proposed to store on the seaward side of the basin. This involves the immediate construction of a wharf wall on the seaside and metalling the surface of the sand which metalling alone is estimated to cost over half a lakh of rupees. Beyond this "hard" for coal it is necessary to provide a stone revetment to protect it from storms. Another object of the basin asked for by the Board, it is understood, is to enable goods to be landed expeditiously and to be handled in sheds alongside the basin conveniently situated and connected with the railway. It is desired to do away with the present iron pier, the platform of which is 18 feet above M.S.L. involving an unnecessary amount of cranage. Both sides of the basin proposed by the Board therefore require to be provided with wharves. During the last year the Board has had before it proposals for enabling horses and troops to be landed on the north pier direct from the steamer, and an estimate amounting to Rs. 17,000 was actually sanctioned for works to enable this to be carried out. Behind this proposal there is no doubt a vague hope that this will lead to other classes of cargo being landed direct from the ship. Petroleum in bulk is already pumped through a pipe along the north pier and applications for more pipes have been received. Several other proposals have been made and considered with the object of enabling steamers to land cargo direct and in fact it is quite certain that deep water quays against which ships may lie form one of the requirements of the port.

The latest decision to form a boat basin in the sand south of the harbour appears to involve the following requirements:—

(*a*) The boat basin must be of so moderate a cost that its abandonment would not stand in the way of the construction of a more expensive inner harbour or dock in the near future or it must be of such a nature as to fit in with future proposals.

(*b*) It must provide immediate facilities for the landing of coal and other goods, that is, it must have wharf walls or quays, a coal hard, railway connections and sheds.

(*c*) The form of its entrance must not involve the construction of an arm into the harbour which would interfere with the ships berths and cause a dangerous backwash, two schemes having already been objected to by the nautical authorities on this account.

(*d*) The Consulting Engineer for Railways strongly advocates that the shore side of the basin should be parallel to the line of railway and the beach road.

The estimate prepared by Mr. Pogson in communication with the Executive Engineer, Buckingham Canal division, for a basin as shown in the sketch alluded to in the Chairman's letter accompanying G.O., No. 834 M., dated 1st December 1896, amounts to Rs. 8,73,667, and this does not include shedding or fencing. If the sheds shown on the plan alongside the basin were included in the estimate, this, at Rs 25 per square yard of area covered, would amount to another 5 lakhs or altogether nearly 14 lakhs. With the view of ascertaining what reductions could be made in this amount, and as the estimate requires alteration in some respects a revised estimate for a boat basin has been prepared by the writer. This estimate amounts to Rupees 8,17,239 without sheds, or Rs. 10,47,239 including four sheds 300 ft. × 60 ft. The following alterations have been made.

First as to the walls: the nature of the sand to the south of the harbour, which has been examined by boring, makes it clear that a comparatively heavy section of wall is a necessity. It is reported that at some distance below the surface the sand takes a slope of from 1 in 7 to 1 in 10. Assuming an average natural slope of earth from bottom of basin to surface of 3 to 1 and that the backing is composed of wet sand weighing 118 lb. per cubic foot, a section has been drawn out which fulfils the ordinary conditions of stability and costs less than the section provided in the original estimate. As weight in the interior of the wall is the only factor affecting stability, and the thickness of the curbs is considered sufficient to stand blows likely to be sustained from lighters and with a view of reducing cost, it is proposed to fill the interior of the curbs with sand and rubble except for a plug of concrete at the bottom. To meet the views of the Consulting Engineer for Railways, the shape of the basin has been altered. The charge of Rs. 66,200 or half the estimated cost of the dredger *Wenlock* has been omitted from the estimate, as it is considered that the machine forms part of the harbour equipment. The item parapet of old blocks as protecting arm has been increased to include the value of the blocks, as the blocks referred to are, it is supposed, part of the surplus stock of blocks remaining over from the harbour construction and their value should be credited to that estimate. The provision for revetting the eastern boundary along the shore has been increased to provide for a bank of stone as shown on the section. The block moulds, trucks and sand waggons are taken as a permanent charge against the estimate, as it is not safe to assume that they will be of any value on completion of work. No charge has been included in this estimate for the use of the stationary engine, crushing and concrete machinery, but some charge should properly be made. As to the protecting arm, Mr. Pogson himself doubts whether a length of 200 feet is sufficient, and any one who has watched the complex wave which courses along the south arm at present, must think his doubt well-founded, and provision is therefore made for making this arm 300 feet long which was the length contemplated by Mr. Parkes. As to shedding the boat basin would obviously be incomplete without this; the area of shedding shown in Mr. Pogson's plan would cost about 5 lakhs, but sheds 120 feet wide seem more than can be necessary. This is the width of the sheds provided at the Albert Docks in London, which are in two spans of 60 feet. Provision is therefore made in this estimate for sheds along the north and west sides of the basin 60 feet wide, which would cost 2 lakhs. Further shedding could be added if required.

No other methods of materially reducing this estimate of 10½ lakhs can be thought of; the estimate is probably a good deal more than expected by the Trustees, and will be too much money to think of expending on a mere temporary work. It involves the construction of a protecting arm jutting out into the harbour for at least 300 feet. It occupies the site which, in the opinion of the Board, is the best site for a future dock, and it does not meet with the requirements of the port, that is to say; (1) it does not provide any means for facilitating the landing of horses or troops; (2) as regards facilitating the landing of coal, all that it would do would be to provide a place of shelter for larger lighters than now used, but at present the Board possesses no means of ensuring that these larger lighters would be built and used; (3) the distance that goods would have to be boated would be slightly greater than at present; and (4) theoretically, at any rate, the disturbance of the sea at the ships berths would be if anything greater than now.

Seeing then that this proposal for a boat basin is no more free from objection than any one of the ten schemes considered by the committee of 1895, let us see what the objections are. The ten schemes considered by the committee of 1895 are divided into three groups:—

(1) Four designs for boat basins in the reclaimed land to the south of the harbour.

(2) Four designs for boat basins inside the water area to the south-west of the harbour.

(3) Two plans for boat basins in connection with the proposed Buckingham Canal connection on the north side of the harbour.

The third group may be left out of consideration as the northern canal has now been abandoned and there remain only the other two classes. The objections to the first class (to which class the estimate under review belongs) are that the schemes all occupy ground that may be required for docks and that they involve the construction of a protecting arm in the harbour which will interfere with the berthing of steamers, and tend to increase the disturbance of water at the ship berths. The objections to the second class are, that they all without exception involve the construction of walls in the harbour which will tend, even to a greater degree than the protecting arms of the other class, to increase the disturbance of the water within the harbour, and thus interfere with the berthing of ships. Mr. Pogson has proposed a further boat basin scheme which has not been submitted to Government for making a boat basin in the sand on the foreshore within the harbour arms, but even this scheme reduces the length of the harbour which, according to the evidence of General Sankey, is so important a factor in lessening the waves which enter the eastern entrance, and it has the further objection of leaving insufficient space between the basin and the Beach road for buildings, sheds, &c. It will be observed that all these schemes are for boat basins, and they are all open to the objection that although estimated to cost from 6 to 11 lakhs of rupees excluding buildings and sheds, &c., they none of them meet the want of quays alongside which ships may lie, and on the other hand each one of them in some degree contains a provision which may be expected to increase the disturbance in the harbour and to leave the trade of the port further off than ever from the great desideratum *still water* which has been the object aimed at ever since the harbour was thought of.

In commenting on the estimate for a small boat basin in the south-west corner of the harbour, which was sanctioned for Rs. 6,63,558 but which was subsequently objected to, Sir Alexander Rendel says:—

"In a report which I made some years ago, I stated that in my opinion the present harbour was little more than an entrance to a harbour yet to be made. Of course a boat basin will not put Madras in the position of Bombay or an English port of any importance, for it will still be necessary for ships to discharge their cargo into and receive from boats in the open harbour which must be often at least inconvenient even with a north-east entrance. But I do not wonder at the Trustees hesitating whilst the harbour is untried in respect to the stability of its works and open to question in respect to the maintenance of its depth to do more than is absolutely necessary for the necessities of the moment. Therefore, as a sheltered basin and a quay for boats will remedy the worst part of the present disadvantages of the port, I think the Trustees have determined wisely."

This together with the fact that the estimate had been sanctioned by the Local Government, appear to be Sir Alexander Rendel's reasons for approving of a boat basin scheme. But the scheme criticised has since been pronounced to be totally inadequate, and every other scheme for a boat basin has been objected to on one score or another. The inconveniences of the present system are probably more than realized by Sir Alexander Rendel. The quantity of coal lying at the bottom of the harbour, lost during the process of unloading, is now so large that it will be necessary to dredge it up to prevent ships touching in the coaling berths, and packages, sometimes of considerable value, are frequently dropped into the sea or damaged. Complaints against the harbour are frequent, and although improvements have been talked of for years, nothing is done. The conclusion one is driven to is that no boat basin that can be

devised will effect an improvement in the present disadvantages of the port commensurate with the cost involved, and which will not be a bar to still further improvement, and it remains to be seen what are the reasons for postponing any longer the execution of some form of improvement which will provide still water and quayage for ships.

In 1891 the Secretary to the Board submitted proposals for constructing docks and Government asked for the opinions of the Presidency Port Officer, the Chamber of Commerce and the leading firms in Madras. These opinions were published in the following February. The Presidency Port Officer, one firm * and the Trades Association were in favour of the immediate construction of docks. This Association advocated the subject being taken up boldly and deprecated the question being postponed until the harbour was completed or until the effects of a cyclone upon the arms had been experienced. The Chamber of Commerce was not unanimous on the subject, but suggested that the results of a cyclone should be awaited. The Chamber admitted, however, the immense advantage which docks would be to the trade of the port and asked for a quay wall to facilitate landing and shipping of cargo. Three other firms ask for improvements, but would postpone the question of docks. One firm confines itself to saying that the trade of the port could not bear the burden of a dock.

P.M.G. No. 347, Marine, dated 4th August 1891.

P.M.G. No. 48, Marine, dated 3rd February 1892.

* Messrs. Wilson & Co.

The consensus of opinion five years ago was apparently in favour of the ultimate construction of a dock. Some of the opinions were in favour of immediate construction, and the others only advocated postponement on the assumption that less expensive improvements were feasible and would be carried out. In 1895 the Engineer to the Board reported on the shoaling taking place to the south of the harbour and at the entrance, and Sir Alexander Rendel, while expressing the opinion that the shoaling could be dealt with by a sand pump dredger or if not by that of a new form of entrance, admitted the wisdom of carrying out a form of improvement to meet the necessities of the moment. The reasons for postponing the consideration of the provision for quayage for ships therefore appear to be that this form of improvement although desirable would be too expensive and that less expensive improvements which would meet the necessities of the moment could be carried out. It is admitted in short on all sides that improvement in some form or other is urgently wanted, but it is strongly urged that no improvement should be allowed to be undertaken haphazard, and without a general plan of development leading up to the ultimate object admitted to be so desirable, viz., quayage for ships. After the most careful and exhaustive consideration of many different boat basin schemes it is clear that the construction of any boat basin such as has been proposed in later years, no matter where situated, would not meet the necessities of the moment and would not bring us any nearer to our ultimate desire but on the contrary. It seems to be inevitable that some interference with the berthing of ships in the outer harbour must occur in the carrying out of any scheme that can be devised either for a boat basin or for an inner harbour for ships, but as in the case of a ship basin this objection would only be a temporary one, it has not the same force in connection with a ship basin as it has in connection with a boat basin, and it is considered that this fact should not deter us from entering on any form of improvement which is really a step towards our ultimate aim, although that scheme which interferes least with the present working of the port is the best, other things being equal.

Putting aside the proposal made by Mr. Cecil Scott in 1885 to make a 36 acre dock on the site of the present High Court Buildings, there are seven plans including quayage for ships or docks which have at different times been drawn out by Mr. Pogson. Two of these were submitted with estimates by the Chairman of the Board to the Chief Engineer in 1892, with an intimation that the Trustees were not then prepared to accept either of them without further discussion and opinion. The amounts * of these estimates could be largely reduced by omitting the provision for graving docks and substituting present rates for dredging, much reduced since the introduction of pump dredgers, and in

* Rs. 55, 36, 289 for 13 acre dock.
„ 96, 65, 434 for 36 do.

other respects. In the larger of these plans ten ships of from 400 to 500 feet long are shown as well as two graving docks. As a matter of fact, however, the length of vessels visiting Madras range from about 250 feet to 430 feet, the length of the P. and O. S.S. "Simla." The B. I. S. N. S.S. "Golconda" is only 422 feet long. The present accommodation of the harbour is only for nine ships, and it is unnecessary to provide for quayage at once for so large a number, more especially if it can be arranged to leave some open berths in the outer harbour. Neither of these schemes admit of gradual development such as is aimed at, and have protecting arms projecting well over steamer berths Nos. 1 and 2. The third plan is for forming a dock of about 24 acres by running out a groyne to the south of the present south break-water enclosing a space to form a dock. This has the objection that the eastern and southern sides of the dock would be directly exposed to the sea, and is also larger than is necessary to start with. Of the other four plans, two Nos. 4 and 5 are for a 22-acre dock formed by walling off the south-west corner of the harbour and the other two Nos. 6 and 7 were made when it was proposed to connect the Buckingham Canal with the harbour by an entrance at the north-west corner. One of these No. 7 is for a series of tidal basins and moles, formed in the shore half of the present harbour, and this plan it would appear was shown to Sir Alexander Rendel about 1895. This plan merely shows a possible scheme of ultimate development, but apart from its providing a canal entrance from the north instead from the south, no details of wall sections are shown, nor does the plan show how it is proposed to carry out the work without interfering with the present business of the port. As several schemes have already been rejected on the ground of this interference, it becomes necessary to carefully consider this point before making a new proposal and to enter into every detail practicable. With this object the following have been taken as data on which to found any scheme of development including quayage for ships for the harbour under present circumstances :—

(*a*) The water in the present harbour is not sufficiently still to allow of a ship lying close alongside of a deep water quay, although in fine weather a ship can be moored sufficiently close to a quay in some parts of the harbour to enable a long gangway being placed from the quay to the ship as has been done in the landing of horses on the north pier. The ship, however, is not still, and even in the finest weather this process is attended with some risk. Quite recently the ship moved away from the pier and the gangway dropped into the sea. Usually there is a movement backwards and forwards of some feet.

(*b*) Owing to the level of the rubble base of the piers being only $18\frac{1}{2}$ feet below lowest tide, and in some places less, a steamer has to lie about 40 feet away from the present piers and to enable these piers being used as quays it would be necessary to construct vertical faced quay walls to the proper depth at the edge of the rubble base.

(*c*) The best site for a ship basin in the first instance is on the sand accretion to the south of the harbour.

(*d*) The narrower the entrance to any basin opening into disturbed water is made, the greater is the stillness of water secured inside the basin. It is found at the port of Marseilles that 50 metres or 164 feet is the width which it is well to give passages which steamers have to traverse under their own steam, as this width enables the officer in the middle of the bridge of a large steamer to see the two walls and thus to estimate his position in the passage.

(*e*) To enable a vessel to move through such a passage made in the south-arm of the present harbour, she must enter from under the lee of a protecting arm about 900 feet long. This assertion is based on the fact that there is at all times in the present harbour, with an eastern entrance, a wave of translation of more or less intensity according to the state of the sea outside, and that when a vessel is coming under the lee of an arm or entrance, there is a time when part of the vessel is exposed to the action of this wave, and part is not; free space is therefore required in water protected from this wave to steady the vessel, and get her pointed in the right direction, before she actually makes the entrance; 900 feet or about two or three steamers' lengths is allowed, this being about the length allowed in the 13-acre dock plan, and accords with the nautical evidence given before Sir Nowell Salmon's committee when the length of protecting arm for a north-east entrance was being dealt with.

(*f*) Ships are at present moored in the harbour in five fathoms below DeHavilland's M.S.L. It seems hardly necessary to make the depth of a still water basin or quayage for ships more than that of the Suez Canal. This is 8½ metres or 27·88 feet. The lowest tide in Madras is 3·59 feet below harbour works datum, or DeHavilland's M.S.L. It is considered, therefore, that a depth of 31½ feet below DeHavilland's M.S.L. is sufficient depth in a still water basin or a little more than that at the 5-fathom line shown on the harbour plans.

(*g*) The protecting arm and entrance to a basin must, therefore, either be beyond this line, or the bottom of the present harbour dredged within the present 5-fathom line.

(*h*) As the shore ends of the present break waters are founded at a less depth than this, dredging cannot be carried out in the harbour until they are protected by walls constructed in front of the existing work.

(*i*) Increasing the depth of the harbour by dredging, involves the removal of a portion, at any rate, of the present iron pier, it being uncertain how deep the existing piers have been screwed, but presumably not more than is necessary for its stability.

(*j*) At present, the harbour has berths for nine steamers, although berth No. 1 is only now suitable for small vessels owing to the shoal that has formed in the south-west corner of the harbour. Any scheme of development decided on should therefore, if possible, not interfere with the berthing of at least eight steamers during execution.

Vide list of steamers attached.

(*k*) The length of the ships using the harbour ranges from 231 feet to 446 feet.

(*l*) Sand at present finds its way through interstices in the south arm. This may be stopped either by additional work in front, or in rear of the present wall, or by grouting. Any proposed quay or works along the south arm will therefore serve this purpose, as well as that for which it is primarily designed.

(*m*) At the present time, with the exception of a certain quantity of coal, there are not many classes of goods which it is required to place directly from the ships into railway waggons. Elaborate railway connections are not therefore, at present, required. It is well, however, to provide for possible development in this direction in the future, and for convenience of railway connection the Consulting Engineer for Railways strongly urges (i) that the shore side of basins or direction of quays on that side should be parallel to the present beach road, and (ii) that ample space should be allowed between the quays and the present railway.

(*n*) As it has been objected in connection with docks for Madras, that as the place is only a port of call and not a terminal port, and that, in consequence, the commanders of vessels calling at Madras with only a small amount of cargo for the port would object to the delay which would be incurred by entering a dock, it is desirable that any scheme of development adopted, should, in the first instance, at any rate, provide open berths for vessels, as well as quays, and that some of the quays should be easily accessible.

(*o*) The following special tools and plant are available or will be so shortly:—The hopper steam dredger "Wenlock" of 400 tons hopper capacity now being converted at Calcutta into a pump dredger. It is estimated that she will be able to deal with 1,600-tons or 32,000 cubic feet of sand per day. Sir Alexander Rendel estimated that a 500-ton dredger, working under Madras conditions, should be capable of filling itself with sand, to transporting its cargo to a sufficient distance outside the harbour, discharging it, and again taking up its place in the harbour, at two hours at the most. This, with an 8-hour day, represents four trips, and the same is therefore taken for the "Wenlock," (20 cubic feet are taken as equivalent to a ton).

Vide his note embodied in Proceedings of Madras Government, No. 813 M., dated 23rd November 1896.

Mr. Deas on the Clyde found that quicksand as taken from the buckets weighed 121 lb. per cubic foot, and Mr. Fowler on the Tees found that sand weighed 112 lb. per cubic foot.

Wheelers tidal rivers, p. 229.

An all-round steam travelling crane weighing 147 tons designed to lift a weight of 40 tons at a maximum distance of 35 feet from the edge of the pier or staging on which it stands.

A complete set of stone-crushing and concrete mixing machinery with 30-ton block waggons and Goliath cranes for lifting blocks into the waggons.

On a consideration of these data, the following scheme of development has been drawn out:—

First stage.—Dredge away the shoal along the south pier which causes the breaking wave along that arm up to a point 900 feet from the shore end. From this point, commence a mole 42 feet wide composed of two walls with a rubble hearting 500 feet long, and having by this means secured sufficiently still water to work in, then construct in front of the south pier for this 900 feet a quay wall, founded at a sufficient depth to admit of subsequent dredging along the whole of this length to 31½ feet below datum. At a distance of about 540 from the shore end of this wall, a length of 164 feet should be made up temporarily, to be subsequently removed to form an entrance to a basin. Carry out a similar wall along the first 600 feet of the north pier and for 100 feet shorewards from the present end. The outer length of 400 feet to the full depth of 31½ feet and the inner 300 feet gradually lessening in depth. These walls would form quays. Then dredge back the 5-fathom line as was sanctioned in the estimate of 1896, transferring the business of the port from the iron pier to the quays. When this was done, the present steamer berth No. 1 would have to be abolished, but perhaps a small berth could be made in the extra space made available by the dredging, between berths Nos. 4 and 5 and the shore, and there would be three deep water quays alongside which a steamer could lie, provided the water were still enough. These would, at any rate, be better than anything that has hitherto existed to enable steamers to unload on a quay or than bringing ships up alongside the north pier as is done at present. Assuming that only berth No. 1 was interfered with, you would have instead a choice of three, if not four, other places—two on either side of the harbour—which would vary in their condition according to the direction of the ocean swell.

Second stage.—Continue the mole by adding 400 or 900 feet in all and construct the 17-acre basin shown on plan No. 4, with its entrance 164 feet wide. This would accommodate six or seven ships in the basin, and at least one ship in ordinary weather alongside the mole, in addition to the open berths in the outer harbour. The dock would be certainly and immediately used by vessels with full cargoes for Madras, such as coal ships or horse ships, and the Clan line ships importing iron, the owners of this line having already asked that docks should be made. It would remain for importers of other goods to demand that their goods should be landed safely on a quay, instead of being tumbled into lighters or into the sea. The importers of goods will have in fact to overcome the opposition that may be expected in the first instance from those interested in the present boat business and probably from the shippers of certain classes of goods. When this had been effected, there would arise a demand for an extension of quayage which brings us to the third stage.

Third stage.—This might be effected by running out another mole from the shore 250 feet wide, and distant 1,000 feet from the south arm quay, connecting the mole with the south arm quay by another quay wall, lengthening the eastern mole from 900 feet to 1,400 feet, and dredging out the basin so formed to 31½ feet below datum. This is similar to part of Mr. Pogson's 1895 design for tidal basins within the harbour area; the basin would not be so protected as the inner basin, but it would not be constructed until after experience had been gained as to the effect of the 900-feet mole. It would accommodate another six ships. The alternative to this stage would be an extension of the inner basin, but this would cost more.

A fourth stage is the construction of two moles from the shore and from the outer end of the north pier quay, to form a powder and petroleum basin provided with special apparatus for dealing with fire, as well as being subject to special rules.

It will be observed that the work included in the first stage consists, for the most part, of work which has already been sanctioned or approved, although not yet put in hand. The estimates sanctioned in 1896 and approved by Sir Alexander Rendel include the two quays at the north and south arms, with this difference that the quays were to be shallow quays only and were placed at a greater distance from the north and south piers. The dredging back of the 5-fathom line was sanctioned, and the

protecting arm 500 feet long now proposed takes the place of the arm of the proposed boat basin. The dredging away of the shoal along the south pier has been approved by the Trustees.

Detailed plans and estimates have been prepared for the works of the first two stages, and amount to about 12¾ lakhs for the first stage and another 25½ lakhs for the second stage as shown below :—

	Rs.
First portion of protecting mole	3,88,480
Quay wall, south side	3,12,000
Quay wall, north side	2,60,700
Dredging back 5 fathom line	2,04,547
	11,61,727
Contingencies	58,137
Establishment	58,136
Total ...	12,78,000
Extending protecting mole	2,36,800
Seventeen acre tidal basin including coal hard, &c.	18,45,547
Sea face revetment	36,830
Sheds	2,16,675
	23,35,852
Contingencies	1,07,074
Establishment	1,07,074
Total ...	25,50,000

Endeavours have been made in drawing out this scheme, to eliminate anything which may give rise to controversy and to utilize to the fullest extent possible all the valuable ideas and proposals that have already been made and considered. Three plans have been made, the first showing the harbour as it exists at present with the proposals of the first two stages shown in red. On a second plan is shown the state of the harbour as it would be on completion of the first two stages and the third plan shows possible developments.

The general idea is based on the following considerations. The size of the dock is made sufficient to take six large steamers of the size of the well-known *Golconda*. The shore quay has been kept parallel to the railway to meet the views of the Consulting Engineer for Railways. The seaward quay is governed by the space available.

The angle which the protecting mole makes with the south pier is provided for a twofold reason : (*a*) it gives a better entry for ships than a mole at right angles to the pier, and (*b*) an opinion has been expressed that this form will secure calmer water at the end. The quay walls at the north and south piers are placed 130 feet back from the pier, to enable the foundations to be dredged out for a block wall, without undermining the existing piers. Mr. Pogson has informed the writer that the rubble base at these parts of the piers is irregular and that it would not be possible to construct walls by the method proposed for the dock wall. The proposal to dredge back the 5 fathom line is made, to enable the dock entrance to be brought closer in shore which is desirable for two reasons : (*a*) to secure sufficient space for a coal hard between the east wall and the sea, and (*b*) to interfere as little as possible with the existing steamer berths and so as not to lessen the length of the outer harbour which is a factor in determining its stillness. The design of the protecting mole is made only 42 feet wide so that the work can be done with the existing all round crane without staging, and as this width is sufficient for two lines of rails without sheds. The first purpose of this mole is to form a protection to the entrance to an inner basin, but on

completion of the third stage, the inner face of the mole would become a still water quay, and it may be found that in all ordinary weather water will be sufficiently still for the inner face to be used as a quay even after the completion of the second stage. Its position is too exposed to be suitable for sheds and the design is therefore only made suitable for landing passengers, troops, horses or such cargo as would be put directly into railway trucks. The lines are so arranged, that only half the weight so supported would act on the backing, and the extra pressure thus brought on to the back of the wall would be counterbalanced by the vertical component due to the weight of the other half on the walls themselves. The walls as designed, fulfil the condition of stability that the resultant pressure falls within the middle three-quarters of the base. The toe of the outer wall might be strengthened with bags of cement concrete if necessary. The dock wall is of very nearly the same strength as that of a successful wall at Calais, its mean thickness being ·38 of the height against ·39 of the Calais wall. The method of construction proposed is the same as that adopted at Calais where the curbs were in some cases 23′ × 21′ 3¾″ instead of 22′ × 22′ at bottom, as designed for Madras. The thickness of the wall at dock bottom is ·506 of the height which is not considered too much, taking into account the nature of the sand and the loads to which a dock wall is subjected. The thickness at the base of the wall is 22 feet or ·45 of the extreme height. Provision has been made for five sheds 60 feet wide running along the northern and western faces of the basin.

The following are the thicknesses of some well-known dock walls :—

	Extreme height.	Thickness at base, per cent.
Liverpool Canada half tide basin	43′	·44
Do. Herculaneum dock.	39′	·46
Albert dock, London ...	38′ 6″	·47

The canal entrance is shown at the south-west corner of the dock. If taken to the north-west corner it would involve a longer railway bridge, unless a double curve were made in the canal. No provision has been made for removing the iron pier, it being assumed that the cost of doing so will be covered by the value of the material recovered. No credit has been taken for the value of blocks that may be recovered from the portion of the south pier between the harbour quay wall and dock wall but as soon as the quay wall is built this block work could be taken up and used either in the mole or as an alternative to the rubble bank sea face and thus effect a saving. The sea face of the coal hard is proposed to be formed by a bank of random rubble. If blocks are available from the south pier these can be used as shown on the alternative section. A considerable number of concrete blocks are in stock being the surplus from the harbour construction works. These blocks should be used, but as their value should in that case be credited to the construction estimate no account of this is taken in making out the estimates.

Conclusion.

It has been shown that the original intention of a harbour for Madras was, to provide a safe and convenient harbour with quayage for ships, and that this intention has never as yet been definitely abandoned, although questions have arisen as to the best method of carrying it out. The outcome of all the advice and opinions that have been taken with regard to these questions has been, to select that method by which the present arms of the harbour will form an entrance to an inner still, water harbour or basin. Several expensive schemes estimated to cost from 55 to 96 lakhs of rupees having been proposed to effect this, and doubts having been expressed as to whether the entrance to the present harbour could be maintained and as to the stability of the outer walls, it has been proposed to postpone the completion of the harbour, and to carry out less expensive improvements which would meet the necessities of the moment. Eleven different schemes for boat basin improvements have been considered and rejected and the two estimates accompanying this note form the twelfth and thirteenth. These last are estimated to cost from 10½ to 14 lakhs of rupees according to the amount of shedding provided. It has been shown that they would not meet with the requirements of the port, and would interfere with the completion of the harbour. It has been shown that for the same sum a beginning might be

made towards the facilitating of landing and embarking cargo and for about three times this sum or 38¼ lakhs works could be executed which would meet all present requirements and something more. Two years ago the Harbour Trust Board was prepared to spend nearly 21 lakhs on minor improvements, and to borrow money to meet this expenditure. The finances of the Trust must now be in a better condition than they were then, and the expenditure now proposed could be met in the same way. The Secretary to the Board has already shown in his letter published in Proceedings of Madras Government, No. 347 M., dated 3rd August 1891, how he estimated, that a dock due of one rupee per ton, would only take the place of present boat-hire paid by importers, and would return interest at 4½ per cent. on Rupees 66,66,666 assuming all the trade of the port to go to the dock. If only half this due were collected, or only half the trade went to the inner basin, it would almost cover interest on the expenditure of 33¼ lakhs at 4 per cent., but it is understood that the saving in boat-hire, &c., to importers by landing goods at a quay, would be considerably more than one rupee per ton, which would enable them to pay a larger due without paying so much as they do now for the present unsatisfactory arrangements of landing. It is also possible that the Trust could borrow at a less rate than 4 per cent.; this, however, is left for others to deal with, but it has seemed probable to the writer that the decision to postpone the consideration of an inner deep basin for ships in favour of a shallow one, may be largely due to exaggerated ideas as to the expense of the one and as to the cheapness of the other. If the proposals involving an expenditure of 38¼ lakhs are feasible and sufficient, as the writer believes they are, surely it would be better to spend this sum rather than to spend from 10 to 14 lakhs on a shallow basin, as well as other smaller sums on makeshift arrangements for landing horses and other goods on the present north pier. The writer being himself one of the Trustees who asked for a shallow basin has only come to this conclusion after a careful perusal of all the records available on the subject and after detailed examination of the cost of the different proposals. At the risk of being blamed for re-opening a question that may have been considered to have been definitely settled, the writer has nevertheless thought it his duty to place before others the information leading him to his conclusion and the results of his enquiry, thinking that they may be swayed in the same direction. Should this not be the case then it seems reasonable that it should be shown beyond the shadow of a doubt either that the proposals cannot be executed for anything like 38¼ lakhs, or that, under present circumstances, the Harbour Trust cannot afford to spend the sum required.

There remains one more objection to the expenditure of any large sum on the Madras Harbour which it may be as well to touch on before concluding. It has been remarked that the Calcutta Docks are not a financial success, and that with such an object lesson before it the Board should not saddle itself with a debt, but it should be observed that the circumstances in Madras are entirely different. When the Kidderpore Docks were constructed in Calcutta, ship jetties were already in existence with warehouses and offices behind them. The Kidderpore Docks are closed non-tidal docks at some distance from the old established places of business, and it is understood also that there are difficulties in the approach. In Madras, on the other hand, we have not got a single jetty at which a ship can lie although it is much wanted, the proposed basin would be merely part of the harbour into which vessels would go under their own steam through an open entrance, and, lastly, there are no sheds to speak of and the Custom-house is admittedly inadequate. The present harbour of Madras is an incomplete thing, unfurnished with the appliances and conveniences of many ports of minor importance.

This note may well be ended with the following extract from the "Pioneer" of recent date:—

"The coast line of Peninsular, India, is more than 3,000 miles in length, yet in this great extent of seaboard we have only three or, say, four ports, viz., Calcutta, Bombay, Karachi and Marmagoa, where large ocean-going vessels can lay alongside and load in all weathers. When we consider the steady growth of our railway system and the increasing pressure of the competition of other countries with our staple products, we must steadily keep in mind the need for bringing "free on board" prices to the lowest possible figure * * * * * * Our backwardness with respect to the work of harbour improvements is astounding, and can only

be accounted for by the antagonism of existing and vested interests * * * * * * * When we consider what has been accomplished and the amounts steadily expended on harbour work in the United Kingdom, and remember that almost all this has been achieved during the present century, it is impossible to believe that we have done our duty in India in this respect."

(Signed) F. J. WILSON.

17th January 1898.

No. 16 I.

Note by the Chief Engineer for Irrigation.

G.O., No. 834, Marine, dated 1st December 1896, directs the Executive Engineer of the Buckingham Canal division (who was under separate orders preparing an estimate for a canal to connect the Cooum with the harbour) to prepare an estimate for a boat basin in connection with this canal in communication with the Engineer to the Harbour Trust Board.

Both these estimates have now been prepared, and at my request Mr. Wilson, who from having acted as Engineer to the Harbour Board in 1892, and from his position as Trustee and local Consulting Engineer to the Board has some personal knowledge of the harbour, has written a note on the subject of the boat basin estimate. It would appear that the estimate for a boat basin forwarded by the Executive Engineer, Buckingham Canal division, has been prepared entirely by the Harbour Engineer on the lines indicated in the sketch accompanying the order quoted above, but that it is not accompanied by any report, nor does it profess to represent what Mr. Pogson himself would recommend. It will be observed that, in addition to this estimate, Mr. Wilson has prepared two other estimates—one for a shallow boat basin similar to Mr. Pogson's estimate but revised in certain respects, and another for part of a scheme of general development of the harbour including quayage for ships—and Mr. Wilson's conclusion is that this latter is more in accordance with the requirements of the harbour than the former.

It is highly improbable, owing to the present financial pressure, that funds can be made immediately available for the canal estimate; but as the boat basin or the other scheme relates to the Marine Department and need not be affected by the execution or non-execution of the canal, Mr. Wilson's note and estimates, together with the estimate submitted by the Executive Engineer of the Buckingham Canal, may be transferred at once to the Marine Department for disposal. It is supposed that either one or other of the harbour schemes estimated for will be carried out, and it will not make any material difference to the canal estimate which is selected; only in the case of the deep basin being decided on, the Cooum canal will have to be a little longer.

(Signed) W. HUGHES,
Chief Engineer for Irrigation.

20th January 1898.

Endorsement in the Public Works Department, Irrigation Branch, dated 27th January 1898, No. 521 C.

Read—the following papers:—

G.O., No. 834, Marine, dated 1st December 1896.

From the Superintending Engineer, II Circle, dated 9th September 1897, No. 179 B.C.

Note by Mr. F. J. Wilson, dated 17th January 1898.

Note by the Chief Engineer for Irrigation, dated 20th January 1898, No. 16 I.

No. 521 C.

Transferred to the Marine Department with reference to G.O., No. 834, Marine, dated 1st December 1896.

(Signed) F. J. WILSON,
Under Secy. to Government,
Irrigation Branch.

27th January 1898.

Note by the Acting Secretary to Government, Marine Department.

1. It seems certain that what Madras wants is an inner harbour, unaffected by the sea, in which vessels of all kinds can load and unload alongside quays, and to which vessels of all kinds and smaller craft can fly for refuge during stormy weather, with the certainty of complete security.

2. It seems also certain that the best place for this inner harbour is the sand accretion to the south of the harbour, because—

(1) There is no room on the north for quays, etc., and the cost of making a secure harbour there would be very heavy;

(2) All authorities consulted agree that the existing harbour is already too short for its width, that this feature is the principal cause in producing the "boiling pot" sea during stormy weather, and that it is therefore in the highest degree inadvisable to curtail or obstruct it in any way whatsoever.

3. The present proposal now placed before Government is to construct a boat basin only in this sand accretion to the south of the harbour, and Mr. Wilson in his able note on the subject objects to this proposal as being inadequate to the requirements of the port, and proposes instead the construction, in the above position, of a 17-acre dock suitable for vessels of all kinds, with a protecting mole extending into the existing harbour, and of two quay walls in the latter—one alongside the south, and one alongside the north arm.

4. For the reasons given in paragraph 1, I fully agree with Mr. Wilson's general proposition that it is sound economy to construct a dock once for all, rather than a boat basin which will not benefit larger vessels in the smallest degree, but I object to the manner in which he proposes to construct this dock, and to his subsidiary proposals.

5. I will take the three stages of construction given at page 14 of Mr. Wilson's note:

First stage.—He proposes to—

(1) dredge away the shoal along south pier to a point 900 feet from shore; and
(2) from this point construct a mole 42 feet wide and 500 feet long, extending from the south arm into the harbour, to protect the entrance to this dock;
(3) between this mole and the shore end construct a quay wall 900 feet long in front of south arm;
(4) construct a similar quay wall 700 feet long in front of shore end of north arm;
(5) dredge back the 5-fathom line to enable ships to lie alongside the above quay walls.

To (1) I have no objection.

To (2) I have a very strong one, because it will have the undoubted effect of making the "boiling pot" boil over still more and, as explained further on, I think it is quite possible that this protecting arm may be omitted altogether, as doing more harm than good.

I object also to (3) and (4) partly because they will curtail the harbour space—*vide* paragraph 2 (2) above—partly because, by Mr. Wilson's own showing, the water in the harbour will rarely be ~~quite~~ enough for vessels to lie alongside such quays—*vide* data (*a*) on page 12 of his note. Their construction would therefore, in my opinion, result in no practical benefit commensurate with their cost.

If (3) and (4) are not carried out, (5) is unnecessary.

6. *Second stage.*—Mr. Wilson proposes to—

(1) add 400 feet to the mole proposed in first stage (2);
(2) construct the 17-acre basin shown on plan No. 4, to accommodate 6 or 7 ships, with an entrance 164 feet wide, placed at 540 feet from shore end of south arm.

I object to (1) for the reason given in the last paragraph.

I agree with (2), but would make the basin large enough, in the first instance, to contain as many vessels as can now find berths in the harbour, *i.e.*, nine, and I would place its entrance so much further seaward as would bring the outer, *i.e.*, eastern, boundary of the basin on the present high water line, with the double object of enabling ships to enter the basin in a portion of the harbour which is already almost deep enough for the purpose (and to some extent protected by the curved portion of the south arm) and of obtaining ample room on the west (landward) side for storing goods. I do not see the object of storing coal between the basin and the sea, which is apparently one of Mr. Wilson's aims in placing his basin so far inland.

7. It may be objected that to place the external wall of the inner basin on the present water line will expose it to cyclonic waves, and require a higher and stronger wall than would otherwise be necessary. I grant this, but I think the objects to be gained, as stated above, are worth this additional expense, and the effect of cyclonic waves on this wall will tend to diminish as the sand accretion to south of harbour extends, as I fear it is bound to do for some considerable distance yet.

8. *Third stage.*—I would have no third stage, but make the inner basin large enough, in the first instance, to meet the requirements of the port for the next twenty-five years. Any additions necessary thereafter should be continued southward, and the south quay wall of the inner basin should be made capable of standing alone, and taking vessels along either side.

9. Now with regard to the entrance to this inner basin, Mr. Wilson proposes to place it at a distance of 540 feet from the shore end of the south arm, to make it 164 feet wide for reasons given at (*d*), page 12, and to protect it with a mole 900 feet long. For reasons given above, I would place it much further seaward, say 1,500 to 1,600 feet, from shore end. As to its width, it is a nautical question of which I am not competent to judge; it should, however, in the interests of peace and quietness inside, be made as narrow as is compatible with the safety of the vessels entering. The necessity for the protecting mole is also a nautical question, and I only speak about it with great diffidence. This excrescence into the existing harbour is so very objectionable in other ways, that I think the opinion of competent nautical men should be taken as to whether it is not possible for a vessel to enter this inner basin either under her own steam, or by warping, without a protecting mole. I have heard a great deal about the breaking wave running along the south arm, but I have never yet seen it, and I should have thought that, in any weather in which the vessels now enter the harbour, it was possible for them to make the inner entrance without protection, provided that it is placed as far as seawards as possible to enable it to obtain some protection from the curve of the south arm. I would provide the mole, of the length and section decided upon in the estimate, but I would not build it until it is proved to be necessary.

10. I am also not competent to judge whether an unimpeded entrance to the inner basin 164 ft. wide (or even 100 ft. wide) would give the practically still water there-in which is absolutely necessary if ships are to lie alongside quays. It is probable that it would during the south-west monsoon, *i.e.*, for 8 months in the year, but not during the north-east monsoon; and it must be remembered that cyclones generally come from the northward. Still water might be, to a great extent, procured by a floating caisson in

the entrance worked from winches or cranes on either side, and I have often wondered why something of this kind has not been tried at the present harbour entrance to check the insetting sea.

11. Having stated my objections to Mr. Wilson's proposals, I now offer my own views on the subject for consideration:

(1) I would commence by surrounding an area of 17 acres (or any area decided upon by those thoroughly acquainted with the requirements of the port) in the sand accretion to the south of the harbour with concrete quay walls on all four sides. They should be sunk to the requisite depth for a ship dock, like wells, in the form of hollow curbs, and then filled with dry rubble, or concrete as decided. The outer (eastern) wall should be capable of resisting the impact of a cyclonic wave, and high enough to keep anything more than heavy spray out of the inner basin.

The south wall should be built of a suitable section to stand alone, in the event of its being found necessary, at some future period, to extend the harbour. The west wall should be built parallel to the existing railway. The north wall should be built parallel to the south arm of the existing harbour, and at such a distance from it as to remove all danger of undermining it during sinking. The south arm cannot act as the north wall of the inner basin, because its rubble base is not sufficiently low to permit of the basin being dredged out to the necessary depth. This north wall would be continued to the proposed entrance and there stopped until the entrance is made.

(2) When the above four walls have been sunk to the required depth, remove all sand from the area enclosed to 3 feet below water level by hand, and deposit it on the beach to such a distance south that it would not be likely to interfere with any further harbour extension.

(3) When this removal by hand reached such a depth that dredging is necessary, remove enough of the south arm to admit the *Wenlock*, and continue the dredging with her, allowing her to deposit the sand out at sea or on land as found most convenient. If the *Wenlock* is too big for this job at the commencement, smaller dredgers, such as are used on the Gódávari, might be obtained.

This opening might be utilized for—

(*a*) making the connection of the north quay wall with the existing south arm;

(*b*) entrance of boats, lighters, etc., into the inner basin during stormy weather, so that the boat basin now contemplated by the Harbour Trust Board would be available long before the completion of the ship dock.

(4) Complete the excavation of the inner basin to the required depth, and, when it is approaching completion, widen the entrance to the width finally decided upon, and build the protecting mole, if found to be absolutely necessary.

12. The above proposals contain no engineering difficulty whatever and possess the advantage of non-interference during construction with the existing harbour or trade of the port.

13. I have not entered into the financial aspect of the question, because my proposals would be cheaper than Mr. Wilson's scheme, for which he has given detailed figures, and if the latter are pronounced to be within the financial powers of the Harbour Trust Board, my proposals will be still more so. They would also be simpler from an engineering point of view, because, with the exception of the entrance to the inner basin, the whole work would be carried on in still water. The first thing to be done, it seems to me, is to settle what we want, and then to see whether we can afford it.

14. If any extension of the harbour inland is considered financially impossible, I think something might be done to prevent the entrance of heavy waves into the existing harbour by a floating caisson or other contrivance.

15. I also think that the Board is bound to spend a considerable sum of money in the near future in protecting the foreshore north of the harbour, and this will have to be considered when the financial position is under discussion.

29th January 1898.

(Signed) W. B. deWINTON,
Ag. Secy. to Govt., Marine Department.

Order—No. 110, Marine, dated 11th February 1898.

The papers read above will be forwarded to the Madras Harbour Trust Board for such remarks and recommendations as they may desire to offer.

(True Extract.)

(Signed) W. B. deWINTON,
Ag. Secretary to Government.

To the Chairman, Harbour Trust Board, with enclosures as specified below:—

Revised estimate for a boat basin Rs. 10,47,239 by Mr. Wilson.
Estimate for Harbour development including quayage for ships Rs. 3,8,28,000 by Mr. Wilson.
Portfolio of plans.
List of ships using the harbour showing their lengths.
Copy of letter addressed to the Secretary to the Harbour Trust Board from Messrs. Cayzer, Irvine & Co.
Copy of letter from the Superintending Engineer, II Circle, No. 179 B.C., dated 9th September 1897, submitting to the Chief Engineer for Irrigation estimates for boat basin and harbour canal, with Mr. Pogson's estimate for a boat basin Rs. 8,73,667.

Exd. T. K. Narayana Aiyangar.

Marine (1898) Department.

Original

CURRENT No. 1257

Order

From

The Chairman,
Harbour Trust Board,
Madras.

No. 2485.

Dated 4th *October* 1898.

Despatched „

Received 7-10-98

Enclosures : ~~fourteen.~~ 17 (4 plans)

Spare copies : three.

SUBJECT.

HARBOUR IMPROVEMENTS.

Replying to G. O. No. 110, Marine, dated 11th February 1898.

Expenditure against Capital exhausted.

BACK PAPERS.

G. O.	No.	Department.	Date.	
Marine	513 E		8. 10. 95	✓
	110		11-2-95	✓
	725		16-8-95	✓
	513E		9-8-95	✓
	639		19-7-95	✓
	520-21		9-6-95	✓
	35		11-1-95	✓
	860		12-12-96	✓
	834		1-12-96	✓
	7579		16-11-96	✓
	~~9563~~		~~16-11-96~~	
	873	Marine	23-11-96	✓
Despatch No. 7		— a —	5. 6. 96	✓
G.O.	396	-	5. 6. 96	✓
"	119-20	"	26. 2. 96	✓
"	41	-	22. 1. 96	✓
"	190	"	1. 7. 95	✓
"	47	"	9. 2. 95	✓
Report of the Madras Harbour Committee				✓
G.O.	48	Marine	3. 2. 92	✓
"	347	"	4. 8. 91	✓
Act II of 1886				✓

FURTHER PAPERS.

G. O.	No.	Department.	Date.

78

No. 2485.

Harbour Trust Office,
Madras, *4th October* 1898.

From J. N. ATKINSON, Esquire, I. C. S.,
Chairman, Harbour Trust Board,
Madras.

To W. B. DeWINTON, Esquire,
Secretary to Government,
Marine Department.

Sir,

I have the honour to submit the following report on the subject of proposed Harbour Improvements, with especial reference to the papers communicated in G. O. No. 110, Marine, dated 11th February 1898. Those papers included two estimates for boat-basins, and a scheme with estimates for a ship dock: and in addition to these the Harbour Trust Board has had under consideration several other schemes for both boat and ship-basins, and for additional piers.

2. With the view of assisting the Board to come to a conclusion on the subject, all material papers, including the minutes of the Trustees, were communicated to the Chamber of Commerce and the Trades' Association, and the opinions of those bodies have been considered by the Board.

3. The various views on the question may be broadly divided into two main groups. First, there are those who hold that for the trade of the port as it stands at present, and may be expected to stand for an indefinite time to come, and considering the financial position of the Harbour Trust Board, the present open Harbour is sufficient, and all that is needed is some means of expediting the discharge of boats. It is pointed out that it is only the rare exception when vessels cannot find accommodation in the Harbour; that when once moored discharge of cargo from the ship can proceed more expeditiously under present circumstances over both sides into boats and lighters than at a quay side; and that delay and inconvenience only arise when the boats reach the pier, where, owing to inadequate room, and consequently an insufficient number of cranes, the boats are often delayed for some hours before they can commence discharging their cargo. The arrangements on the pier are further stigmatised as inadequate, both cranes and trucks being, it is said, insufficient in number, and the former in power also.

4. To remedy these inconveniences various suggestions have been made ranging from the mere provision of more, and more powerful cranes and trucks on the existing pier up to the construction of a boat-basin capable of conversion hereafter, if the necessity should arise, into a ship dock. The object aimed at by the authors of these suggestions is to secure the prompt unloading of each boat as soon as it comes to hand, and their only doubt is as to what extension and improvement of existing arrangements is necessary. Some persons, probably a small minority, believe that nothing more is needed than an increase and improvement of the cranes and trucks on the present pier. Others think that one, or if necessary more, additional piers should be constructed, with proper equipment of cranes, trucks, etc., and the Board had plans and estimates prepared for two such additional piers. One obvious disadvantage of the present pier is its height above mean sea level, 18 feet, and it was proposed therefore that the additional piers should be lower by 6 feet.

5. Those who think that improved and increased pier accommodation is all that is at present required are probably a small minority, if for no other reason, because it is generally accepted that some basin must be provided for shelter of Harbour small craft in rough weather. But there is a large body of opinion, including the majority of the shipping agencies, in favour of restricting Harbour improvements at the present time to the construction of a boat-basin with the necessary equipment of cranes, sheds, etc. Numerous plans for boat-basins have been considered at one time or another, both within the water-spread of the Harbour, in its foreshore, and in the sand accretion to the south. It has been impossible to ascertain which of these finds greatest favour; but it may be taken as probably correct that the one upon which most attention has been concentrated, and which should be accepted as the type of most suitable boat-basin is that numbered as Plan No. 2 in the file forwarded with the G. O. under reply.

Expenditure Capital exhausted.

6. The above paragraphs have as briefly as possible set out the views of those who advocate the retention of the present method of berthing ships in the open Harbour, and of discharging cargo by means of boats. These persons object to the construction of an expensive dock at the present time, but it is not clear that the majority of them are opposed to the adoption now of a complete plan of future development. At a meeting of the Harbour Board held on Friday, 30th September, a resolution in favour of some plan of development being adopted, was carried unanimously.

7. There is another large body of opinion which contends that the Harbour as it at present exists is essentially incomplete; that a plan of future development should now be finally decided upon, and steadily worked up to. They object to the proposals referred to in paras. 3, 4 and 5 as mere temporary expedients to meet present wants and as likely, perhaps irremediably, to block the way of future improvements. They urge that the ultimate form of development to be aimed at is an inner Harbour or, ship's basin where vessels would lie at a quay, and that this is demanded alike for the safety of shipping the benefit of consignees and exporters, and the financial interests of the Port.

8. It is hopeless to expect unanimity of opinion in the matter. The question has twice been referred to the Chamber of Commerce and Trades' Association. On the first occasion both bodies recommended the construction of a boat-basin capable of conversion hereafter, if necessity should arise, into a ship dock: on the second occasion both bodies—the Chamber of Commerce by a majority of one—recommended the construction of an inner ship-basin at once. At the meeting of the Harbour Trust Board on 16th September a resolution in favour of a ship-basin was proposed, but lost by 5 to 2, the representatives of the Chamber of Commerce and of the Trades' Association voting against the expressed opinions of the bodies they represent, and three members of the Board being absent. At the meeting of the Board held on Friday, 30th September, a resolution in favour of a ship-basin was carried by 5 to 4.

9. Whatever be the form of improvement eventually adopted, the cost must be met by a loan raised under Act II of 1886; and unless the money market becomes much easier, the Harbour Trust Board will have to apply to Government for funds before the execution of any scheme can be put in hand. The amount of progress in the execution of the scheme adopted must therefore depend on the amount of money that Government may find it possible to place at the disposal of the Board.

10. Having regard to the great variety of opinion that exists on this question of Harbour improvements, the Harbour Trust Board has resolved to lay the whole matter before Government and to ask it with the advice of its own Engineers and after consulting Sir A. Rendel to decide what should be the plan for future development of the Harbour: and what part of the work should now be undertaken to remedy existing inconveniences.

11. It would be out of the question in this letter to repeat in full detail all the arguments for and against each proposal that has been mooted: but together with this letter I have the honor to submit a complete file of all minutes and material connected papers, as stated in the annexed list.

12. This letter has been submitted to, and considered by, the Trustees, a copy of their resolution approving it is appended.

I have the honour to be,

Sir,

Your obedient servant,

Chairman,
Harbour Trust Board.

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(1). Letter No. 55, dated 21st April 1898, from the Chairman, Harbour Trust Board, to the Chairman, Chamber of Commerce, forwarding a series of minutes written by various Trustees, and other papers regarding Harbour improvements.

N. B.—A similar letter was sent on the same date to the Chairman of the Trades' Association.

(2). Reply from the Chairman, Chamber of Commerce, dated 14th May.

(3). Harbour Trust Board's resolution No. 10, dated 27th May, upon G. O. No. 110, dated 11th February, and reply from the Chamber.

(4). Letter dated 28th May from the Trades' Association, supporting the views expressed by the Chamber of Commerce.

(5). Note by the Chairman, regarding the dissent, of Messrs. Black and Simpson, from the above resolution.

(6). Minutes thereon by Trustees.

(7). Resolutions 2 and 3 of 10th June 1898.

(8). Letter from Mr. Wilson, dated Ootacamund, 5th July.

(9). Letter from the Chairman, Harbour Trust Board, to the Chairman, Chamber of Commerce, dated 5th August, again referring the question of Harbour improvements to the Chamber with special reference to the Financial aspect of the question.

N. B.—A similar letter was also addressed to the Chairman of the Trades' Association.

(10). Reply from Trades' Association, dated 18th August.

(11). Reply from the Chairman, Chamber of Commerce, dated 2nd September.

(12). Copy of resolution proposed by the Chairman at the Board's meeting held on 16th September negatived by 5 votes to 2.

(13). Letter (in original) from 230 European and Native Firms and Traders, regarding proposed Harbour improvements, requesting that a favourable consideration may be given to a wet Dock scheme for reasons given.

Harbour Board's resolution, No. 5, dated 30th September.

(14). Extract of proceedings of the Trustees, No. 4, dated 30th September, with copies of resolutions then carried, referred to in paras. 6 and 7 of letter No. 2485, dated 4th October.

Extracts of Proceedings of the Trustees of the Harbour of Madras, at a Meeting held at the Offices of the Board, on Friday, the 30th day of September 1898.

* * * * *

4. Read draft letter to the Secretary to Government, Marine Department, replying to G. O., No. 110, Marine, dated 11th February 1898, regarding proposed Harbour improvements.

Read minute by a Trustee.

Read letter from Mr. F. J. Wilson, dated 29th September, giving notice that he intended to move a resolution regarding Harbour improvements, and, if carried, that he would move a further resolution, both of which, with Mr. Wilson's letter, had been printed and circulated to all Trustees.

The first resolution was, after discussion, put by Mr. Wilson as follows:—

"That, looking to the fact that many forms of improvement to the Madras Harbour are postponed or hampered for want of a general scheme of development, the Board, as at present constituted, is of opinion that the time has now come to draw out and decide on some such scheme of development finally, irrespective of what items of work it should be decided to undertake immediately."

This was carried unanimously.

The question was then raised as to whether Mr. Wilson was in order in putting to the vote his second proposed resolution, as if carried it would practically reverse the vote upon the resolution proposed by the Chairman at the last meeting.

The Chairman ruled that Mr. Wilson was in order in putting his proposed second resolution, which was then proposed by him as follows :—

"That the Board, as at present constituted, is of opinion that the scheme of development of the Madras Harbour that should be decided on should take the form of an inner ship basin or dock in the sand accretion to the south of the present Harbour of about the same size and general position as that of the design forwarded by Government to the Board for remarks with G. O. 110, Marine, dated 11th February 1898, provided that it can be constructed and fully equipped with sheds, cranes and all appliances required for a sum not exceeding 40 lakhs."

This was supported by Mr. Yorke, and on being put to the vote was carried by 5 to 4.

The draft letter to Government was then discussed, amended in various particulars, and approved as amended.

5. Letter from 230 European and Native Firms and Traders, regarding proposed Harbour Improvements,—having been circulated to all Trustees—was laid on the Board's table, and it was resolved that this letter be submitted to Government.

* * * *

(True extract.)

C. PINSENT,
Secretary,
Harbour Trust Board.

MADRAS HARBOUR TRUST,

21*st April* 1898.

No. 55

FROM

J. N. ATKINSON, ESQUIRE, I. C. S.,
CHAIRMAN, HARBOUR TRUST BOARD,
Madras.

To

THE CHAIRMAN,
CHAMBER OF COMMERCE,
Madras,

SIR,

I have the honour to forward herewith, a series of minutes written by various members of the Harbour Trust Board, and other papers as noted at foot on the subject of improvement of the Madras Harbour.

You will observe that there are the following three schemes before the Trustees :—

(1). A boat-basin, wherein coal, and general cargo would be landed and shipped.

(2). A boat-basin for landing and shipping general cargo only ; to be supplemented by separate arrangements, the details of which have not been worked out, for landing coal.

(3). A ship dock, wherein coal, general cargo, horses, passengers, &c., would be landed and shipped direct from the ship on to a quay, and *vice versa*.

I have the honour to request that you will kindly favour this Board with an expression of the Chamber's opinion on the relative advantages of the three proposals.

I have the honour to be,
Sir,
Your obedient servant,
J. N. ATKINSON,
CHAIRMAN
Harbour Trust Board.

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1. G. O. No. 110, Marine, dated 11th February 1898.
2. Minutes by Trustees.
3. Chairman's notes.
4. Traffic Manager's letters Nos. 8859 P and 9043 P, dated 8th and 18th March 1898.
5. Letters from the Dy. Port Conservator, dated 22nd March 1898.
6. Letter from the Board's Engineer No. 8, dated 2nd April 1898.
7. Letter from the Board's Engineer No. 31, dated 15th April 1898.
8. Memo. from the Board's Secretary submitting Financial Forecasts.

Secretary, Harbour Trust Board.

G. O. No. 110, Marine, dated 11th February 1898, forwarding, for such remarks and recommendations as the Board may desire to offer, papers relating to the construction of a boat-basin for the Madras Harbour.

Minutes by Trustees.

As Mr. deWinton puts it, "the first thing to be done is, to settle what we want, and then to see whether we can afford it," but it seems to me that no sooner do we settle on some plan that we think will answer our requirements, then some other scheme is put forward, and the previous is described as unsuitable, so unless we make up our minds to stick to a distinct line of action nothing whatever will be done.

The scheme now put forward by Mr. Wilson is for a wet basin, with wharves for vessels to lie alongside of and discharge or load, and the Acting Secretary to Government in his note on the scheme remarks that he fully concurs in Mr. Wilson's view that "it is a sound economy to construct a dock once for all, rather than a boat-basin which will not benefit larger vessels in the smallest degree." Mr. Wilson is of opinion that "the dock would be certainly and immediately used by vessels with full cargoes for Madras, such as coal and horse ships and the Clan line ships importing iron," and he thinks that "importers of other goods" would "demand that their goods should be landed safely on a quay instead of being tumbled into lighters or into the sea."

Now, it seems to me that as Madras is principally a port of call, and that steamers calling to discharge or take in passengers and cargo require quick despatch, a wet basin would seldom if ever be used by such vessels on account of the delay that would be experienced in entering and leaving it, and I would point out that it has been stated by the B. I. S. N. Co. agents at this port that the vessels of that Company could do as good a day's work, if not better, at Madras than at Calcutta, because they could work all hatches and discharge into boats on both sides. Possibly this could be also done in a wet basin, but the delay of entering, making fast, casting off, and leaving a wharf would, I think, deter the Captain or the Agents of a steamer requiring quick despatch from using a wet basin. Now, if the statement attributed to the agents of the steamers mostly using Madras Harbour is correct; a wet basin would be used, principally, by vessels arriving with horses and coal and iron—few others discharge full cargoes. Is it worth our while to expend about 33 lakhs to meet the requirements of these vessels? When we decided on the boat-basin scheme, the general opinion was, I believe, that it would meet all the requirements of vessels using the port. Before accepting the view that "it is sound economy to construct a dock once for all, rather than a boat-basin which will not benefit larger vessels in the smallest degree." I think that we should carefully consider whether the reasons given for constructing a dock are sufficiently weighty for us to accept. The scheme is recommended because it will mainly facilitate the discharging of horses, coal and iron. A boat-basin would also afford facilities, and the question appears to be, "would not the facilities afforded by a boat-basin for horses, coal and iron suffice?" When we accepted the scheme, we thought so, and I do not think that any good reason has been put forward to prove that our ideas on the subject were wrong. With the exception of coal and kerosine oil our import trade shows no noticeable increase—in fact it varies very little. Our export trade shows a tendency to decline, judging from the returns for the period April—December 1897. For kerosine oil no additional facilities appear necessary, and coal, horses and iron are the three principal items of our import trade requiring special facilities. Even, under existing conditions, horses are landed and shipped with few casualties and a horse ship does not arrive every day. With the facilities offered by the boat-basin scheme the requirements of the coal steamers would be met with as satisfactory as at most other ports where coal is discharged into lighters, I believe that even at Port Said coal is so discharged.

If the trade of the Port is likely to increase to any great extent, and a probability of full cargoes being, as a matter of course, landed and shipped within a reasonable period, then, I think, we should be justified in constructing a wet dock, but as we do not know how the trade of Madras is likely to be affected when the East Coast Railway is completed, nor whether any portion of our exports or imports would go to Vizagapatam on the Harbour improvements proposed for that port being carried out, I think that we should be very careful about accepting a scheme which might end in leaving us with a veritable "white elephant" on our hands, and a load of debt. If it can be satisfac-

Secretary, Harbour Trust Board.

torily proved that the trade of the port is on such a very certain footing as to warrant a large expenditure to meet future necessities, I think that we should be justified in providing a wet dock and wharves, but under existing conditions such a dock, in my opinion, is not required. Should, however, the dock scheme be accepted, there is one point which requires special attention, and that is, the site for, the coal hard. In the plans accompanying Mr. Wilson's proposals vessels with coal would discharge in the near vicinity of others discharging general cargo, and this is undesirable for obvious reasons, but the Acting Secretary to Government in para. 6 of his note remarks that he does not see the object of storing coal between the basin and the sea? Should the Trustees approve of a wet basin, then, all details connected with its entrance, the protection, if any, required for such entrance, and the places to be set apart for the discharging of coal, and general cargo should be reported on by a Special Committee of the Trustees. As a nautical man, I consider a protecting arm to the inner entrance necessary. I have my own opinion as to the best position for the entrance to an inner basin, but on this point the opinion of the Pilots would be most valuable and they should be examined by the Special Committee. Initialled—H. A. S. 5—3—1898.

Mr. Wilson's resume of the Harbour is most interesting, but it seems to me that the plans already before Government for a boat-basin as far to the west of the south groyne as possible meet all that trade at present requires, and that the time has not yet arrived for docks.

The proposals made by Mr. Parkes, as described by Mr. Wilson on page 9, could easily be modified, so that after the completion of the proposed boat-basin with wharf walls a separate dock for steamers could be built to the east of the boat-basin in the accretion, at some future time.

It is undesirable that coal and general cargo should be landed at or near the same place as proposed by Mr. Wilson, and if provision is to be made for landing coal direct on wharves, it should be landed to the north of the Harbour, if general cargo is to be landed and shipped to the south.

For general cargo docks are not required, and, in my opinion, would not be generally used, coasting steamers at any rate would not have time to use them.

When shipping goods to Calcutta our consignees invariably stipulate for shipment by Coast steamers as these do not use the jetties there, and Calcutta importers find it more expensive and less convenient to use the jetties than to take overside delivery.

The ships' agents are all of one opinion, *viz.*, that as good a day's work can be done here as at any port. Ships can work all their hatches at both sides at one and the same time.

The pier is unable to cope with the traffic and if two additional piers were constructed, and some provision made for berthing larger cargo boats in rough weather, nothing more would be required.

As suitable protection for cargo boats would have to be in the form of a basin, it would be better to utilize it for landing cargo also, and so obviate the necessity of additional piers, which is the position the Trustees have hitherto taken up.

Mr. Wilson says on page 10 that the Trustees possess no means of ensuring that larger lighters would be built. The Trustees need not have the slightest apprehension on this point. So soon as protection is provided, larger cargo boats will be built. So soon as larger boats are built, the cost of landing will be reduced. At present owners of cargo boats run great risks and are naturally chary of adding to their stock or of building larger ones.

The pier is already unable to discharge fast enough the cargo boats that exist, and they cannot be used for landing coal as owing to their draft they are unable to approach near enough to the shore.

It is the necessity for landing cargo on the fore-shore that has prolonged the existence of the Masulah boat and so maintained the high rates of boat hire, otherwise its occupation inside the Harbour would have disappeared long ago.

Steamers larger than the "Golconda" (5,874) are being built, and it is unwise to assume that she is the maximum size of vessel that is likely to enter this port.

The British India Company have, I understand, estimates under consideration for steamers to call at Madras, that will carry 9,000 tons of cargo, and 150 passengers.

I think it would be wiser and safer for the Trustees to proceed with the boat-basin first as it will always be required for steamers which have not much work, whatever form the future development of the Port may take. After the boat-basin is completed it will be quite time enough to consider the larger question of docks, in the meantime it will be affording accommodation for larger cargo boats.

The proposed pier from the North Groyne for landing horses, which, I understand, will not extend beyond the rubble base, and therefore not reduce the water space in the Harbour can be tried for landing coal, and if successful can be extended, or similar additional piers projected to enable several steamers to discharge at one time on the North Groyne (which might require widening) direct without boats.

As Mr. Wilson has quoted an extract from the "Pioneer" which has the appearance of attributing sinister motives to those opposing what they consider to be useless expense, and except for coal, an absolute hindrance, I took the opportunity of sending the Managing Agents of the B. I. S. N. Co., a copy of the memorandum kindly sent me by Mr. Wilson and asked for their views.

They replied that they quite concur with the opinion expressed in the above minute; and that they are not in favour of anything more than a boat-basin.

All through this question of increased accommodation suggestions have been made that the steamer Agents are prejudiced against docks on account of interests they are supposed to have in the landing of cargo.

I do not know of a single firm of steamers' agents that owns boats in the Madras Harbour. If it be suggested that they would for selfish reasons perfer to continue the present system of landing, it must be taken for granted that they are prepared to sacrifice the interests not only of the steamers, whose interests they profess to represent, but their own separate interests as merchants of Madras, either for the sake of an illicit return commission from their boat contractor, or for a sentimental attachment to their Dubashes.

If it be proposed to build docks, and not to charge ships Dock Dues for their use, and to leave the fairway of the Harbour open as it is at present so that steamers could use docks or not as they choose, then absolutely no reasonable objection to docks could be raised by agents.

Do the Trustees propose not to call on the ships to pay Dock Dues, that is to say, is it their intention to make instead a charge on goods passing through the dock in consideration of the boat-hire that would be saved? If this is the proposal and it is found that docks are not sufficiently used, then the Harbour dues at present paid by the merchant will have to be enhanced to meet interest upon expenditure.

If docks are built, interest must be met either directly by the ship in the form of dock, or enhanced port, dues or by the merchant in the shape of enhanced Harbour Dues. If the Docks are built and are not used, the whole trade of the port will be taxed for what the ship agents contend is a needless expenditure for general cargo, and I do not think that any merchant would be in favour of coal and general cargo being landed at the same place.

To enhance the Port Dues or add Dock Dues to a steamer's expenses I need hardly say will lead to higher freight and fewer ships, whilst the Harbour Dues we now pay press very heavily on many kinds of merchandise for which Madras has to compete with Bombay and Coast Ports.

If the ship be called upon to pay additional dues the Agents' contention is that they do not want docks, as a ship can do as good work now without as with them.

All ships want is improved facilities for the discharge of cargo boats, so that it will be possible for more boats to be employed at one time.

This has been the steamer agent's contention all through this controversy, and it is surprising that such efforts should be made to thrust docks on the shipping, when the smaller and more satisfactory scheme of a boat-basin already before Government will meet all the requirements of the Port for general cargo.

Initialled—C. B. S. 8—3—98.

Dues insufficient to meet expenditure Capital exhausted.

In continuation of my minute of the 8th I have received the following from the Honorable Mr. M. C. Turner, lately a Member of the Bombay Port Trust and now a Member of the Calcutta Port Trust and a partner in Messrs. MacKinnon Mackenzie & Co., Calcutta, the Managing agents of the B. I. S. N. Co. Initialled—C. B. S. 10—3—98.

Notes on the QUESTION for providing Docks in Madras.

By the Honorable Mr. M. C. Turner.

Three questions have to be considered in connection with this proposal.

Firstly :—Are docks required in view of the possible expansion of the trade of the port ?

Secondly :—Is it possible that the revenue derived from export and charges on cargo plus dock dues on steamers using the docks would be sufficient to meet the interest on the outlay ?

Thirdly :—Is the present accommodation, such as it is, insufficient for the requirements of the port ?

As regards the first point you are of course in a better position to speak than myself, but taking everything into consideration I should say that the trade of Madras was not likely to increase much. Cargo from the East Coast Railway will, I take it, possibly find its way down to Vizagapatam or be brought to Calcutta. Secondly. Judging from what has happened here I should say that your receipts would, by no means, suffice to pay the interest on outlay. So far as I can see the result of building the dock in Calcutta has, hitherto, been the institution of a -/4/-annas tax on all exports and imports of general cargo and -/2/-annas a ton on the exports of coal, this in addition to a -/4/- annas per ton due on all vessels coming to Calcutta.

I very much fear that Madras will find itself burdened with additional taxes and tools when you have finished your docks which, in my opinion, you can well do without.

The present accommodation would, I think, be improved by a boat-basin especially if a wall could be built on the shore side well equipped with handy cranes suitable for discharging cargo from the boats. I would certainly not have coal worked in the same basin, I would keep the coal to the north of the Harbour as at present and by running out jetties lightly built, I think you would do all that is required to meet the coal trade.

I entirely agree with Mr. Simpson's remarks. Further information as to the feasibility of Mr. deWinton's suggested closing the Harbour entrance by a floating caisson would be of interest.

Initialled—A. J. Y. 8—3—98.

I have endeavoured to keep an open mind on the question of Docks and Boat Basin, until I had seen the arguments *pro* and *con* ; and having read Capt. Street's and Mr. Simpson's minutes, I am decidedly in favour of docks, not only because the Dock scheme is the logical sequence to the previous history of the Harbour ; but because facilities for landing and shipping at a quay are wanted now, and are not a mere future possible contingency.

There may be an extreme view that Madras will never need docks ; but I doubt whether this would find many supporters ; and Capt. Street admits that "if the trade of the Port is likely to increase "to any great extent, and a probability of full cargoes being, as a matter of course, landed and shipped "within a reasonable period, then I think we should be justified in constructing a wet dock." This is the general argument against docks, a doubt of the expansiveness of Madras trade, and therefore (1) of the necessity for docks, (2) of our ability to meet the cost. Mr. Simpson says much the same as Capt. Street, "the time has not yet arrived for docks," and the Honourable Mr. M. C. Turner of Calcutta, whose note Mr. Simpson has kindly communicated, formulates three questions, which, if answered in the affirmative, would apparently satisfy him that docks are required.

I will take the questions put by Mr. Turner (slightly altered in form), as they succinctly state what are the pre-requisites to our deciding *pro* or *con* Docks.

(1). Is trade expanding or likely to expand ?

The Traffic Manager has dealt with this in a very interesting letter (circulated with another paper) No. 8859 P, dated 11th March 1898. I give here a table extracted from his letter.

Year.	Imports, tons.	Exports, tons.	Total.	Coal, coke and patent fuel.	Net tonnage excluding coal, etc.	Remarks.
1887-88 ...	210,979	106,207	316,986	15,492	301,494	
1888-89 ..	201,597	89,203	290,600	29,085	261,515	
1889-90 ...	246,659	112,525	359,184	34,368	324,816	
1890-91 ...	288,537	103,435	391,972	48,890	343,082	
1891-92 ...	347,401	88,939	436,340	49,027	387,313	
1892-93 ...	277,843	85,938	363,781	67,875	295,906	
1893-94 ..	285,251	98,660	383,911	82,302	301,609	
1894-95 ...	285,276	104,188	389,464	99,166	290,298	
1895-96 ...	330,697	99,074	429,771	134,452	295,319	
1896-97 ...	385,605	102,941	488,546	150,659	337,887	
1897-98 ...	432,418	82,582	515,000	170,000	345,000	

In regard to these figures Mr. Hutchence points out that in 1890-91 and 1891-92 trade was abnormally swelled by large imports of grain, those being famine years, also that in the current year 9,000 tons is due to excess of grain imports. But after making these allowances the figures seem to me most re-assuring and satisfactory, evincing a steady progress, though hampered by stationary exports. I can see no possible grounds for fear as to the future. The country is growing in population and wealth, new fields of cultivation and of industrial employment are being opened up every year, and in the normal process of events this must go on ; and Madras must, in consequence, experience a steady increase in its trade, always provided those entrusted with the regulation and assistance of that trade, of whom the Harbour Trust Board is the chief, take care that with increasing demands improved facilities are given.

The figures in the statement above show that, even without coal, trade is expanding. There are fears that with the completion of the Bezwada Madras Railway our coal trade will vanish. I don't think that this necessarily follows. But even if so, why need we despair of some other branch of trade supplying the deficit ? Kerosine oil in bulk has made immense strides of late years, and in both cases, the coal and the oil trade, the sudden growth of the trade has been unforeseen.

The fears as to the damaging competition of Vizagapatam and northern ports are purely chimerical, about $\frac{3}{4}$ of the whole volume of Madras trade is its imports, and none of its imports go to any of the northern districts, except an infinitesimal amount of transhipped cargo. As to exports at the present time, the quantity of goods and produce brought by rail from places north of Bezwada to Madras is quite negligeable : and if any trade south of Bezwada which now finds its outlet at Madras is, after opening of the B. M. Railway, diverted to northern ports, it can only be on account of, and directly due to, mismanagement in Madras, whether by the mercantile firms or the Railways or the Harbour Trust Board. On this point we need have no fears whatever, but rather hopes. The B. M. Railway may bring more stuff, oil seeds, cotton, etc., to Madras from the western and southern parts of the Kistna District and from Nellore ; it cannot possibly deprive Madras of trade. I do not myself anticipate that at first this new Railway will directly affect the trade of this port much. No doubt it will do so gradually and indirectly in the future, by opening up new tracts of country, and stimulating production.

It seems to me then that the statistics of our trade during the past ten years or so are encouraging ; and I am confident that if we give every facility that is possible to trade, we are certain to see a large improvement in the future. On the other hand if we fail to advance with the times, we run great risk of seeing our commerce transferred to other ports.

(2). The next question is, whether the revenue to be anticipated from our improvements will repay interest on outlay ?

Secretary, Harbour Trust Board.

Mr. Wilson's estimate is 38½ lacs. We can borrow at 4½ per cent and the interest would therefore amount to Rs. 1,72,125. If cargo be discharged at a quay consignees would be saved all landing charges. I have no precise information as to what the landing charges amount to. For coal I believe it is Rs. 1·2 per ton; for grain 12 annas to one rupee a ton; and for other articles varying rates working out to approximately Re. 1 (one) per ton. These are not the only gains to importers by landing at a quay. There is the question of safety from damage in being lowered over the side into the lighter; and in being hoisted on to the pier; of risk of complete loss in the sea; of pilfering between ship and shore, and between shore or pier head and Customs sheds. All these are important pecuniary considerations, and I understand have a considerable effect on the rates of insurance on goods consigned to and exported from Madras. The value of the trade may be stated at 12 crores of rupees per annum, and ½ per cent saved on this would mean Rs. 1,50,000 saved to the trade of the Port.

It seems probable that consignees would gladly pay an all round rate of 12 annas a ton to be rid of the worry, the risk and the cost of present landing arrangements. That rate would on the average figures of trade for the past 3 years bring us in Rs. 2,44,551, which is far more than sufficient. A rate of 8 annas a ton would give Rs. 1,63,034, which is about Rs. 9,000 too little: but the deficiency would probably be more than made good by savings in porterage and preventive charges, since our present cooly establishments could be largely reduced. There is therefore no fear that we should not be able to bear the cost of docks, even if Madras trade remains stationary; and any such anticipations are groundless hallucinations.

(3). The last point raised by Mr. Turner is as to the sufficiency of our present accommodation. Mr. Simpson says that "the ship's agents are all of one opinion, *viz.*, that as good a day's work can be done here as at any port, ships can work all their hatches at both sides at one and the same time." But he goes on to detract from this statement by complaining of the Pier being unable to cope with the traffic, and admits that better arrangements are needed for discharging from boats and lighters. The sentence I have quoted above is rather in conflict with one further on in Mr. Simpson's note:—"All ships' want is improved facilities for the discharge of cargo boats, so that it will be possible for more boats to be employed at one time." If the ship is already working "all her hatches at both sides at one and the same time," she is presumably discharging as fast as possible, and therefore more boats will not accelerate matters. Again Mr. Simpson says that "consignees in Calcutta find it more expensive and less convenient to use the jetties than to take overside, delivery." There must be something peculiar in Calcutta, otherwise consignees at every port in the world would follow the same plan; and the peculiarity is, I believe, that consignees generally have their own boats, and convey their goods away direct to their own godowns, to which water carriage is cheaper and oftener more convenient than by land.

There have been long and bitter complaints of the inconveniences of landing at Madras, and these complaints all are focussed round the boats. So long as cargo is discharged into boats, manned by the Madras boatman as we know him, so long will there be complaints of damage, loss, and pilfering. We want to get rid of the boatman altogether. It is he and his friends that causes the never-ending friction between ships' agents and consignees, friction which has given rise to muttered threats of boycotting on the one side and of raising freights on the other. Such a state of things cannot be healthy, and must injuriously affect the trade of Madras; and the one effectual remedy will be to provide a means of landing and shipping without the intervention of either boatman or landing dubash.

Mr. Simpson says that coasting steamers would not have time to use docks. I have had the records looked into, and I find that on the average coasting steamers remain in the Harbour from 14 to 22 working hours.* To get in and out of a dock would occupy about one hour. †

Much is said about the comparative convenience and quickness of discharge and shipping under present arrangements. But I have nowhere seen it noticed that by carrying on these operations in a dock alongside a quay, work could go on day and night. I have lately in an indirect way enquired of the Chamber of Commerce whether it would like night working to be started at this port. No, reply has yet reached me, but from conversations I have had with various merchants, I learn that there is, generally speaking, a disinclination to ask for such a concession, because of the risks that attend night working of loss, damage and pilfering. These risks are, as pointed out above, bad enough in the day they would be much worse at night. And as Collector of Sea Customs I should probably find considerable difficulty in devising satisfactory arrangements to guard against smuggling. But if we had

* *Vide* letter from Deputy Conservator printed on page 11. † Ditto page 12.

a dock, no boats, but discharge direct on to a quay, the whole premises enclosed in a suitable fence all these risks of pilfering, damage and smuggling would vanish or be reduced to a minimum; and there is not the slightest doubt that given such arrangements ships might be worked continuously day and night. This is a very strong argument in favour of docks. In such circumstances I believe even coasting steamers would be glad to enter the docks.

Neither Captain Street, nor Mr. Simpson have referred to the security a dock would afford in stormy weather. When the Harbour works were commenced much was said of the necessity for a Harbour of refuge. The Harbour has been built and is looked on by mariners as a trap to be most care fully avoided in cyclonic weather. Now we have the chance of removing this reproach, and of at last fitting the Harbour to serve one of the principal ends for which it was designed. It is our duty to embrace the opportunity.

Our late colleague Mr. Scott had sent in his resignation as a Trustee before the papers had reached him, and therefore he could not record any official minute. He however wrote to me as follows authorising me to make use of what he said:—

"The question as to how a basin can best be made must be left to the Engineers, but I do hope the Board will endorse the broad conclusion, that both Wilson and deWinton come to, and not spend money on works that cannot ultimately be fitted into a scheme for an inner Dock basin. The only minute I have seen is Captain Street's, but I rather think he overlooks the point that Wilson brings out, *viz.*, that the Boat-basin would cost far more than we originally thought. In fact it seems to me that by a little judicious arrangement we shall get the nucleus of docks to hold steamers for practically the same expenditure that the facilities Captain Street contemplates would cost. I remember 2 or 3 years ago Mr. Pinsent took out some figures showing that by the saving in boat-hire we could cheapen the Port and at the same time provide interest and sinking fund on the capital required for Docks. There would be other items of revenue, such as godown rent, when the scheme of warehousing on warrants is complete. I should be dead against any scheme that involved an increase of dues, but I hope and expect that you will be able to show that the reverse may be expected." This opinion, coming from one of such sound circumspection, carries great weight.

The Trades Association some years ago gave an unqualified opinion in favour of Docks; the owners of one of the principal lines of steamers trading with Madras has done the same; there is a general feeling that Madras Harbour is not advancing with the times, we are running a great risk of driving trade away from the port to complete the Harbour and make it fulfil the objects with which it was designed, an inner basin is essential; we can well afford to construct such a basin, and therefore undoubtedly we ought to do it.

I have referred above to the loss that occurs between ship and shore, and I give here a statement showing for one week the number of cases of loss and damage of cargo, etc., during landing operations.

March 10th ...	Patiala ...	... 3 sleepers	lost overboard.
11th ...	Goalpara ...	... 4 do	do
12th ...	Neidenfels ...	... 5 cases	do
„ ...	Goalpara ...	... 11 sleepers	do
„ ...	Pier ...	... 1 case	fell into the sea.
13th ...	Oronsay ...	... 2 bags chalk	lost overboard.
„ ...	Neidenfels ...	... 11 bars iron } 1 keg nails }	do
„ ...	Goalpara ...	... 1 sleeper	do
14th ...	Neidenfels ...	... 3 bundles iron.	do
„	do ...	... 1 „ steel.	do
15th ...	do ...	... 38 bars iron.	do
„ ...	do ...	... Boat No. 40 loaded with iron sank alongside ship.	
16th ...	Palitana ...	... 5 sleepers,	lost overboard.

The above is a pretty large tale of losses for one week, at a time when the sea has been like a mill pond. I am told that all these risks are discounted in Insurance rates. In that case all I can say is that the elimination of the risks must produce a very substantial reduction in Insurance rates.

Secretary, Harbour Trust Board.

My remarks above have been written on the double assumption (1) that Mr. Wilson's estimate of 38¼ lakhs could not be reduced: and (2) that the coal trade must vanish so soon as the B. M. R. is opened.

As to the first assumption it must be remembered that the estimate will, in any case, be only gradually worked up to, though, in my opinion, it is necessary to complete the inner dock or basin as early as possible; and there are certain parts of the estimate that may be found unnecessary, *e. g.*, the very long protecting arm.

Then as to coal, if we can pay our way without looking for any coal traffic, it follows that we shall be in a position to give up all dock dues on coal. In other words, we should relieve coal ships of all cost of discharging. It is not quite certain how much this would amount to. The Traffic Manager gives the figure as about Rs. 2 a ton, exclusive of the 8 annas dock dues, which would ordinarily be charged on all goods landed at the docks. Would this saving of Rs. 2 or 2-8 a ton on Bengal coal enable it to compete with Singareni coal?

Initialled—J. N. A. 18—3—98.

I do not think there is anything conflicting in my statements as quoted in para. 3 by the Chairman.

7. If there is only one ship in the Harbour, as good a day's work can be done as anywhere. If there are a number of ships, the work is limited not by the ship's capacity to discharge the cargo, but by the Pier's capacity to discharge the boats. The ship can work all her hatches at once both sides, but if the boats cannot get back fast enough, it is useless her doing so. I thought this was well understood, and that this was the reason for a boat-basin being advocated.

I thank the Chairman for pointing out the omission to mention the dock's utility in rough weather under this heading. Mr. Turner writes me—

"You will be burdening the trade with a heavy debt, which will be a drag on Madras for years "to come. The first big cyclone would probably play havoc with the vessels lying in dock, and then "such a scare would be established that you would not get your dock used again."

I would suggest that the various minutes and opinions might be sent to the Chamber of Commerce and Trades Association with Mr. Wilson's memorandum as proposed, as the trade will have to pay the piper whatever is done.

Initialled—C. B. S. 21—3—98.

The Chairman remarks, that there is no reference in my minute of the 5th instant regarding the security a dock would afford in stormy weather. As I am unable to see that a wet-basin would afford any security during a cyclone to a vessel, I did not refer to the matter. It must be borne in mind that the force of wind during a cyclone is generally strong enough to force vessels away from their fastenings without the aid of the sea. The state of the shipping at Calcutta and Chittagong after a cyclonic storm has passed over these ports, proves what wind alone can do. I do not think that any Captain of a vessel would care to remain in the wet-basin, during cyclonic weather, and I do not see that the basin would offer any protection from the wind. If one vessel broke adrift, she would probably injure all others in the basin. It seems to me that Mr. Turner, of M. M. and Co., Calcutta, sees all the weak points of Mr. Wilson's scheme.

Initialled—H. A. S. 21—3—98.

I have just read Captain Street's and Mr. Simpson's Minutes on G. O. No. 110, Marine, dated 11th February 1898, which forwarded to the Board for remarks and recommendations, the papers and estimates relating to the construction of a boat-basin for the Madras Harbour, and as Mr. Yorke entirely agrees with Mr. Simpson's remarks, these may be taken to be Mr. Yorke's reply to the G. O. under reference. The first thing that strikes me is that these gentlemen have misapprehended the entire point and requirements of the situation, for which I, as the writer of the note on the subject of the Harbour, may be to some extent responsible. For this reason I wish to explain what has happened. It having been recognised by the Harbour Trust Board for many years past that something should be done to improve what are called "facilities" for handling cargo in the Harbour, and more especially coal, many different schemes have been proposed and rejected one after another. No one of these schemes was ever thoroughly examined from all points of view or worked out in detail, and although the schemes were accepted by Committees or at meetings of the Board, it has happened over and over again that objections to the scheme selected have been brought forward either on points that were not considered at all at the Committee Meeting, or by persons or bodies who were not represented.

In November 1896 one of these decisions was come to in the usual way, the members of the Board were taken down to the south arm of the Harbour, where they were shown a site for a boat-basin marked out by Mr. Pinsent, the Secretary. As a matter of fact, Mr. Pinsent had proposed a ship basin and, to the best of my recollection, the only reason why it was decided to have a boat-basin rather than a ship basin, was that the latter would cost too much, but no estimates were made out and the matter was not gone into in any detail so far as I recollect. This point was not in any way thoroughly examined, the resolution, if it can be called a resolution at all, was passed on the pier, and I very much doubt whether all the members present could have told you on leaving its exact terms. One thing however was clearly stated in the Chairman's letter forwarding the results of this meeting to Government, and this is that the Trustees proposed to construct a boat-basin in the sand to the south of the Harbour "for providing better facilities for the landing of coal." The idea was to make a coal-hard on the sea side of the boat-basin, and as the Board's Engineer was absent on leave, Government was asked to make the required estimate. What I myself contemplated was that the Government officer entrusted with its preparation would take the general idea and would work the whole thing out, getting instructions and collecting information from the proper authorities to enable him to fix such details as depth, exact position of walls, requirements as to shedding, position of entrance, &c., &c. As a matter of fact the estimate submitted to Government was prepared entirely by Mr. Pogson, and came up without any report to show on what ground the various details had been fixed. It fell to my lot to supply the deficiency, and my note on the estimate is the result. I had recently been put in the position of Consulting Engineer to the Board, and I thought it behoved me to take some extra trouble in the matter. Finding a difficulty in supplying adequate reasons for constructing the basin as estimated for, and knowing the manner in which the Board's request for an estimate had arisen, I prepared alternative estimates and worked out the cost per foot running of various classes of wharf wall; and in short endeavoured to place on paper every item of information which would enable a non-engineer to come to a sound conclusion as to what should be done to carry out what is, as I understand, the main object of all schemes, *viz.*, to provide better facilities. Coming now to Captain Street's minute, I find him advocating the Board to adhere to a distinct line of action, and with this advice, I cordially agree, provided always that that distinct line of action has been decided on after mature consideration, and that it is clearly supported by sound reasons. This I hold has never as yet been done by the Board. I cannot accept the results of the meeting of November 1896 as a distinct line of action so decided on. If any further proof of this were needed, after what I have already said regarding the way this decision was come to, I have only to point to Captain Street's and Mr. Simpson's minutes. As I have said above, the decision then made by the Board was to construct a boat-basin in the sand to the south of the Harbour, for providing better facilities for the landing of coal. The sketch given to the Government officers for guidance in preparing the estimate shows the coal hards on the sea side of the basin. Now Captain Street takes exception to coal being discharged on the sea side of a basin 850 feet wide, *a fortiori* he would object to coal being discharged on the sea side of a boat-basin only 400 feet wide. Mr. Simpson also objects to the boat-basin being used for coal at all. On this important detail therefore three prominent members of the Board do not now agree with the decision of the Board of November 1896.

Both Captain Street and Mr. Simpson make objections to the ship basin estimate; but I cannot see that either gentleman has clearly indicated what, in his opinion, really should be done. Captain Street says that when the Trustees accepted the scheme (I suppose him to mean Mr. Pinsent's sketch), they thought that "*the facilities afforded by a boat-basin for horses, coal and iron*" would suffice, and he does not think that any good reason has been put forward to prove that these ideas were wrong. Now I was one of those Trustees, and I most certainly never had any idea that a boat-basin would afford any facilities for landing horses, nor do I now understand in what way it would do so. As to affording facilities for coal, as I have pointed out above, if it is objectionable to discharge coal at the side of a basin 850 feet wide at one end and 600 feet at the other, it must be still more objectionable to discharge coal at the side of a basin only 400 feet wide at one end and 200 feet wide at the other. Two blacks do not of course make a white, and I am quite willing to admit that if the Board is ready to go to the expense, it would be better to have a separate landing place for coal, but half a loaf is better than no bread, and after all that has been said about affording facilities for the landing of coal, Mr. Simpson proposes that the proposed pier from the North groyne for landing horses *can be tried* for landing coal, and if successful can be extended, and that is all. Mr. Yorke agrees with him. I think this is practically no bread. Captain Street does not, so far as I can see, make any proposal at all for improving facilities for landing coal. I cannot express too strongly my disapproval of this proposal of Mr. Simpson's. If the Trustees want a landing place for coal against the North arm

in the name of common sense, let us have a landing place designed for the purpose, taking into account the necessary railway lines, widening of the pier if necessary; but to suggest that the design should be made specially to suit one class of traffic, and to leave it to chance whether it will suit the most important traffic of all, seems to me the height of folly. Mr. Turner also suggests *light* jetties being run out to facilitate the landing of coal. This is a somewhat better proposal, as he intends that the jetties should be specially designed to suit the purpose for which they are intended. The objection to this proposal is that they would be useless in rough weather, and judging from past experience might be destroyed by a storm. Another point is that before pronouncing on the merits or demerits of a proposal like this, the whole cost of the proposal, including all details, rails, &c., should be estimated.

Mr. Simpson says that he thinks that "the plans already before Government for a boat-basin" meet all requirements. The plans he alludes to are those, I suppose, sent to the Board for remarks. Both of them provide for coal being stacked on the sea side of the basin, and are very different from the boat-basin proposed by Mr. Parkes, which Mr. Simpson seems to favor. I would therefore ask Mr. Simpson which plan it is that he favours. I think the Board ought to give a definite opinion, and that it would be altogether insufficient to say that the Board was or was not in favour of docks, or was or was not in favour of a boat-basin. The Board has declared several times it was in favour of a boat-basin, but it has always happened that when details were gone into that some insuperable objection arise. I am strongly of opinion, therefore, that the only way of deciding the matter is for each member of the Board to state in writing what work he would propose as an alternative to any proposal which has been made, and to which he has an objection. None of the estimates sent to the Board seem to meet the views of either Captain Street or Messrs. Simpson and Yorke, and it remains for them to modify one or other of the schemes to suit what would meet their views.

I would not appoint a special Committee, past experience of Committee's decisions is not encouraging, but it might do good for the Trustees to meet purely for the purposes of interchange of ideas on this subject, and for discussion. The minutes hitherto written on the subject seem to have been confined to criticism of what is described as my scheme, but do not deal with any alternative. The Trustees asked Government to prepare an estimate for them on certain lines, and now they have got it. I do not recommend it myself, and no one has as yet expressed distinct approval of it. My opinion is that it is open to as many objections as all the other boat-basin schemes. The objections to my alternative seem to be mostly financial, but considering that something like 130 lakhs of rupees have been spent on the Harbour, and that in any case it is necessary to spend another 10 to 14 lakhs at least, to object to the extra 20 lakhs or so seems to me like swallowing a camel and straining at a gnat. I have seen no argument as yet that a boat-basin is all that the port will ever want. It is generally argued that a boat-basin is good enough for the present, the dock will follow. I am inclined to doubt whether a boat-basin is good enough even for the present; but even if this were so, I hold the opinion that we should draw out a plan of development, now, as has been done at other ports.

Initialled—F. J. W. • 25—3—98.

In the remarks that I made a few days ago on Captain Street's and Mr. Simpson's minutes, I said nothing on the subject of Captain Street's last minute, which has reference to the amount of protection that a ship basin would afford to vessels in storms, because I was not then prepared to controvert the opinion of a Marine officer on a subject which might be held to be entirely a nautical one. On thinking it over, however, it occurs to me that there are some points in this minute which are fairly open to engineering and outside criticism, and as I hold that the best way of coming to a satisfactory conclusion on the subject under enquiry is for everybody concerned to say what he thinks, I make no further apology for the following remarks:—

The first point is the general statement that a ship basin would afford no protection from the effects of storms, as is evidenced by the results of storms at Calcutta. Now any one who has been to Calcutta must know what a very different scene is presented by the Hooghly than is ever likely to be seen in a Madras ship basin. Besides the steamers at the jetties, there are steamers moored in the stream. Sailing and other ships, I believe, lie sometimes three and four feet feet deep alongside of each other. The river has a treacherous current, which is notorious, and is subject at times to a tidal bore unless I am mistaken. The two cases do not seem to me to be parallel if it had been said that the Kidderpore docks afforded no protection in a storm. I could have understood the comparison, but I understand that the damage alluded to took place in the Hooghly.

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The next point that appears to me to be open to criticism is that the effect of the wind alone is generally sufficient to break ships from their moorings alongside a quay. Now as an engineer what occurs to me is to use what knowledge we have, to see why this should be so. This is what we know about wind pressure during the storm of 1881, which did such damage to the Madras Harbour. The greatest recorded velocity of the wind was only 33 miles an hour, and during the storm of 1872 it was 57 miles per hour. These velocities represent pressures of only 10·89 and 31·49 lbs. per square foot according to a formula adopted for reducing velocity to pressures, but this is not very reliable. These pressures are very low compared with what has been observed in other places. After the destruction of the Tay bridge, a special Committee was appointed by the Board of Trade to consider the question of wind pressure, and the rule recommended by this Committee was that a maximum pressure of 56 lbs. per square foot should be allowed for.

It should be understood, however, that this recommendation was made for a particular class of work, *viz.*, large high level railway bridges in an exposed situation, and although pressures of 65 lbs. per square foot and over have been registered by wind gauges in the United Kingdom, the evidence derived from the upsetting of railway carriages and similar sources goes to show that the wind pressure on a surface, such as that of a railway carriage, seldom, if ever, exceeds from 30 to 34 pounds per square foot. This is due to the negative pressure in rear of a thin plate, and to the fact that the average wind pressure over a large area is considerably less than the maximum pressure exerted here, and thereby an inpinging eddy on a small area, such as that of a wind gauge. Wind pressure on a surface near the ground is certainly less than on an elevated structure, and is not so great on a surface such as that of a ship's side as on a flat surface. Recent American experiments point to an allowance of 50 lbs. per square foot as ample for any large area, and I consider it would be a perfectly safe assumption to take this as the maximum wind pressure that could be brought to bear on a ship in a Madras basin.

The next thing to consider is the area that might be exposed to this pressure. The very worst case that can be conceived is that of a large steamer, being very lightly loaded and lying alongside of a quay with the wind blowing exactly at right angles to and away from the quay, and that this should occur when the water in the basin is at the highest possible level. To determine the amount of free board of vessels I measured the S. S. "*Baron Cawdor*" this morning, she was drawing only 11 feet of water and about half the length of the vessel was 22 feet above water and the other half about 25 feet, or an average of about 23½ feet. Something has to be added for funnel, rigging, &c. Take the case of the P. and O. S. S. "*Simla*," one of the largest ships which has used the Harbour, she is 430 feet long, and assume a depth of 28′′ feet over this length to represent the area of her side view including funnel, masts, rigging, &c. Assume the level of water in the basin to be 5 feet below the top of the quay, that is above high tide level, then the area exposed to a wind flowing off the quay would be $430 \times 23 = 9{,}890$ square feet, and the pressure on this area at 50 lbs. would be about 220 tons. Bollords can be made to resist a pull of about 400 tons, and these would be placed at 100 feet intervals along the quay. There would be four of these opposite the ship. The "*Simla*" probably carries at least 2¼" studded chain anchor cables, which would bear a proof strain of 91½ tons, so that all that would be necessary to secure the "*Simla*" from breaking away by wind pressure under the conditions I have assumed would be for this chain cable to be passed round a bollard at either end of the ship. We would thus get the strength of four chains holding the ship, which would take a pull of four of $4 \times 91\frac{1}{2}$ or 364½ tons without exceeding the proof strain against a required resistance of 220 tons. With 220 tons the actual strain on the cable would be $\frac{220}{4}$ or 55 tons. This is, I am aware, over the usual working safe load, but the condition is not likely to occur more than once in the life time of a chain, and is well under the strain that the chain is subjected to each time that it is tested.

The ship would have her ordinary hawser moorings besides. The conditions I have assumed are worse than could reasonably be expected especially on the north-west and southern quays, as at these quays vessels would be sheltered to some extent by the sheds alongside the quays, and on the other quay there would probably be large heaps of coal. The pressure 50 lbs. per square foot that I have assumed is much greater than has been experienced on both occasions of the Cyclones of 1872 and 1881.

In short, I cannot see that there is any engineering difficulty in securing a vessel to a quay to resist any wind pressure that can be conceived, and if vessels do break away from wind pressure alone, it can only be due to insufficient attention being paid to the moorings. In a Madras basin I would make it the duty of the Engineer and the Dy. Port Conservator to go round and inspect all the moorings

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Secretary, Harbour Trust Board.

on the approach of a storm, and, if necessary, there is no reason why special moorings should not be provided.

I have only alluded above to the force of the wind tending to cause vessels to break away as this was the point made in Captain Street's minute, but the possible force of waves is a very different matter. Waves have been known to give a blow enquivalent to a ton per square foot or over 20 times the greatest wind pressure ever recorded.

The width of entrance to a basin which I proposed was 164 feet, this being the least width which a vessel can pass through with convenience under her own steam. I see, however, that Captain Aves recommends warping vessels in, and reducing the width of, the entrance. I only suggested a wide entrance, as I thought it would be objected to less on account of time employed in going in and out, but if warping is to be done, then I would make the entrance still narrower, say 80 feet, and would provide a recess for a caisson, the caisson itself might be provided subsequently if it were found that in rough weather the disturbance in the basin was inconvenient.

The entrance could thus be closed in such cases. There are several different types of caissons in use for closing entrances which I need not here describe, but their advantages over gates are the saving of room, in shortening the length of the entrance, the facility with which they can be maintained and repaired as compared with gates. The power they give of examining the sill and masonry of the entrance as more than one stop can be made for them, and what is a very important advantage, a caisson can be made to carry a road or line of Railway across the entrance. There is no engineering difficulty therefore in making a ship basin at Madras a perfectly still water basin, if the open entrance is found insufficient, and as to the exposure of the site this is not more exposed than many other docks already in existence. The Leith-docks, for instance, are made on land reclaimed from the sea, and their position is almost identical with the proposed Madras site. It may be said that Leith is not exposed to such severe storms as Madras. It may be true that Leith is not exposed to such severe *waves*, but we have evidence as regards wind at the Forth bridge not many miles from Leith. At the Forth bridge the wind gauges have already registered pressures running up to 40 lbs, and in one instance to 65 lbs. per square foot, and in the latter case the momentary deflection of the spring would have been still greater if it had not been checked at that point by a fixed stop. The wind pressures at the Forth bridge that have been recorded are therefore a good deal larger than those recorded at Madras in the Cyclones of 1872 and 1881; and it is fair therefore to assume that a basin at Madras would not be exposed to any more risk from wind than the Leith docks.

In my first minute I suggested that each member of the Board who had any objection to any of the works proposed should suggest an alternative and go into the matter in detail, and it occurs to me now to say a few more words on this subject. Some of the minutes that have been written seem to imply that what has been proposed is to construct a dock at a cost of 38½ lakhs, but I would invite a perusal of the estimates forwarded for remarks. Of this 38½ lakhs, about 12¾ lakhs is for work which has for the most part already been approved by the Board and sanctioned by Government. Of the remaining 25¾ lakhs only 19 lakhs, are for the ship basin itself. Mr. Simpson, backed by Mr. Yorke, says that "it is surprising that such efforts should be made to thrust docks on the shipping when "the smaller and more satisfactory scheme of a boat-basin already before Government will meet "all the requirements of the Port for general cargo."

Now, assume for the sake of argument that Mr. Simpson alludes to Mr. Pogson's estimate of Rs. 8,73,667, as he does not say which scheme he refers to, although he here says it will meet with all the requirements of the Port if we are to judge from his own minute, he does not believe that it will meet with all the requirements of the Port, but only that it will meet with some of the requirements. First of all he says coal and general cargo are not to be landed near the same place, but we should try the horse jetty for landing coal, and if successful similar or additional piers should be made. He makes no proposal at all to meet the contingency of that plan proving unsuccessful. Again he says that if the boat-basin is made first a separate dock could be made to the east of the basin at some future time. With such a boat basin, as estimated for, this could not be done. It, therefore, seems to me that the smaller scheme alluded to by Mr. Simpson is, according to his own showing, not what he really wants, and according to his own ideas does not meet with all requirements.

I would ask therefore for further detail, so that Mr. Simpson's proposals can be drawn out and estimated for. It is only by such detailed examination of any proposal made that we can arrive at a sound conclusion as to its merits.

(Initialled) F. J. W. 27—3—98.

The maximum rates of boat hire sanctioned for Madras are as follows :—

TO AND FROM SHIPS OF ALL DESCRIPTIONS LYING AT ANCHOR WITHIN THE MADRAS HARBOUR.

Common Boats.

	RS.	A.	P.
Ordinary trip*	1	8	0
Transhipment	1	0	0
Ballast trip*	1	12	0
Water trip (from the beach)	2	0	0

Large Pier Boats.

Ordinary trip per ton	0	10	0
Transhipment per ton	0	8	0
Water trip	1	0	0

MAXIMUM MASULA BOAT-LOAD.

Inside the Harbour.

Dead weight, 3 tons, not damageable by water.

Rice, sugar, grain and ginger, 30 bags.

General cargo, 2 tons, by measurement of 50 cubic feet per ton.

Large pier boats shall carry the ascertained practicable quantity of goods according to their size and measurement, as expressed in the licenses granted under Act X of 1889.

I have endeavoured to ascertain what are the actual rates charged to consignees, to enable us to see whether the substitution of loading and unloading at a quay wall would actually cheapen work at the port or not.

I first addressed myself to the shipping agents, and received replies from Messrs. Binny & Co., Messrs. Gordon Woodroffe & Co., and Messrs. Volkart Bros., and the Agents P. & O. Co. These first replies were to the effect that the following is the scale of rates for landing cargo inside of the Harbour, Rupees 1-8-0 per masulah boat trip for general cargo, excepting iron, which is charged at Rs. 1-5-6 per ton.

This did not help me, so I then enquired what was meant by "a masulah boat trip," and this elicited the information that

"The tonnage of a masula boat is approximately 2 tons for general (measurement) cargo and 2 to 3 tons for dead weight. The maximum quantity is not always carried and boat-hire is calculated at Rs. 1-8 per trip, *i. e.*, per boat load or portion thereof, from steamer to shore or *evie versa*."

"The rate charged for boat-hire either to the Beach or to the Pier is Rs. 1-8 per trip; masulah boats do not discharge at the Pier except on special occasions."

"This rate covers risk of damage or pilferage while cargo is in custody of the landing contractors, and also any loss sustained through omissions on the part of Preventive Officers to note the condition in which packages are discharged, the custom of the Port being to hold that such packages are discharged in good order and the ship consequently not liable. The number of Preventive officers is deficient, one man frequently has to supervise two hatches."

"The rate of boat-hire on iron, *viz.*, Rs. 1-5-6 per ton, includes landing on the Beach above high water mark, at a spot fixed by the Harbour Trust officials. This rate was in force in 1885 when a Government order was issued directing that all iron be landed on the Beach and has been in force ever since."

"The charge for boat-hire is so much per lighter at the rate of 10 annas per ton on the carrying capacity of the lighter and not at 10 annas per ton of cargo; the rate charged, *viz.*, Rs. 9 per lighter, works out at about the same rate per ton cargo, as the average lighter capacity is about 14 tons."

"The rate per lighter appears to be in accordance with the Government schedule."

"The schedule of boat fares appears to have been drawn up on the basis of the maximum number of trips a boat can make, but the number of trips is limited by the inadequate arrangements

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* Eight annas less if proceeding to or from the pier.

for their discharge at the Pier which prevents the boats obtaining full employment and consequently enhances the rates of hire."

I don't know whether the shipping agents were conscious that the actual charges levied on consignees were in excess of sanctioned rates, but in each case the reply contained a sort of apology to the above effect.

Meanwhile I had been prosecuting further enquiries from other business firms, and had received information, to which I shall refer directly, showing that as I expected the landing charges really charged are on the average up to at least Re. 1 a ton, and in the case of small consignments much more. It is worth while to refer to the reasons assigned by the shipping agents for levying charges in excess of the sanctioned rates of boat-hire. These reasons are (1) that the rate covers risk of damage and pilfering between ship and shore; (2) that it covers cost of loading and unloading; (3) that it covers cost of carrying cargo landed above high water mark; and (4) that it compensates for the delay caused in unloading boats by the present inadequate arrangements at the pier. The agents of the Clan Line add optimistically but dubiously, "If matters can be arranged whereby detention can be minimised and the boats are able to work a reasonable number of trips per diem, something might be done in the way of reducing rates." Now if we have a boat-basin reasons Nos. 1 and 2 will still remain, No. 3 will vanish; but No. 4 may still be alleged, whether rightly or wrongly, and in any case whatever be the increased facilities afforded by a boat-basin, we may be perfectly sure that the rates of boat-hire will not thereby be reduced. On the contrary, it seems to me quite on the cards that pretexts will easily be found,—the increased distance will serve well enough—for increasing the rates.

Now as to the actual rates paid by consignees, I annex a table compiled from information from many of them, showing what rate per ton they have been billed for,

			Rs.	A.	P.
Binny & Co., Piece goods			1	1	11
Do. Coal...	Boat-hire 0 12 0 / Gunny bags 0 6 0		1	2	0
Wilson & Co., all round rate (about)			1	0	0
Parry & Co., do. (do.)			1	0	0
Dymes & Co., average rate			1	5	1
G. W. Deane & Co., do.			0	12	10
Leighton & Co., do.			1	5	9
Wrenn, Bennett & Co., do.			1	2	6
Vest & Co.			1	8	0
Addison & Co.			1	5	1
		10	11	11	2
Average per ton Rs.			1	2	9

The following table will show approximately what was paid in landing and shipping charges by the trade of the port during the past and current years.

	Rs.	A.	P.
1896-97—1,50,659 tons coal at Rs. 1-2-0	1,69,491	6	0
21,000 tons iron and steel at Rs. 1-5-6	28,218	12	0
* 307,812 tons general cargo at, say, Rs. 1-2-0	3,46,288	8	0
Total	5,43,998	10	0
1897-98—173,000 tons coal at Rs. 1-2-0	1,94,625	0	0
22,000 tons iron and steel at Rs. 1-5-6	29,542	8	0
* 317,000 tons general cargo, at say, Rs. 1-2	3,56,625	0	0
Total	5,80,792	8	0

* Exclusive of bulk oil.

Compare these figures with the rates that we ask the trade to pay.

We ask the trade to pay—	Rs.	A.	P.
1896-97—150,659 tons coal free of Dock dues	...	...	...
21,000 tons iron and steel at, say, 10 annas	13,125	0	0
307,812 tons general cargo at do.	1,92,382	8	0
Total ...	2,05,507	8	0
1897-98—173,000 tons coal free of Dock dues	0	0	0
22,000 tons iron and steel at 10 annas	13,750	0	0
317,000 tons general cargo at do.	1,98,125	0	0
Total ...	2,11,875	0	0

One is hard put to it to understand why men of common sense should prefer to pay 2½ times more than a fair price for services rendered. And then it must be remembered that whereas the dock charges will, as trade expands, tend to decrease in the rate of incidence, there is not only no guarantee that boat charges will not increase: but every probability that this will happen; not only by direct enhancement due to the normal increase in cost of labour, but indirectly in consequence of refusal of the boatmen to work, or of strikes and the like. Recently there has been such pressure of work in the Harbour that some of the masula boatmen refused to work after 3 P. M. and Messrs. Binny & Co. had to land coal out of lighters on the north arm. At Tuticorin, not many months ago, the cargo boatmen found it more profitable to trade along the coast, and the trade of the port was temporarily paralysed. At Negapatam the boatmen struck, because they did not like landing troops. What is now happening at Bombay may any day happen here: and while a strike among the coolies on shore working in a dock could probably be met and defeated, a strike among the boatmen would bring trade to a standstill, as actually happened here in 1894.

I know it is said that large as the amount paid for boat-hire seems, the shipping agencies do not make much out of it, as they have so many claims to meet on account of damage and pilfering. This is probably quite true; but what an absolute waste of money it is. These 5¾ lacs of rupees are not productive expenditure, but represent either loss of valuable goods, or labour which is unnecessary. So that the present process of landing cargoes in boats, whether at the pier, the beach, or, as is proposed, at a boat-basin entails waste of time, labour and money. It is sheer waste from beginning to end, and why any business man should wish to continue it passes my comprehension.

Captain Street has referred to the fact that our imports progress but slowly, and that our exports show a tendency to decline Is not this due solely to the fact that our landing and shipping arrangements are disgracefully behind the times? They are costly and bad. So bad that no tinkering with boat-basins will mend them. It is this and only this that enables other ports to compete with us on terms so favourable to them. Madras firms themselves hesitate between Bombay and Madras as their place of export, and I believe that ever so small an increase in the charges at this port would drive a large amount of stuff, all that comes from places beyond Cuddapah, to Bombay. On the other hand, I have it on good authority that if we had a ship dock, and loading from a quay with charges reduced as we will reduce them, we should at once attract to us a large amount of trade that now finds its outlet at Cocanada.

There is another point in this controversy deserving of very careful consideration. The advocates of a boat basin do not profess to offer a final scheme. They admit that the boat-basin is only a temporary make-shift. It is good enough for the present, and will stave off the necessity for building a dock for a few years longer. They say "the time has not yet arrived," not "the time never will arrive." But looking at the matter not now from the standpoint of cargo tonnage, but of numbers of ships visiting the port, it must be evident that the time undoubtedly has come to provide increased Harbour accommodation of one sort or another. The following are the numbers of mercantile steamships visiting Madras in the past eight years; and the numbers that failed at first to find room in the Harbour.

Dues insufficient to meet expenditure Capital exhausted

		No.	Tonnage.	No room inside Harbour.
1890—91	...	638	994,891	1 or 2 occasions.
1891—92	...	697	1,195,738	1 or 2 do.
1892—93	...	629	1,110,987	6 occasions.
1893—94	...	659	1,221,256	2 occasions.
1894—95	...	640	1,150,037	1 occasion.
1895—96	...	656	1,184,644	7 occasions, average of 6 hours each.
1896—97	...	662	1,180,664	6 occasions.
1897—98	...	...	...	8 occasions.

There can be no doubt that the numbers will go on increasing, and we must therfore increase our accommodation. It was only last year that the Deputy Conservator proposed to refuse admittance to the Harbour to sailing vessels, because they occupy the moorings for so long a time. The Deputy Conservator was told to use his own discretion, and it is noticeable that since that time though various sailing ships have visited the port, none have entered the Harbour, and none have carried away any cargo, so that for want of Harbour room we are boycotting the cheapest freight to be had.

I say that it is certain that before many years are past Madras will either have committed commercial suicide, or she must increase her accommodation for ships. But if we are to construct a boat-basin now at a cost, say, of 10 lacs, (I take no account of the extra accommodation for coal and horse ships which Capt. Street and Mr. Simpson wish us to provide, though those proposals would, I suppose, run us into a good many lacs), we shall find ourselves burdened with "a veritable white elephant" in the shape of a boat-basin that will not supply our wants, and a debt of 10 lacs at 4½ per cent, which, for all the good it will have done us, might as well have been thrown into the sea. And it will be a much more difficult matter then to raise the wherewithal to build a ship's dock. Beware, therefore, lest the decision now to build a boat-basin may not shut us out for ever from the possibility of extending our ship accommodation.

J. N. A. 28—3—98.

Mr. Wilson's note is a valuable and interesting addition to the existing literature on the Madras Harbour; and after its perusal, one cannot help being struck by the great divergence of opinion expressed by the eminent authorities who have been from time to time consulted in regard to developments and extensions.

When so many wise men have frequently been diametrically opposed to one another in their views as to what should, or should not, be done, it is hardly a matter of surprise that there has been much delay, and considerable hesitancy in adopting any definite line of action. The time has come, however, when a decided move should be made, and I hope this vexed and much discussed question will now receive final disposal.

In view of such variance in engineering and nautical expert opinion, on the proposals that have from time to time been put forward, I will confine my remarks to criticism of the scheme now laid before us by Mr. Wilson, from a purely commercial and financial point of view, concluding with a statement of what I consider is required to facilitate the landing and shipping of cargo at this port.

The first stage of Mr. Wilson's scheme is to cost Rs. 12,78,000, the second Rs. 25,50,000, or in all Rs. 38,28,000. This is the original estimate: can it be taken as final? Can we rely on securing a fully equipped and complete dock for an expenditure of 38¼ lacs? Estimates almost proverbially have an unpleasant tendency to expand, and before launching out on a scheme of this sort, we should be well assured on this point.

Now for the first stage. What shall we get for the 12¾ lacs it will cost? It does not appear to me to provide for any special improvement for the landing of coal, admittedly one of the most pressing wants of the port. We should have a mole of some 500 feet running out into the Harbour, necessitating the abolishment of No. 1 berth, and nautical opinion has hitherto been opposed to any curtailment of space inside the Harbour. Mr. Wilson certainly anticipates "that there would be three deep "water quays, alongside which a steamer could lie, provided the water were still enough." Is it likely the water will be still enough? I doubt it—the consensus of expert opinion is decidedly against it, and I think it is supported by practical experience.

In addition to the above there will be a quay wall in front of the south Pier for 900 feet from the shore end, and a similar structure to the north side some 700 feet long.

The above is, so far as I can see, what we get for the 12¾ lakhs, and what practical benefit will it be for the trade of the port? I must confess I see very little. I do not see any use of the quay wall in front

of the northern groyne, and I question if that to the south will be of any material assistance. So far, therefore, as the first stage is concerned, I fail to find that it can be of any real benefit. I quite approve of the policy of so planning improvements if possible, that they may be at some future time further developed if necessary, and I had hoped that by spending 12¾ lakhs now on the first stage, we would have secured such improvements as are necessary for the trade of the present time, leaving the future to decide whether the trade of Madras will ever warrant the construction of docks, and the fulfilment of stage No. 2.

It seems to me, therefore, the adoption of stage No. 1 necessitates the acceptance and immediate carrying out of No. 2 also, or else we shall have a half and half sort of scheme of not much value.

The question then arises, are docks necessary or required? I don't consider they are. The only condition under which the subject would merit consideration is, if it can be incontestably proved beyond the shadow of a doubt, that, not only would trade have to bear no extra charges, but that there would be a very material reduction in the existing rates, and also a reasonable margin allowed for unforeseen contingencies. It would I think, be rash to accept the figures put forward as conclusive on that point. The Traffic Manager's estimates and forecasts I consider somewhat sketchy, and with a distinct tendency to be one sided. For instance, he can hardly expect any one conversant with the trade, to believe that because coal is landed in docks there will be no wastage. The expenditure is based on the "Estimated charges for this year" (presumably for the Harbour as it stands) plus 4½ per cent interest on 30 lakhs. This hardly seems sound reasoning. What grounds are there for assuming that no extra expenditure will be necessary? Is no provision to be made for repayment of the contemplated loan, or for repairs, renewals, and upkeep of the docks, wharves and sheds, has any allowance been made for dredging, an item I should say, likely be a serious one. The capital outlay is assumed to be only 30 lakhs. The estimates, as they stand, are 38, with a possibility, I might even say, a probability of being a good deal more before the work is finally completed. Interest is calculated at 4½ o/o; it will, I think, be generally admitted that the future of the money market is so very uncertain, that it is open to grave doubt if funds could be raised on such terms. It is easy to shew a saving to trade of about 5 lakhs by such rule of thumb estimates, as the above, I am unable, however, to accept them as a reliable and carefully compiled forecast of what might reasonably be expected to be the result of docks.

The Chairman's figures regarding the trade of the port during the past decade hardly warrant the sanguine view he takes of the position. If the abnormal trade of 1890-91 and 91-92 is to be deducted the same rule should be adopted throughout, but no mention is made, for instance, of all the railway material imported in, 1896-97 for the construction of the Madras Bezwada Railway, surely that is equally abnormal. I have no doubt, however, the figures will show an increase, but that is about all, and I fail to see where the great expansion of trade is to come from, which we are asked to look for by the construction of docks. What trade is being stifled for the want of them?

The comparative statements the Chairman gives, showing what is paid now for landing and shipping and what trade would be asked to pay if there were docks, are no doubt alluring, but upon what data are they compiled? He shews certainly how he arrives at the present cost of shipping, &c., but I submit it is fallacious, the figure he quotes is not the average rate, but the mean, as quantities have not been taken into the calculation, and I venture to remark that the cargo handled by the four firms mentioned at the bottom of the list given, and who pay the highest rates, bears a comparatively small proportion to the total tonnage of the port. The first two statements therefore cannot be accepted as reliable. As to the second, what the "trade is asked to pay." Being interested in the importation of coal, I should be delighted to think there was a possibility of importing it free of charges, and I can put no other construction on the phrase "free of dock dues". But I am afraid it would be unwise to be carried away by such an utopian idea as to think such a thing possible. It is here again very easy to say the trade is paying 2¾ times more than it might, for services rendered, and make up statements such as the above referred to, to support it; but I do not think the cost and contingent expenses of docks have been quite fully realised or allowed for. It would appear from the Chairman's remarks in his first minute, that he reckons on the interest on the loan being the only additional expense that will have to be covered, I fear not, and that being the case, all the estimates of what the trade will be asked to pay, may prove to be totally inadequate.

In addition to the many other objections to docks which have already been put forward by Mr. Simpson, and with which I agree, I would add the following words of Sir Alexander Rendel:—

"I do not wonder at the Trustees hesitating whilst the Harbour is untried in respect to the stability of its works, and open to question in respect to the maintenance of its depth, to do more

Does insufficient to meet expenditure Capital exhausted

"than is absolutely necessary for the necessities of the moment. Therefore, as a sheltered basin and a "quay for boats will remedy the worst part of the present disadvantages of the port, I think the Trus- "tees have determined wisely." The stability of the Harbour has still to be proved, and it is a very weighty consideration to be kept in view.

The present "disadvantages of the port" are the want of facilities on shore for shipping into, and landing from lighters or boats, and disposing of the cargo when it is landed. The existing Pier is quite insufficient to meet demands, and it has also the disadvantage of being so high, necessitating a lift of, I suppose, about 20 feet. I consider the above drawbacks can be best overcome, by a series of low quays or jetties with the necessary shedding in close proximity to them.

I cannot but help thinking the most convenient position is inside the present Harbour, keeping the coal to the north, and the general trade to the south, as it is highly desirable that coal should not be handled in the same basin with other goods. The objection to this suggestion will be of course that the space of the Harbour must not be curtailed, but why should it be? Could not the whole work be kept within the 2 or 3 fathom line, excavating the foreshore if necessary?

What greater objection could there be to having a protecting wall to the jetties within the 2 or 3 fathom line to ensure calm water, than to a mole running out into the middle of the Harbour? It has been remarked that the low jetties inside the Harbour were washed away in 1882, but it must be remembered they were only partially constructed, and were not protected by a wall. The requirements for landing coal would be fully met by discharging in bulk into large lighters as is done at most places, notably Port Said, "one of the largest coaling stations in the world; to do this low quays are necessary for the discharge of lighters, and unquestionably the most convenient site for the storage of coal is the northwest corner, where it is now, and I believe it is quite capable of being made suitable for all requirements. From the many plans that have appeared from time to time, I am inclined to think that a scheme something on the above lines could be carried out at a moderate cost, and I believe it would fully remove the disadvantages we are at present labouring under—and then, having ample facilities for working our steamers in the Harbour, docks would not be required, as at present is the case in Calcutta; there they have docks, but regret they have ever been burdened with them!

I would support Mr. Simpson's proposal that all the papers should be printed and sent to the Chamber of Commerce for an expression of its opinion; it is a subject in which the whole of the Mercantile community of Madras is interested, and it would be well now to bring its discussion to a final conclusion. I understand it is also to be sent to the Trades Association.

I deprecate any further minutes by Trustees, as if we are all going to continue answering one another there will be no finality to it. We have each had an opportunity of expressing our opinion, and the best thing to be done is to meet and interchange views and ideas, as Mr. Wilson suggests.

R. J. B. 1—4—98.

No. 8859 P.

HARBOUR TRUST BOARD,
MADRAS, *8th March* 1898.

To

THE SECRETARY,
Harbour Trust Board.

SIR,

I have the honor to acknowledge receipt of your Memo. No. 3044 T of this date, asking me to prepare a statement for the Chairman's information as to the increase or decrease of the trade of the port, and to submit the following, which, I would premise, deals only with the *tonnage* of the port, as I have no information as to the value of the trade.

The first statement shows the total tonnage landed at, and shipped from, this port during the past 11 years, and is as under—the tonnage for the present year 1897-98, being taken from 11 months' actuals and 1 month estimated.

	Total tons.
1887-88	316,986
1888-89	290,600
1889-90	359,184
1890-91	391,972
1891-92	436,340
1892-93	363,781
1893-94	383,911
1894-95	389,464
1895-96	429,771
1896-97	488,546
1897-98	515,000

The above shows that the tonnage, as a whole, is steadily increasing.

The second statement divides the total tonnage during the same period of 11 years into imports and exports, and is as under, *viz.*:—

Years.	Imports Tons.	Exports Tons.	Total Tons.	Remarks.
1887—88 ...	210,979	106,207	316,986	
1888—89 ...	201,597	89,203	290,600	
1889—90 ...	246,659	112,525	359,184	
1890—91 ...	288,537	103,435	391,972	
1891—92 ...	347,401	88,939	436,340	
1892—93 ...	277,843	85,938	363,781	
1893—94 ...	285,251	98,660	383,911	
1894—95 ...	285,276	104,188	389,464	
1895—96 ...	330,697	99,074	429,771	
1896—97 ...	385,605	102,941	488,546	
1897—98 ...	432,418	82,582	515,000	

Statement No. 2 shows that while the import tonnage has largely increased the export tonnage has declined, and the statistics maintained in this department shows that the decline has been principally confined to a few articles of export, *viz.*, cotton, groundnuts, and jaggery; the rise in export tonnage last year being entirely due to the unusual quantity of jaggery shipped, *viz.*, some 190,000 bags, while none has been shipped this year.

The increase in the column of the import trade is very marked, and the question naturally arises as to what articles of import the increase is due, and it is clear that the items of coal and coke form the great bulk of the increase, as will be shown in statement No. 3, in which the tonnage of these goods has been deducted from the total tonnage.

Years.	Total tonnage.	Tonnage of coal, coke and patent fuel.	Net tonnage exclusive of coal and coke.	—
1887—88 ...	316,986	15,492	301,494	
1888—89 ...	290,600	29,085	261,515	
1889—90 ...	359,184	34,368	324,816	
1890—91 ...	391,972	48,890	343,082	*
1891—92 ...	436,340	49,027	387,313	*
1892—93 ...	363,781	67,875	295,906	
1893—94 ...	383,911	82,302	301,609	
1894—95 ..	389,464	99,166	290,298	
1895—96 ...	429,771	134,452	295,319	
1896—97 ...	488,546	150,659	337,887	
1897—98 ...	515,000	170,000	345,000	†

*1890—91 / 1891—92 } These were years of great scarcity in Madras, amounting almost to famine and the heavy rise of import tonnage was due to abnormally large quantities of food grains imported amounting to tons 35,000 in 1890-91 and to tons 109,000 in 1891-92 against an average for the previous three years of only 16,000 tons.—

For purposes of comparison as to whether the tonnage of the port, apart from coal, is increasing or decreasing these abnormal tonnages of grain *viz.*, 35,000—16,000=19,000 tons in 1890-91; and 109,000—16,000=93,000 tons in 1891-92, should be deducted from the net tonnage which has been done in statement No. 4 as under, *viz.*,

	Tons.	
1887—88	301,494	
1888—89	261,515	
1889—90	324,816	
1890—91	324,082	Average annual net tonnage after deducting tonnage of coal, coke and patent fuel and abnormal tonnage of grain imported during 1890-91 and 1891-92.
1891—92	294,313	
1892—93	295,906	Average per annum ... tons 299,254.
1893—94	301,609	
1894—95	290,298	
1895—96	295,319	
1896—97	337,887	Excluding coal, coke and patent fuel.
1897—98	345,000	Average per annum ... tons 326,068.

In examining and comparing the figures in statement 4, I would observe that the Board's revenue receipts remained almost stationary at about 4½ lakhs of rupees for a number of years, if the dues on the abnormal tonnage of grain mentioned above be excluded, but during the past three years there has been very satisfactory increases. During these three years the tonnage of coal imported has risen largely as shown in statement 3, and to see whether the rise in the total tonnage and consequent revenue receipts have been entirely due to increased imports of coal. I have taken the average net tonnage of the 8 years prior to 1895-96 and also the average net tonnage of the 3 latter years, and find that the average tonnage of goods other than coal has been nearly 27,000 tons in excess of the average of goods during the previous 8 years, when less coal was imported, and during the present year 1897-98 the excess net tonnage will amount to 45,000 tons, exclusive of 116,725 tons of coal landed in excess of the average tonnage of coal during the former 8 years.

The above statements, I would submit, shows that the import tonnage as a whole has increased very satisfactorily, and also that there has been a moderate increase in the import tonnage of goods other than coal, during the past eleven years: while, on the other hand, it is to be regretted that the export tonnage has declined instead of increasing as might have been reasonably expected.

With reference to the Chairman's enquiry as to the relative cost to consignee of landing goods now in the Harbour and in a Dock, I would say that the cost of landing in a Dock would be *nil*. I have no reliable information as to what the actual charges to consignee now are, but some three or four years ago I saw bills made against importers for landing charges, and these ranged from Rs. 1-8-0 to Rs. 2-8-0 per ton.

I have the honor to be,
Sir,
Your obedient servant,
S. HUTCHENCE,
Traffic Manager.

P. S.—The statement that 45,000 tons excess of goods will be landed during the present year, *vide* para. 6 above, may have to be modified, as grain in excess of last year's imports has been landed. Up to this date, *viz.*, 11th March, some 9,000 tons excess has been landed, which would reduce the 45,000 tons to about 35,000 tons, unless a corresponding increase occurs in other goods, which may happen as railway stores and bulk oil are coming in.

No. 9043 P.

HARBOUR TRUST BOARD,
TRAFFIC DEPARTMENT,
MADRAS, *18th March* 1898.

FROM THE TRAFFIC MANAGER, HARBOUR TRUST BOARD,
Madras.

TO THE SECRETARY, HARBOUR TRUST BOARD,
Madras.

SIR,

I have the honor to acknowledge receipt of your No. 3028 T, of the 5th Instant, forwarding for remarks, copy of G. O. No. 110, Marine, containing Mr. F. J. Wilson's note on estimate for constructing a boat basin, and connected papers.

2. I have carefully read through the papers, and am strongly in favor of a dock rather than a boat-basin. The first and, I would say, immediate requirement of the Port is smooth water, quay walls at which steamers can moor, and where coal and other bulky goods can be handled without incurring the heavy charges for boat hire, bagging and wastage, and also at which the very valuable exports of the port can be shipped with a minimum of risk of damage from sea or rain water.

3. The question as to where or how these quays are to be constructed is not a subject for me to remark on, but I would venture to remark, with reference to the last clause of para 6 of Mr. deWinton's note, *viz.*, "I do not see the object of storing coal between the basin and the sea," that one great advantage would be obtained by storing coal in this position, *viz.*, an abatement of the coal nuisance. This would be effected by placing a width of 500 to 600 feet of water *between* the coal ships and heaps: and the business parts of the beach and High Courts, into which water all coal dust carried by the wind would fall and become *dead*, instead of being deposited on the ground to be picked up by the next eddy of wind and carried on and on till it became an unmitigated evil all over the beach. Another advantage would be that storage area would be provided on three sides of the dock instead of on two sides only as I understand from Mr. deWinton's note.

Regarding the question from a financial view, I think there need be no hesitation in spending 30 lakhs on docks. With an increasing tonnage—rising revenue, and some 6 or 7 lakhs cash on hand, the necessary revenue can be raised, not by increasing the cost to importers or exporters; but by very materially reducing the charges.

I would abolish the present elaborate schedule of rates and introduce first one charge, *viz.*, Rs. 1-4-0 per ton on all goods landed or shipped. This charge to cover use of dock, Harbour or roadstead, cranage, and porterage charges. Second, storage; and wharfage rates; leviable only after sufficient time has been allowed to enable goods to be taken if required. *3rd.*—Special rates—for horses, cows or bullocks, elephants, coin or bullion.

Proviso—All goods not admissible into Harbour 12 annas per ton. Such goods to be handled exclusively by consignee, as at present.

Minimum charge 4 annas.

4. I estimate this would bring in revenue as under:—

Landing or shipping charge on present tonnage 515,000 tons at 1-4-0	Rs. 6,43,750	
Less 10,000 tons not admissible into Harbour, 8 annas per ton	5,000	6,38,750
Storage, including bonded warehouse		35,000
Wharfage (as at present)		7,000
Special rates—Horses, coin, &c. (as at present)		12,000
Water supplied to shipping (as at present)		6,000
Interest on capital (as at present)		16,000
Total Rupees ...		7,14,750

Secretary, Harbour Trust Board.

5. The trade now pays about as under on 515,000 tons of goods—*viz.*,—

	Rs.
Harbour dues in all its varied forms	5,90,000
Interest on capital (shown above as item of receipt)	16,000
Godown rent to Collector of Sea Customs	30,000
Porterage charges on all goods not porteraged by Trust—*viz.*, all exports—Imports—Timber—grain and other coasting cargo landed on the beach ... ... about	75,000
Boat hire lowest all round computation at 12 annas per ton	3,81,250
Bagging on 170,000 tons coal at 6 annas	63,750
Wastage of coal at 2½ % on 170,000 tons=4,250 at 13-0-0...	55,250
	12,11,250
Deduct charges as above ...	7,14,750
Annual saving to trade ...	4,96,500

6. With reference to the rough estimate of receipts it has to be seen whether this is sufficient to meet the additional charges.

The estimated charges this year amount to	6,90,000
Add interest on 30 lakhs at 4½ %	1,35,000
Total income required ...	8,25,000

The following deductions have, however, to be made as a dock cannot be completed for at least two years, during which capital is repaid, thus reducing interest; and large savings would be effected in Porterage labour—

Capital repaid 2,00,000—Interest	9,000	
Saving in Porterage labour probably	40,000	
		49,000
Net income required ...		7,76,000
The estimated revenue collections as shown above amount to ...	7,14,750	
Add Port and Pilotage fund contributions	45,000	
		7,59,750
Deficit ...		17,000

7. The above are rough estimates framed from my knowledge of the trade of the port—and the receipts will, in all probability, be largely exceeded owing to increasing tonnage, while the interest charges are reduced yearly by Rs. 4,500. Such sums as may be needed for protective works to the north are provided for by the cash balance of 6 to 7 lakhs now in hand, which would also meet any small deficits which may occur till increased tonnage revenue balances expenditure.

9. In paras 4 and 5 I have excluded Port Fund dues as not being directly paid by the trade of the Port, and as I do not think it would be necessary to levy any charge from shipping above that now levied, and I would submit that if the Board can give the merchants of Madras good docks in which their valuable goods (worth over Rs. 120,000,000 a year) can be handled with a minimum risk of loss from wet, damage, and pilfering and save them a round 5 lakhs a year, they ought to be satisfied with the arrangement, which will, I am sure, compare favorably with any port.

10. The result of docks would be that charges, as a whole, would stand at $\frac{1}{12}$ of present charges, while on coal, which requires special protection, the charges would be as under per ton :—

	At present. Rs. A. P.	In dock. Rs. A. P.
Bagging	0 6 0	... ...
Boat hire	0 12 0	... ...
Harbour dues	0 12 0	1 4 0
Carrying and stacking	0 4 0	... ...
Loading	0 2 0	... ...
Entry of vehicles	0 1 0	... ...
Wastage 2½ % at Rs. 13 per ton	0 5 2	... ...
Total at present Rs. ...	2 10 2	1 4 0
at dock ...	1 4 0	
Saving Rs, ...	1 6 2	

Does insufficient to meet expenditure Capital exhausted.

11. A further saving on coal would be effected if importers could arrange to put the vessels into the Board's hands for discharge when alongside of the quays. The 5 annas per ton now paid for stevedore work could be done by the Board for two annas per ton, a saving of annas 3 per ton ; increasing the saving to 1-9-2 per ton, to which may be added the Port due at Calcutta, *viz.*, annas 2 per ton which has been remitted ; and the quicker discharge in a dock, *viz.*, 3 or 4 days instead of 8 to 10 days as at present, should have the effect of reducing freights. Altogether I think a saving of Rs. 2 per ton can be effected on coal.

12. I have taken Capital expenditure at 30 lakhs, as a large part of the work planned by Mr Wilson will not be required for many years if at all, and would remark, that one very marked advantage of Mr. Wilson's scheme, is, that the work of building such length of the south protecting mole, as may be necessary, can be carried on simultaneously with the building of the eastern quay wall of the dock, and as soon as these two walls are built, or even while they are building, dredging operations can be carried on, and an opening made to admit ships to the east quay. The advantage of this is, that probably within six months of the commencement of the work, berthing space will be available for coal ships, and the port in a position to compete with Singarini, by the time the East Coast Railway is opened.

I have the honor to be,
Sir,
Your obedient servant,
S. HUTCHENCE,
Traffic Manager.

No. 87 H.

PORT OFFICE,
MADRAS, 22*nd March* 1898.

FROM THE DEPUTY CONSERVATOR OF THE PORT OF MADRAS,

To THE SECRETARY, HARBOUR TRUST BOARD, *Madras.*

SIR,

With reference to your letter No. 477c, dated 12th instant, I have the honor to furnish for the information of the Trustees particulars as to the average number of working hours steamers remain at Madras.

(*a.*) Clan Line Home steamers Outward bound, 45¾ hours.
(*b.*) B. I. Home Line do. do. 16½ hours.
(*c*). Clan Line steamers Homeward bound, 64½ hours.
(*d*). B. I. steamers Homeward bound, 12¼ hours.
(*e*). *British India steamers.*
I. Bound north, 14⅓ hours.
II. Bound south, 22 hours.
III. For Rangoon *via* coast, 54 hours.
IV. For Rangoon direct, 13 hours.
V. For Singapore, 24 hours.
(*f*). *Asiatic steamers.*
I. Bound north, 9½ hours.
II. Bound south, 20¼ hours.
III. Rangoon Mail *via* Port Blair, 28 hours.
(*g*). Messageries Maritime steamers.
I. Bound north, 7 hours.
II. Bound south, 9½ hours.
(*h.*) Austrian Lloyds.
I. Bound north, 8 hours.
II. Bound south, 8¼ hours.
(*i.*) German steamers, 32 hours.
(*j.*) Coal steamers, 115 hours.
(*k.*) Tank Oil steamers, 16¾ hours.
(*l.*) Kerosine Oil case steamers, 125¼ hours.
(*m.*) Horse steamers, 27¼ hours.
(*n.*) Steamers.
I. To Natal or Mauritius with emigrants, 60 hours.
II. With return emigrants, 9 hours.
(*o*). Royal Indian Marine steamers trooping, 24 hours.

I have the honor to be,
Sir,
Your most obedient servant,
W. AVES,
Commander, R. I. M.,
Deputy Conservator of the Port.

Secretary, Harbour Trust Board.

No.

PORT OFFICE,
MADRAS, *22nd March*, 1898.

FROM

THE DEPUTY CONSERVATOR OF THE PORT OF MADRAS,

TO

THE SECRETARY TO THE HARBOUR TRUST BOARD,
Madras.

SIR,

Agreeably to the request contained in your letter No. 461 (*a*), dated 5th instant, I have the honor to offer the following remarks upon Mr. Wilson's note, or estimate for a boat basin and note thereon by the Acting Secretary to Government, Marine Department.

2. It certainly appears to me better to construct a ship dock than the boat-basin proposed, provided that it can be done without curtailing the present water area, or increasing, to any appreciable extent, its turbulence. All that would be gained by a boat-basin would be shelter for boats, and small harbour craft in bad weather, more accommodation for them, facilities for discharge and loading of boats, and increased accommodation space for cargo on shore. But the distance for boats to ply would be considerably increased, and boat-hire would not therefore be decreased. A ship dock would give *all* the advantages of the boat-basin and *none* of the disadvantages, and, in *addition*, it would give the increased accommodation space for ships which is at present needed (and which will probably be still more needed every year) and ships inside it would have still water to discharge overside into boats, on one side, and the quay on the other—a manner of working which proved so satisfactory at the jetties in Calcutta.

3. If ships with coal, iron and other large cargoes were accommodated in a dock, they would not only get quicker despatch, but they would not as now, by occupying berths in the outer Harbour for sometimes 2 weeks (for which no extra charge is made) exclude other vessels which require accommodation for only a day, or perhaps a few hours, and to which delay of a day is much more serious than to those with full cargoes for Madras. There would not be the enormous wastage of coal and loss of iron, and other cargo overboard from vessels in a dock. The 10,000 tons of coal estimated to be at the bottom of the Harbour would be reduced to about 100 or so in the same period. Boat-hire would necessarily be greatly decreased for these vessels, and probably none incurred in the case of coal and iron; and even if boats were used, the hire would be reduced in accordance with the distance they had to travel.

4. The weight or quantity lifted in and out by dock cranes in a hoist would be 3 or 4 times greater than by the ship's derricks, and the amount of each lift by the ship's derricks overside into or out of lighters could be quite double the amount now discharged or loaded in the present Harbour, as very much larger and more commodious lighters could be used, and they could lie quietly alongside, and there would not be nearly as many accidents to boatmen.

5. I have heard it stated, promiscuously, that ships can do a better day's work overside into boats than alongside a quay or jetty, and the statement has been made with reference to Calcutta and the jetties there.

I have had considerable practical experience of the two methods, and I have never understood how it was possible that this statement could be correct, and I question it.

One thing I do know, and that is that it was very much cooler, less dusty, and less noisy, and generally very much pleasanter on board in the stream than alongside the jetties, and there was every inducement for the ship's people to try to believe the above statement; and if docks are made here, this will be one of the reasons for opposition, though of course it would never be so disagreeable as Calcutta.

6. Some 23 years ago I saw a steamer of 1,100 tons loaded at Santos with bags of coffee in 16 hours. It was "backed" in. I do not think such despatch even to-day could be obtained working overside from boats!

7. As the accommodation for vessels would be so much increased by a dock, no Sunday work would be necessary, as it is now, owing to want of space for vessels, and the congestion on the iron pier; the present scandalous state of affairs for the landing and embarkation of passengers would cease, and the port of Madras would no longer be, as it is rightly termed at present, "a one horse place."

8. Vessels in dock would no longer find it necessary for safety to proceed to sea in the event of a Cyclone, and any disabled or unseaworthy vessels, which might happen to be in Harbour, could be placed inside in safety, instead of having to remain, and take their *almost certain* chance of being wrecked in the outer so-called Harbour. Steamers in this Harbour are very often unprepared to proceed to sea under 48 hours' notice, owing to their engines or boilers being under repair or overhaul.

9. I consider Mr. Wilson's general idea as the best yet proposed, and the site selected as the best apparently available; but I would prefer one immediately to the west of the North Beach road on the site now occupied by the Sea Custom House, Port Offices, Commissariat Offices, &c., and its shape should be oblong or square, and it should be much larger, so as to allow of steamers steaming in and out of it.

10. I do not agree with Mr. deWinton's view that the entrance should be further seawards. In fact, if it could be done, I would advocate the entrance being still further inshore, *as far inshore as is possible to put it*, as it stands to reason that the further from the entrance to the present Harbour, the calmer it must necessarily be, *i. e.*, the less swell there can be, and it is the *swell* which causes vessels to heave and range, and not the surface sea. The position of the entrance as advocated by Mr. deWinton is, in my opinion, the worst which could be chosen both as regards rough water and as interfering more with the present outer Harbour. That some individuals may never have seen the breaking wave running along the south arm does not alter the fact that such a wave does frequently do so. I have very often seen it, sometimes high enough to break over the arm, and a great many other people have seen it too. I think that accommodation in the dock for six ships would be ample to begin with;—at all events for some years to come—and if later on more was required, it should be made by extension of the dock to the southwards if possible, *i. e.*, if the present proposed site be adopted.

11. I would, however, recommend the dock being made at least half as long again, for two reasons; first, so as to allow plenty of room for boat accommodation, and their loading, and unloading, at the further end, clear of the ships, and the part required for their being moved in, and to reduce the congestion in the entrance, which would ensue if they had to go outside to discharge; and, 2ndly, to give more room for ships to be manœuvred in, and to allow of an extra 2 or 3 to go inside if bad weather threatened. The sides of the dock should be parallel to each other.

12. It is absolutely necessary to have a mole to protect the entrance, and also to assist in docking and undocking ships; but I do not think it should be more than 400 feet long, and the entrance could be reduced to 100 feet wide.

13. Vessels would have to be warped in and out, but this would not take more than about an hour, after a little practice.

14. The present No. 1 berth would be abolished, and possibly No. 2, but with the 5 fathom line dredged back to where Mr. Wilson proposes, there would be ample room for 2 other berths, or four if the iron pier be removed. A vessel could not be placed close alongside (*i. e.*, touching) the north pier quay as shown in plan (marked "Goa"), but she could lay within 10 feet of it.

15. It would never do to have a ship in the position where "Rewa" is placed in the plan, as she would be in the way of vessels entering or leaving, and there should be no outside knuckle on the mole, it should be flush with the entrance.

16. It will be seen from the above that I am only prepared, at present, to advocate the 1st part of Mr. Wilson's scheme. It will be time enough to consider further developments when more dock space is required. It may be found eventually that *every* vessel will prefer to enter a dock, and have still water and safety, to remaining in the present so called Harbour, if only for a day.

17. Should it be decided to have a dock, I would recommend its being provided with *all up-to-date conveniences*, such as hydraulic cranes for each hatchway, hydraulic capstains for docking, electric light

for working at night, &c., &c. There would be several small details to go into before a final plan could be adopted, and I would suggest that, if the Board decide to have one, the Deputy Conservator should pay a visit to a few well known docks which are known to be in approved working order, and make notes of all points in connection with the working of the same.

18. Messrs. Cayzer Irvine & Co.'s a very practical and successful firm of ship owners, who are very much interested in the port of Madras, have advocated the construction of an inner dock, and I think that too great importance cannot be attached to this fact.

19. The reason the Calcutta Dock is not a great success, is because a dock was not necessary there, there being already ample facilities for vessels in the stream, where they had calm water and jetties, and where they were if not quite safe, very much safer from the effects of a Cyclone than they are in the present Harbour of Madras.

Those who were only interested in the despatch of their ships, naturally protested against docks, as unnecessary under the circumstances, and suggested that if they were compelled to have them, they should be at Diamond Harbour and not at Kidderpore, and thus obviate the necessity of vessels navigating the most dangerous portion of the river, and also giving greater despatch than could even be obtained in Calcutta—and minimising considerably the chances of wreck—but other interests were too strong, and the docks were made in the wrong place.

20. With a dock at Madras the expenses of moorings would be considerably reduced, if all vessels were accommodated in it, and rafts to land heavy weights, and the attendant expenses, would no longer be necessary.

Fire on boardship in dock could be extinguished much easier than under present arrangements, as she could be assisted by the shore hydrants.

21. With regard to the direction of cyclones, and the remark that they generally come from the northward, I must point out that this is entirely incorrect. Cyclones generally approach the coast from the E. S. E. to S. E. The first Cyclonic *wind* comes from between N. N. W. and N. N. E. according to the direction of the centre of the storm. The *heaviest swell* comes from the direction of the storm's centre, and as the storm centre approaches the wind veers, until it ultimately blows from the opposite direction, and the *worst sea* would then be in the N. W. corner of the Harbour, and not the S. W. I do not understand how a floating caisson across the present Harbour entrance could materially assist in giving still water, even if it could be placed and kept there, which I very much doubt; and if this was possible, it would have to be removed so often, that it might for all practicable purposes be away altogether. Moreover, with an ordinary swell, it would soon be knocked to pieces, and sunk, and only cause an obstruction in the entrance.

I have the honor to be,
Sir,
Your most obedient servant,
W. AVES,
Commander, R. I. M.,
Deputy Conservator of the Port.

No. 105H.

PORT OFFICE,
MADRAS, *1st April* 1898.

FROM

THE DEPUTY CONSERVATOR OF THE
PORT OF MADRAS.

To

THE CHAIRMAN HARBOUR TRUST BOARD.

SIR,

In reply to your letter No. 544C, dated 30th ultimo, I have the honor to inform you that I do not anticipate that vessels in a still water dock in the sand accretion to the south of the Harbour would be likely to carry away their moorings by wind pressure in a cyclone, any more than they might be in the docks at Calcutta and other places.

I would, however, point out that it might be found eventually that in order to secure *absolutely* still water in the dock during a cyclone, that a sinkable caisson gate was necessary, and this should be provided for. It could be kept in the dock and only placed into position when considered advisable by the Deputy Conservator.

If ships broke adrift by wind pressure, it would be attributable to the lines not being sufficiently strong, and all that would be necessary would be to see that they were so, and supplement the ship's lines by others if required, and of which a stock should be kept for the purpose.

I have the honor to be,
Sir,
Your most obedient servant,
W. AVES,
Commander, R. I. M.,
Dy. Conservator of the Port.

No. 8

MADRAS, *2nd April* 1898.

FROM

THE ENGINEER, HARBOUR TRUST BOARD,
Madras.

To

THE CHAIRMAN, HARBOUR TRUST BOARD,
Madras.

SIR,

In reply to your letter No. 968E, dated 30th March, I have the honor to say that I consider a ship would be absolutely safe in a dock to the south of the south pier in a cyclone, if properly moored, and for that purpose the Board's Deputy Conservator would naturally adopt the best means obtainable.

2. It is not a question of calculations of wind pressure, &c., but one of experience of how the wind has acted upon the water, in the present Harbour since the capping was added, and on this point, the Harbour Masters remarked to me, as soon as the capping was added to the pier, how much it had reduced the wind pressure, upon the vessel when nearing the piers. Any one who has noticed how quiet the sea is within 800 feet from either bend of the piers, and under the Eastern Arms, during a strong wind and high sea, must also have noticed, that the wind does not act upon the water, or vessels in the Harbour until well across the Harbour, and as a dock would be 800 feet wide, or one quarter the width of the Harbour; the vessels in dock would not be exposed to any thing like the wind pressure they now stand inside the present Harbour.

3. I do not believe that a vessel *could* part a cable due to wind pressure alone, but it is the wave motion, *added* to the wind pressure which does the damage, by bringing sudden strains upon the cables which they are not calculated to bear such strains, but as the water inside a dock would be absolutely calm or free from a wave motion in a Cyclone, there would be no sudden strain upon a vessel's hawsers &c. There are other docks exposed to strong gales, without accident to the vessels in dock, and there is no reason why Madras should prove otherwise, and therefore whoever has raised the question now referred to me, must have lost sight of the facts that there will be no heavy swell or wave motion in

Secretary, Harbour Trust Board.

the proposed dock or extension to the Madras Harbour, and hence no danger to vessels in a storm. If the swell which now enters the Madras Harbour could not be prevented from entering a dock, it would be *no improvement on the present Harbour*, and in that case, I would be the last to propose a dock for Madras; but fortunately still water *can be secured* in a dock at Madras; as easily, as elsewhere.

I have the honor to be,
Sir,
Your obedient servant,
A. LEE POGSON,
Engineer,
Harbour Trust Board.

No. 31.

FROM
THE ENGINEER,
HARBOUR TRUST BOARD,
Madras.

To
THE CHAIRMAN,
HARBOUR TRUST BOARD,
Madras.

MADRAS, 15*th April* 1898.

SIR,

I have the honour to acknowledge the receipt of G. O., No. 110 Marine, dated 11th February, communicating a note by Mr. F. J. Wilson on a boat-basin to the Madras Harbour, forwarded with your letter No. 879E, dated 1st March 1898, for my remarks.

Plans will follow.

2. In the above G.O., Mr. Wilson has carefully gone through, and referred to all former reports and plans for Harbour Improvements, and placed before the Board many points which most of the Trustees have not had the opportunity of studying. A perusal of this report will help them to decide what form the Harbour Improvements should take, but beyond going over well considered reports, no new facts or arguments have therein been put forward, and we are still face to face with the old questions:—

A. Is a dock required?

B. Are more berths for steamers required; if so, would they best be provided by dredging out the present Harbour, or would it not be better to *extend* the Harbour through the South Pier, and there provide additional berths for vessels in absolute still water, with part of the walls so built, that they can be used as wharves, alongside, and upon which, vessels could discharge cargo, coal, &c., if necessary. By such an *extension* to the Harbour, a boat-basin would be provided at no extra cost, and if wharves are in years to come proved necessary, they can easily be formed, and the extension converted into a complete dock.

C. Is a boat-basin all that is required for the present; if not, would not the Harbour Extension B provide the requirements of A and C?

3. Mr Wilson's note is accompanied by a portfolio containing all my plans for docks and boat-basins, but one which was submitted in May 1893, and was recorded with the Board's Resolution thereon; this plan has not been included, but the suggestions by the Chief Engineer, Public Works Department, alluded to hereafter, are identical with that scheme.

4. With these plans Mr. Wilson now submits a plan for a dock which developes into the present Harbour by cutting it up into a series of moles and projecting arms; thereby making it almost impossible for a vessel to steam into the dock without the additional expenditure and assistance of steam tugs, which is a point all schemes hitherto have carefully avoided.

5. The plan would appear to be the result of a combination of portions of nearly all the former schemes, with the result that it is not the best that can be designed, as it interferes with the present

berths in the Harbour, and is in direct opposition to the views of the Marine authorities; and these serious objections have been carefully studied by the Chief Engineer, Public Works Department in his criticisms upon Mr. Wilson's proposals, and in doing so, his recommendations are identical with the plans I submitted in 1893 for Harbour Improvements, and which I now reproduce as an accompaniment to this letter, having marked in red upon the plans the modifications I would now propose, leaving it to the future to prove whether extra wharfage is necessary. Until such time, the scheme can remain as an *Extension to the Harbour*, providing extra berthage in absolute still water, a low level jetty for customs, and a wharf for landing and stacking coal direct from the ship's side. My letter No. 74, dated 5th May 1893, clearly explains the advantages to be gained by placing the wet basin as far east as possible, *viz.*, in a line with the eastern wall of the South Pier, and thereby carrying the entrance to a quiet, safe, and deep water corner of the present Harbour, where no expensive and objectionable protecting arm will be necessary, and consequently a great saving in cost, easy entrance, and no interference with the present arrangement of berths in the Harbour.

6. As to the details of construction and cost of any such work, I do not think these points should be considered, until it is decided, *what is required.*

When once it has been laid down, what the requirements of the Port are, it will be a very simple matter for an Engineer to draw up a plan to meet all requirements, but until this has been done, no satisfactory plan can be decided upon.

7. Before considering any form of improvement, I must first ask the Board to bear in mind the shallowing difficulties it has to face, with reference to the Harbour Entrance, and the rapidly increasing accretion of sand to the south of the Harbour. Any improvements to the Harbour should be money spent in a right direction, and that can only be in some work which will assist in keeping stored up, well to the south of the Harbour, all sand accreting from the south, and so prevent it reaching and shoaling up the entrance, beyond the powers of dredging. I have already said, and it is my duty to repeat, that I do not believe dredging alone can save the Harbour entrance from shoaling, and that a groyne to the south of the South Pier must be built to keep back the sand. With the assistance of a groyne the dredger may be able to remove the sand being thrown up from deep water, but to expect it to remove this sand, as well as the sand travelling along the coast, is in my opinion an impossibility, but it has been decided to give the dredger a fair trial, and I think the results should be awaited.

8. A severe cyclone in this monsoon, will prove how much sand will have to be dealt with, as the bank or slope of sand from the South Pier curve, to the South Pier Head, is already steeper than the natural slope of the bed of the sea from east to west, while the natural sea bottom from south to north is level, as shown by all the contours in every Marine Survey; and therefore this bank of sand must be deposited in the entrance, as soon as there is sea enough to remove it. In para. 6 of G.O., No. 813M, dated 23rd November 1896, the Right Honourable the Secretary of State for India remarks: "I agree "with the view taken in the Consulting Engineer's report that until the doubts which still attach to the "stability of Harbour, and its safety from the *encroachments of the sand are finally removed*, the present "proposals are all that can prudently be undertaken for its improvement"—

and Sir Alexander Rendel remarks: "But I do not wonder at the Trustees hesitating, whilst the "Harbour is untried in respect to the stability of its works and open to question in respect to the "maintenance of its depth, to do more than is absolutely necessary for the necessities of the moment." with the sand difficulty before us, I do not think the Trust should undertake to construct a dock or even a boat-basin which will not help the sand difficulty, but an *extension* to the Harbour is considered necessary, and if part of the money to be so spent can save the Harbour from shoaling, it should be sanctioned at once, and the line taken should be—

Plan A. To run out the groyne of stone, colored green on plan, to stay the sand to the south of it, while the action of this groyne to the north of it, will be to scour away the sand, and deepen the now shoaling entrance. When the groyne has reached the line of the outer straight of the South Pier, a wall of large and small rubble stone, in line with the South Pier, and in continuation of it, would be formed, and capped with old concrete blocks, to be removed from the South Pier wave-breakers when so enclosed by the mound

Secretary, Harbour Trust Board.

of stone. This groyne, and mound of stone, would together form a sea wall which would rise to at least 13 feet above sea level, and it would also be lined with blocks placed along it, to prevent the stone from being displaced, raising it 19 feet above sea level.

9. When this wall had reached the South Pier, and enclosed a still-water wet basin, it would be deepened by dredging, to enable a water-tight quay wall being built inside, or west of the stone mound, and the space between the new wharf wall, and the sea wall, would then be filled up with stone, and the whole faced with concrete blocks, which would make a more massive wall than the present Harbour piers. This modification in the original plan is necessary, as so much shoaling has taken place outside the South Pier since 1893. When the basin has been formed, I would then cut through the South Pier and provide a ship entrance without any protecting arm. This basin or extension to the present Harbour would provide extra berths, coal wharves, and a low level customs wharf for lighters, &c., without interfering with the present Harbour.

10. The stone groyne would also arrest the sand for many years to come, and when the shore line had reached the end of it, all that would be necessary would be to extend it seawards.

11. The groyne is placed to the south of the South Pier, so as to be at a sufficient distance from the entrance, as to allow a vessel missing the entrance, due to current or other causes, and yet be able to steer clear of it, while its action would be to scour the sand past the entrance, and so assist the dredging operations which I believe would then be able to deal with what sand might escape round the groyne, during the extensions; but without a groyne, I do not believe that a dredger will be able to maintain the required depth at the entrance to the Harbour.

12. The cost of the extension as per plan A will be about 24 lakhs, and that of the completed dock, plan B, 35 lakhs in all, while the estimate for the boat-basin in the sand to the south of the South Pier will cost as much as 14 lakhs, without providing any additional berths or quayage alongside which vessels can lay; and there is the objectionable protecting arm, and the risk of boats being swamped in bad weather from waves reflected from the South Pier and the protecting arm.

13. In my opinion, any boat-basin which has its entrance through the South Pier should not be nearer the shore line than 2,000 feet from the root of the pier, or the boats will never be able to enter the basin during heavy weather in a North-East Monsoon, in which case the trade of the port will be brought to a stand still.

14. The estimate I prepared for the boat-basin has been cut down by omitting the concrete filling within the walls, and a proposal has been made to fill in the curbs with stone and sand, instead of concrete; this is a mistake, as unless the curbs are filled with concrete, they will certainly crack in settlement, and the curbs being in pieces, the sand will at once wash out, and free the stone with it.

15. The wall being thus lightened, and split in two for want of a solid hearting, will be overturned; I therefore cannot recommend the work being carried out in the manner suggested, and would ask the Board not to be led into the risk of experimenting in walls too light for the work, and therefore in considering the boat-basin estimate, I would ask the Board to be prepared to sanction the original estimate for curbs properly filled with concrete, if a boat-basin is to be built, but I am of opinion an *extension to the Harbour* is what is required, as it will answer all purposes for the present, and is capable of development as an extension to the Harbour, a boat-basin, or a dock if necessary.

I have the honour to be,

Sir,

Your most obedient servant,

A. LEE FOGSON,

Engineer, Harbour Trust Board.

Docks. Rs. 40,00,000.

Date end of.	Balance of Capital advances to be repaid.	Invested Funds and Cash.	Receipts. Interest at 3½ per cent.	Surplus Port Funds	Harbour Dues.	Total.	Expenditure. Interest on Capital expenditure.	Ordinary average expenditure.	Repairs and maintenance.	Engineer's Establishment.	Refund of Capital advances.	Total expenditure.	+ or −	Remarks.
1897—98	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	−1,56,635	* Includes value of Dredger "Wenlock."
1898—99	47,80000	7,68,365	23,378	40,000	† 5,13,853	5,77,231	2,30,000	2,18,000	1,00,000	25,000	1,00,000	6,73,000	− 95,769	† Average of 1893—8.
	10,00,000													
1899—1900	56,80,000	6,72,766	19 000	40,000	5,15,000	5,74,000	3,00,000	2,18,000	1,00,000	25,000	1 00,000	7,43,000	−1,69,909	
	20,00,000													
1900—1	75,80,000	5,03,766	16,000	40,000	5,15,000	5,71,000	3,63,000	2,18,000	1,00,000	25,000	1,00,000	8,06,000	−2,35,000	
	10,00,000													
1901—2	81,80,000	2,68,766	8,000	40,000	5,15,000	8,83,000	3,82,000	‡ 2,00,000	1,00,000	25,000	1,00,000	8,07,000	+ 76,000	‡ Saving in labour Rs. 18,000.
					§ 3,20,000									§ Dock dues @ one rupee per ton.
1902—3	83,80,000	3,45,000	12,000	40,000	8,35,000	8,87,000	3,77,500	‖ 1,80,000	1,00,000	25,000	1,00,000	4,82,500	+1,04,500	‖ Labour saving 20,000.
1902—3	¶ 82,00,000	4,49,500	15,000	40,000	8,35,000	8,90,000	3,69,000	1,80,000	1,00,000	25,000	1,00,000	7,74,000	+1,16,000	¶ Sale of surplus tools and plant Rs 80,000
1903—4	81,00,000	5,65,500	18,000	40,000	8,35,000	8,93,000	3,64,500	1,80,000	1,00,000	25,000	1,00,000	7,69,500	+1,23,500	
1904—5	80,00,000	6,89,000	20,000	40,000	8,35,000	8,95,000	3,60,000	1,80,000	1,00,000	25,000	1,00,000	7,65,000	+1,30,000	
1905—6	79,00,000	8,19,000	25,000	40,000	8,35,000	9,00,000	3,55,500	1,80,000	1,00,000	25,000	1,00,000	7,60,500	+1,39,500	
								**1,00,000						** Rs. 1,40,000 Port Dues remitted and charged against Harbour Dues.
1906—7	78,00,000	9,58,500	30,000	——	8,35,000	8,65,000	3,51,000	1,80,000	1,00,000	25,000	1,00,000	8,56,000	+ 9,000	
1907—8	77,00,000	9,67,500	35,000	——	8,35,000	8,70,000	3,46,500	2,80,000	1,00,000	25,000	1,00,000	8,51,500	+ 18,500	
1908—9	76,00,000	9,86,000	36,000	——	8,35,000	8,71,000	3,42,000	2,80,000	1,00,000	25,000	1,00,000	8,47,000	+ 24,000	
1909—10	75,00,000	10,10,000	37,000	——	8,35,000	8,72,000	3,37,500	2,80,000	1,00,000	25 000	1,00,000	8,42,500	+ 29,500	
1910—11	74,00,000	10,39,500	38,000	——	8,35,000	8,73,000	3,33,000	2,80,000	1,00,000	25,000	1,00,000	8,38,000	+ 35,000	
1911—12	73,00,000	10,34,500	39,000	——	8,35,000	8,74,000	3,28,500	2,80,000	1,00,000	25,000	1,00,000	8,33,500	+ 40,500	Pilotage Fees could be remitted Rs.40, 000
1912—13	72,00,000	11,15,000	40,000	——	8,35,000	8,75,000	3,24,000	†† 3,20,000	1,00,000	25,000	1,00,000	8,69,000	+ 6,000	†† Includes Pilotage expenditure charged to Harbour Dues.
1913—14	71,00,000	11,21,000	40,000	——	8,35,000	8,75,000	3,19,500	3,20,000	1,00,000	25,000	1,00,000	8,64,500	+ 10,000	
1914—15	70,00,000	11,31,000	40,000	——	8,35,000	8,75,000	3,15,000	3,20,000	1,00,000	25,000	1,00,000	8,60,000	+ 15,000	
1915—16	69,00,000	11,46,000	41,000	——	8,35,000	8,76,000	3,10,500	3,20,000	1,00,000	25,000	1,00,000	8,55,500	+ 20,500	
1916—17	68,00,000	11,66,500	42,000	——	8,35,000	8,77,000	3,06,000	3,20,000	1,00,000	25,000	1,00,000	8,51,000	+ 26,000	
1917—18	67,00,000	11,92,500	43,000	——	8,35,000	8,78,000	3,01,500	3,20,000	1,00,000	25,000	1,00,000	8,46,500	+ 31,500	
1918—19	66,00,000	12,24,000	44,000	——	8,35,000	8,79,000	2,97,000	3,20,000	1,00,000	25,000	1,00,000	8,42,000	+ 37,000	
1919—20	65,00,000	12,61,000	45,000	——	8,35,000	8,80,000	2,92,500	3,20,000	1,00,000	25,000	1,00,000	8,37,500	+ 42,500	Porterage Dues could be remitted.
1920—21	64,00,000	13,03,500	47,000	——	* 7,50,000	7,97,000	2,88,000	3,20,000	1,00,000	25,000	1,00,000	8,33,000	— 36,000	Rs. 85,000 deducted.
1921—22	63,00,000	12,67,500	46,000	——	7,50,000	7,96,000	2,83,500	3,20,000	1,00,000	25,000	1,00,000	8,28,500	— 32,500	
1922—23	62,00,000	12,35,000	45,000	——	7,50,000	7,95,000	2,79,000	3,20,000	1,00,000	25,000	1,00,000	8,24,000	— 29,000	
1923—24	61,00,000	12,06,000	44,000	——	7,50,000	7,94,000	2,74,500	3,20,000	1,00,000	25,000	1,00,000	8,19,500	— 25 500	
1924—25	60,00,000	11,80,500	43,000	——	7,50,000	7,93,000	2,70,000	3,20,000	1,00,000	25,000	1,00,000	8,15,000	— 22 000	
1925—26	59,00,000	11,58,500	42,000	——	7,50,000	7,92,000	2,65,500	3,20,000	1,00,000	25,000	1,00,000	8,10,500	— 18,500	
1926—27	58,00,000	11,40,000	41,000	——	7,50,000	7,91,000	2,61,000	3,20,000	1,00,000	25,000	1,00,000	8,06,000	— 15,000	
1927—28	57,00,000	11,25,000	40,000	——	7,50,000	7,90,000	2,56,500	3,20,000	1,00,000	25,000	1,00,000	8,01,500	— 11,500	
1928—29	56,00,000	11,13,500	40,000	——	7,50,000	7,90,000	2,52,000	3,20,000	1,00,000	25,000	1,00,000	7,97,500	— 7,000	
1929—30	55,00,000	11,06,500	40,000	——	7,50,000	7,90,000	2,47,500	3,20,000	1,00,000	25,000	1,00,000	7,92,500	— 2,500	
1930—31	54,00,000	11,04,000	40,000	——	7,50,000	7,90,000	2,43,000	3,20,000	1,00,000	25,000	1,00,000	7,88,000	+ 2,000	Harbour Dues could be reduced.

C. PINSENT,

Secretary, Harbour Trust Board.

MADRAS, 18*th April* 1898.

Secretary, Harbour Trust Board.

1931—32	53,00,000	10,81,245	7,568	40,000	5,15,000	5,62,568	2,83,508	2,18,000	1,00,000	25,000	1,00,000	7,34,450	— 1,65,780	
1932—33...	52,00,000	1,52,316	1,720	40,000	5,15,000	5,56,720	2,79,000	2,18,000	1,00,000	25,000	1,00,000	7,26,500	— 1,63,932	† Rs. 70,000 sale of Tool and Plant.
												7,22,000	— 1,65,280	Dues insufficient to meet expenditure Capital exhausted.

Harbour as at present.

Date.	Balance of Capital advances to be repaid.	Invested funds and cash.	Receipts.				Expenditure.						+ or −	Remarks.
			Interest at 3½ per cent. on invested funds.	Surplus Port funds.	Harbour dues.	Total.	Interest on Capital expenditure.	Ordinary average expenditure.	Maintenance and repairs.	Engineer's establishment.	Refund of Capital advances.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
End of	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1897- 98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	"Wenlock." * Includes value of Dredger.
1898- 99 ...	47,80,000	7,68,365	23,378	40,000	† 5,13,853	5,77,231	2,15,100	† 2,16,647	1,00,000	25,000	1,00,000	6,56,747	— 79,516	† Average 1893—98.
1899-1900 ...	46,80,000	6,88,849	20,595	40,000	5,15,000	5,75,595	2,10,600	2,18,000	1,00,000	25,000	1,00,000	6,53,600	— 78,005	
1900- 1 ...	45,80,000	6,10,844	17,865	40,000	5,15,000	5,72,865	2,06,100	2,18,000	1,00,000	25,000	1,00,000	6,49,100	— 76,235	
1901- 2 ...	44,80,000	5,34,609	15,197	40,000	5,15,000	5,70,197	2,01,600	2,18,000	1,00,000	25,000	1,00,000	6,44,600	— 74,403	
1902- 3 ...	43,80,000	4,60,206	12,593	40,000	5,15,000	5,67,593	1,97,100	2,18,000	1,00,000	25,000	1,00,000	6,40,100	— 72,507	
1903- 4 ...	42,80,000	3,87,699	10,055	40,000	5,15,000	5,65,055	1,92,600	2,18,000	1,00,000	25,000	1,00,000	6,35,600	— 70,545	
1904- 5 ...	41,80,000	3,17,154	7,586	40,000	5,15,000	5,62,586	1,88,100	2,18,000	1,00,000	25,000	1,00,000	6,31,100	— 68,514	
1905- 6 ...	40,80,000	2,48,640	5,188	40,000	5,15,000	5,60,188	1,83,600	2,18,000	1,00,000	25,000	1,00,000	6,26,600	— 66,412	
1906- 7 ...	39,80,000	1,82,228	2,514	40,000	5,15,000	5,57,514	1,79,100	2,18,000	1,00,000	25,000	1,00,000	6,22,100	— 64,586	Dues insufficient to meet expenditure. Capital exhausted.
1907- 8 ...	38,80,000	1,17,642	603	40,000	5,15,000	5,55,603	1,74,600	2,18,000	1,00,000	25,000	1,00,000	6,17,600	— 61,997	
1908- 9 ...	37,80,000	55,645												

Harbour with Boat basin, costing Rs. 10,20,000.

End of 1897- 98 ...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	* Includes value of Dredger "Wenlock".
1898- 99 ...	53,00,000	7,68,365	23,379	40,000	† 5,13,853	5,77,232	2,38,500	2,00,000	1,00,000	25,000	1,00,000	6,63,500	— 86,268	† Average 1893—98.
1899-1900 ...	57,50,000	6,82,097	20,359	40,000	5,15,000	5,75,359	2,58,750	2,00,000	1,00,000	25,000	1,00,000	6,83,750	— 1,08,391	‡ Saving in labour Rs. 18,000.
1900- 1 ...	56,50,000	5,73,706	16,566	40,000	5,15,000	5,71,566	2,54,250	2,00,000	1,00,000	25,000	1,00,000	6,79,250	— 1,07,684	¶ Rs. 50,000 sale of tools and plant.
1901- 2 ...	¶55,00,000	4,66,022	12,797	40,000	5,15,000	5,67,797	2,47,500	2,00,000	1,00,000	25,000	1,00,000	6,72,500	— 1,04,703	
1902- 3 ...	54,00,000	3,61,319	9,053	40,000	5,15,000	5,64,053	2,43,000	2,00,000	1,00,000	25,000	1,00,000	6,68,000	— 1,03,947	
1903- 4 ...	53,00,000	2,57,372	5,337	40,000	5,15,000	5,60,337	2,38,500	2,00,000	1,00,000	25,000	1,00,000	6,63,500	— 1,03,163	
1904- 5 ...	52,00,000	1,54,209	1,647	40,000	5,15,000	5,56,647	2,34,000	2,00,000	1,00,000	25,000	1,00,000	6,59,000	— 1,02,353	Dues insufficient to meet expenditure. Capital exhausted.
1905- 6 ...	51,00,000	51,856	...	40,000	5,15,000	5,55,000	2,29,500	2,00,000	1,00,000	25,000	1,00,000	6,54,500	— 99,000	

Harbour with two subsidiary Piers, costing Rs. 8,20,000.

End of 1897- 98...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	* Includes value of "Wenlock."
1898- 99...	52,00,000	7,68,365	23,379	40,000	† 5,13,853	5,77,232	2,34,000	† 2,16,647	1,00,000	25,000	1,00,000	6,75,647	— 98,415	† Average 1893—98.
1899-1900...	55,00,000	6,69,950	19,934	40,000	5,15,000	5,74,934	2,47,500	2,18,000	1,00,000	25,000	1,00,000	6,90,500	— 1,15,566	
1900-1901...	54,00,000	5,54,384	15,889	40,000	5,15,000	5,70,889	2,43,000	2,18,000	1,00,000	25,000	1,00,000	6,86,000	— 1,15,111	
1901- 902...	53,00,000	4,39,273	11,861	40,000	5,15,000	5,66,861	2,38,500	2,18,000	1,00,000	25,000	1,00,000	6,81,500	— 1,14,639	
1902- 903	52,00,000	3,24,634	7,848	40,000	5,15 000	5,62,848	2,34,000	2,18,000	1,00,000	25,000	1,00,000	6,77,000	— 1,14,152	
1903- 904...	51,00,000	2,10,482	3,853	40,000	5,15,000	5,58,853	2,29,500	2,18,000	1,00,000	25,000	1,00,000	6,72,500	— 1,13,647	
1904- 905...	50,00,000	96,835	...	...	...	...	...	...	...	...	...	...	...	Dues insufficient to meet expenditure—Capital exhausted.

Harbour with two subsidiary Piers and Boat basin, costing Rs. 18,00,000.

1897- 98...	48,80,000	* 9,25,000	23,500	90,000	5,53,100	6,66,600	2,19,566	2,60,569	2,19,700	23,400	1,00,000	8,23,235	— 1,56,635	* Includes "Wenlock."
1898- 99...	57,20,000	7,68,365	23,378	40,000	5,13,853	5,77,231	2,57,400	2,16,647	1,00,000	25,000	1,00,000	6,99,047	— 1,21,816	
1899-1900...	65,70,000	6,46,549	19,129	40,000	5,15,000	5,74,129	2,95,650	2,18,000	1,00,000	25,000	1,00,000	7,38,650	— 1,64,521	
1900- 901...	64,70,000	4,82,028	13,370	40,000	5,15,000	5,68,370	2,91,150	2,18,000	1,00,000	25,000	1,00,000	7,34,150	— 1,65,780	† Rs. 70,000 sale of Tool and Plant.
1901- 902...	†63,00,000	3,16,248	7,568	40,000	5,15,000	5,62,568	2,83,508	2,18,000	1,00,000	25,000	1,00,000	7,26,500	— 1,63,932	
1902- 903...	62,00,000	1,52,316	1,720	40,000	5,15,000	5,56,720	2,79,000	2,18,000	1,00,000	25,000	1,00,000	7,22,000	— 1,65,280	Dues insufficient to meet expenditure Capital exhausted.

MADRAS HARBOUR TRUST,
SECRETARY'S OFFICE,
18th April 1898.

No. 233.

FROM

THE SECRETARY,
HARBOUR TRUST BOARD,
Madras,

TO

THE CHAIRMAN,
HARBOUR TRUST BOARD,
Madras.

SIR,

I have the honour to submit herewith, as directed, financial forecasts of receipts and charges (*a*) for the Harbour as at present (*b*) with boat-basin costing Rs. 10,20,000, (*c*) two subsidiary piers costing Rs. 8,20,000, (*d*) the two combined, piers and boat-basin, Rs. 18,00,000, and (*e*) docks, Rs. 40,00,000.

2. In the previous forecast made in 1896, when it was proposed to issue a debenture loan to repay the advances outstanding due to Government, the balance of invested funds and cash at the end of the official year 1897-98 was estimated at Rs. 9,57,000; the actuals, after paying unexpectedly heavy demands on account of the Engineer's Department, have proved to be Rs. 9,25,000 in round figures, including the value of the Dredger "*Wenlock*."

3. The first line, in all cases, for the purposes of the present calculations has been based on the budget estimate for 1898-99, and shows a deficit of Rs. 1,56,635.

4. In the previous forecast the income from Harbour dues was stated at Rs. 4,95,000, rising to Rs. 5,60,000; it is now taken at Rs. 5,15,000, against an average for 1893-98 of Rs. 5,13,853. No allowance has been made for increase of trade, and in view of the possible loss of, or a great reduction in, the coal trade, it is open to question whether Rs. 5,15,000 is not too high a figure. Coal, however, will pay only 8 annas net, if the proposed reduction in porterage is sanctioned, and the income from that source is therefore only Rs. 80,000. The total estimated receipts from dues for the current year are Rs. 5,53,100 or Rs. 38,000 more than the average taken. If the receipts in future are maintained all round except in the case of coal, half the coal trade may be lost before the figure Rs. 5,15,000 becomes the actual income.

If the average income should prove to be under-estimated at Rs. 5,15,000, the financial position would be improved accordingly.

The average expenditure for the past five years 1893-98 has been Rs. 2,16,647; the sum of Rs. 2,18,000 has been taken.

Provision has been made to the extent of Rs. 1,00,000 for maintenance and repairs, and Rs. 25,000 for the Engineer's Establishment. In the previous forecasts Rs. 40,000 to Rs. 46,000 only were provided. Dredging has now to be taken into consideration. The Engineer says Rs. 1,25,000 is not too much, but probably enough on the average.

5. Owing to this increase in expenditure, receipts under present conditions will prove inadequate to meet expenses, and, in ten years' time, Harbour dues would have to be raised. With a boat-basin or subsidiary piers, or both, invested funds are still sooner exhausted, and dues must be raised at earlier dates.

6. The boat-basin is taken as costing Rs. 10,20,000; but the Engineer informs me that it cannot be built for less than Rs. 14,00,000; if so, the position would be more unfavourable.

7. The subsidiary piers, suggested by the Chamber of Commerce, are stated as costing Rs. 8,20,000. It is impossible to say whether this is correct or how far out, in the absence of an estimate from the Engineer; who informed me that, if built like Gopaulpore pier only 20 feet wide, the cost would be only Rs. 3,00,000; but on this width cranes could not be worked, there would be only two lines of rails, and the Traffic Manager says it would therefore be useless for general cargo. Again, the Engineer tells me that if the subsidiary piers are to be built as broad as the present pier, the two will cost not less than it did. £ 107,000 or say Rs. 15,00,000. I have merely split the difference, and taken Rs. 8,20,000.

8. In the case of docks Mr. Wilson's estimate is 38¼ lakhs; I have allowed 40 lakhs.

9. While with either boat-basin or extra piers, or both combined, Harbour dues must, sooner or later, be raised, it is different in the case of docks.

Up to completion heavy deficits must occur, in consequence of additional payments for interest, the rate of which has throughout been reckoned at 4½ per cent.

10. On completion of the docks, I have taken a dock due of one rupee per ton on 320,000 tons of cargo imported and exported. This excludes the tonnage of coal, coke, and kerosine oil imported, and of salt exported, which articles might be exempted from payment of dock dues.

The managing owners of the Clan Line have suggested that a dock due should be levied as against the saving in boat-hire, and this is stated to be "one rupee per ton all round." The dock would, therefore, impose no extra charge on the trade of the port, and a large surplus revenue is at once the result of charging a dock due in lieu of boat-hire.

11. In dealing with this surplus I have suggested that Port dues should first be abolished; this eliminates the item Rs. 40,000 surplus Port funds from receipts, and adds also a charge of Rs. 1,00,000 to the expenditure, Port funds collected being about Rs. 1,40,000, paid by steamers. This should be popular with owners, and tend to the advantage of Madras as a port of call.

12. The surplus being still considerable, Pilotage fees Rs. 40,000 could next be remitted, and the expenses of the Harbour Masters' establishment charged to Revenue. These reductions, when feasible, have been approved in principle by the Trustees.

13. The next reduction practicable would be Porterage dues, and these to the extent of Rs. 85,000 are deducted from receipts in 1920-21.

14. Then comes a rather extended period of deficits; but notwithstanding previous reductions, it is to be noted that Capital investments have been kept intact, and funds are ample to meet all requirements up to 1930-31, when with 11 lakhs invested, and a small surplus revenue, a beginning might be made to reduce Harbour dues, from the rate calculated since 1901-2, *viz.*, Rs. 1-12-0 per ton, that is 12 annas as at present, and one rupee in lieu of boat-hire.

15. The above may be summarised as follows:—

If maintenance and repairs of the *Harbour as at present* (*a*) is to cost on an average Rs. 1,25,000 per annum, the dues must be raised.

Boat-basin. Rs. 10,00,000 (*b*) dues must be raised; and if the cost is to be Rs. 14,00,000, as stated by the Engineer, deficits to be met will be larger.

Subsidiary Piers. (*c*) Dues must be raised, to what extent depends upon the cost of construction.

(*b*) *and* (*c*). In the absence of exact information as to cost, that is, whether the boat-basin will cost ten or fourteen lakhs, and whether the piers will cost three lakhs or fifteen, these forecasts merely illustrate that Harbour dues must be raised sooner or later; and in the case of the two combined (*d*) the necessity is emphasised.

Docks (*e*). The estimate is 38¼ lakhs. Docks will pay their way and effect economy if 40 lakhs are spent; and if it is found necessary to construct a northern entrance, or incur other heavy Capital expenditure, the surplus could be used for payment of additional interest upon outlay, instead of in reduction of dues.

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

C. PINSENT,
Secretary.

P.S.—Since the accompanying calculations were made, and the above letter printed, the Order of Government upon the Budget Estimate for the current official year has been received, and as it is therein stated that no surplus Port Funds will be available for transfer for the next year or two, owing to Light-house expenditure, and as Government has not passed the proposal to reduce porterage charges on coal, the forecasts will have to be modified as follows.

Receipts. Port Funds *minus* Rs. 90,000, Porterage on coal *plus* Rs. 41,000. *Charges.* Sir Alexander Rendel *plus* Rs. 11,000. These alterations equal a net *minus* of Rs. 60,000 for 1898-99, to which must be added Port Fund surplus *minus* Rs. 40,000 in 1899-1900. Total deduction say Rs. 1,00,000 in round figures, up to the end of 1899-1900.

This will exhaust the Board's invested funds sooner than shown in the forecasts for either boat-basin or extra piers, or both combined; but in the case of Docks would merely postpone the suggested reductions in Port and Pilotage Dues, and subsequently in Porterage and Harbour Dues.

C. P. 19—4—98.

1-36

Secretary, Harbour Trust Board.

2 1st

The Madras Chamber of Commerce

Madras 14th May 1898.

From,

The Hon'ble Mr G.G.Arbuthnot,

Chairman, Chamber of Commerce,

M A D R A S.

To

The Chairman,

Harbour Trust Board,

M A D R A S.

~~Sir,~~

Your letter No.55 dated the 21st ultimo, forwarding certain papers referring to the Madras Harbour improvements and requesting an expression of the Chamber's opinion on the relative advantages of the three proposals of the Trustees mentioned therein, has been under consideration by the Chamber. After due deliberation and discussion, the Chamber is disposed to support the view, broadly stated, that the time has not yet arrived for Docks and that it is doubtful whether the trade of the Port could afford to pay for such a luxury. In the Chamber's opinion, however, a boat-basin is urgently required, such as will afford facilities for the discharge of cargo boats and cheapen the landing of goods. It is nevertheless very desirable, the Chamber thinks, that this boat-basin should be constructed so that it could eventually be fitted in with a larger scheme for Docks, should the construction of these eventually appear to be justified. As to how a boat-basin of the kind suggested could best be constructed, this is an engineering question which can only be decided by the professional advisers of the Board. The Chamber, however, trusts that, in any plan that is devised, the arrangements for landing coal will be kept separate and distinct from those for landing general cargo so that the latter may not in any way suffer from coal dust.

In conclusion, the Chamber would be glad to have an assurance that before a final decision is arrived at, and before any plans are definitely sanctioned, a final opportunity will be given to its members and others interested to express their views with regard to the same.

I have the honour to be,
Sir,
Your Obedient Servant
George G.Arbuthnot,
Chairman.

HARBOUR TRUST
MADRAS-4 OCT 98
SECRETARY'S OFFICE

(True copy)

Secretary, Harbour Trust Board.

(3)

EXTRACT of Proceedings of the TRUSTEES OF THE HARBOUR OF MADRAS, at a Meeting held at the Offices of the Board on Friday the 27th day of May 1898.

10. Read letter from the Chairman, Chamber of Commerce, replying to reference No. ff, dated 21st April, regarding proposed Harbour improvements.

Read minutes by Trustees.

G.O., Marine, No. 110, dated 11th February 1898, forwarding, for such remarks and recommendations as the Board may desire to offer, papers relating to the construction of a Boat-basin in connection with the Harbour was then again taken into consideration and discussed.

Resolved (a) that the Board, as now constituted, is of opinion that the landing of coal should not take place in proximity to other goods, and that therefore the two plans for Boat-basins now under consideration must be rejected on that account if for no other reasons:

(b) that the dues and charges now paid by the Trade of the Port cannot bear enchancement:

(c) that having regard to the increase in charges which must necessarily follow the construction of a Boat-basin, the Board as at present constituted, is of opinion that no Boat-basin should be constructed (Mr Black dissenting):

(d) that before committing itself to a large scheme for providing Docks the Board determines to call for plans and estimates for erecting one or more subsidiary jetties with the necessary cranes, trucks, lines and connections with the Custom House sufficient to meet the deficiencies of the present arrangements on the iron screw pile pier:

(e) the question of landing coal will be considered in Committee.

HARBOUR TRUST
MADRAS-4 OCT 98
SECRETARY'S OFFICE

(True Extract)

Secretary, Harbour Trust Board.

(4)

23 81

The Trades Association,
Madras,
dated 28th May 1898.

J.N.Atkinson Esq I.C.S.,
Chairman, Harbour Trust Board,
M A D R A S.

Sir,

I have the honour to acknowledge your letter No.54 dated the 21st April inviting the opinion of this Association on the three schemes for the improvement of the Madras Harbour as detailed in the papers accompanying yours under reply.

I regret the delay in answering your reference owing to unavoidable difficulty in obtaining the views of all the Members of the Association. The papers you have sent have been very carefully considered, but they show such a divergence of opinion on the part of the Members of the Harbour Trust Board, the Engineering experts, the representatives of the various steamship companies and the Members of the Chamber of Commerce that it is a very difficult matter to decide what is the best plan for improving the admittedly defective facilities of the Harbour for landing and shipping goods.

After due consideration the Members of the Trades Association have come to the conclusion that the present Trade of the Port and the uncertain future effects of the East Coast Railway and improvements to Northern Ports on the imports and exports here, do not justify the expenditure that the Dock scheme will involve.

The Members believe that a Boat basin to the south of the south Groyne where goods could be landed direct on the quays according to the plan last adopted by the Harbour Trust Board (with possible modifications) would give facilities now wanting, or, as Sir A.Rendel puts it "a sheltered basin and a quay for boats will remedy the worst part of the present disadvantages of the port." It is however considered that other arrangements should be made for the landing of coal as it is obviously objectionable that this should be done in a basin where other goods are dealt with.

The Members desire to point out that the present delay in landing and shipping goods on and from the Pier would be materially lessened if

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all

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all the cranes (instead of two only as at present) were worked by steam. The use of hand-power cranes on the Pier is an anachronison that should have been abolished long ago.

The Association believe that it does not pass the ingenuity of Engineers to construct a Boat basin at a moderate cost that could (should the need arise) be expanded into Docks and they therefore are in favour of this scheme in preference to the construction of Docks.

There appears to be no finality in the proposals made for improving the Harbour, for no sooner is one scheme adopted than another is brought forward and it is greatly to be desired that something definite should be settled on and carried out without further delay.

I have &c,

Signed J.Francis Davies

for Chairman.

(True copy)

HARBOUR TRUST
MADRAS-4 OCT 08
SECRETARY'S OFFICE

C Pinent

Secretary,

Harbour Trust Board.

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Mr. Black has said that his criticisms of the financial aspect of the proposal to construct docks remain unanswered. In what follows I have extracted the various criticisms and supplied the necessary answers as briefly and uncontentiously as possible.

Mr. Black's criticisms.

(1). "Estimates almost proverbially have an unpleasant tendency to expand, and before launching out on a scheme of this sort we should be well assured on this point."

(2). "Is no provision to be made for repayment of the contemplated loan?"

(3). "Or for repairs, renewals, and upkeep of the docks, wharves and sheds."

(4). "Has any allowance been made for dredging?"

Replies thereto.

(1). If the work, as estimated for, be given out to a respectable firm of contractors, there is good reason to hope that it will be completed for the sum provided.

(2). Provision has been made, *vide* Secretary's forecast. Section 31 of the Harbour Trust Act runs as follows:—"No sum larger than one lakh of rupees per annum shall be at any time so repayable by the said Board to the said Secretary of State." Therefore no commencement can be made towards repaying the contemplated loan till the existing capital debt has been repaid.

(3). Provision has been made. Taking the actuals of the eight years ending 1897-98, the average amount annually spent on petty construction and repairs of all kinds was Rs. 25,495. This is exclusive of a large sum spent on the screw pile pier, which will, of course, not be maintained, if either docks or boat-basin are built. The amount provided in the forecast is Rs. 1,00,000, *i. e.*, nearly four times what has hitherto been spent. The heavy masonry of either dock or boat-basin will require next to no repairs.

(4). This is included in the Rs. 1,00,000 provided for "Petty construction and repairs." Dredging is not likely to be a heavy item. When working at Pamben the "*Wenlock*" is said to have cost 2 annas 6 pies per cubic yard dredged. The cost should certainly be less at Madras. The cost is made up of (1) fuel, (2) establishment, (3) contingencies.

When doing her own hoppering in a day of 12 hours the "*Wenlock*" consumes about 22 cwts. of coal. To be on the safe side 25 cwts. are taken. Allowing 20 working days per mensem, she will use $1\frac{1}{4} \times 20 = 25$ tons of coal per mensem, costing say Rs. 15 per ton = Rs. 4,500 per annum.

At Pamben the "*Wenlock*" had a very expensive establishment, including an Engineer on Rs. 300, and a Gunner-carpenter on Rs. 150. The crew had provisions found. At Madras the establishment would be somewhat as in the margin. The total cost of working the dredger would then be—

	Rs.
1 Engineer	100
1 Sarang	60
2 Firemen at 30	60
1 Pump Driver	60
1 Gauge Driver	30
1 Crane Driver	25
1 Sukani	25
6 Lascars at 15	90
2 Hoppermen at 20 ...	40
1 Greaser	20
1 Assistant Pump Driver ...	30
	540 × 12
	=6,480
Contingencies ...	1,020
	7,500

Fuel	4,500
Establishment	6,480
Contingencies	1,020
Total ...	12,000

(5). "The capital outlay is assumed to be only 30 lakhs."

(5). This is obviously a mistake. In the Secretary's forecast an outlay of 40 lakhs is assumed.

(6). "Interest is calculated at 4½ per cent.; it will, I think, be generally admitted that the future of the money market is so very uncertain, that it is open to grave doubt if funds could be raised on such terms."

(6). The necessary loan will be obtained, as always hitherto, from Government, which so long as it is satisfied of the soundness of the Harbour Board's proposals, will undoubtedly advance the necessary funds. Interest on such advances is fixed by Section 30 of the Act at 4½ per cent. If Government will not advance the necessary capital, it will be impossible to proceed with any scheme of improvement.

In conclusion, I may point out that Mr. Black's criticisms, 1, 2, 3, 4 and 6 above, apply equally to boat-basin and docks: and that whereas any extra expenditure entailed by the former must be met by additional imposts on the trade of the port; in the case of docks there will be no additional impost until the extra expenditure exceeds the amount saved by abolition of landing charges.

Initialled—J. N. A. 21—6—1898.

The greater part of Mr. Black's minute of the 8th June is taken up with arguments to show that the Board cannot afford a dock, but as it has been already acknowledged that any other form of improvement involving considerable capital expenditure will also involve an increase of dues, and as it is also acknowledged that some form of improvement or other is necessary, it seems to me that we should not abandon the idea of forming a dock until it is conclusively shown that the resources of the Port are insufficient. I consider Mr. Black's arguments are not conclusive on this point as they are based on many assumptions.

First of all he assumes that no fully equipped dock can be made for less than 40 lakhs, and indeed say he thinks it not improbable that it might cost 60 lakhs, but I think it is quite unnecessary to be so sceptical as to the cost of a dock provided we have a carefully prepared detailed estimate providing for everything that the Board wants. The large estimates referred to by Mr. Black provided for larger docks than now proposed, included provision for graving docks and showed no details which could be examined. The cost of dredging is less than it used to be owing to the introduction of pump dredgers. The estimate of Rs. 96,65,434 for instance was for a 36 acre dock including provision for *two graving docks*. The amount of the series of estimates which comprise what I have called the first and second stages and which are now before the Board for remarks is Rs. 38,28,000. All details are shown. Whatever is considered unnecessary by the Board may be struck out and provision made for any items that it is considered should be added. The scheme is, of course, only one out of many that could be made, and the cost of the scheme can no doubt be materially altered in either direction according to what is provided for.

It has been suggested for instance that the mole provided for is unnecessarily long, and that by moving the entrance further seaward the dredging provided for in the present Harbour could be omitted. As to the matter of equipment I don't think there is any necessity to make a mere guess as to what should be provided, and the Board itself is in the best position to say what this should be. I have not unfortunately got copies of the estimates with me, but I may safely assume that the only equipment provided for in the estimates is that for sheds. It is for the Board to say whether the number and size of sheds provided is sufficient. The other items of a dock equipment are cranes, buoys, offices and railway lines. As to cranes all the latest constructed docks are provided with a hydraulic system with moveable hydraulic cranes. On the other hand many docks have not got such a system and are only provided with a few stationary cranes for lifting heavy weights; up to 12 or 13 years ago, at any rate I have it on the authority of Mr. Vernon Harcourt that most of the loading and unloading at Liverpool was done by the vessel's own steam winches. The Board is already possessed of a stock of cranes including an all-round crane to lift 40 tons which are, I presume, sufficient at present to handle the trade of the Port. Renewals of this stock would be a Revenue charge and need not find a place in a dock estimate. I think, therefore, that a hydraulic system need not be considered for the present and that it would be safe to provide for say 10 cranes at Rs. 7,000 each. Three buoys moored in the centre of such a dock, as is estimated for, would be sufficient, and as some of the ship berths in the Harbour would be taken up, it seems hardly necessary to make provision for these. As to offices the cost of the present offices might be added. As to railway lines, I have an idea that some provision was made, but allowing 2 miles of railway at Rs. 20,000

per mile should be ample. If we take Rs. 30,000 for offices, the sum to be added to the estimate of Rs. 38,28,000, is Rs. 1,40,000 or altogether Rs. 39,68,000. Fencing might perhaps be added, but the Board is going to fence in any case. I can think of no other equipment necessary, and I therefore see no reason for assuming that a dock equipped in this way and of the description estimated for should cost more than 40 lakhs. Any estimate should, of course, be carefully scrutinized by some one other than the estimator before being actually sanctioned. As regards rates, the only items about which there is any uncertainty are dredging and the sinking of curbs forming the walls, classes of work that have not previously been done in Madras. On the other hand, as I have indicated above, suggestions have been made which would reduce the estimate I have made out roughly, that by moving the entrance to about 1,100 feet from the shore end of the groyne, omitting the dredging in the Harbour and the quay at the north side and by shortening the mole to 600 feet that with the items of equipment described above, the estimate could be reduced to something over 37 lakhs.

Under the circumstances, as the amount of the estimate is so important, I would suggest that the Board decide on a limit of expenditure which it *can* afford to pay for a dock of the size and description estimated for, and then to ask Government to obtain an opinion as to whether the present or any other scheme can be executed for the money.

As regards the fixing of this sum, I would point out that the financial prospects of a dock scheme have been greatly damaged by the decision of the Board to exclude coal from the dock, and my own opinion is that this is not necessary. The position of the coal wharf shown on the dock plan at present under consideration may be objectionable, although I think that the amount of inconvenience likely to be felt from coal dust has been exaggerated, but by an alteration of design I think a coal wharf could be so placed as to be of little or no objection at all. From a perusal of the plans of existing docks it would appear that in many cases coal and other goods are dealt with in the same dock although at different wharves. The plan of Great Grimsby Royal dock shows two coal drops at one end of the dock, which is only 500 ft. wide with sheds and warehouses along one side and which can hardly be connected with coal. The Newport dock Mon. is an oblong basin 2,500 ft. long and 500 ft. wide, and one side is entirely occupied by coal hoists. There is a grain warehouse on the opposite side, and the value of the imports for 1883 at this dock was £956,934; this can hardly have been coal. I have drawn out a plan showing a coal wharf in which only one ship would be within 500 ft. of the nearest coal ship and all the rest at distances up to 1,250 ft. away. The plan is similar to that of the Tilbury dock and could be extended eventually to hold about——steamers. The cost of work that I would suggest being done in the first instance I have roughly estimated to amount Rs. 43,12,550 including sheds, cranes, offices, and two miles of railway lines as before. The area of the dock is 23 acres, taking into account that at present about half the trade of the Port is coal, and the cry for improvements was chiefly made on account of coal, and if the exclusion of coal is going to result in nothing being done at all, I think the point is worth considering. I submit the plan merely to show the sort of thing that might be done. A cheaper design might be made by making the dock smaller or omitting the construction of some part of the permanent dock walls at first. As regards dues and the consequent revenue which must be estimated in order to fix on a limiting sum for expenditure, considering the low figure that has been taken for tonnage, is it not going too far to allow only 10 annas a ton? Would it not be better to have a 12 anna or even a one rupee due than no improvement at all?

Initialled—F. J. W. 15—6—98.

Note by the Chairman, regarding dissent of Messrs. Black and Simpson to resolution No. 10(c) of last meeting, regarding proposed Harbour improvements.

Minutes by Trustees.

The Chairman seems to take up a strange position in regard to the boat-basin. I take it that he was quite prepared if a consensus of opinion had been in favour of docks to face the financial situation.

The opinion of the trade of the port has been unanimous that a dock, as being too expensive, is not required; but that a smaller and less expensive boat-basin, capable of development, will meet all requirements.

Apparently this either does not suit the promoters of the dock scheme, as they now turn round and say nothing can be done as we have no funds, although a boat-basin scheme is and has been before Government for years. It is a pity if all progress is to be scotched, because the trade of the port wish the Board to proceed more cautiously than some of the members of the Board would like.

The proposal for docks has for its object the development of the trade of the port. The development of the trade of the port will best be served in the opinion of those who should know by a boat-basin, therefore we must look to this development for the increased dues to meet the additional interest that will be required to cover expenditure on a boat-basin.

Until a boat-basin, large enough to hold the lighters and steam launches required for working the shipping is built, it is impossible to hope for any development at all.

Initialled—C. B. S. 4—6—98.

As the Board have resolved not to have a boat-basin, I cannot see that any useful purpose can be gained by complying with the Chairman's invitation. If the Board is prepared to reopen the question, I shall be very pleased to give my views, meanwhile it seems to me the subject is dead.

Initialled—R. J. B. 4—6—98.

With all deference to Mr. Simpson I fail to see that the position I have taken up in regard to the boat-basin is a strange one. I am still as firm a believer as ever in docks as the best, perhaps the only way to keep the trade of the port progressing. But I want to hear everything that can be said for and against both docks and boat-basin, and as it is quite certain that the question is, more one of finance than anything else, I wanted to hear how the advocates of a boat-basin proposed to meet the financial difficulty.

I cannot too strongly deprecate vague generalities in discussing the matter, what are wanted are exact statements of fact, and detailed estimates, and therefore I object to such expressions as "a less expensive boat-basin capable of development" as used by Mr. Simpson, and to the Chamber's statement that the "boat-basin should be constructed so that it could eventually be fitted in with a larger scheme for docks." The opinion of the Engineers is that if you construct a boat-basin in such a way that without uprooting it altogether you can enlarge and deepen it into a dock, the cost will probably come pretty near to that of making a dock straight off in the first instance; while the additional expense necessary to convert it into a dock would make the gross cost much more than that of a dock. The important point is that no one can tell what such a convertible boat-basin would cost, until detailed estimates have been framed. What, therefore, is the value of opinions in favour of a convertible boat basin on the score of economy, when investigation may show that such a boat-basin will be as costle a dock? Suppose the figures were as follows:—(1) Boat-basin, pure and simple as estimated for, 4 lacs. (2) Dock do. do. 35 lacs. (3) Convertible boat-basin 25 lacs. (4) Cost of converting ditto to docks 25 lacs.

Would the Chamber of Commerce still vote for a convertible boat-basin ?

The question being mainly one of finance, I had careful forecasts prepared by the Secretary of the financial effect of constructing boat-basin, docks, and subsidiary piers. Except Mr. Black, who has said baldly, without giving reasons, that he cannot accept the figures in the forecasts, no one has offered a word of criticism on the forecasts; nor has any one attempted to frame an alternative forecast. The nett result of my forecast, which stands unrefuted and uncriticised is, that with either boat-basin or piers, or both, the Harbour Trust Board has certain bankruptcy staring it in the face, and can only avoid this by a considerable enhancement of dues. Whereas with docks (charging a rupee dock due in lieu of landing charges), not only is bankruptcy avoided, but within 7 or 8 years of the commencement of the docks a commencement may be made towards the remission of dues, and this remission will thereafter go on steadily and progressively. So Mr. Simpson will see that, in the case of docks, there is no financial situation to be faced, except with open arms. I may mention one criticism of my forecast which was profferred to me by a leading partner in a leading firm, *viz.*, that if he thought this remission of dues that I anticipate were to take effect immediately, he would be in favour of docks; but that as he did not see that any pecuniary benefit would accrue to him in his time, he preferred what he called the cheaper scheme. There is a good deal of reason in this view, since obviously it is equitable that the cost of Harbour improvements should be apportioned as equally as possible between those who share in them, whether now or in the future; and therefore we ought carefully to take into consideration the advisability and equity of remitting charges now. I myself believe this to be the right course. Thus in my (or the Secretary's) financial forecast, a dock due of Rupee one per ton was taken as the *datum*, it being held that the trade would willingly pay this in place of present landing charges. There is no reason why this dock due should not be very much less, the effect of reducing it being only to postpone remission of other charges (Port dues, Pilotage dues, etc.) I calculated elsewhere that assuming the cost of docks to be 35 lacs, a dock due of 8 annas per ton would almost suffice to pay interest on that sum. It is open to us therefore to levy a dock due of anything from 8 annas upwards. And surely the substitution of an 8 or 9 anna due in lieu of present landing charges would be an immense boon to the Trade.

Mr. Simpson thinks that the increased dues, necessary to meet the interest due on a loan for a boat-basin, will be furnished by the increase in the trade of the Port which will follow the construction of a boat-basin. I do not admit that the construction of a boat-basin will facilitate trade. I believe that landing charges will be increased thereby. But putting that aside, I take it that it is not contended that a dock will not offer *better* facilities than a boat-basin. It will offer all the facilities of the latter, and something more. If then a boat-basin is likely to augment the volume of trade of the port, much more will a dock do so.

I hold strongly that we ought to fit the port for every branch of trade: and so long as we have no means of putting a ship alongside a quay, we are behind the times, and unprepared to meet trade requirements. The unexpected is always happening. Ten years ago no one could have foreseen the extent of our coal and oil trade. Is it impossible that other large import or export trades should appear? The Government is now doing its utmost to establish an iron industry. Whether the smelting be done locally with imported coal, or at Calcutta or elsewhere, the industry could not prosper, I imagine, unless there be means of running the ore or the iron alongside the ship.

I think it right to bring to the notice of the Trustees a circumstance which may lead to considerable enhancement of the cost of maintaining the present Harbour as the only accommodation for ships. A few days ago a vessel was moored outside the Harbour: she dropped her anchor and proceeded to make a stern line fast to the buoy, but the moment strain came on the buoy, it carried away from its moorings. Examination has shown that both the buoys outside are unsafe, the chains by which they are fastened to the moorings having chafed on the sandy bottom so much as to render them incapable of bearing any strain. Repairs have been effected, but we have no appliances here for doing these repairs satisfactorily. The buoys inside the Harbour are now being examined. It is believed that for one reason or another there is so much chafage that parts of the moorings will have to be renewed every three years. This will entail a heavy annual charge on the Board, the actual amount of which is now being calculated.

Mr. Simpson refers to the unanimous opinion of the Chamber of Commerce and Trades' Association in favour of a boat-basin. This opinion proceeds solely on the ground that the trade of the port

cannot afford the expense of docks. I believe that these two bodies have entirely misunderstood the financial situation. They see that the estimate for docks is 35 lacs and for boat-basin 14 lacs; they think that whichever scheme is adopted, this large capital outlay will have to be defrayed at once by an immediate charge on the trade of the Port; and therefore they advocate the cheaper scheme. As a matter of fact, not one pie of this capital expenditure will be paid by any merchant now in Madras. The money will be raised by loan from Government, and this new loan will be added to that already existing; repayment will continue at the same rate as now, *viz.*, 1 lac per annum, so that repayment of the boat-basin or dock loan, whichever it is, will not commence till the existing loan has been paid off, say 49 years hence. Repayment of our capital outlay will go on automatically as now, without any one feeling it or knowing of it, and the present generation of merchants will reap the benefits of a loan to be repaid by their successors in the 2nd and 3rd generation

All that we have to consider is how we can meet the charge for interest on the loan. It is so simple a matter that I cannot understand the possibility of two opinions on the subject. In the case of the boat-basin, in order to meet the charge for interest, we must make an immediate proportionate enhancement of charges; in the case of a dock we shall relieve the trade of the Port of all landing charges (moderately computed at one rupee a ton), and in lieu thereof we will charge a dock due of from 8 annas to Rupee one a ton. Actually we offer to construct a dock for nothing, and in addition to make a present to the Trade of a sum that may amount to 8 annas per ton of cargo landed, and yet that misguided body says it does not want this, but prefers a boat-basin with all its inferior advantages, with an added charge of an uncertain amount for interest, and with the possibility of increased landing charges.

Initialled—J. N. A. 6—6—98.

I decline to discuss the question of a boat basin for reasons already given.

I cannot, however, allow the Chairman's statement, that his financial forecast relating to the construction of docks "stands unrefuted and uncritised," to pass unchallenged. I have already commented upon his figures, whether "baldly" or not, is a matter of opinion, the fact remains, no answer has been given.

The most recent estimate for docks, and they have been many and varied, is about 40 lacs. 4½ o/o on that amount is **Rs. 1,80,000,** to meet same the Chairman proposes to levy dock dues, anything from 8 annas to Re. 1 per ton. The existing rate of boat hire I should say is about Re. 1 per ton all round. In his minute dated 28-3-98 he bases his calculation on the tonnage of 97/8 with dock dues at 10 annas. Excluding coal, 10 annas per ton on 339,000 tons equals **Rs. 2,11,875,** which shews a saving of 6 annas per ton on what trade pays at present, and leaves a margin of **Rs. 31,000,** for contingent expenses.

I submit, however, that we cannot assume that 339,000 tons *will* pay dock dues, I am not singular in being of the opinion, that all steamers will not use the docks, some from preference, others from inability, as if the docks are full, rather than remain idle, discharge will be conducted in the Harbour.

I consider a deduction of 25 o/o none too much to meet the above, which would reduce the tonnage on which dock dues would be levied, to 254,250 tons, and likewise the revenue accruing from it, to **Rs. 1,58,906;** this would not even pay the interest, let alone the extra expenses I have already referred to in a previous minute, dues would have to be enhanced, and the annas 6 the trade are expected to save by docks, would rapidly disappear.

The above is based on the assumption that docks will be built and *fully equipped* for 40 lacs. Various estimates have been put forward from time to time, ranging from 30 to 80 or 90 lacs, and I consider it would be rash and most imprudent not to allow for a substantial margin over and above the present estimate of 40 lacs. If docks eventually cost 50 lacs, the interest would amount to **Rs. 2,25,000.** 60 lacs would bring it up to **Rs. 2,70,000,** either contingency is anything but improbable, and the result is obvious. In the Chairman's optimistic views of his question after a comparatively short acquaintance with the trade of Madras, he persists in assuming that the interest on a loan is the only expense to be met, and ignores altogether contingencies which I consider require attention and providing for, *i. e.*, repairs, renewals, dredging, upkeep of sheds and wharves, &c., &c. In his forecast 1 lac is mentioned as necessary for the maintenance and

upkeep of the Harbour as it stands, and a like amount is considered sufficient when docks are added. Is this sound or is it reasonable? The conclusion I have come to regarding docks is, that the problematical saving in dock dues as compared with existing boat charges, is inadequate to justify their construction, and it is not improbable that eventually there will be no saving at all, and the trade of Madras may have to bear a heavier burden than it does at present. If the trade of Madras was being strangled, or its development impeded by want of docks, I consider there would be unmistakeable indications, which are at present wanting.

In addition, the Mercantile community of Madras are against docks, and as I have said in another minute, the "disadvantages of the port" are "want of facilities on shore for shipping into, and landing from boats, and lighters, and disposing of the cargo when it is landed." I believe it is possible to overcome these drawbacks by the construction of one or two low jetties, an estimate for which we await.

I cannot refrain from remarking on the Chairman's alarming statement that the "Board has certain bankruptcy staring it in the face" even though we do nothing in the way of improvements, at least I gather so from the forecast. This deplorable state of affairs seems somewhat inconsistent with the Board's recent intention to abolish the charge of 4 annas for porterage on coal, nor does the Board's decision to acquire pipes for the landing of petroleum appear to be judicious. In such financial straits, importers might well have been allowed to continue to bear all expenses and responsibility connected with same.

It seems to be high time for the Board to investigate closely the financial position of the Trust, and shape its course according to its means. I cannot but help thinking that under existing circumstances, our Engineering Establishment is more than we can prudently stand, and the question arises whether it would not be possible to come to some arrangement with Government, or economise by amalgamating the Engineering with other duties.

If bankruptcy is inevitable, one of two things is necessary, either an increase in revenue, or a curtailment of expenditure. The former would necessitate enhancement of dues, but before so serious a step as that is taken, outgoings should be subjected to the closest scrutiny.

Initialled—R. J. B. 8—6—98.

The Chairman surely does not expect Mr. Black and me to make plans and estimates. If the question of a boat basin is to be re-opened, I shall be most happy to communicate my own opinion to the Board's Engineer.

If the Trade of the Port is increasing, as the Chairman insists in a Minute I quote below, without the facilities the Trade of the Port desire, surely it is reasonable to expect they will continue to improve if these facilities are given effect to. Instead the Chairman desires the Trade to support a scheme which as far as I can gather has only the support of himself and another official Member who can hardly be expected to be familiar with our Trade requirements.

If Government are prepared to find money on the easy terms the Chairman suggests for a dock, surely they will be equally complacent if asked for a smaller sum for a scheme that has the support of the entire mercantile community.

I am sorry if these are vague generalities, but they are surely as practical as providing for "the unexpected."

Again in regard to the opinions of Engineers as to a convertable basin. Has our Engineer been asked to prepare a plan on the lines suggested by the Trade, and to frame an estimate, if he has I should like to see it, at present I do not know how the 14 lacs said to be required, is arrived at.

I would refer to the following extract from the Chairman's Minute of the 18—3—98.

Attached to the same Minute is one by Mr. Hutchence in which he says:—

"Regarding the question from a financial view, I think there need be no hesitation in "spending 30 lakhs on docks. With an increasing tonnage—rising revenue, and *some 6 or 7 lakhs* "*cash on hand*, the necessary revenue can be raised, not by increasing the cost to importers or "exporters; but by very materially reducing the charges."

The following are from the Chairman's Minute.

"(1.) Is trade expanding or likely to expand?

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"The Traffic Manager has dealt with this in a very interesting letter (circulated with another "paper) No. 8859 P, dated 11th March 1898. I give here a table extracted from his letter—

Year.	Imports, tons	Exports, tons.	Total.	Coal, Coke & Patent Fuel.	Net tonnage excluding Coal, etc.	Remarks.
1887—88 ..	210,979	106,207	316,986	15,492	301,494	
1888—89 ...	201,597	89,203	290,600	29,085	261,515	
1889—90 ..	246,659	112,525	359,184	34,368	324,816	
1890—91 ..	288,537	103,435	391,972	48,890	343,082	
1891—92 ...	347,401	88,939	436,340	49,027	387,313	
1892—93 ..	277,843	85,938	363,781	67,875	295,906	
1893—94 ..	285,251	98,660	383,911	82,302	301,609	
1894—95 ...	285,276	104,188	389,464	99,166	290,298	
1895—96 ..	330,697	99,074	429,771	134,452	295,319	
1896—97 .	385,605	102,941	488,546	150,659	337,887	
1897—98 ...	432,582	82,582	515,000	170,000	345,000	

"In regard to these figures Mr. Hutchence points out that in 1890-91 and 1891-92 trade "was abnormally swelled by large imports of grain, those being famine years, also that in the current "year 9,000 tons is due to excess of grain imports. But after making these allowances the figures seem "to me most re-as-uring and satisfactory, evincing a steady progress, though hampered by stationary "exports. I can see no possible grounds for fear as to the future The country is growing in popula- "tion and wealth, new fields of cultivation and of industrial employment are being opened up every year, "and in the normal process of events this must go on; and Madras must, in consequence, experience a "steady increase in its trade, always provided those entrusted with the regulation and assistance of the "trade, of whom the Harbour Trust Board is the chief, take care that with increasing demands improv- "ed facilities are given.

"The figures in the statement above show that, even without coal, trade is expanding. There are fears "that with the completion of the Bezwada Madras Railway our coal trade will vanish. I don't think that "this necessarily follows. But even if so, why need we despair of some other branch of trade supplying "the deficit? Kerosine oil in bulk has made immense strides of late years, and in both cases, the coal and "the oil trade, the sudden growth of the trade has been unforeseen.

"The fears as to the damaging competition of Vizagapatam and northern ports are purely "chimerical, about $\frac{3}{4}$ of the whole volume of Madras trade is its imports, and none of its imports go to "any of the northern districts, except an infinitesimal amount of transhipped cargo. As to exports at "the present time, the quantity of goods and produce brought by rail from places north of Bezwada to "Madras is quite negligeable: and if any trade south of Bezwada which now finds its outlet at Madras "is, after opening the B. M. Railway, diverted to northern ports, it can only be on account of, and "directly due to, mismanagement in Madras, whether by the mercantile firms or the Railways or the "Harbour Trust Board. On this point we need have no fears whatever, but rather hopes. The B. M. "Railway may bring more stuff, oil seeds, cotton, etc., to Madras from the western and southern parts "of the Kistna District and from Nellore; it cannot possibly deprive Madras of its trade. I do not "myself anticipate that at first this new Railway will directly affect the trade of this port much. No "doubt it will do so gradually and indirectly in the future, by opening up new tracts of country, and "stimulating production.

"It seems to me then that the statistics of our trade during the past ten years or so are "encouraging; and I am confident that if we give every facility that is possible to trade, we are certain

"to see a large improvement in the future. On the other hand if we fail to advance with the times, "we run great risk of seeing our commerce transferred to other ports.

"My remarks above have been written on the double assumption (1) that Mr. Wilson's esti- "mate of 38¼ lakhs could not be reduced: and (2) that the coal trade must vanish so soon as the "B. M. R. is opened.

"As to the first assumption it must be remembered that the estimate will, in any case, be only "gradually worked up to, though, in my opinion, it is necessary to complete the inner dock or basin as "early as possible; and there are certain parts of the estimate that may be found unnecessary, *e. g.*, "the very long protecting arm.

"Then as to coal, if we can pay our way without looking for any coal traffic, it follows that "we shall be in a position to give up all dock dues on coal. In other words, we should relieve coal "ships of all cost of discharging. It is not quite certain how much this would amount to. The Traffic "Manager gives the figure as about Rs. 2 a ton, exclusive of the 8 annas dock dues, which would ordi- "narily be charged on all goods landed at the docks. Would this saving of Rs. 2 or 2-8 a ton on Ben- "gal coal enable it to compete with Singareni coal?"

I do not know what has happened during the past 4 months to make the Chairman take the gloomy view that "certain bankruptcy is staring the Board in the face."

Initialled—C. B. S. 9—6—98.

At the last meeting I accepted the view that a boat-basin could not be constructed without an increase in charges, and that there would be no return as there would be little or no decrease in boat-hire. With respect to a boat-basin I am not satisfied that a due of 8 or 9 annas would meet the cost of upkeep as well as the interest on captial borrowed. It is assumed by those in favour of the wet-basin scheme that the basin would be used by all vessels visiting the port, but we have no assurance that this will be the case. It might be used after a time, perhaps, by some of the coasters, but I think that these vessels, as a rule, would prefer discharging at moorings in the Harbour. I notice that the Chairman draws attention in his note to the state of the moorings both inside and outside of the Harbour. I do not know whether he believes that these moorings would be unnecessary on a wet-basin being constructed. The moorings outside are for vessels while discharging timber and powder, and other kinds of cargo not allowed to be discharged inside of the Harbour. These moorings would have to be maintained whether a boat-basin is constructed or not, and I do not think that many of the moorings inside could be dispensed with.

Taking into consideration the views of the trade in respect to a wet basin, it seems to me that our best plan would be to drop the subject—at all events for a time—and to confine ourselves to meeting, as far as practicable, the deficiencies of the present Pier arrangements.

Initialled—H. A. S. 10—6—98.

3/St

(7)

EXTRACT of Proceedings of the TRUSTEES OF THE HARBOUR OF MADRAS, at a Meeting held at the Offices of the Board on Friday **the** 10th **day of** June **189**8 .

2. Read note by the Chairman upon the dissent expressed to resolution 10 (c) by Messrs. Black and Simpson, and requesting that they would favour the Board with proposals to finance the boat-basin they approve of without increasing the charges of the Port.

Read minutes by Trustees.

Postponed pending receipt of estimates for jetties called for from the Engineer.

3. Read letter, dated 28th May 1898, from the Chairman, Trades Association, replying to reference No. 54, dated 21st April 1898, regarding proposed Harbour improvements.

Recorded.

(True Extract)

HARBOUR TRUST
MADRAS-4 OCT 98
SECRETARY'S OFFICE

C Spinnett

Secretary,
Harbour Trust Board.

57

OOTACAMUND,
July 5th, 1898.

To

THE CHAIRMAN,
Madras Harbour Trust Board.

SIR,

I have the honour to inform you that the letter of the Chairman of the Madras Chamber of Commerce, dated 14th May last, and certain remarks that have fallen from Trustees of the Harbour, have led me to consider, from an engineering point of view, how different proposals for carrying out improvements to the Harbour could be carried out and at what cost.

My experience is, that engineering schemes which may, at first sight, appear not only practicable but in every way advantageous, very often look very different when drawn out to scale and their cost estimated. I have consequently endeavoured to draw out, with rough estimates of cost, different schemes to meet with the requirements of the different proposals made so far as I am able; and as the results may possibly be of assistance to the Trustees in forming a conclusion as to what should be done, I have the honour to submit the plans for your perusal.

What the Chamber of Commerce asks for, in the letter I have quoted is, a boat-basin which will afford facilities for the discharge of cargo boats, and cheapen the landing of goods; and that this boat-basin should be so constructed that it could eventually be fitted in with a larger scheme for docks. Two ways of doing this immediately occur to one. First to design a boat-basin which could be converted into a dock without disturbing the working of the Port, in which case the expenditure incurred on the boat-basin would not be thrown away when the conversion takes place; or secondly, to design a cheap boat-basin which would answer present requirements and so situated as not to interfere with a separate dock being constructed hereafter. As regards the first way I have heard it suggested that walls might be made first of all deep enough for a boat-basin, and when conversion was required they might be sunk deeper or in some way made suitable for a dock; but apart from the obvious objection that during the process of conversion the boat-basin wall would be useless and alongside traffic interrupted, I think the suggestion is impracticable. To make a boat-basin "convertible," therefore, it appears to me necessary to construct your boat-basin wall as for a dock at once and only to dredge to the depth required for a boat-basin to start with. I therefore designed as small and cheap a dock as would seem to suit requirements shown on plan A, this I estimate roughly to cost nearly 34 lakhs. I then cut off such portion of this dock as would form a boat-basin. This I have done as shown on plan B, and which I estimate roughly to cost a little over 20 lakhs. If such a scheme were carried out, you would spend, therefore, 20 lakhs to begin with, and when you wanted a dock you would have to spend a further sum of about 14 lakhs, removing the piece of shallow boat-basin wall marked A. B. None of the railway lines, sheds or equipment need be disturbed—whether under the circumstances it would not be better to spend the larger amount of 34 lakhs to start with is a matter for the Trustees to consider.

Coming now to the second way of interpreting the proposal of the Chamber of Commerce, one is immediately confronted with difficulties. A depth of 6 feet at low water is asked for, this is $9\frac{1}{2}$ feet below De, H, M, S, L, the datum to which the fathom lines are referred. The entrance to the basin must be about 600 feet from the shore end of the present south pier. If a basin is made opposite this point, it will be right in the centre of the best site for a dock as shown on plan C. I have drawn this out and made a rough estimate of its cost, *viz.*, Rs. 6,86,000, according to what I understand to be the suggestion of one of the Trustees. It does not seem, however, to meet the requirement of the Chamber of Commerce that it should be capable of being fitted in with a larger scheme for docks. For a certain period, at any rate during the construction of a dock, with a basin in this position, the basin sheds and appliances would have to be abandoned altogether. I then tried the effect of bringing the basin further west as shown on plan D. The result is not at all satisfactory. The estimate for the boat-basin itself is a lakh more than the other. The basin is of a very awkward shape, and I doubt if it would cheapen the landing of goods. It has to be remembered that Government proposes to make a canal from whatever basin is constructed by the Harbour Trust Board to the Cooum. If a dock is made outside of this, one or two bridges would be required. It will be observed that these boat-basin rough estimates are less than those already before the Board. This is due to the small size of the basins now allowed for.

On the whole, looking at the matter from an engineering point of view, if the construction of a dock in the sand accretion to the south of the Harbour is to be taken into account at all, I would recommend something like plans A or B, or something on the same principle.

I think it is highly desirable in any scheme adopted that some line should be fixed on now for the main western quay, so that railway connections, buildings and other arrangements in its neighbourhood, such as roads, need never be altered as developments are carried out. If this is not done, as would be the case with a non-convertible boat-basin, it is almost certain that minor improvements in connection with railways, roads, sheds, warehouses, fencing and such like, will either be hampered or be constructed to be subsequently pulled down. The only reason that I have taken this line so far out as 900 feet from the Railway boundary on plan A is, that I wanted to put the entrance far enough out to avoid the necessity of dredging in the Harbour and at the same time to keep the dock as small and cheap as possible. If it were not for the expense, I think the line, 400 feet from the boundary as shown on the 23 acre dock plan and 17 acre dock plan, would be enough and better for some reasons, one of which is that the quay would be further from the sea.

I have, &c.,

(Signed) F. J. WILSON,
Local Consulting Engineer
to the Harbour Trust Board.

Marine (1898) Department.

clear. 976: 23-11-98
982: 31-10-99

CURRENT No. 125

Govt 10 No 3 1-99

Order

From
The Chairman,
Harbour Trust Board,
Madras.

No. 2485.

Dated 4th *October* 1898.
Despatched „
Received
Enclosures : fourteen.
Spare copies : three.

SUBJECT.

HARBOUR IMPROVEMENTS.

Replying to G. O. No. 110, Marine, dated 11th February 1898.

BACK PAPERS.

.O.	No.	Department.	Date.

FURTHER PAPERS.

G. O.	No.	Department.	Date.

No. 2485.

Harbour Trust Office,
Madras, *4th October* 1898.

From

J. N. ATKINSON, Esquire, I. C. S.,
Chairman, Harbour Trust Board,
Madras.

To

W. B. DeWINTON, Esquire,
Secretary to Government,
Marine Department.

Sir,

I have the honour to submit the following report on the subject of proposed Harbour Improvements, with especial reference to the papers communicated in G. O. No. 110, Marine, dated 11th February 1898. Those papers included two estimates for boat-basins, and a scheme with estimates for a ship dock: and in addition to these the Harbour Trust Board has had under consideration several other schemes for both boat and ship-basins, and for additional piers.

2. With the view of assisting the Board to come to a conclusion on the subject, all material papers, including the minutes of the Trustees, were communicated to the Chamber of Commerce and the Trades' Association, and the opinions of those bodies have been considered by the Board.

3. The various views on the question may be broadly divided into two main groups. First, there are those who hold that for the trade of the port as it stands at present, and may be expected to stand for an indefinite time to come, and considering the financial position of the Harbour Trust Board, the present open Harbour is sufficient, and all that is needed is some means of expediting the discharge of boats. It is pointed out that it is only the rare exception when vessels cannot find accommodation in the Harbour; that when once moored discharge of cargo from the ship can proceed more expeditiously under present circumstances over both sides into boats and lighters than at a quay side; and that delay and inconvenience only arise when the boats reach the pier, where, owing to inadequate room, and consequently an insufficient number of cranes, the boats are often delayed for some hours before they can commence discharging their cargo. The arrangements on the pier are further stigmatised as inadequate, both cranes and trucks being, it is said, insufficient in number, and the former in power also.

4. To remedy these inconveniences various suggestions have been made ranging from the mere provision of more, and more powerful cranes and trucks on the existing pier up to the construction of a boat-basin capable of conversion hereafter, if the necessity should arise, into a ship dock. The object aimed at by the authors of these suggestions is to secure the prompt unloading of each boat as soon as it comes to hand, and their only doubt is as to what extension and improvement of existing arrangements is necessary. Some persons, probably a small minority, believe that nothing more is needed than an increase and improvement of the cranes and trucks on the present pier. Others think that one, or if necessary more, additional piers should be constructed, with proper equipment of cranes, trucks, etc., and the Board had plans and estimates prepared for two such additional piers. One obvious disadvantage of the present pier is its height above mean sea level, 18 feet, and it was proposed therefore that the additional piers should be lower by 6 feet.

5. Those who think that improved and increased pier accommodation is all that is at present required are probably a small minority, if for no other reason, because it is generally accepted that some basin must be provided for shelter of Harbour small craft in rough weather. But there is a large body of opinion, including the majority of the shipping agencies, in favour of restricting Harbour improvements at the present time to the construction of a boat-basin with the necessary equipment of cranes, sheds, etc. Numerous plans for boat-basins have been considered at one time or another, both within the water-spread of the Harbour, in its foreshore, and in the sand accretion to the south. It has been impossible to ascertain which of these finds greatest favour; but it may be taken as probably correct that the one upon which most attention has been concentrated, and which should be accepted as the type of most suitable boat-basin is that numbered as Plan No. 2 in the file forwarded with the G. O. under reply.

6. The above paragraphs have as briefly as possible set out the views of those who advocate the retention of the present method of berthing ships in the open Harbour, and of discharging cargo by means of boats. These persons object to the construction of an expensive dock at the present time, but it is not clear that the majority of them are opposed to the adoption now of a complete plan of future development. At a meeting of the Harbour Board held on Friday, 30th September, a resolution in favour of some plan of development being adopted, was carried unanimously.

7. There is another large body of opinion which contends that the Harbour as it at present exists is essentially incomplete; that a plan of future development should now be finally decided upon, and steadily worked up to. They object to the proposals referred to in paras. 3, 4 and 5 as mere temporary expedients to meet present wants and as likely, perhaps irremediably, to block the way of future improvements. They urge that the ultimate form of development to be aimed at is an inner Harbour or, ship's basin where vessels would lie at a quay, and that this is demanded alike for the safety of shipping the benefit of consignees and exporters, and the financial interests of the Port.

8. It is hopeless to expect unanimity of opinion in the matter. The question has twice been referred to the Chamber of Commerce and Trades' Association. On the first occasion both bodies recommended the construction of a boat-basin capable of conversion hereafter, if necessity should arise, into a ship dock: on the second occasion both bodies—the Chamber of Commerce by a majority of one—recommended the construction of an inner ship-basin at once. At the meeting of the Harbour Trust Board on 16th September a resolution in favour of a ship-basin was proposed, but lost by 5 to 2, the representatives of the Chamber of Commerce and of the Trades' Association voting against the expressed opinions of the bodies they represent, and three members of the Board being absent. At the meeting of the Board held on Friday, 30th September, a resolution in favour of a ship-basin was carried by 5 to 4.

9. Whatever be the form of improvement eventually adopted, the cost must be met by a loan raised under Act II of 1886; and unless the money market becomes much easier, the Harbour Trust Board will have to apply to Government for funds before the execution of any scheme can be put in hand. The amount of progress in the execution of the scheme adopted must therefore depend on the amount of money that Government may find it possible to place at the disposal of the Board.

10. Having regard to the great variety of opinion that exists on this question of Harbour improvements, the Harbour Trust Board has resolved to lay the whole matter before Government and to ask it with the advice of its own Engineers and after consulting Sir A. Rendel to decide what should be the plan for future development of the Harbour: and what part of the work should now be undertaken to remedy existing inconveniences.

11. It would be out of the question in this letter to repeat in full detail all the arguments for and against each proposal that has been mooted: but together with this letter I have the honor to submit a complete file of all minutes and material connected papers, as stated in the annexed list.

12. This letter has been submitted to, and considered by, the Trustees, a copy of their resolution approving it is appended.

I have the honour to be,

Sir,

Your obedient servant,

J. N. ATKINSON,
Chairman,
Harbour Trust Board.

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(1). Letter No. 55, dated 21st April 1898, from the Chairman, Harbour Trust Board, to the Chairman, Chamber of Commerce, forwarding a series of minutes written by various Trustees, and other papers regarding Harbour improvements.

N. B.—A similar letter was sent on the same date to the Chairman of the Trades' Association.

(2). Reply from the Chairman, Chamber of Commerce, dated 14th May.

(3). Harbour Trust Board's resolution No. 10, dated 27th May, upon G. O. No. 110, dated 11th February, and reply from the Chamber.

(4). Letter dated 28th May from the Trades' Association, supporting the views expressed by the Chamber of Commerce.

(5). Note by the Chairman, regarding the dissent, of Messrs. Black and Simpson, from the above resolution.

(6). Minutes thereon by Trustees.

(7). Resolutions 2 and 3 of 10th June 1898.

(8). Letter from Mr. Wilson, dated Ootacamund, 5th July.

(9). Letter from the Chairman, Harbour Trust Board, to the Chairman, Chamber of Commerce, dated 5th August, again referring the question of Harbour improvements to the Chamber with special reference to the Financial aspect of the question.

N. B.—A similar letter was also addressed to the Chairman of the Trades' Association.

(10). Reply from Trades' Association, dated 18th August.

(11). Reply from the Chairman, Chamber of Commerce, dated 2nd September.

(12). Copy of resolution proposed by the Chairman at the Board's meeting held on 16th September negatived by 5 votes to 2.

(13). Letter (in original) from 230 European and Native Firms and Traders, regarding proposed Harbour improvements, requesting that a favourable consideration may be given to a wet Dock scheme for reasons given.

Harbour Board's resolution, No. 5, dated 30th September.

(14). Extract of proceedings of the Trustees, No. 4, dated 30th September, with copies of resolutions then carried, referred to in paras. 6 and 7 of letter No. 2485, dated 4th October.

Extracts of Proceedings of the Trustees of the Harbour of Madras, at a Meeting held at the Offices of the Board, on Friday, the 30th day of September 1898.

* * * *

4. Read draft letter to the Secretary to Government, Marine Department, replying to G. O., No. 110, Marine, dated 11th February 1898, regarding proposed Harbour improvements.

Read minute by a Trustee.

Read letter from Mr. F. J. Wilson, dated 29th September, giving notice that he intended to move a resolution regarding Harbour improvements, and, if carried, that he would move a further resolution, both of which, with Mr. Wilson's letter, had been printed and circulated to all Trustees.

The first resolution was, after discussion, put by Mr. Wilson as follows:—

"That, looking to the fact that many forms of improvement to the Madras Harbour are postponed or hampered for want of a general scheme of development, the Board, as at present constituted, is of opinion that the time has now come to draw out and decide on some such scheme of development finally, irrespective of what items of work it should be decided to undertake immediately."

This was carried unanimously.

The question was then raised as to whether Mr. Wilson was in order in putting to the vote his second proposed resolution, as if carried it would practically reverse the vote upon the resolution proposed by the Chairman at the last meeting.

The Chairman ruled that Mr. Wilson was in order in putting his proposed second resolution, which was then proposed by him as follows:—

"That the Board, as at present constituted, is of opinion that the scheme of development of the Madras Harbour that should be decided on should take the form of an inner ship basin or dock in the sand accretion to the south of the present Harbour of about the same size and general position as that of the design forwarded by Government to the Board for remarks with G. O. 110, Marine, dated 11th February 1898, provided that it can be constructed and fully equipped with sheds, cranes and all appliances required for a sum not exceeding 40 lakhs."

This was supported by Mr. Yorke, and on being put to the vote was carried by 5 to 4.

The draft letter to Government was then discussed, amended in various particulars, and approved as amended.

5. Letter from 230 European and Native Firms and Traders, regarding proposed Harbour Improvements,—having been circulated to all Trustees—was laid on the Board's table, and it was resolved that this letter be submitted to Government.

* * *

(True extract,)

C. PINSENT,

Secretary,

Harbour Trust Board.

No. 1250.

MADRAS, 5th *August* 1898.

FROM

J. N. ATKINSON, ESQ., I. C. S.,
Chairman, Harbour Trust Board.

To

THE CHAIRMAN,
CHAMBER OF COMMERCE,
Madras.

SIR,

Referring to your letter dated 14th May 1898, I have the honour once more to invite the attention of the Chamber of Commerce to the question of Harbour improvements. The papers that were forwarded with my letter No. 55, dated 21st April, were voluminous, and dealt in a more or less desultory way with many aspects of the question; but it has become apparent that it is on financial grounds that the ultimate decision will mainly rest, and the Harbour Trust Board having had these under careful consideration, is of opinion that it is advisable to lay a statement of them before the Chamber of Commerce and invite a further expression of opinion thereon.

2. The schemes which this Board has had before it include several for ship docks; several for boat-basins, whether for permanent use as such, or capable of conversion into docks; and a scheme for supplementary iron piers: and in approaching the consideration of each of these schemes, the Board has steadily kept in view two guiding principles which it believes are unanimously accepted by the Trade of the Port, *viz.*, (1) that there must be no addition to the charges levied on Trade in the Port and (2) that the place for landing and storage of coal must be, as far as possible, removed from that of general cargo.

3. This Board believes that in certain quarters misapprehensions exist as to the exact financial aspect of the various schemes of Harbour improvement. In all cases, whatever be the nature of the scheme of improvement contemplated, the charges that will have to be defrayed by the Trade of the Port are as follows: (1) Repayment of Capital outlay, (2) Annual charge for interest thereon, (3) Establishment, (4) Maintenance and repairs, including dredging.

4. The first of these need not be considered at all, the capital required will be raised by loan from Government under the Madras Harbour Trust Act (II of 1886), and in accordance with section 31 thereof no greater sum than one lakh of Rupees can be repaid towards liquidation of capital debt due to Government in any one year. Since, therefore, the existing debt is 49 lakhs, no charge can be made upon the Trade of the Port towards repayment of any Capital outlay on any scheme of improvement of whatever kind till 49 years from now. It will be apparent also that under the circumstances explained, the formation of a sinking fund is entirely uncalled for.

5. The rate of interest chargeable on a loan from Government is fixed by section 30 of the Act at 4½ %; the amount annually payable will vary according to the capital cost of the scheme of improvement adopted. I offer a few further remarks on this below.

6. The charge for establishment will be, for all practical purposes, the same whether docks or boat-basin be constructed; it will be higher if subsidiary piers be the form of improvement adopted.

Similarly the cost of maintenance, repairs and dredging will be approximately the same for either docks or boat-basin. In either case there must be the same shedding, cranes, railway lines, and other appliances; and it is these that will make up nine-tenths or perhaps even ninety-nine hundredths of the bill for repairs and maintenance. The heavy walls, whether of dock or boat-basin, will require practically no repairs. Since the completion of the present Harbour the amount spent on repairs of the two walls is less than Rs. 100. The cost of dredging will vary according to the position of the basin excavated. This charge will not, however, be a heavy one, and for all practical purposes the cost may be assumed to be the same whether for ship dock or boat-basin.

The maintenance of an iron pier or piers will be more costly than that of either dock or boat-basin. In the last 8 years upwards of 1¼ lakh of rupees has been spent in repairs to the present iron pier. If masonry piers could be substituted for iron piers, the maintenance would probably cost less.

7. It will be apparent from the foregoing that, under the heads of Repayment of Capital outlay, Establishment, Maintenance and Repairs, and Dredging, the annual charge to be borne by the trade of the Port will be practically the same whether docks, boat-basin or masonry piers be constructed. There remains the question of interest on Capital outlay. The advocates of a dock argue that whereas in the case of a boat-basin the charge for interest can only be met by a direct impost on the trade of the Port; if a dock be constructed, and dock dues charged on consignees in lieu of present boating charges, there will be no increased impost on the trade of the Port unless the charge for interest exceeds the amount of boating charges that would have been levied on the goods loaded and discharged direct on the dock quay. On the other hand it is argued that ships will not enter the dock, and cargo be loaded and discharged therein in sufficient quantity to cover the interest on Capital outlay; and the Kidderpore docks are quoted as a warning. To this again it is replied that the Kidderpore docks are daily attracting increased tonnage; that ships' captains will prefer the safety and convenience of a dock to the open Harbour, that consignees will insist on delivery direct from the ship on to the quay, and that exporters will prefer making shipment direct from shed to ship.

8. It is found that during 1897-98, excluding all coal, coke, patent fuel, kerosine oil, whether bulk or case oil, explosives, timber, firewood, and also all coasting cargo, the total tonnage of both exports and imports handled in the Harbour was 182,000 tons. Supposing there be an objection to take coasting steamers into the inner Harbour or dock, there is no reason apparent why this general foreign cargo should not be handled therein and a dock due of Re. 1 per ton on this quantity would more than cover interest at 4½ % on a capital outlay of Rs. 40,00,000.

9. It may be worth while here briefly to refer to a contention that has been put forward by the advocates of a boat-basin, *viz.*, that, given safety for small craft in rough weather, the size of lighters will increase and the boating charges proportionately decrease. The advocates of docks answer that there is no guarantee that either of these consequences will ensue; that experience shows that for discharge or loading in the open Harbour at the ship's side lighters of the present size and masulah boats are the most expeditious craft that can be devised, and that the number and size of lighters and boats must necessarily be regulated by the quantity of work to be done, since no business man can afford to let his capital lie idle in boats in excess of the number wanted.

10. In order to prevent any possibility of misconception, it may be as well to state that for the use of the proposed ship dock, no charges of any kind would be levied upon the vessels using the same. Any vessel loading or discharging in the dock would pay Pilotage and Port dues under the Indian Ports Act exactly in the same way and at the same rate as she does at present for use of the outer Harbour. She would pay no other due, charge or fee whatever for entering and making use of the inner basin or Harbour, or ship dock by whatever name it be called. The cost of the dock would be met by a dock due levied at so much per ton on goods landed or shipped, and this due would be recovered from exporters or consignees. It would be an additional charge on exporters or consignees, but it would relieve them entirely of all boating charges, with the subsidiary charges in certain cases for watchmen, tarpaulins, moving coolies, &c. It is believed that to be relieved of these charges, exporters and consignees will gladly pay a dock due of Re. 1 a ton, which would suffice to pay interest on outlay up to Rs. 40,00,000, even assuming that the cargo handled is only foreign amounting to 182,000 tons annually.

11. The estimates for docks that have been under consideration range from Rs. 43,00,000 for eleven ships, to Rs. 34,00,000 for seven ships. It may be assumed that a dock of adequate capacity and properly equipped will cost from 35 to 40 lakhs.

The estimates for boat-basins range from Rs. 20,00,000 to Rs. 7,00,000. A boat-basin of adequate capacity and properly equipped will cost about 10½ lakhs.

The estimate for subsidiary piers has been scrutinised as far as information available allows by the Board's Local Consulting Engineer, and a copy of his note is annexed.

12. In the above remarks it has been assumed that in order to execute any new scheme of improvement a loan from Government of the capital cost is essential; it would be impossible to finance any scheme by borrowing in the open market; and equally impossible to defray cost of construction from the Harbour Trust Board's cash balances.

13. In reference to the Chamber's suggestion that a boat-basin capable of conversion into a dock should be the form of development adopted, I beg to point out that estimates and plans therefor have been considered, and it is found that the initial cost will be as great or greater than that of a non-convertible basin, while the subsequent conversion into a ship dock would raise the cost higher than that of a dock of the same size and facilities constructed in the first instance.

14. I have the honour to enquire whether on a review of the facts now laid before you the Chamber of Commerce adheres to its opinion that a ship dock would be "a luxury," and that a convertible boat-basin is the form of improvement that should be adopted.

I have the honour to be,

Sir,

Your obedient servant,

J. N. ATKINSON,

Chairman,

Harbour Trust Board.

Enclosures:—

Statement of Tonnage.

Note by Local Consulting Engineer.

Approximate Tonnage of the goods shewn in the Administration Report for 1897-98, excluding Kerosine Oil in bulk and cases, Timber, Scantlings and Firewood, Coal, Coke and Patent Fuel, Dynamite and other Explosives.

	Total Tonnage.	Loss.		Net Tonnage.	
		Coal ...	35,771		
		Coke ...	385		
		K. Oil ...	24,463		
		Explosives ...	486		
I ...	156,556		61,105	95,451	Goods imported from Foreign Ports.
		Coal ...	100		
		Coke ...	1,073		
		Timber ...	990		
II ...	9,358		2,163	7,195	Stores imported by Madras Railway.
III ...	2,053	Nil.		2,053	Stores imported by South Indian Railway.
IV ...	8,335	Nil.		8,335	Stores imported by Beswada Madras Railway.
		Coal ...	137,560		
		Coke ...	2,426		
		F. Wood ...	5,740		
		K. Oil ...	484		
		Timber ...	18,840		
V ...	254,264		165,050	89,214	Goods imported from Coast Ports.
VII ...	64,991	Coal ...	1,400	62,991	Goods exported to Foreign Ports.
		Coal ...	300		
		K. Oil ...	316		
VIII ...	29,704		616	29,088	Goods exported to Coast Ports.
IX ...	5,801	Nil.		5,801	Stores imported by Government.
X ...	2,416	Nil.		2,416	Stores exported by Government.
Total...	532,878		230,334	302,544	

Summary.

Foreign Imports—

Statement No. I	General Merchandise	95,451	
II	Madras Railway Co.	7,195	
III	S. I. Railway Co.	2,053	
IV	Beswada-Madras Ry.	8,335	
IX	Government Stores	5,801	
			118,835
Foreign Exports—			
Statement No. VII	General Merchandise		62,991
	Total Foreign Trade Tons ...		181,826
Coasting—			
Statement No. V	Imports tons	89,214	
Do. VII	Exports ,, ...	29,088	
Do. X	,, Government	2,416	
			120,718
	Total Tonnage Foreign ...		181,826
	Do. Coasting ...		120,718
	Coal, Coke, Timber, Firewood, Kerosine Oil, Explosives ...		302,544
	Total calculated according to average size of packages or tonnage when known, Tons		230,334
	... ...		532,878

MADRAS, 2nd August 1898.

To

THE SECRETARY,
Harbour Trust Board.

S. HUTCHENCE,
Traffic Manager,
Harbour Trust.

Note on estimates for Coal basin and Subsidiary piers, &c.

The estimates for a coal basin and electric transporter and those for subsidiary piers within the Harbour, which have been sent to me for remarks, appear to have originated from two entirely separate causes. The preparation of the first set of estimates for the coal basin, &c, was due to the decision of the Board that no matter whether an inner Harbour ship basin, dock or boat-basin were constructed, coal must be dealt with separately. This requirement did not involve the construction of a basin to protect boats in a storm, but merely some arrangement which would facilitate the landing of coal in ordinary weather, The arrangement was to be in addition to an inner Harbour or boat-basin, and I don't think the Engineer can have had anything else in his mind when he prepared the estimates. The other set of estimates for Subsidiary piers originated with a proposal of the Chamber of Commerce, and these also involved the construction of some protective basin in addition, as the piers themselves could not afford any protection to the dredger "*Wenlock*," and the improved lighters which it is held would be the outcome of having some place of protection to put them in, in bad weather.

It was with some surprise, therefore, that I discovered at the last meeting of the Board that there was an idea in some quarters that the proposed coal-basin would be sufficient for protecting small craft, and that this basin, together with two subsidiary piers, was to be considered as a complete alternative to the construction of an inner Harbour, dock or boat-basin. To do this is to revive an idea that was finally rejected fifteen years ago, and before dealing with the details of the estimates sent to me, I would remind the members of the Board as to what happened in the years 1881—83. I think it was said by one member that the damage done inside the Harbour in 1881 was due to the failure of the outer walls of the Harbour, but this is not in accordance with the evidence given before Sir Nowell Salmon's Committee, nor with the Master Attendant's report on the results of the storm. The latter said that all the cargo boats in the place were wrecked, the beach ravaged and the low level jetties (then in course of construction) *utterly swept away before a block had fallen from the walls.* The Committee's report contains the following:—"It is agreed on all hands that owing to the frequently disturbed state of the water, the facilities "for landing and embarking passengers, cargo, &c., offered by the Harbour are very much restricted, *nor* "*would it be feasible for the same reason to use without serious interruption wharves and jetties along the* "*shore line, or to keep in safety within it such improved lighters, tugs and other Harbour craft as would* "*greatly increase its value as a trading port* * * * *. The confused sea within the Harbour is attributed "by all who have given evidence to the nearly constant swell from the eastward which runs in through "the present entrance, and being deflected from the side walls, causes, what is described, as a nubbly "sea or 'joggle of a sea' and in bad weather as being like a boiling pot."

With such evidence before us, it is clear that any basin constructed within the Harbour area to be relied on for protecting the Harbour craft in bad weather should be very strongly made. It would be a very serious thing for the trade of the Port surely, for all the lighters and other Harbour craft, including the dredger, to be wrecked again, not only on account of the actual money loss involved, but in the damage to the reputation of the Port that must follow any disaster of this kind. The coal basin, as now estimated for, is totally unsuited as a place of protection for Harbour craft in bad weather. In the first place it is very small covering less than one acre. The dredger "*Wenlock*," which is 140 feet long, could only just get into it.—(*Vide* scaled drawing herewith.)

The basin sanctioned in 1895 covered an area of 4 acres and was finally rejected for one reason, amongst others, that it was totally inadequate for the trade of the Port. The north to south breakwater is a light structure only 12 feet wide, founded in a rubble bank only 5½ feet below lowest tide level and top only 7 feet above highest tide level.

The other quay wall has a parapet to this height of 7 feet above highest high tide level, but the level of the quay itself is only 1 foot above the highest high tide level. The situation of the coal basin itself at the root of the existing north pier is opposite one of the weakest parts of the whole existing breakwater. The breakwater has ere this shown signs of weakness at this point, and with a storm blowing from the north-east it is to be expected that the sea would break over this height of 7 feet above highest high water. In this connection I observe that the Engineer provided a parapet along the north pier at this point in his estimate for a canal entrance of 1895. The objection to putting up a parapet here is that it would interfere with the passage of the all round crane along the pier which may be required at any time to add to the wave breaker. I see little or no reason why a breakwater running into the Harbour at right angles to the north pier should be made of a lighter section than has been considered necessary for a similar arm proposed to protect the boat-basin entrance in the south pier. Deducting dredging and other

sundries which may not be necessary at the north, the protecting arm which Mr. Pogson proposed for the south arm was estimated to cost about Rs. 410 per running foot against Rs. 108 per foot for the arm now proposed for this breakwater at the north. I have not been supplied with information as to the method proposed for constructing this breakwater, but I understand that it is proposed to put down blocks for a width of 24 feet so as to carry the all round crane and then to lift a row of blocks on the inside. If this coal basin is to be built, I think it would be wise to allow in the estimate for these blocks being left, thus making a breakwater 24 feet wide and to found the blocks at 10 feet below low tide level instead of 5½ feet—a parapet could be added at any time afterwards if found necessary. As regards the quay running out from the shore, I think it would be well to increase the depth of the block work of the outer wall and to raise the level of the quay to 5 feet above DeHavilland's mean sea level, in which case the thickness of the inner wall should be increased to 7 feet. These additions would considerably increase the estimates, but not to the extent necessary to fit it to serve as a basin for protecting the Harbour craft in bad weather. To do this it would be necessary to increase its size and cost to something like the boat-basin sanctioned for Rs. 6,63,553 in 1895, which was to be constructed in the south-west corner of the Harbour.

It follows from what I have said that, in my opinion, if open subsidiary piers are constructed that it would be necessary to construct a separate protective boat-basin as well as the small coal-basin, unless the latter is increased in size and cost to such an extent as would make the cost of the whole scheme considerably more than that of a fully equipped boat-basin in the sand to the south of the Harbour.

There remains Mr. Pogson's latest proposal to form a protective basin by means of a curved iron jetty filled in, as shown, to some extent with concrete, and which he estimates would cost Rs. 5,58,469 with a central jetty, or Rs. 4,37,246 without this central jetty. Without details of these estimates I cannot criticize the sufficiency of these provisions for the work shown on the plan, but if the jetty work is the same as that provided for the subsidiary jetties, it is cheap compared with similar work done at Tuticorin. Certain advantages are claimed for this proposal. It would appear at first sight at any rate to be a cheap scheme, however efficient it might be, but for a proper comparison of cost of the scheme with that of others, its provisions should be examined and compared with the other schemes. The following is the result of a comparison with the estimate for a boat-basin to the south of the Harbour:—

	Estimate. Rs. 4,37,246 for enclosing space near existing iron pier.	*Estimate.* Rs. 10,47,239 for boat-basin south of the Harbour.
Approximate water area available for boats ...	4 acres.	6 acres.
Available length of wharf wall for boats ...	1,000 feet.	3,900 feet.
Amount provided for sheds	58,102 Rs.	2,00,000 Rs.

The most important item in a dock or basin is the length of quay provided, and it will be observed that if the provision for sheds is excluded from the estimates, that the wharfage provided by the new scheme will cost Rs. 379 per foot, whereas in the other estimate the cost is Rs. 217 per foot; of the 1,000 feet of wharfage provided by the new scheme about 400 feet is that on the existing pier at the objectionable height of 18 feet above M. S. L. The 3,900 feet of wharfage provided in the old basin estimate is probably a good deal more than would be required; this is partly due to a length of canal and a Port Officer's basin having been included in the estimate; but I think this comparison is sufficient to show that you really do not get so much for your money in the way of wharfage in a basin of the description most lately proposed as in a basin formed in the sand.

As regards the design itself, it is of course open to all the objections already taken to structures projecting into the Harbour. The top of the proposed curved jetty is only 7 feet above highest high water, and it is very much open to question whether it would afford sufficient protection to craft in any such storm as that of 1881. The quay itself would certainly be unapproachable and its stability depends on the absence of motion on a loose rubble bank only 8 feet below low water level. The scheme does not of course fit in with any inner Harbour or dock. If carried out, Railway lines, roads, fencing and buildings, such as the proposed Custom House, would be made to suit it, and these would all form hindrances to any future development. I think the proposal is a retrograde step and has little to recommend it.

(Initialled) F. J. W. 3—8—98.

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The Trades Association,

Madras,

dated the 18th August 1898.

J.N.Atkinson Esq I.C.S.,

Chairman, Harbour Trust Board,

M A D R A S.

Sir,

DOCKS AND BOAT BASINS SCHEME

I have the honour to acknowledge your No.1251 dated the 5th instant on the above subject and beg to reply as follows:-

At a Meeting held on the 10th May 1898 to consider the above, the opinion of the Members appeared to be pretty equally divided between the two proposals. A slight preponderance of feeling was however expressed in favour of the Boat Basins Scheme, principally on account of its cost. It was ultimately decided to recommend this, in preference to the more expensive Docks Scheme. Several of the Members, including the Chairman of the Association, were absent from Madras and had no opportunity of joining in the discussion. The original papers have again been circulated, together with the additional information furnished by the Chairman of the Harbour Trust, in his letter dated 5th August. At a special meeting of the Members held yesterday, the 17th August, the proposals were again discussed. The respective merits of the two schemes were closely considered in every detail, and having regard to the important information not previously available, it was resolved to ask permission to withdraw the previous recommendation in favour of the Boat Basins, and to express an unqualified preference in favour of the more complete Docks Scheme, which in the opinion of the Association is not only likely to increase the trade of the Port, but will materially reduce cost of both landing and shipping goods, and result in much less damage and loss to cargo generally.

I have the honour to be,

Sir,

Your most obedient servant,

R. Harper,

Chairman.

HARBOUR TRUST
MADRAS 4 OCT '98
SECRETARY'S OFFICE

(True Copy)

Secretary, Harbour Trust Board.

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The Madras Chamber of Commerce,

Madras, 2nd September 1898.

From

S. R. Turnbull Esq,

Chairman, Chamber of Commerce,

M A D R A S.

To

The Chairman,

Harbour Trust Board,

M A D R A S.

Sir,

I have the honour to acknowledge the receipt of your letter No. 1250, dated the 5th ultimo, in which you again invite the attention of the Chamber to the question of Harbour improvements and in which, after contrasting the financial aspects of the boat-basin and ships-dock schemes respectively, you enquire whether, on a review of the facts therein stated, the Chamber adheres to the opinion in favour of a boat-basin which it expressed in its letter of the 14th May.

In reply, I beg to state that your letter and its enclosures have been circulated amongst the members of the Chamber, and the whole question has been carefully re-considered in the light of the additional representations and arguments contained in those documents. There is no necessity to report to you in detail the different views that have been expressed on the subject. It suffices to say that a division of opinion has been found to exist amongst the members, and under these circumstances it has been thought advisable to lay before you merely the result of a long discussion that took place at a meeting of the Chamber, held on the 30th ultimo. At this meeting, a resolution to the following effect was laid before the members:-

"The Chamber of Commerce is of opinion that the construction of Docks is premature. It deprecates the expenditure of a further large sum of money until it is ascertained by experience what protective works, if any, are required for the entrance, as it considers that such works, if necessary, may have a very important bearing on the site and construction of Docks should it be found desirable to build them hereafter. Meanwhile, the Chamber considers that the Harbour Trust Board should take early steps to remove the existing congestion

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of traffic on the pier, and give greater facilities for the loading and unloading of boats, which is the chief draw-back to the Port."

To this resolution, an amendment was proposed to the following effect:-

"The Chamber considers that the arguments in favour of an inner Harbour or Dock are conclusive, and advocates one being made."

In the usual course, the amendment was voted on first, and with the result that it was carried by a majority of one vote. Accordingly the substantive proposition was lost by the same majority.

It seems hopeless to expect that any unanimity of opinion on the subject will be attained, and the views of the Chamber as a body must be taken as being fairly represented in the resolution and in the amendment quoted above.

I have &c,

Signed S. R. Turnbull,

Chairman.

(True Copy

Secretary,

Harbour Trust Board.

HARBOUR TRUST
MADRAS - 4 OCT 18
SECRETARY'S OFFICE

(12)

EXTRACT of Proceedings of the TRUSTEES OF THE HARBOUR OF MADRAS, at a Meeting held at the Offices of the Board on Friday **the** 16th **day of** September **189**8 .

2. Letters from the Chamber of Commerce and Trades' Association dated 2nd September and 18th August, replying to references respecting Harbour improvements, having been circulated, were with G.O.No.110 Marine, dated 11th February 1898 taken into consideration, and the Chairman moved the following resolution:-

1. That the Board has had under consideration the two estimates for boat-basins, the estimate for a scheme of development including a ship-basin and the other papers forwarded to the Board for remarks with G.O.No.110, Marine, dated 11th February 1898.

2. That with the view of assisting the Board to come to a conclusion on the subject referred to them, the papers and minutes of Trustees thereon were forwarded by the Board, to the Chamber of Commerce and to the Trades' Association, and the Board has considered their replies.

3. That, at the instance of the Chamber of Commerce, a proposal to construct a boat-basin which should be capable of being converted into a dock has been considered, and that a proposal to meet the present requirements of the port by the construction of subsidiary piers within the Harbour without any basin has also been considered.

4. That the Board is agreed that the time has come to adopt a final scheme for the complete development of the Harbour in the future, no matter what portion of the work it should be decided toundertake immediately.

5. That for this reason and for the further reasons given below, the proposal to construct subsidiary piers and to put aside the consideration of further development, does not meet with the Board's approval. Subsidiary piers would be of little use by themselves, seeing that the Harbour small craft would remain unprotected in heavy weather, they afford only a clumsy and

expensive

C-2-45

expensive method of dealing with traffic, and their working is likely to be very seriously interfered with by Railway arrangements.

6. That the Board cannot approve the proposal to construct now a boat-basin capable of future conversion into a dock, not only for the reasons that have already influenced the Board to reject a boat-basin altogether, but also because the construction of such a basin must cost more than a non-convertible basin.

7. The Board having already rejected the proposals for constructing non-convertible boat-basins is of opinion that the best way to facilitate trade, to cheapen loading and discharge, to make the port a safe one, and thereby to attract shipping and cheapen freights, is to provide a ship-basin or dock wherein ships can receive and discharge cargo direct at a quay, and simultaneously, if desired, into lighters on the other side.

8. That as the objections that have been raised to the construction of such a basin, are apparently purely financial, the Board has had under consideration the financial aspects of constructing a ship basin and of constructing a boat-basin. The Board considers that docks or a ship-basin will entail no greater annual charges under the heads of maintenance and repairs, dredging establishment and repayment of capital than would a boat-basin as the shedding length of quays, dredging and establishment would be the same in either case. That the only difference between docks and a boat-basin lies in the matter of interest on the capital expenditure, and that whereas in the case of a boat-basin the charge for interest must be met by an impost on the trade of the port without any pecuniary set off, in the case of docks the charge for interest will be partially or wholly counter-balanced by the saving of all charges for boat-hire as well as by diminished loss of goods between ship and shore.

9. That for the above reasons the Board as at present constituted is of opinion that a ship-basin of the same size and general position as that of the design forwarded by Government to the Board for remarks should be constructed, provided that it can be constructed and fully equipped with sheds, cranes and all appliances for a sum not exceeding 40 lakhs. In the matter of equipment the Board observes that only sheds have been provided for. The sheds provided are considered sufficient. As regards cranes the Board considers that in the first instance it is not necessary to provide for a hydraulic system.

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The Board already possesses the cranes shown in the accompanying list and as most of the work of discharging and loading will be performed by hand, considers that this equipment will be sufficient. No provision has been made in the estimates for new offices; for this a sum of Rs 35,000 should be added.

As regards the position and width of the entrance to the dock, the design under review places this 600 feet from the shore end of the existing S.pier involving work inside the Harbour estimated to cost some 8 lakhs.-Mr Wilson's objects in so placing it were to keep the new dock as far away from the sea as possible and to suit proposed developments within the existing area of the Harbour as shown in his plans of final stages.-As it has been suggested by the Chief Engineer that whatever new work is added should be kept outside the existing Harbour. Mr Wilson has submitted to the Board two sketches with rough estimates in which the entrance is placed 1,000 feet from the shore end of the S.pier, and the Board prefers this position to that originally proposed as it does away with the necessity for interference with the existing Harbour. It has been also suggested by the Chief Engineer that the entrance should be placed still further seawards and a protecting mole omitted, but the cost of this proposal has not been estimated. If such a design can be drawn out to show that it would cost less, and be as efficacious the omission of the protecting mole jutting out into the Harbour has its advantages, the Board observes however that the further out to sea the basin is placed the greater will be the cost of the sea face wall and the greater will be the exposure of the sea side quay to the violence of a storm.

As regards the width of the entrance that proposed in the design under review is 164 feet with the object of allowing vessels to pass through it under their own steam. The Deputy Port Conservator has expressed the opinion that even with this width vessels will have to be warped in Mr Wilson suggests that if warping is to be resorted to, it would be better to make the entrance only 80 feet wide so that if desired in the future the dock might be converted more easily into a closed dock by which not only greater stillness would be secured but a greater permanent depth of water in the dock might be obtained. The Board as at present constituted is of opinion that in the first instance it is desirable to make the entrance suitable for vessels to enter under their own steam, with perhaps some assistance from a line thrown on to the quay.

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10. The Board recognises the great weight which attaches to the opinions of the Chamber of Commerce, and Trades Association, and notes from their final replies that while neither body, it is understood, is unanimous both have decided in favour of an inner Harbour or Dock. The Board resolves to submit all material papers to Government together with the letters from the Chamber and Trades' Association with a request that Government will decide after consulting its own Engineers and Sir Alexander Rendel what form the proposed Dock or inner Harbour should take and where it should be constructed.

11. In due course, so soon as a plan and estimate have been sanctioned by Government under Section 64 of the Madras Harbour Trust Act, the Board will ask Government to move the Governor General of India in Council under Section 34 of the Act for his consent to an advance of the funds necessary for execution of the work.

12. That it is of urgent importance that a final decision be come to, and work commenced on, the scheme finally adopted at as early a date as possible, and the Board therefore respectfully solicits the early consideration of this matter by Government.

On being put to the vote this resolution was lost by 5 to 2 and it was then resolved that the Chairman is requested to draft a letter explaining to Government exactly how the matter stands.

(True Extract)

HARBOUR TRUST
MADRAS-4 OCT 8
SECRETARY'S OFFICE

Secretary,
Harbour Trust Board.

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CHAIRMAN

MADRAS 16.SEP.58

HARBOUR TRUST

J. N. ATKINSON Esq.,

CHAIRMAN,

Harbour Trust Board,

Madras.

SIR,

With reference to the question of Harbour Improvements now under discussion we the undersigned, beg to approach you with an expression of our opinion, as we are directly interested in the trade of the port.

2. Three schemes have been proposed by the Members of the Harbour Trust Board:—*viz.*,

(1) A Boat Basin.

(2) A Boat Basin which can be converted into a Wet Dock.

(3) A Wet Dock.

Each of these has its supporters and we have had the benefit of understanding all that has been urged in favour of each, but we beg leave to acknowledge our preference for the last scheme—a Wet Dock for this port.

The only objection of any importance that has been raised against this scheme (No. 3) is on the score of finance. We shall, however, endeavour to show by a comparision of the relative advantages of the three schemes that the Wet Dock scheme, if carried out, would be most economical and profitable to the trade.

3. **Boat Basin.** Taking the financial side of this scheme, we consider that the Harbour Trust Board would have to borrow at least 15 lacs of rupees for this purpose. The interest on that loan and the cost of the up-keep of the basin would entail the levy of additional dues and consequently additional burden to the trade. As regards facilities for importing or exporting we shall possibly be in the same position as we are, that is, absolutely at the mercy of the boat man and the landing contractor. The mitigating or minimising risk of damage to goods would not be any better. On the other hand, some among us consider that matters would get worse. For as packages are generally damaged not on board steamer but in the process of being tumbled into boats or lighters, the greater the despatch with which a steamer discharges her cargo the greater will be

the damage. For the same reason, the greater the capacity of the boats, the greater also will be the damage to goods which would be heaped in larger quantities. Lastly as owing to the position of the basin, boats or lighters will have to ply a greater distance between the steamer and the basin the probability is that boat hire will be enhanced. In any case the present state of matters would not improve in the least.

4. **A Convertible Boat Basin.** All the above objections apply also to this scheme which has the further disadvantage of requiring about 30 lacs or twice the amount of the Boat Basin scheme. The burden to the trade would accordingly be proportionate. This scheme does not appear to be entitled to any consideration except out of deference to its proposers. It has nothing intrinsic to recommend it.

5. **A Wet Dock.** It has been suggested that 40 lacs would be required, for this schemes but as official estimates have a tendency to increase when the work is fairly in progress we may after allowing a margin for the unforseen consider that fifty lacs would be sufficient. Taking the safe minimum of cargo to be about 2,00,000 tons (excluding Coal, Kerosine Oil &c.) exported and imported in a year we think that by charging dock dues on that quantity at the same rate at which the minimum boat hire is now paid *viz.*, Re. 1-2-0 the Board would be able to pay interest on outlay. We base our calculations on the assumption, (1) That Rs. 50 lacs would be required for the construction and full equipment of the dock, (2) That the trade of the port would remain stationary, and (3) That the coal trade would vanish as soon as Bezwada Madras Railway is in full working order.

We anticipate, however, that with increased facilities for landing and shipping goods there would be a corresponding increase in the trade of the port. It has been suggested that some steamers may not go into docks. That would, of course, mean a loss to the Harbour Trust Board in Dock dues. If such a contingency should arise the Collector of Sea Customs can, under the powers vested in him by the Sea Customs Act and also in his capacity as Conservator of the Port, compel the steamers to use the Docks in the interests of the Consignees. However we need not apprehend any loss in this direction as, it is improbable, what with the assurance that they would have to pay nothing and what with the facilities afforded, the steamers would refuse to go into docks.

6. We would accordingly urge that the Wet Dock scheme be viewed with favour, for even if a large outlay is required for the work, it will benefit the trade without additional dues or charges being levied.

The damage done to goods by their being tumbled into lighters and boats would cease. The people that suffer the greatest loss under present arrangements are importers of wine, spirits, glass, earthenware, cement, &c. Even

strongly packed cases get smashed up and when compensation is asked, the steamer Agents have a trite reply—"Frail packing" and consequently the consignees are obliged to bear the loss. The confusion caused in landing of Iron is another nuisance which would also require some attention. In fact, the supporters of the Boat Basin scheme appear to consider that all that is required is facilities for the steamers while seemingly they have no sympathy with the consignees at all.

We have therefore the honor to request that a favourable consideration be given to the advantages of the Wet Dock scheme.

We have the honor to be,

Sir

your most obedient servants,

G. R. C. AND CO.'s PRINTERS, MADRAS.

NAME.	RESIDENCE OR PLACE OF BUSINESS.
Md. Badshesaheb	18th Line Beach
Augusto per pro. G. D'ANGELIS. H. d'Angelis Manager, English Warehouse	2nd Line Beach. 177 Mount Rd " "
Lakon Dass Sons	Mount-Road
Dadaji Khan & Co	do do
Spencer & Co	do do
Binny & Co	Mount Road
Wilson & Co	"
Moses & Co	"

NAME.	RESIDENCE OR PLACE OF BUSINESS.
E Kencatakistnayad Chetty and J T Shunmgam	27 Cope Kencatachellady st Mount Road Madras
Del Sutto	Mount Road Madras
Lawrence Mayo	16 Mount Road
Kapitan	No 1st Line Beach.
Simpson & Co	Engineers & Founders St Thomé Mount Road
Ramaswamy	
Selemanadeen & Co	10 Esplanade Row, Madras
Westr. & Co	Mount Road
Krishnathoo Sripir Dhanu	do
Kanu & Co	1st Line Beach
N. Ghuckchuckdas Vaidya Dhruma	2nd Line Beach
Dhanu & Co	1st Line Beach.
Ramichetty	2nd do
FOR SPENCER & CO. LTD.	80, Armenian Street
Secretary.	Mount Rd
Carl Simon Locher	Esplanade.
Murugesam & Co.	armenian Street.
FOR THE ANGLO-INDIAN TRADING CO., LTD.	
M. J. Ean Managing Director.	

NAME.	RESIDENCE OR PLACE OF BUSINESS.
Mayappa Pillai & Co	No Armenian Street
Mr Mohamed Alibhamajee & Co	No 28 Angappah Naick Street
(1st) Mohamed Khaleel Shirazy Mohamad Hazem Konaji (2nd) Hajee Mirza Mahomed Shirazy	No 36/37 Angappah Naick street No 23 Erabalachetty street No 10, Sambandha Mudali Street, Madras
Harry Ormerod	Secretaries Beach.
Wilson Samuel & Co	Mount Rd.
P. P. Parker & Sons	do.
Sir Thanikachalam Chetty (2nd) Sir Thanikachalam Radhakrishnan	No 111 Mint Street Sowcarpettah

NAME.	RESIDENCE OR PLACE OF BUSINESS.
A Thiruvengadathan Kavin agent D.H.E. Elliott & Co's	156. Popham's Broadway.
SHAIK MAHOMEDALLY & SONS.	Ammen Koyil Street
	Govindappa Naikan St.
	"
	"
	"
Francis & Co	64. Thumboo Chetty St.
	Govindappa Naikan Street.
Ebrahim Currim.	EBRAHIM CURRIM, UMBRELLA MERCHANT, NO. 931, CHINA BAZAAR ROAD, MADRAS. BOMBAY BRANCH.
Hamilton & Co	103 Brownapatnel Bldgs
L. Govindaraj & Co	Ramappa Chetty St. Madras.
C. Chockalinga Chetty	"
[illegible]	"
P. Chidambaram Chetty.	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
P. Arunachurry Chetty	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	Ayyapillay Street
[illegible]	"
[illegible]	"
V. T. Ramanjooloo Chetty & Sons	China Bazaar Road
V. Soobramaniam chetty	

NAME.	RESIDENCE OR PLACE OF BUSINESS.
M. MAHOMEDALLY JEEVAJEE & CO.	Linghee Chetty Street Madras
ABDOOL HOOSSAIN JEEVAJEE & CO.	" "
J. Jagavathee	China Bazar Road Madras
[illegible]	" "
[illegible]	" "
[illegible]	" "
[illegible]	" "
[illegible]	Govindappah Naiken St
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[illegible]	Narayana Moodelly St China Bazar Road Madras
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[illegible]	Narayana Moodelly St Madras
[illegible]	Rasappah chetty St Madras
[illegible]	" "
[illegible]	" "
[illegible]	" "
[illegible]	" "
[illegible]	" "
[illegible]	" "

NAME.	RESIDENCE OR PLACE OF BUSINESS.
[illegible] Ramanjum chetty	China Bazar Road
[illegible] Kistnamah chetty	"
P. Nummalwar chetty	"
V. Moorthoosawmy Mudaliar.	"
[illegible]	"
[illegible]	"
[illegible]	"
M. Venkatasawmy chetty	"
V. Chinnapiah chetty & Co.	Bunder St. Madras
[illegible]	Godown St. Madras
V. Chundrasawmy Mudaliar	Rasappah Chetty St. Madras
[illegible]	Thomasons & Co, Broadway, Madras.
[illegible]	Govindappa Naicken St.
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	"
[illegible]	No 28 Rasappah chetty St.
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

NAME.	RESIDENCE OR PLACE OF BUSINESS.
	Coral Merchant Str
	〃
	〃
	〃

Marine (1897) Department.

CURRENT No. 1274

Order

From
The Chairman,
Harbour Trust Board,
Madras.

No. 2584

Dated 10—10—98

Despatched " —— " ——

Received

Enclosures 9* (*1 Postoffice Receipt)

Spare copies

SUBJECT.

Returning as directed the enclosures sent with G.O.No.110 M dated 11th February 1898,

BACK PAPERS.

G. O.	No.	Department.	Date.

FURTHER PAPERS.

G. O.	No.	Department.	Date.

(10) Marine Department. 9.

C. No. 1257 of 1898.

HIS EXCELLENCY THE GOVERNOR.
1 THE HON'BLE SIR HENRY BLISS, K.C.I.E.
1 THE HON'BLE MR. GROSE, C.I.E.

SUBJECT.

Madras Harbour Improvements.

35 P Note

40 P

FOR ORDERS.

In my opinion the advocate of the dock scheme have made the best of the argument. As the merit of this dock, I approve of Mr. Wilson's proposals as modified in May 1

the C.E.'s former note. His object however, that the whole of the papers & all the competing schemes must be borne for Sir A. Rendel's opinion; it would therefore be a waste of time to criticise them in detail now.

BS
27/10/98

I agree that the ship dock promises best, & that the papers should all be submitted for Sir A. Rendel's opinion.

AHL Bayley 28/10/98

With G.O.No. 110 Marine dated 11th February 1898 are recorded --- notes by Mr. Wilson, the Chief Engineer for Irrigation, and the Secretary to Government Marine Department on the subject of the proposed improvements of the Madras Harbour, An introductory office note will be found attached to the original of the G.O. On the margin of this office note are recorded the instructions of Hon. Members are given. It was then decided that the papers --- should go to the Harbour Trust Board for remarks, and that when their views were received, the Government would consider what scheme, if any, should be recommended to the Secretary of State.

2. The letter noted above contains the reply of the Chairman, Harbour Trust Board, to the reference which

P. W. 13. 500-27-1-98.

H. Wis (1)+(2) 27.10.98 31.10.98

which has been made to him, which includes two estimates for boat basins and a scheme with estimates for a ship dock. In addition to these, the Harbour Trust Board has had under consideration several other schemes for boat, and ship, basins, and for additional piers.

3. The Chairman indicates the steps which the Board has taken to come to a conclusion on the subject, and he discusses the various proposals which have been brought forward.

4. Having regard to the great variety of opinio n that exists on the question of the Harbour improvements, the Harbour Trust Board seem unable to decide on any plan for the future development of the harbour. They therefore lay the whole matter before Government for orders.

5. As regards funds the Board seem inclined to recede from their former proposal for raising money in the open market. They intimate that unless the money market becomes much easier they will have to apply to Government for funds before the execution of any scheme can be put in hand, and they point out that the amount of progress in the execution of the scheme adopted must therefore depend on the amount of money that Government may find it

possible

possible to place at the disposal of the Board.

R.S. 6. The Harbour Trust Board writes to the Colonial Secretary that it is certain some method of the class of facilitation into which it has fallen. This facilitation is practically confined to the mercantile members of the Board, & it is incompetent for that Board to say how should be made to provide the enormous expenditure of a ship dock over a boat basin when that expenditure has been to clear said before them by the Chairman & the Commissioner of the Board, & supported by incontrovertible facts & figures. It will be noted, from the last papers in the file, that so long ago as 1891, the Resident Engineer of the Board, proposed with admirable foresight, the construction of a ship dock at the self same time as those now under discussion. The proposal met with general

+ Flag P & I

B

33

acceptance, but chanal the fate of all others connected with the improvements of the Harbour, & has condemned to the pyramids.

I hope this era of indecisions is now absolutely at an end - both the Chairman & Engr Sup of the Board stung in horns of a ship Dock, & Government. I hope, in accord with News it unlocks strange if the blindness to the interests of the mercantile members of the Board has allowed to block the way. I think, therefore, that Govt should pronounce definitely & unmistakeably in favour of a ship Dock, and decline absolutely to listen to any further arguments in favour of a boat basin.

There is however, some difference of opinion between these Gentlemen. Capons & myself on the form, location & other details of the ship Dock, & as it would be [illegible] waste of time to

4 2 AP

3. 3 8 P

have regular plans & estimates prepared (& all others are misleading) until the board exactly what we want. I recommend that the H.T.B be informed

(a) that Govt considers that in the interests of the trade of the Port, & of the preservation of the shipping, further expenditure on improving Hayden Harbour is unavoidable.

(b) that Govt considers that a ship Dock in the land adjacent to the north of the harbour, is the form which this improvement should take

(c) that the papers on the subject will be forwarded at once by Govt to Sir A. Rendel, & he is be asked to decide

(1) the size & shape of the Dock

(2) the method of its construction

(3) the position & width of its entrance

(4) the necessity or otherwise of a protecting mole.

(d) that Sir A. Rendel's decision

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will be communicated to the H.T.B. who will be requested to have detailed plans & estimates prepared in accordance therewith, & submitted to Govt.

(2) that when these plans & estimates are received, together with a precis of the financial position, Govt will address the Govt of India upon the position of financing the scheme, if the H.T.B cannot see its way to carrying it out in the open market.

9. There is one alternative to a ships dock which should, I think, be also placed before Sir A. Rendel before his decision and that is the closing of the Eastern & opening of a N.E. entrance to the present harbour. This would involve the strengthening of the East face, & probably also of a portion of the N. face, to render them impregnable to the attack of cyclonic waves. It would also

4 39P

mean the construction of quay walls along the Western & part of the Southern faces of the harbour, & dredging the latter up to them.

This scheme would have the great advantage of postponing sine die the silting in the entrance & within the harbour, & we have the evidence of many experienced sea-captains that the harbour will be as accessible as now, & that they will be enabled to stay there during a cyclone practically, if I have rightly understood that the water in the harbour will be at all times sufficient for ships to lie alongside quays. I should much prefer this scheme to any other, because it would render the harbour useful as it is, instead of having recourse to entrance to another harbour, a scheme which could take but a short time in which too much time & money has been spent, & because it will certainly offer

regard

much greater facilities for
landing, shipping & storing
cargo than the small dock
proposed, & will attract the
classes of vessels - But,
if the necessary Millions be
not Granted, & it is almost
impossible to say beforehand
with any certainty that it will
be, we should have spent
perhaps as much, if not more, on this
scheme, than on an inner dock,
& the still, no certain days,
under the method of using
boats for landing cargo -
The success is therefore, un-
certain, while that of a dock
is certain, & it is best to be
sure where large sums of
money are concerned.
I would, however, as stated above,
place this alternative before
Sir A. Rendel for decision

[illegible]
20.10.98

Marine DEPARTMENT.

5

Papers to be read in Proceedings:—

Again G.O., dated 189 –, No.

Again G.O., dated 11th February 1898, No. 110 Marine

Warrant No. ~~1235~~ 2485 of 1898, dated ~~5th October 98~~, from the Chairman, Harbour

" " " 189 " " " " Trust Board.

" " " 189 " " " "

Extract para 9 of Note by the Chief Engineer and Secretary to Government dated 20th October 1898.

ORDER. No. 10 Mar 93-1-99.

His Excellency the Governor

A.54
26.11.98

T/B.

His Excellency the Governor in Council observes that, for some years past, the question of improving the Madras Harbour, so as to provide increased facilities for trade, ~~and to meet the shoaling going on both inside and at the entrance of the enclosure~~, has at intervals engaged the attention of the Harbour Trust Board and of the Local Government. The various measures proposed up to 1896 were referred to the Home Government for the opinion of the Consulting Engineer in London. Sir A. Rendel ~~hoped that the difficulties caused by the movement of sand might be removed by dredging, as regards~~

~~regarded the improvements sug-~~
~~gested for the purposes of trade~~,
~~estimated to cost 15½ lakhs~~,
~~the Consulting Engineer~~ was of
opinion that until the doubts
which attached to the stability
of the harbour and its immunity
from the encroachment of the
sand were finally removed,
the proposals then made were
all that could prudently be
undertaken.

2. The Despatch communicating
these observations was referred
to the Harbour Trust Board on
23rd November 1896 with G.O. No
813 Marine.

3. Since that date the question
of Harbour improvements has
been under almost continuous
discussion by the Harbour Trust
Board and its local profession-
al advisers, and as there
seemed no hope of unanimity
of opinion as to the measures
best calculated to attain the
objects in view, the whole matter
has been submitted to Govern-
ment by the Board for such
action

W

action as His Excellency the
Governor in Council may
consider best.

4. The following are the
schemes which have now
been laid before Government
(a) A boat basin - prepared
by Mr. Pogson - Estimate Rs
8,73,667.
(b) A boat basin similar to
Mr. Pogson's, but altered in some
particulars and providing sheds
in addition - prepared by Mr.
Wilson - Estimate Rs 10,47,239.
(c) A 17-acre dock suitable for
vessels of all kinds, with a
protecting mole extending into
the existing harbour, and of
two quay walls in the harbour,
one alongside the south and
the other alongside the north
arm - prepared by Mr. Wilson -
Estimate Rs 38,28,000.
(d) A Ships Dock as in (c)
above, with the other works
omitted or modified, and
the methods of construction
revised as suggested by the
Chief

Chief Engineer P.W.D
~~to Government~~.

5. As regards funds, the Board have receded from their original proposal to raise money in the open market. They intimate that unless the money market becomes much easier, they will have to apply to Government for financial aid before the execution of any scheme can be undertaken, and they point out that the progress of work will be limited by the amount of money that Government may find it possible to advance.

6. His Excellency the Governor in Council, after a careful review of the situation, is of opinion that in the interests of trade and shipping, the development, ~~by dredging~~ of the Madras Harbour ~~are~~ is essential, and that a Ships' Dock in the sand accretion to the south of

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of the harbour is the form which this development should take.

7. In view, however, of the differences of opinion among local Engineering authorities, and the magnitude of the interests involved, it seems necessary that the highest expert opinion should be obtained. His Excellency the Governor in Council, accordingly, resolves to refer the whole matter to the Home Government in order that the advice of the Consulting Engineer to the India office may be elicited as to the most suitable measures to be adopted for the improvement of the harbour, having regard to local conditions, with which Sir Alexander Rendel is believed to be fully conversant.

8. The following points are indicated for consideration in the event of a ship dock being recommended

(1) The

(1) the size and shape of the dock.
(2) the method of its construction
(3) the position and width of its entrance.
(4) the necessity or otherwise of a protecting mole

9. The question of closing the eastern, and opening a N. E, entrance to the present harbour, as an alternative to a Ships' Dock, adverted to by Mr. de Winton in para 9 of his note recorded above, will also be referred to the Secretary of State for the Consulting Engineer's opinion.

R.S.

31 P- Despatch

1-3-99

To.

The Rt. Hon. the Secy
of State for India

My Lord,

With your Lordships Despatch No. 6 P.W. dated 29th October 1896, was forwarded for our information, copy of a report

Despatch

To.

The Presy. Port officer
- Chairman H.T. Bd.

Flag H

A.S.H
26.11.98

Despatch P

report by Sir A. Rendel on the various measures which had been proposed for the improvement of the Madras Harbour, for the purposes of trade, and for the prevention of the shoaling which the survey of 1895 had disclosed, both inside and at the entrance of the harbour. These measures have since formed the subject of much discussion by the Harbour Trust Board and their professional advisers. The Board has not, however, been able to arrive at any unanimity of opinion, such as would justify the carrying into effect of any particular measures. The matter has accordingly been referred by the Harbour Trust Board to Government for decision.

2. The various schemes that have been brought forward are briefly described in the accompanying copy of our Proceedings No 14 M dated 3-1-99.

and we have the honour to request that your Lordship will be so good as to obtain from Sir A. Rendel an expression of opinion on the measures proposed for the development of the harbour.

We have &c

R.S.

W. M. Sc

9 Oct 1899

Papers accompanying

(1) G.O. No 10 Marine d/3 Jany 99

(2) Copy of letter from S.E. III circle No. 179 B.C. dated 9th Septr 1897 submitting Mr. Pogson's estimate for a boat basin – Rs ~~1047239~~ 373667.

(3) Mr. Wilson's revised estimate for a boat basin – Rs 1047239.

(4) Mr. Wilson's estimate for Harbour development including graving dock for ships – Rs 3828000.

(5) Portfolio of plans.

(6) List of ships using the harbour showing their lengths.

(7) Copy of letter addressed to the Secretary, Harbour Trust Board by Messrs. Gayzer Irvine and Co.

End Eng HS. 23-11-98 - Rs 28-11-98

4

The Despatches will explain his request to forward to the Secretary of State the ~~enclosures~~ plans and estimates and other enclosures connected with the Madras Harbour Improvements. The draft of the order having contained instructions for the despatch of these documents.

R.S.

9 Mar 99

2 2

No 7

C. & W.

I beg to submit
that on the 5th January
1899 a signed copy
of despatch No. 1
Marine with copy of
Proceedings attached
was despatched to the
Right Honorable
the Secretary of State
for India with a
pencil note that
enclosures will follow,
as Subrahmaniya
Aiyar had told
me that Marine
C. No. 1278 and
portfolio of plans
were sent to W on
the 21st October/98.
I was watching for
these documents by
seeing the disposal
register

register of outward
and the enclosures
last every precaution
them. I kept the
original papers
with no purpose
with this object
I made a thorough
search for the
documents in
the Record and
the Technical
sections. I regret to say
that I did not report the
matter to you.

Subramoneyar.

Please let me know
whether you informed the
Despatcher that the Portfolio
and the current had been
missing.

Init. 10/3/99

H.C.

Just before the Christmas holidays, when I saw the file of G.O. 10 March 3-1-99 with the Despatcher, I told him that there was another currant and a big portfolio of plans connected with it which I thought were missing and had incidentally referred the matter to C.A.W. I asked him to be on the look out for them as, eventually if they were actually missing, the matter would have to be reported formally to C.A.W.

Jas
10-3-99

C. A. W.

Submitted. The matter should have been brought to notice earlier

H.S. 23-4-98.

3

H.S.W.

The Despatcher says that the original documents sent to the Secretary of State contained a pencil note to the effect that the missing enclosures would "follow". If this be so, the India office will doubtless wait some time for them. They have now been sent and it is hoped that they will arrive before any formal application is made to the country. Should the India office wish out complaining of the delay, some explanation will be necessary. The following remarks are therefore placed on record. They should be attached to the original G.O. 10 March of 3rd Jan 99 for future reference.

On the day before yesterday I had occasion to consult my portfolio of Sanitary Board papers

4

original therefore that
its deposit in the
Registry was record

PUBLIC WORKS SECRETARIAT.

IRRIGATION BRANCH,

CHEPAK, MADRAS.

Please see
file.
Asst
30/3/88

Edgeward 30-1888.

Sir

I received
enclosed letter from
the Secy to the Harbour
Trust yesterday, and
on enquiring from
Parsons I found
that the portfolio
of plans was not
CAW