GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

28th December 1880, No. 2,949 W.

General.
Establishment.

Read the following paper:—

No. 97. From F. N. THOROWGOOD, Esq., M. Inst. C.E., Superintendent of Madras Harbour Works, to the Secretary to Government, Public Works Department, Buildings and Roads, dated Madras, 15th December 1880, No. 71 W.

I HAVE the honor to state that from what I have learnt to-day from Mr. Parkes it will be necessary for me to request Government to sanction the entertainment of a special leading workman to put down the screw moorings for this harbour.

2. I was under the impression that such a man would be sent out by the contractor for the moorings, but this is not the case. The salary of the man is allowed for in the cost of the moorings, and would be arranged in England.

3. I have no one on the works who has had charge of the details of fixing moorings, and I have told Mr. Parkes that I must have a special workman for this. No action can be taken, however, until the request for such assistance be transmitted through the Madras Government.

4. Mr. Parkes leaves on the 17th for Madras, but he has made all arrangements for securing the services of an experienced man, and all that is now needed is sanction of this Government for the appointment. I therefore request that this sanction may be given at as early a date as possible.

No. 98. ORDER THEREON, 28th December 1880, No. 2,949 W.

SANCTION is accorded to the engagement of a Moorings Superintendent. The precise terms of the engagement should be reported for formal approval.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent of Madras Harbour Works.
„ Examiner of Public Works Accounts.

Exd. F. C. Shunker.
Spare Copies

GENERAL.
ESTABLISHMENT.

Gobt. of {1880} Madras.

PUBLIC WORKS.

To

THE SUPERINTENDENT, OF
MADRAS HARBOUR WORKS,

&c., &c., &c.

Dated December, 28th.

Issued

Recd. *Encl.*

G. O., 28th December 1880, No. 2,949 W.

DECEMBER.

Nos. 97-98.

Moorings Superintendent for the Madras Harbour Works.—Sanctions the engagement of a — reporting the terms for formal approval.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

2nd February 1881, No. 284 W.

General.
Establishment.

Read the following paper :—

No. 8. From F. N. THOROWGOOD, M. INST. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 10th January 1881, No. 79 W.

ADVERTING to the orders of Government, No. 2,949 W. of 28th December 1880, I have the honor to state that it will be necessary that the Secretary of State be addressed on the subject of the appointment of a leading hand for screwing down the Harbour moorings.

2. I cannot give the precise terms for the engagement of such a man, but Mr. Parkes has left clear instructions on the subject in England, and from the India Office reference will at once be made to Mr. Parkes's office on receipt of a requisition for the man from the Government of Madras.

3. I would venture to suggest that a telegram be despatched asking for a Foreman for screw moorings, so that he may arrive nearly at the same time as the moorings themselves.

No. 8-A. Telegram from the Secretary to the Government of India, Public Works Department, Calcutta, to the Secretary to Government, Public Works Department, Madras, dated 28th January 1881.

AFTER inquiry no Mechanical Engineer can be found for Madras Harbour moorings.

No. 9. ORDER THEREON, 2nd February 1881, No. 284 W.

ORDERED that the following telegram be despatched, and copy of the foregoing correspondence, with a copy of G.O., No. 2,949 W., dated 28th December 1880, forwarded to the Secretary of State for India :—

"Foreman required for screw moorings Madras Harbour. Please engage and send out a man. Terms on record in Mr. Parkes's office. Calcutta cannot supply."

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent, Madras Harbour Works.
" Examiner of Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL.
ESTABLISHMENT.

Govt. of {1881} Madras.

PUBLIC WORKS.

To

THE SUPERINTENDENT, MADRAS
HARBOUR WORKS,

&c., &c., &c.

Dated February, 2nd.

Issued

Recd. *Encl.*

G. O., 2nd February 1881, *No.* 284 W.

FEBRUARY.

Nos. 8-9.

Moorings Foreman, Madras Harbour Works.—Telegram to the Secretary of State for India to engage a —.

Public Works Department

PUBLIC WORKS DEPARTMENT.

No. 7 .

TO THE MOST HONORABLE THE MARQUIS OF HARTINGTON,
SECRETARY OF STATE FOR INDIA.

MY LORD MARQUIS,—In continuation of our telegram of the 2nd instant, we have the honor to forward the accompanying correspondence* relative to the engagement of a special leading workman to put down the screw moorings for the Madras Harbour.

* Proceedings of Government, No. 2,949 W., dated 28th December 1880.
Do., do., No. 284 W., dated 2nd Feb. 1881.

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

(Signed) W. P. ADAM.
(„) ~~N. B. CHAMBERLAIN.~~
(„) W. HUDLESTON.
(„) ~~DAVID F. CARMICHAEL.~~

FORT ST. GEORGE,
15 February 1881.

Exd. S. T. Austin.

FORT ST. GEORGE.

PUBLIC WORKS DEPARTMENT.

Letter to the Most Honorable the Secretary of State for India.

Dated 15th February.

No. 7 of 1881.

FORWARDING correspondence relative to the engagement of a Moorings Foreman for the Madras Harbour Works.

Public Works Department

Proceedings of the Madras Government

Read the following.

Despatch from the Secretary of State for India
N° 9 dated 24th March 1881

Telegram from Governor Madras
to the Secretary of State dated 2d Feby 81

"Foreman required for screw moorings Madras Harbour. Please engage and send out a man. Terms on record in Mr Parkes's office. Calcutta cannot supply"

With reference to your Excellency's telegram quoted in the margin, I have to inform you that Mr. C. Jackson who is acting for Mr. Parkes C.E. during his absence from this Country has recommended Mr W. J. Boteler for employment as Foreman for putting down and fixing the Mooring System in the Madras Harbours, and I have accordingly caused Mr. Boteler to be engaged for such employment on the terms and conditions detailed in the accompanying copy of agreement entered into by him

2. Mr. Boteler will leave for Madras by the Mail leaving Southampton on the 30th Instant

Order thereon 26th April 1881 N° 1089 W.

Communicated to the Superintendent Madras Harbour Works for-

for information and guidance

(True Extract)

Lt. C. C. Ramson
Captain R.E.
Off. Under Secy to Govt Pub. Wks.

19/3/83

India Office, London,

~~7th December 1880~~
24th March 1881

Sir,

I have the honor to inform you that the bearer of this letter, Mr. W. S. Bobeler has been appointed by the Secretary of State in Council Foreman for putting down Screw Moorings in the Harbour at Madras

I have the honor to be,

Sir,

Your most obedient Servant,

A. Strange Lt Col

Director General of Stores for India.

To The

Secretary to Government,

Public Works Department.
(Madras Harbour Works)
Madras

Y 2019. 50.—12/80. I. 2888.

* ENCLOSURE * EXAMINER P. W. 136 X 8 MAY 81

P.W. 2857/81.

Through the Examiner P.W.

No. 911

From

THE SUPERINTENDENT,

MADRAS HARBOUR WORKS,

To The Secretary to Government
P. W. Department
Buildings and Roads

MADRAS, 2nd May 1881.

1 Enclosure

SIR,

I have the honour to report that Mr. W. L. Boteler, Foreman for putting down the screw moorings in the Madras Harbour, arrived here this morning.

2. I enclose herewith a letter brought by Mr. Boteler from the India Office and delivered by him to me.

I have the honor to be,
Sir,
Your most Obdt Servt

F. Harrowood M. Inst. C.E.
Superintendent
M. H. Works

JEH
Rcd Encl

No 854 W. & 855 W. 7/3-4-80
P.W. Secy's No 19 A. 7/20-4-80
" 1128 A.W.F.
No 1120 P.W. 10-5-80
" No 1113 A.W. 10-5-80
No 1316 W. 4-6-80
Accts No 29. 12-6-80
G.O. 2048 W 30-8-80
" 2244 W & 2245 W 24-9-80
" 2502 A.W. & 2502 B.W. 29-10-80
" 2765 W. & 2766 W. 1-12-80
B.H. 396 W. 12-2-81
" 482 W. 22-2-81
Encl. to No. 136 & date 3d May 1881.

No 2949 W 28-12-80
" 284 W 2-2-81
Accts No 7 07 15-2-81
No 1085 W 26-4-81

Buildings & Roads

3rd May

From

The Superintendent
Madras Harbour Mch.

Forwarded to the Secretary to Government Public Works Department for information.

2. A note of the date of Mr. Boteler's arrival has been taken by this Office.

No. 9 W-
Dated 2nd May 1881

Rec'd 11 May

D. C. Gordon
Examiner P.W. Accounts.
2nd May.

Rec'd 18/5/81

No 1312 W. 23/5/81

B

Recorded

Cy

23-5-81

No. of Enclosures one

No. 1312 W

Moorings

Reports arrival of Fireman for putting down moorings with order

R. 23-5-81.

G.12-5-81 Rs 20/-

CAMTER
30 MAR 81

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

25th November 1881, No. 2954 W.

Buildings and Roads.
Civil Works.

Read again :—

No. 118. From Colonel W. S. TREVOR, R.E., Officiating Secretary to the Government of India, Public Works Department (Account—General), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 22nd October 1881, No. 379 A.G.

I AM directed to request that you will furnish the Government of India at a very early date with a special report on the present state of the Harbour Works, the sufficiency of the grant already assigned for the work for the current year, and the probable amount, if any, that will be needed next year.

No. 118-A. From W. PARKES, Esq., M. INST. C.E., Engineer-in-Chief, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated 23, Abingdon Street, 12th October 1881.

Madras Harbour Moorings.

THE orders of the Government of Madras, No. 1797 W. of 21st July, and No. 2184 W. of 3rd September, having been referred to me for remarks, I beg to submit the following.

2. The former is based upon a letter from the Master Attendant in which he says "our increased experience of the capabilities of the Madras Harbour has convinced myself and the officers of this department that the system of buoys which was prepared in consultation with Messrs. Parkes and Thorowgood and submitted for orders of Government with my letter No. 2017, dated 11th March 1879, requires revision, and the substitution of a smaller number than was then considered practicable and a different disposition of them."

3. The question here raised was referred by the Government to a Committee, and that Committee has made an *ad interim* report, on which the second order above noted is based, simply recommending that the first steps in carrying out the sanctioned scheme be proceeded with.

4. I am bound to confess that I do not understand why the Master Attendant considered it necessary to bring this question before the Government at all. I presume that he has discretion, by the very nature of his office, to lay down as many or as few buoys as he thinks desirable, and he is in no way bound to the 29 sites shown on the plan, but has the choice of 96 sites.

5. The principle of the system is to distribute over the whole area of the harbour (except the space near the entrance, which must always be kept free for ships to bring up in) 134 points of attachment for mooring chains. These points of attachment consist of screws sunk in the ground 20 feet, with chains attached, of which only the last link is to remain above ground. Four of these are to form the attachment for a buoy, but if they are not immediately required for that purpose, they may be left for an indefinite time, during which they will be no obstruction to shipping. They will only require that some small object, such as a log of wood more conspicuous at the bottom of the harbour than the end link of a chain, be attached to each that they may be found by a diver when required.

6. I cannot imagine any distribution of these screws which would give a greater latitude of choice to the harbour authorities for the positions of the buoys than that adopted, and I consider it of great importance that there should be this latitude of

choice, not only for present, but for future, arrangements. It may be that the number of screws is unnecessarily great for present requirements, but their fixing requires special appliances which may not be available when an extension of accommodation is required, and as the whole expenditure upon their purchase and fixing is only about Rs. 50,000, there does not appear to be much object in deferring the fixing of such portion as might, so far as immediate arrangements are concerned, be dispensed with, to be hereafter fixed at a much increased cost.

7. I would therefore express a hope that these considerations be weighed before any departure is permitted from the arrangement of the *screws* already sanctioned (with one small modification which I have already suggested to Mr. Thorowgood), but the number and position of the *buoys* is a question on which I have no opinion to offer.

Read also—

No. 118-B. From F. N. THOROWGOOD, Esq., M. INST. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 9th November 1881, No. 58 W.

I HAVE the honor to submit the following report in reply to the Order of Government No. 2701 W. of the 2nd November, on a letter* from the Government of India.

* No. 379 A-C, 22nd October 1881.

2. I forwarded for the Government of India, with my letter No. 54 W. of 24th October 1881, a plan showing the state of the harbour at the end of September, and this may be taken practically to represent the present state of affairs as regards the lengths of the piers, the depths of water, and the state of the shore within and without the harbour.

3. STATE OF THE PIERS.—The two piers are now completed in length, and terminate in water eight fathoms deep below mean sea level, with an opening of 550 feet between their terminations. There yet remains to be built on each pier a return wall or horn, the object of which is to prevent the waves from running round the curved walls, by deflecting them off at first starting.

4. DATE OF COMPLETION.—These horns are only 70 feet in length, but they are designed on so sharp a curve that it will be necessary to alter the wheels of the Titan cranes before any blocks can be set. The two cranes have likewise to be turned completely round in their own length, which will probably be a risky and difficult undertaking. I do not therefore think that the piers will be actually and finally completed before April of next year.

5. CONCRETE BLOCK-WORK.—The length of the concrete block-work of the north pier is 3,870 lineal feet, and this has been built in $4\frac{3}{4}$ years. The length of the block-work of the south pier is 3,972 feet, and this has been built in 4 years. The estimated quantity of concrete blocks for the piers was 2,00,100 cubic yards; the quantity actually used has been 2,06,581 cubic yards, and it is possible that about 80 cubic yards additional will still be required.

6. SETTLEMENT.—Towards the ends of the two piers, where the rubble foundation is deep, there has been in some places an excess of settlement by the compression of the underlying rubble. This settlement has, however, never brought the work down to more than 9 inches lower than the designed height of 3 feet 6 inches above high water. The *general* appearance of the upper surface of the whole 7,842 feet of block-work is fairly regular, although irregularities are conspicuous at some places on close inspection. During the construction of the piers no block has ever been bodily displaced by the sea, but in November 1880 one block at the extreme end of the north pier (as it was then) was undermined and sunk down 3 feet. The shallow-water portions of the piers also suffered during construction, owing to the foundations being buried in sand. Some repairs will be necessary to those portions when the piers are completed, but I have not judged it necessary to carry these out yet because of the traffic along the piers.

7. SHELTER AFFORDED.—The harbour affords excellent shelter now during all winds except those from due east, and with the wind in this quarter the surf is greatly reduced, but not entirely abolished. All steamers calling at Madras now enter

the harbour, and there can be no doubt as to the immense benefit derived from the work. Large full-rigged sailing ships also come inside during the fair season, and are at present only excluded during the storm months on account of the absence of a steam tug and the backward state of the moorings.

8. MOORINGS.—The fixing of the moorings is proceeding but slowly, the executive difficulties having proved heavier than was anticipated. These, however, are diminishing as we gain more experience. There are now nine shallow water moorings fixed in position, and one buoy attached to four screws is fixed in nearly $4\frac{1}{2}$ fathom water. These buoys are used freely by vessels, but the moorings in deeper water are what are more needed at present, and these will now be proceeded with whenever the sea is sufficiently smooth, for the surface has to be perfectly calm to allow of the screwing apparatus to be worked.

9. DEPTH OF WATER.—The bottom of the harbour was surveyed by the Harbour Works staff in September last with the utmost care and accuracy, and the result has been submitted to Government with approval.* There is absolutely no silting up except in the south corner, and this is easily accounted for. The depths were compared with those of September 1879, and in both instances are reduced to what is called DeHavilland's mean sea level, which seems to be in reality about 1 foot below high water.

* G.O., No. 2521 W., dated 15th October 1881.

10. With reference to the probable expenditure during the current year, I have carefully gone into each head of account, and I believe that the total sum granted for the current year will be sufficient.

11. EXPENDITURE.—The following table will place the figures more clearly:—

	RS.
Amount allotted as per budget estimate, 1881-82	3,78,247
First supplemental grant—G.O., No. 1483 W., 14th June 1881 ...	73,822
Second " " " " 1997 W., of 13th August 1881.	2,00,000
Third " " " " 2475 W., 8th October 1881 ...	74,000
(This was on account of the Madras Railway).	
Total ...	7,26,069
Expenditure up to 31st October (approximate)	5,14,225
Balance for remaining five months	2,11,844
Estimated in detail to be expended up to 31st March 1882 ...	2,02,724
Balance ...	9,120

I have allowed for payments to be made in England for moorings and for all other expenses that I can think of as likely to occur, but not for any very heavy charge on account of purchase of land to the north of the harbour, as I do not know how that matter stands. It seems therefore that for the remainder of the current year no extra funds will be needed.

12. For the ensuing year 1882-83 the executive work will be confined to completing the moorings, fixing a lighthouse and generally closing the work, and possibly for purchasing land to the north or carrying on heavy protective works. It is hard to estimate at this date what will be required, as the months of November and December may bring such seas as will do more damage to property than has yet occurred. With such a possibility in view I think Rs. 2,00,000 ought to be available for next year. It must, however, be borne in mind that Rs. 80,000 may pretty safely be reckoned upon for the sale of plant, and that possibly some gain may accrue from the land newly formed to the south of the harbour.

No. 2661.

REFERRED to the Master Attendant, Administrative Department, Madras, for any observations he may wish to offer, particularly on the subject of paragraph 7.

(Signed) R. H. SANKEY, Col., R.E.,
Secy. to Govt., P.W.D.

14th November 1881.

No. 118-C. From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 19th November 1881, No. 10176.

THE altered conditions of the harbour render it unnecessary to notice any portion of the letter, No. 58 W., dated 9th November 1881, from the Superintendent of the Madras Harbour Works, except paragraph 7, and on that I have the honor to forward the following remarks.

2. A very considerable amount of shelter is still given to steamers in respect of landing and shipping operations, and so far the use of the harbour is of great benefit to the port; but owing to the large space occupied by the wrecks of the *Hobart* and *Salisbury*, and the necessity of giving the injured walls a wide berth, I have felt it necessary to limit the entry of steamers to three at one time. It is possible, therefore, though at this season not probable, that vessels might have to wait their turns for a few hours. The distribution of the mooring chains already laid down in the south corner also limits the practicable space on that side. The subject of the moorings will have to be carefully reconsidered. Mr. Thorowgood in a letter to me says it is imperatively necessary that the buoys should keep the ground shackle well off the ground. Mr. Parkes in a letter,* recently forwarded to me by Government for report on the same subject, says that the cables and bridles may be allowed to lie on the ground for an indefinite period. One thing is certain that an ample amount of play must be given to the buoys, without which the moorings cannot be safe. I am informed, though not officially, that the large buoy which parted its fastening without any ship at it, was hove down to the upper shackle with a force equal to six tons. It is obvious that with a sea running 10 or 12 feet high something must go. I expected the buoy, which is very thin material, would have collapsed, but it seems the chain broke. All doubts about the safety of these moorings must be removed before they can be brought into general use. I suppose they were tested in England, but information on that head should be sought from the India Office.

* Dated 12th October 1881, herewith returned.

3. As regards the steam tug, Mr. Green, who I had hoped would have carried out the order for me, informs me that the India Office declined his interference, and deputed the work to their broker. The tug would doubtless have been here before the accident, if the former arrangement had been uninterrupted, and the choice would have that of practical men. The want of success that has attended all indents for steam vessels for this Presidency hitherto makes me anxious for this one. It is unnecessary to say she would be of great use now.

No. 119. ORDER THEREON, 25th November 1881, No. 2954 W.

ORDERED that the reports above recorded from the Superintendent, Madras Harbour Works, and the Master Attendant, Madras, be forwarded to the Government of India, with reference to their letter of the 22nd October, No. 379 A.G.

2. The Government of India will also be furnished with the subsequent reports made by the Chief Engineer, Public Works Department, and the Superintendent of the Madras Harbour Works, detailing the damage sustained by the harbour by the recent storm.

(Here enter No. 2955 W., dated 25th November 1881.)

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent, Madras Harbour Works.
" Marine Department, with copy of Note by the Honorable W. Hudleston.
" Master Attendant.

Exd. E. C. Shunker.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1881} Madras.

PUBLIC WORKS.

To

THE SUPERINTENDENT,
MADRAS HARBOUR WORKS,
&c., &c., &c.

Dated November, 25th.

Issued

Recd. *Encl.*

G.O., 25th November 1881, No. 2954 W.

NOVEMBER.
Nos. 118-119.

Madras Harbour Works.—Reports regarding the state of the —, and the probable amount of funds required in 1882-83, with reports of the damage to the Harbour Works during the late cyclone, ordered to be forwarded to the Government of India.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

21st December 1881, No. 3169 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 81. From F. N. THOROWGOOD, Esq., M. INST. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 10th December 1881, No. 72 W.

I HAVE yesterday received G.O., No. 2954 W., of November 25th, 1881, in which appears a letter from the Master Attendant to Government referring to the Harbour buoys.

2. I must beg to be allowed to correct Captain Taylor in what he has represented me as saying, Mr. Parkes's written instructions to me regarding the large buoys were that "you must keep the swivels of the bridle chains clear of the ground." The necessity of this is obvious, as it is to allow the buoy and chain to revolve freely on the swivel, which would not be the case if the swivel lay on the ground.

3. When I found that Captain Taylor thought the large buoy was moored too taut, I wrote to him and drew his attention to the necessity of keeping "the swivel of the bridle chain clear of the ground." I was perfectly aware that the *ground shackles* might be anywhere, and had received Mr. Parkes's views on that point also.

4. As Captain Taylor's letter now reads, it would seem that I insist on lifting the "ground shackles," and that Mr. Parkes does not so insist, which places me in the apparent position of insisting on an absurdity and of going counter to Mr. Parkes's orders. What I in reality have done is to carry out his instructions by hanging the swivel clear of the bottom.

5. With reference to the strain on the buoy referred to by Captain Taylor, I cannot tell how he arrived at 6 tons load, but I must remark that the load was not sufficient to sink the buoy to its proper line of floatation, so the strain was less than was intended for similar buoys in $7\frac{1}{2}$ fathoms of water.

6. I would also remark that the chain did not break, but the shackle pin came out owing, as I believe, to the peculiar method of fastening.

7. I would very respectfully ask that these corrections may be recorded.

No. 3018.

REFERRED* to the Master Attendant, Administrative Department, Madras, for any remarks he may wish to offer.

* To be returned.

14th December 1881. (Signed) R. H. SANKEY, Col., R.E.,
Secretary to Govt., P.W.D.

No. 81-A. From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 16th December 1881, No. 11235.

MR. THOROWGOOD having forwarded me a copy of a letter he has addressed to Government, in the Public Works Department, regarding the swivels of the bridle chain attached to the moorings, I beg to acknowledge that I had not read his letter aright, and that, when I considered that his letter and Mr. Parkes's instructions were at variance, I made a mistake. I have now been furnished with a rough sketch of

the connection, and I see the swivel is attached to the large ring to which the four chains are united. But while admitting my mistake, I must be allowed to say that it does not in any way interfere with the important question of tight mooring, to which I attribute the accident on the 12th, and the evil reputation that hangs over the moorings, which reputation must be cleared up before any use can be made of them. The swivel is certainly in the wrong place, it should be near the buoy. Of course being where it is no change is worth making now, but another swivel must be introduced higher up, and the buoy allowed fair play. The drawing of the pin of the upper shackle, if that was the fault, must be gone into. I consider the question of the mooring to be of vital importance, and beg to suggest that an inquiry be held as soon as convenient while what evidence can be procured is still available.

2. The original letter from Mr. Thorowgood referred to me for remarks is herewith returned.

No. 82. ORDER THEREON, 21st December 1881, No. 3169 W.

MR. PARKES will, as early as possible after his arrival from England, submit a report on the Harbour Works, with special reference to the effects of the storm of the 12th and 13th November 1881.

2. In doing so he should deal with the subject in generally the following order :—

1*st*, the effects of the storm on the works ;
2*nd*, the points of the original design which having proved defective now call for modification ;
3*rd*, whether the shelter against wave disturbance within the Harbour has been sufficiently provided for in the original design ;
4*th*, whether the details of the mooring arrangements require modification with reference to the objections urged by the Master Attendant in the marginally quoted correspondence ;
5*th*, the condition of the foreshore north of the Harbour ;
6*th*, the foreshore within the Harbour, and whether the plan of jetties now under execution is in all respects suitable ;
7*th*, the plan which under each of the foregoing heads it would now seem best to adopt for completion of the works, with a statement of the approximate outlay and time required for execution.

G.O., No. 1797 W., dated 21st July 1881.
„ „ 2484 W., „ 3rd Sept. „

3. To enable Mr. Parkes fully to prosecute his inquiries such of the past correspondence in the office of the Chief Engineer and Secretary as he may require will be placed at his disposal. He will also be authorised to call on any Government officer for information likely to be of service to him.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Engineer-in-Chief, Madras Harbour Works.
„ Superintendent, Madras Harbour Works.
„ Marine Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1881} Madras.

PUBLIC WORKS.

To

THE ENGINEER-IN-CHIEF, MADRAS HARBOUR WORKS,

&c., &c., &c.

Dated December, 21st.

Issued

Recd. *Encl.*

G.O., 21st December 1881, No. 3169 W.

DECEMBER.

No. 81-82.

Madras Harbour Works.—Mr. Parkes requested to submit, as early as possible after his arrival from England, a report on the —, with special reference to the effects of the storm of the 12th and 13th November 1881.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

26th January 1882, No. 227 W.

Buildings and Roads.
Civil Works.

Read the following papers :—

No. 121. From W. PARKES, Esq., M. INST. C.E., Engineer-in-Chief, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 3rd January 1882, No. 1 W.

I HAVE the honor to inform you that I arrived in Madras on the 30th ultimo, in pursuance of the instructions of the Secretary of State, and that I at once commenced my investigations into the present state of the works with the view of submitting at as early a date as possible a report upon them embodying my recommendations for their restoration and completion.

2. Mr. Thorowgood and Mr. Beardmore have already made considerable progress with the necessary surveys, but much yet remains to be done before sufficient materials shall have been obtained for fully matured conclusions. No time, however, will be lost in pursuing the investigation.

3. In the meantime I think it desirable not to delay furnishing what I think will be deemed a satisfactory explanation of one fact which occasioned general surprise, viz., the parting of the six new buoys from their mooring chains during the storm of the 12th November.

4. The explanation is this. The buoys are attached to the chains by shackles which are made in strict accordance with the Admiralty specification and were all subjected to a proof strain of $40\frac{1}{2}$ tons for the small buoys and 112 tons for the large ones, strains of which the force necessary to draw the buoys under water would be but a small fraction.

5. Each of these shackles has a bolt passing through it, which takes all the strain, and this bolt is prevented from shaking out by a tapered steel pin passing through it and the eyes of the shackle. This again was intended to be kept in its place by a small pellet of lead driven into a properly shaped receptacle, *but this last precaution was omitted.*

6. The consequence was that when the bolts of the shackle had little strain upon them, but much vibration owing to the tossing of the buoys by the waves, the steel pins were first shaken out and then the bolt, and the buoys floated away.

7. If there had been the continuous strain of a ship upon them, the bolts would probably have kept their places, and this is confirmed by the fact that the buoy to which the steam hopper barges were secured did not give way till after the hawser by which they were attached parted, but subsequently when there was no strain upon it it drifted away.

8. As this mode of securing the shackle bolts is not new but has been in universal use for all Admiralty moorings for many years, it did not occur to me to issue any special instructions to Mr. Thorowgood regarding the provision and use of the leaden pellets. It appears, however, that neither he nor Mr. Boteler, the Mooring Foreman, nor the officers of the Marine Department were aware that this was an essential part of the design.

9. I would express a hope that the Government would take measures to make public this simple explanation of what certainly appeared at first sight a serious failure.

No. 92.

REFERRED to the Superintendent of the Madras Harbour Works for any remarks he may desire to offer.

11th January 1882. (Signed) ROSS THOMPSON, Lieut.-Col., R.E.,
Ag. Under Secy. to Govt., P.W.D.

No. 121-A. From F. N. THOROWGOOD, Esq., M. INST. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 12th January 1882, No. 82 W.

I HAVE the honor to return herewith Mr. Parkes' letter to Government, No. 1 W., dated 3rd January, bearing your endorsement No. 92, dated 11th January 1882, which is referred to me for remark.

2. I have no doubt that the coming ashore of the buoys was entirely due to the absence of the leaden plug which should have been driven in over the end of the locking pin of the shackle bolt. It is greatly to be regretted that this omission occurred, as it has in a measure brought the moorings into disrepute.

3. As the work of putting down the moorings and attaching the buoys was in my hands, I feel it necessary to state that, although I was in possession of several tracings of the buoys, chains, and shackles, there was not shown on any of them any indication of a leaden plug to retain the locking pin in its place. In Mr. Parkes' weekly letters to me, in which the mooring gear was described in detail, no reference was ever made to these leaden plugs, and when the shackles were sent out from England no leaden plugs were forwarded for insertion into the shackle. Mr. Boteler who was under me as Special Foreman for the moorings and who came out from England presumably with all necessary information as to details, had received no instructions as to the leaden pellets nor did he know that they were required. I myself never heard of their being used before, and was in perfect ignorance of their necessity in this case. It appears, however, that the Admiralty have insisted on their use in their specifications for certainly eight years.

4. I trust that this statement will show that the failure of the buoys was not the fault of the executive staff here.

No. 121-B. From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 9th January 1882, No. 130.

I HAVE the honor to acknowledge the receipt of Proceedings of Government and the order thereon, No. 3169 W., dated 21st December 1881, and to state that I have received Mr. Thorowgood's explanation of the case of accident to the harbour buoys, copy of which I append; but while admitting that it accounts for much of the mischief caused to the smaller buoys, where the pins of the shackle appear to have worked out, it does not clear up the mystery connected with the large buoy, which was too lightly moored to admit of any shaking, such as might affect the smaller ones. A more reasonable explanation is in my opinion afforded by the position of the shackle, which directly connects the buoy to the moorings, the jaws of which were turned up, and in this situation enabled the long spindle of the buoy to exercise a powerful leverage sufficient as is now shown to extend the jaws of the shackle and cause the separation from the buoy. All doubts about the moorings must be set at rest before I can recommend Government to take the responsibility of hanging ships to them. The

subject of moorings belongs appropriately to the Marine Department, and this department should be invited to co-operate with the Harbour Works in laying them, if not entirely to control the operation. I would respectfully suggest that on the return of the Chief Engineer he should be asked to come to the beach and make a careful inquiry into the whole subject, the importance of which cannot be overestimated. The duration of the moorings under water is also another subject upon which some light can be thrown by an inspection of the large buoy belonging to this department, which has been three years afloat, but is now lying on the beach.

From F. N. THOROWGOOD, Esq, M. INST. C.E., Superintendent, Madras Harbour Works, to the Master Attendant, Administrative Department, dated Madras, 3rd January 1882, No. 315 M.

I HAVE the honor to forward herewith a tracing of a large buoy and fastenings, similar to that which broke away on 12th November.

2. The cause of the failure of the fastening has been instantly explained by Mr. Parkes. The small pin for keeping the bolt of the shackle in place ought to have been secured by means of a pellet of lead hammered down over its end. But as no advice or instructions had been sent to me about the necessity for these leaden pellets, and as no such pellets were sent with the moorings, neither I nor any of my staff were aware of their being an essential part of the design; by the Admiralty for the last seven years.

3. It seems that this system of securing the bolt of the shackle has been exclusively adopted

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No. 122. ORDER THEREON, 26th January 1882, No. 227 W.

THIS correspondence will be referred to the Harbour Committee, who will be requested to collect the facts of the case in regard to the failure of the moorings to admit of a reference being made to the Secretary of State for such further inquiry as may be necessary from the authorities in England best acquainted with the system.

(True Extract.)

Lieut.-Col., R.E.,
Ag. Under Secy. to Govt., P.W.D.

To the Harbour Committee.
" Superintendent, Madras Harbour Works.
" Engineer-in-Chief, Madras Harbour Works.
" Marine Department.

Exd. E. C. Shunker.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of [1882] Madras.

PUBLIC WORKS.

To

THE HARBOUR COMMITTEE,

&c., &c., &c.

Dated January, 26th.

Issued

Recd. *Encl.*

G.O., 26th January 1882, No. 227 W.

JANUARY.

Nos. 121-122.

Failure of the Harbour Moorings.—Referring to the Harbour Committee for report papers relating to the — .

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

7th February 1882, No. 328 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 24. From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 3rd February 1882, No. 912.

SINCE writing the letter as per margin, I have the honor to state that Mr. Parkes called at this office and, in speaking of the accident to the buoys, attributed it to the leaden pellets of the shackles having been overlooked; but I cannot endorse this opinion, and think a matter of such great importance should be properly investigated, and the whole question of the moorings should be gone into. I therefore respectfully beg that the recommendation made in the letter quoted in the margin (copy of which is herewith sent), that the Chief Engineer should make a full inquiry into the matter, be carried out without loss of time.

No. 130, dated January 9th, 1882.

No. 25. ORDER THEREON, 7th February 1882, No. 328 W.

RECORDED with reference to G.O., No. 227 W., of 30th January 1882.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Marine Department.
„ Superintendent, Madras Harbour Works.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1882} Madras.

PUBLIC WORKS.

To

THE MARINE DEPARTMENT,

&c., &c., &c.

Dated February, 7th.

Issued

Recd. *Encl.*

7th February 1882, *No.* 328 *W.*

FEBRUARY.

Nos. 24-25.

Failure of the Harbour Moorings.—Letter from the Master Attendant suggesting that a full inquiry should be made by the Chief Engineer regarding the —, recorded.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

8th March 1882, No. 598 W.

Buildings and Roads.
Civil Works.

Read the following paper:—

No. 71. From the Harbour Works Committee, to the Secretary to Government, Public Works Department, dated Madras, 24th February 1882.

WE have the honor to report that, in accordance with the instructions contained in G.O., No. 227 W. of the 26th January, we have inquired into the facts connected with the breaking away of the harbour buoys on the 12th November last.

2. We find that, with one exception, all the buoys that came on shore had lost their shackle pins, and we can come to no other conclusion than that this loss was the cause of the buoys getting away from their moorings. We are further of opinion that the shackle pins dropped out, owing to the omission to drive in the leaden plugs which are intended to keep these pins in position.

3. One buoy came on shore with its spindle broken, but we have no evidence as to how this occurred, and we are not prepared to adopt any of the conjectural causes that have been named to us.

4. We would recommend (and to this Mr. Parkes does not object) that the position of the jaws connecting the large buoys to the bridle chains should be reversed, and that in future they be turned down instead of turned up.

5. We further think that it would probably be better that the large buoys should have a greater length of free bridle chain than at present, and that in consequence another swivel should be inserted near the buoy. We are aware that this means each ship would require more room to swing in than at present, but we see no objection to this being the case.

6. At Mr. Parkes's request we forward herewith his letter to our Chairman, dated the 9th instant.

(Signed) P. MACFADYEN.
(,,) ERNEST BARCLAY.
(,,) G. D. LEMAN.
(,,) J. H. TAYLOR.
(,,) ARTHUR M. SAUNDERS.
(,,) NATH. ST. B. BEARDMORE.
(,,) J. G. COLEMAN.
(,,) ROBT. C. ORR.
(,,) ROBT. C. WALKER.

From W. PARKES, Esq., M. INST. C.E., Engineer-in-Chief, Madras Harbour Works, to the Chairman, Harbour Works Committee, Madras, dated 9th February 1882, No. 2 M.

IN the Proceedings of Government, No. 227 W., of the 26th January last, which are referred to the Harbour Works Committee for report, there appears a letter from the Master Attendant, dated 9th January, which I saw for the first time on receipt of a copy of the Proceedings a few days ago.

2. This letter contains certain statements which are so misleading that I think it right to bring them to your notice, with a view to their correction being put prominently on record.

3. Captain Taylor admits that the omission of the lead pellet may "account for much of the mischief to the smaller buoys where the pins of the shackles appear to have worked out, but adds that "it does not clear up the mystery connected with the large buoy, which was too tightly (misprinted *lightly*) moored to admit of any shaking."

4. This buoy was not tightly moored as stated by Captain Taylor. It was connected by four chains to screws placed at the four corners of a square of 200 feet side, and these chains are of such a length as to allow of 7 feet slack on each. The junction of the four chains at the centre of the square would require to be lifted 50 feet from the ground before the chains became tight. There was therefore ample freedom for the buoy to rise and fall with the waves.

5. Captain Taylor goes on to say, "a more reasonable explanation" (though he does not say why an explanation which satisfied him in respect of the small buoys is less reasonable in respect of the large one) "is in my opinion afforded by the position of the shackle which directly connects the buoys to the moorings, the jaws of which were turned up and in this situation enabled the long spindle of the buoy to exercise a powerful leverage sufficient *as is now shown* to extend the jaws of the shackle and cause the separation from the buoy."

6. I am not aware on what fact Captain Taylor can justify the words I have underlined. The shackle in question is still in the bottom of the sea, neither it nor the chain attached to it having been found. On the other hand, one of the shackles which connected two of the ground chains to the vertical bridle chain has been found by the divers *without the pin in it*. "It appeared to have worked out" in precisely the same manner as in the case of the shackles of the smaller buoys. His objection to the position of the upper shackle with the jaws uppermost may or may not be sound on principle, but it derives no support whatever from any facts connected with the breaking away of the buoy on the 12th November. I respectfully submit that this question therefore is not within the scope of the reference to the Committee, which is confined to the evidence bearing on the "failure of the moorings."

7. Captain Taylor then suggests that "the subject of moorings belongs appropriately to the Marine Department and that this Department should be invited to co-operate with the Harbour Works in laying them, if not entirely to control the operation." This subject is again beyond the scope of the reference to the Committee, and I only notice it to say that the Government records appear to me to show that the Marine Department were consulted at every possible stage of the proceedings, and their advice on all nautical points adopted without question.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the President, Harbour Committee, dated Madras, 20th February 1882, No. 1422.

WHILE agreeing with the Committee generally in their opinion, yet as the only professional officer present, and the question involving technicalities, I consider that Mr. Parkes having requested that a letter of his relating to the moorings may be attached to the report, and the Committee having consented, I am under the necessity of asking that a short reply on my part may also be appended.

2. Neither Mr. Parkes nor the Harbour authorities produced the slightest *evidence* as to the actual cause of the moorings coming away, but attributed it to the omission of the lead pellets, a grave omission I am willing to admit, but not a satisfactory explanation of the entire accident.

3. Even without the pellets the usual resistance offered by the tightness of the pin, and the insertion of the key, should have kept the shackles secure for a long time. It was the injudicious tight mooring that produced the extraordinary result. A bare sufficiency of bridle chain seems to have been in all cases allowed to enable the buoys to float at a proper level in fine weather, immediately over the screw in the case of the single buoys, and immediately over the centre of the four ground chains in the case of the large buoy. The effect of a sea rising about 18 feet, and of causing the buoy to rise and fall to that extent, created an abnormal state of things, in which something was bound to give way. Mr. Thorowgood's attention to this matter was drawn by me through the Chief Engineer some time before the accident, and the event showed my judgment to have been right. Mr. Thorowgood admitted the fact of the tight mooring being objectionable, but said he was only carrying out Mr. Parkes's idea, who would not be interfered with. Let any reasonable person consider what the effect of the large buoy lifting the four great chains, to which the ring and swivel are attached, to any height of which the buoy was capable of floating, then and there letting the whole mass fall to the bottom in one confused lump, its own bridle chain also falling slack to the depth caused by the hollow of the wave, and this rise and fall occurring about every 20 seconds during the whole bad weather, and then say if that was not enough to shake anything adrift; shackles were never meant to be subject to such treatment. Under any circumstances it will not take long for the key to rust, and danger be incurred from that source. The remedy offered by the Committee of a sufficient bridle chain with a swivel in the proper place will, if the Marine Department is allowed its proper voice in this matter, restore my confidence and through me that of the public.

4. I object to the constitution of the small buoys owing to the leverage exerted by the buoy on its spindle, which is tightly placed in the swivel. One spindle has broken from this cause. Moreover, the spindle arrangement is unnecessary, and a useless danger, for after passing through the swivel and a nut having been screwed on above and below the swivel, the end of the spindle seems to be clenched over the lower nut, and so cannot be undone again for purposes of removal or cleaning. Moreover, the whole strain of the buoy with slip or other attachment above rests upon the threads of the two screws, and the small portion of end clenched over. I would far rather have a simple buoy with a ring at top and bottom, like the Marine Department buoys, which have been several years in service, without any attempt to release themselves.

5. Mr. Parkes's attempt to show that consultation was held between the Marine and Harbour authorities is entirely misleading. The only consultations were about the number of buoys and the sites to be selected for them, and Mr. Thorowgood agreed with the Marine Department about the necessity of a smaller number being placed than Mr. Parkes had insisted on. Corrosion is so extensive under water here that it would be nothing but profligate waste to cover the whole bottom of the harbour with screws and chains on the chance of some of them at some time coming into use.

6. Under judicious management the moorings are sufficient for the situation, though great care will always be imperative when rough days ensue, and ships are depending on them.

No. 72. ORDER THEREON, 8th March 1882, No. 598 W.

THE Harbour Committee has now submitted its report as called for in G.O., 26th January 1882, No. 227 W., regarding the causes which led to the parting of six of the new buoys during the storm of the 12th November 1881.

2. The Right Honorable the Governor in Council while seeing no reason to dissent from the opinion expressed by the Committee, that the accident was due to the dropping out of the shackle pins in the manner described by Mr. Parkes, considers that the precaution on which so much depended of securing the pin by means of a lead pellet should have been carefully explained in the specification originally furnished for the guidance of the officer charged with the execution of work.

3. As the fixing of the pellet in question apparently devolves on a diver not under the immediate eye of the responsible officer, it seems doubtful whether there exist adequate securities for the due performance of an operation at once so delicate and so important, the Government therefore desire that they may be furnished with further information on this point by the Engineer-in-Chief of the Harbour Works.

4. The other questions which have come up for consideration are—

(1) the position of the shackle at the top of the bridle chain;
(2) whether a swivel should not be placed immediately below the shackle in addition to the one at the bottom of the bridle chain;
(3) whether the bridle chains are of sufficient length to allow of the buoys rising and falling with the waves without having too much work thrown on them in lifting the ground chains, and
(4) whether the attachment of the spindle of the small buoys to the swivel is of sufficient strength.

5. As regards the first of these, it is understood that Mr. Parkes has recognised the desirability of reversing the position of the shackle jaws, and that no further question on the subject is likely to arise.

6. With reference to the second, the Government are of opinion that although some extra expense may be caused by the placing of the additional swivel immediately below the shackle, it will on the whole be desirable to incur this as recommended by the Master Attendant.

7. Similarly, in reference to the third point, viz., the lengthening of the bridle chains, the Government accept the opinion of the Committee which has been agreed to by the Master Attendant. The additional length of chain to be given will be decided by the latter officer in communication with the Engineer-in-Chief of the Harbour Works.

8. On the fourth point the Government would wish to receive suggestions for strengthening the attachment of the spindle from the Engineer-in-Chief, as these, if

concurred in by the Master Attendant, may admit of a settlement of the question without requiring a reference to the Secretary of State.

9. As there seems to be some misapprehension regarding the relative responsibilities of the Engineer-in-Chief and the Master Attendant in regard to the putting down of the moorings, the Right Honorable the Governor in Council is clearly of opinion that the last-named officer should invariably be consulted on all points connected with the details of this work and his assent obtained.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Harbour Committee.
" Superintendent of Madras Harbour Works.
" Engineer-in-Chief " "
" Marine Department. " "

Exd. S. T. Austin.
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BUILDINGS AND ROADS
CIVIL WORKS.

Govt. of {1882} Madras

PUBLIC WORKS.

To

THE HARBOUR COMMITTEE,

&c., &c.. &c.

Dated March, 8th.

Issued

Recd. *Encl.*

G.O., 8th March 1882, *No.* 598 *W.*

MARCH.

Nos. 71-72.

Parting of the buoys from their mooring chains in the Madras Harbour.—Passing orders on the Report of the Harbour Committee regarding the —.

D. V. W

To save time & avoy of this might. were be sent to the Master attendant in response to the last G.O. on the Subject & the proceedings with a request that the Govt. may be informed as to decision that may be arrived at between himself & Mr. Parkes on the amount of Slack to be allowed in future

3/4/82

No 1203

From

The Port Officer of Calcutta,

To

The Secretary to the
Government of Bengal,
Public Works Departt.

Fort William, Port Office
Calcutta, the 20th March 1882

Sir,

I was requested verbally by Colonel Lankey the Secretary to Government of Madras in the Public Works Department to report on the failure of some of the buoys of the moorings at Madras to ride out the late Cyclone - I have made careful enquiries, and in the first place would observe that the "powerful leverage" referred to by the Master Attendant of Madras in his report No 130 of 9 January (in the case of the large buoys) does not exist, the leverage cannot exceed half the length of one link of the mooring chain nor is there any evidence of such action. The one shackle which has been found opened out belongs to one of the small buoys

and

and not to the large one - it appears to me quite clear that the opening of the jaws of this shackle arose from the pin having worked half out and only holding the chain by one "lug" in which state it was when picked up. - In all the mooring buoys of the Calcutta River as well as the Channel buoys the jaws of the shackles are thus turned upwards. —

2. I concur entirely in Mr. Parkes' explanation that the breaking adrift of these buoys is due to the pins "working out" in the absence of the leaden "pellets" which should have secured them. —

3. We have had much trouble with the Ridge Light Ship, which rides on Sandy bottom - from the same cause, and have found it necessary to clinch the pins. The lead pellet ought to be equally effective. —

4 I would observe that in Bombay Harbour during the South West Monsoon, at which Season the Sea is rough, the Government Moorings are eased down to the ground and the large buoys removed, the end of the buoy chain being marked by a small wooden buoy. - My own impression is also that although seven feet, the amount of slack allowed in these Moorings, may theoretically be ample, yet in practice I would not recommend less than a minimum of 5% or 10 feet for slack chain and I would advise 12 or 14 feet. —

5. Copy of correspondence is attached which kindly return. —

I have &c.

Sd Arthur W. Stiffe

Lieut Cdr R.N.

Port Officer Calcutta

№ 793. C a/3d April/82

Letter from the Port officer at Calcutta, № 1203 a/20th March/82.

Copy forwarded to the Master Attendant Madras in continuation of G.O. 598. W. a/8th March/82, and with a request that Govt may be informed as to the decision that may be arrived at in consultation with Hr Parkes as to the amount of "slack" to be allowed in future.

Sgd/ R-J.

ag. Under Secy. P.W.D

Sgd R.P.

Despd 3-4-82.

G.O. No. 598 dy 8-3-82
G.O. No. 328 dy 7-2-82
G.O. No. 227 dy 26-1-82

No. 793. Cy 3-4-82

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 140.

Read—the following papers :—

From A. STIFFE, Esq., Port Officer of Calcutta, to the Secretary to the Government of Bengal, Public Works Department, dated Calcutta, 20th March 1882, No. 1203.

I was requested verbally by Colonel Sankey, the Secretary to the Government of Madras in the Public Works Department, to report on the failure of some of the buoys of the moorings at Madras to ride out the late cyclone. I have made careful inquiries, and in the first place would observe that the "powerful leverage" referred to by the Master Attendant of Madras in his report No. 130 of 9th January (in the case of the large buoys) does not exist, the leverage cannot exceed half the length of one link of the mooring chain, nor is there any evidence of such action. The one shackle which has been found opened out belongs to one of the small buoys and not to the large one ; it appears to me quite clear that the opening of the jaws of this shackle arose from the pin having worked half out and only holding the chain by one "lug," in which state it was when picked up. In all the mooring buoys of the Calcutta river, as well as the channel buoys, the jaws of the shackles are thus turned upwards.

2. I concur entirely in Mr. Parkes' explanation that the breaking adrift of these buoys is due to the pins working out in the absence of the leaden "pellets" which should have secured them.

3. We have had much trouble with the Ridge Light Ship, which rides on sandy bottom, from the same cause, and have found it necessary to clinch the pins. The lead pellet ought to be equally effective.

4. I would observe that in Bombay Harbour, during the south-west monsoon, at which season the sea is rough, the Government moorings are eased down to the ground and the large buoys removed, the end of the buoy chain being marked by a small wooden buoy. My own impression is also that although 7 feet, the amount of slack allowed in these moorings, may theoretically be ample, yet in practice I would not recommend less than a minimum of 5 per cent. or 10 feet for slack chain, and I would advise 12 or 14 feet.

5. Copy of correspondence is attached, which kindly return.

No. 1144 M.P.I.

Endorsement on the above.

Procs. of the Govt. of Madras, P. W. D., under head Buildings and Roads, (Civil Works), for January 1882, Nos. 121/2.
Letter from the Engineer-in-Chief, Madras Harbour Works, to the Chairman, Harbour Works Committee, dated 9th February 1882.

Bengal Public Works Dept.,
Mis. Pub. Improvements,
30th March 1882.

Forwarded to the Secretary to the Government of Madras, Public Works Department, with reference to the correspondence noted in the margin.

(Signed) O. HOERULE,
Offig. Assistant Secretary.

No. 140-A.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 8th August 1882, No. 6770.

With reference to your office No. 793/1 C, dated 2nd August 1882, I have the honor to state that I do not know how to communicate with Mr. Parkes. My opinion is that, assuming a fair height of a wave to be 15 feet, a slack of $2\frac{1}{2}$ fathoms should be allowed, a shackle being inserted near the buoy.

No. 141.

Order—dated 21st August 1882, No. 2155 W., Public Works.

Communicated to the Engineer-in-Chief, Madras Harbour Works, in continuation of G.O., No. 598 W., dated 8th March 1882.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Engineer-in-Chief, Madras Harbour Works.
" Superintendent, do. do.
" Master Attendant, Madras.
" Marine Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1882} Madras.

PUBLIC WORKS.

Dated August, 21st.

Recd. *Encl.*

G.O., 21st Aug. 1882, No. 2155 W.

AUGUST.

Nos. 140-141.

Moorings at Madras.

Letters from the Port Officer of Calcutta and the Master Attendant, Madras, on the subject of the failure of some of the buoys of the —, communicated to the Engineer-in-Chief, Madras Harbour Works.

Staff ready to go on with the work and is nervous like the Bombay Government on your responsibility to introduce any modifications that you may deem essential but I gather from the Port Officer's letter under reply that in the present condition of the harbour you do not consider it necessary to go on with the moorings, and that the question may be deferred till it becomes necessary on completion of the works to consider how close the ships may with safety be packed

3. This appears to me to be the main point for immediate consideration and the next is the removal of the small buoys which you consider are too near the shore to make use of with any security — I am only sorry that I will oblige as the Boardmore must have instructions to the contrary of the Staff

Despatched 20-12-82

19.12.82

A.No 2158 W of 21-8-82

Memo No 793C of 3-4-82

A.No 598 W of 8-3-82

" 328 W of 7-2-82

" 227 W of 26-1-82

" 3169 W of 21-12-81.

" 2954 W of 25-11-81.

Memo No. 2297C of 12-12-82

No 2373C of 20th Dec/82.

To the Master Attendant

Sir

Before taking further action in your letter No 10546 dated the 7th inst. I have referred to Mr. Beardmore the information in regard to the subject adverted to in para 2, and as I wish to be enabled to take early orders of Government in reference to the points at issue I should be glad if you will inform me definitely whether the certainty that considerable delay must occur in completing the harbour works on the Island to advise that nothing more should now be done in regard to the moorings -

2. Mr. Beardmore has it is understood his

D.R./12

27TH DECEMBER 1882, No. 3434 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

No. 193.

READ—the following papers:—

From N. ST. B. BEARDMORE, Esq., C.E., Acting Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 16th November 1882, No. 47 W.

I have the honor to address you, partly at Mr. Parkes' desire, with regard to G.O., No. 2155 W., of 21st August 1882, and to request your instructions on certain points with regard to the future driving and completion of the moorings. The Master Attendant offers the opinion that a slack of $2\frac{1}{2}$ fathoms should be allowed in the bridle chain and a shackle inserted near the buoy. Am I to consider these, as well as the other opinions expressed in G.O., No. 598 W., of 8th March 1882, as distinct orders for modifications to be actually carried out in the design for moorings? The Master Attendant was to have communicated with Mr. Parkes, but I understand has not yet done so.

2. Mr. Parkes states in a letter of late date to me:—

"With respect to the large moorings my own opinion is that the two conditions laid down by Captain Taylor are not applicable to them, and that to carry them out would be injurious rather than otherwise, though not materially so. While therefore I shall be happy to give any assistance I can in carrying out any modification that Government may order on Captain Taylor's recommendation, it must be understood that the recommendation should be made in precise terms, and that I have no responsibility in it beyond seeing that Captain Taylor's requirements are properly carried out. I think however, considering that the large moorings have some features which are new, it would be better to try them before adopting modifications which may not be improvements."

Mr. Parkes further remarks that he quite assents to the fact that Captain Taylor's wishes should be carried out if they are clearly stated by him, and approved by Government.

3. The nine moorings on the western row in 3 to $3\frac{1}{2}$ fathoms water have been driven in entire accordance with the recommendations of the Mooring Committee as to position: and for some months past to eight of them have buoys been made fast which each have at least $2\frac{1}{2}$ fathoms of scope in the bridle chain and a shackle, as well as swivel near the buoy, as desired by the Master Attendant.

4. These buoys have not been used this year, though some of them were used during the south-west monsoon last year. A short time ago, as the north-east monsoon was approaching, I thought, in order to avoid wear and tear, it would be better to remove them, and addressed the Master Attendant enquiring if he was prepared to take entire charge of them. In reply he forwarded a report from the Deputy Master Attendant, in which the latter stated that these buoys were of no use to him, and implied that I might remove them or not as I liked. This was unfortunate, because, had I known at the time I handed the first lot over to the Master Attendant on the 12th April and 5th June last, that they would not be used, I might have had them unshackled at once and brought ashore and thus have saved their wear and tear. That chains will wear and buoys will rust in such a sea as this is to be expected, and from an examination I made of some of the chains about two months ago the wearing is perhaps rather more than one might have expected. I think

therefore you will consider that when the Master Attendant finds any of the buoys no longer of any service to him, or for any other reason gives up the use of them, he should, if they have been handed over by me to him as complete, either remove them himself, or request me to do so, in order (as the buoys and chains are rather costly) to preserve them for use for as long a period as possible.

5. All the bridle and mooring chains of the buoys which broke away in the storm of November 1881 have now been found and made secure. You will remember that five of the buoys broke away in consequence of the shackles not having been properly made fast with lead pellets; and that some discussion arose from the fact of the eye of the spindle of one other of the small buoys having broken off and not having been found. This was found lying on the bottom attached to the bridle chain of the second small buoy of the western row from the south.

No. 2127 C.

Referred to the Master Attendant, Madras, for early remarks.

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

21st November 1882.

To the Master Attendant, Madras, in original, to be returned.

No. 193-A.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 7th December 1882, No. 10546.

In returning the letter from the Acting Superintendent, Harbour Works, dated 16th November,* relating to moorings, I have the honor to observe that in the present condition of the harbour I do not consider that the moorings require to be driven and completed in any special haste. For many reasons, until smooth water is obtained, the present method of mooring ships with their own anchors and cables and only a stern fast to a buoy is the best. This sort of plant deteriorates very rapidly, as it appears Mr. Beardmore has discovered, and only when a question of packing ships closer than can be done at present arises need the general system of mooring be pressed to completion. Then I should consider that the extra length of bridle chain, $2\frac{1}{2}$ fathoms for the large buoys, and a swivel near all buoys, should be adopted. I note Mr. Parkes' objection that the large moorings having some features that are new, he considers that it would be better to try them before adopting modifications; but my opinion is formed upon the heavy sea that I now find is to be expected at times so long as there exists an eastern opening, and I feel certain that the system advocated by Mr. Parkes does not afford play enough.

* No. 47 W.

2. I should be glad, however, if Mr. Beardmore would complete the two large buoys on his principle, so that a trial might be given them. He writes in this letter that all the bridle and mooring chains of the buoys that broke away have been found and made secure, yet he gives me to understand that they are not connected with the buoys. I cannot imagine why they are not, as I have been told the operation is very easy, and one that the Marine Department will have to carry out, whenever cleaning or painting is required or accidents occur. On this head I must remark that the P. and O. *Shannon* cut down her stern fast buoy with her screw two days ago (while getting under way and sunk it).

3. The small buoys are too near the shore to make use of with any security while the harbour is open to seaward. Mr. Beardmore is right in saying that they were partially used, but that was before the accident. This Department has no means at present of taking them into store or securing the moorings, but the Harbour Works

have, and Mr. Beardmore has been asked to remove them. I should be glad to know, within some reasonable limit, when and how the harbour will be finished before urging the mooring question.

4. I request that a copy of this letter be forwarded to Mr. Parkes, in attention to the order that I should communicate with that gentleman—*vide* memorandum No. 793 C., dated 3rd April 1882.

No. 2297 C.

Copy of the above forwarded to the Superintendent, Madras Harbour Works, for early remarks with reference to paragraph 2.

(Signed) R. H. SANKEY, Colonel, R.E.,
Chief Engineer, P.W.D.

12th December 1882.

To the Superintendent, Madras Harbour Works.

No. 193-B.

From J. H. TAYLOR, Esq., Lieutenant, R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 21st December 1882, No. 11102.

In acknowledging letter No. 2373 C., dated 20th instant, I have the honor to state that I am decidedly of opinion that the moorings in the harbour should not be permanently secured, until the success of the harbour is undoubted, and very much more shelter given from the sea. It is found practically that in the present state of the harbour vessels require much more space than contemplated in its completed condition, and thus the system of buoyage proposed ultimately is unsuitable to present requirements. For immediate wants this Department can lay down moorings as found necessary.

3. I send herewith specimen of a chain which has been down about four years attached to one of our own buoys, which you will observe is nearly worn out.

3. In the face of such cogent evidence it is clear that, after, say, ten years' wear, any Port Officer would naturally have very serious misgivings as to the serviceability of either chains or buoys.

4. The constantly recurring expense of looking after a net work of moorings so as to ensure and maintain safety would be a very considerable item.

No. 194.

ORDER—dated 27th December 1882, No. 3434 W., Public Works.

Under the circumstances it is considered unnecessary to proceed further with the operation of laying down the moorings in the harbour, and the Superintendent of the Harbour Works will submit an early report as to the means he proposes for storing the plant and for dispensing with the services of all establishments specially entertained for the work in question.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Master Attendant, Madras.
" Superintendent, Madras Harbour Works.
" Engineer-in-Chief, "
" Marine Department.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1882} Madras.

PUBLIC WORKS.

Dated December, 27th.

Recd. *Encl.*

G.O., 27th Dec. 1882, No. 3434 W.

DECEMBER.

Nos. 193-194.

Moorings in the Madras Harbour.

Orders regarding the —.

No. 52 W.

FROM

THE ACTING SUPERINTENDENT,
MADRAS HARBOUR WORKS,

To

The Secretary to Government
Public Works Department

MADRAS, 10 January 1883.

Sir

With reference to G.O. 3434, W. of the 27 December, I have the honour to report that for the present at least it will be better to allow the Moorings and plant to remain stored where they are now lying. Some are on the Beach opposite the High Court and near Clive's Battery, some are at the South Pier and some are on our Ground at the North Pier.

2. The Foreman specially engaged for the Work can be discharged at a month's notice and I have warned him that I may soon give him the notice. At present he is employed on other work. The same remarks apply to the Diver and Diver's Assistant who

generally work with him. The crew can be discharged at a days notice but at present they are also employed on other work.

I have the honour to be,
Sir,
Your most obedient Servant
Thos. H. Beardmore C.E.
Ag Superintendent
N.F. Works.

Buildings & Roads.

From H. M. Superintendent
Madras Harbour Works

No. 171 Way 16 January/83

B

Approved

12.1.83

No. 52 W.
Dated 10th
Recd } January 1883

No. 171 Way 16 January/83.

Ko. 2954. H. 25. 11. H
" 3169. H. 21. 12. H
" 227. H. 26. 1. K
" 326. H. 7. 2. K
" 598. H. 8. 3. K
No. 793. C. 3. 4. K
Ko. 2155. H. 21. 5. K
No. 2373. C. 20. 12. K
Ko. 4434. H. 27. 12. K

Recd
10/1

Supdt Madras Harbour Moorings
Master Attendant
Madras.

Madras Harbour Moorings -
Reports on the storing of gear
and disposal of establishment
of for -

With order
Dated and Receipt Rqr.

Copy of letter from the Examiner
P. W. Accounts, Madras, to the
Superintendent, Madras Harbor Works
No. 175 X dated 31 May 1883.

1/83

With reference to para 2 of
this office letter No. 892 X dated the
16 March 1883, I have the honor to
request that you will be good enough
to state whether the necessary intima-
tion has been given to the Local
Government to arrange with the
Secretary of State for India to
stop payment of the usual
family remittance of £10/- on
account of Mr Botelar late
foreman of the Moorings on the
Madras Harbor Works, or whether
the fact was noted in his Last
Pay Certificate forwarded to the
Secretary of State, or in the
Last Pay Certificate given to
Mr Botelar.

2. The favor of an early
reply is requested.

I have &c.

G. Hatton

Supdt Corresponding Draftsman

G. P. W.

No. 816

Copy of letter from the Superintendent Madras Harbour Works to the Examiner P.W. accts Madras No: 14 C. dated 4th June/83

With reference to your letter No: 175 X dated 31st May/83, I have the honor to inform you that Mr: Boteler, late Foreman of Moorings, has been furnished with a last pay certificate in which the deduction on account of family remittance of 10£ has been noted, and a copy of the same has also been sent to your office with the Salary Bill for March 1883.

Mr Botelers departure to England was reported to Government, Vide G.O. No: 954 Ft, dated 29th March 1883.

/True Copy/

G.K. Patton

Supdt. Correspondence Branch
4/6/83

E.P. 8/6

E.P. 8/6

Mr

From,

The Examiner P.W. Accounts,

Madras.

To,

The Secretary to Government,

Public Works Department.

No. 46 W. Madras, 8th June 1883.

Copy of this Office letter No. 175 X. dated 31st. May 1883 to the Superintendent Madras Harbor Works together with copy of his reply thereon (letter No. 14 C. dated 4th. June 1883) are forwarded to the Secretary to Government P.W. Department for information.

2. A copy of Mr. Boteler's Last Pay Certificate is also enclosed for submission to the Secretary of State with the intimation, if not already done, that Mr. Boteler's family remittance should cease from 1st. April 1883.

D. C. Condon

Examiner P.W. Accounts.

To D.W.

C. No: 2391.

It is understood that Mr. Botelers Agreement with the Secty of State is in Cs office.

R.S.

19.3

No 695 Jay 20 March/13

C No. 2391 - From the Supt. M. Hr No. 58W 17.3.13 repts intended departure of Mr W.S. Botelers, foreman of Moorings, to England on 26 instant -

C. —

For note -

Mr Botelers agreement is understood to be in your office.

(Sd.) J.S.

B 20/3

Sir J. Arrow 20/3

1714.16.1.83
6958.20.3.83

P.W.C.No 4840

From,

The Examiner P.W.Accounts,

Madras.

To,

The Secretary to Government,

P.W.Department.

No. 46W.

Dated 8th June 1883.

Rcvd. 9 ——

Enclos. 3.

Mr. Boteler. Regarding the

family remittance of------

No 1681 W PUBLIC WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT,

UNDER date the 15th June 83

Read the following :—

From the Examiner of Public Works Accounts,

No. 46W, dated 8th June 1883 submitting

Last Pay Certificate of Mr Boteler

late Foreman Mr. Harris

ORDERED to be forwarded to the Home Government.

Supt Mr. & Works ✓
Exr Mr A ✓
Dcyd 16/6

H.E. No 1682 Wdy 15th June 83

To

THE ~~MOST HONORABLE THE~~ SECRETARY OF STATE, ~~FOR~~ INDIA Office London

~~MY LORD MARQUIS~~ Sir

I am directed

~~WE have the honor~~ to forward herewith a Last Pay Certificate which has been furnished by the Examiner of Public Works Accounts on account of Mr W. S. Boteler, late Foreman for Mooring Operations, Madras Harbour Works ~~Engineer in the Public Works Department this Presidency,~~ who ~~has~~ proceeded to Europe on the 26th March 1883 ~~year~~ on his services being dispensed with, in accordance with Proc. of this Govt No 957 W dy 29th March 1883, a copy of which is herewith.

2. The payment of Mr Boteler's family remittance in England should have ceased with effect from 1st April 1883.

Dcyd with Last Pay certificate in Copy ✓ & Ord No 957 W dy & 29th March 83

10/6/83

I have the honor to be

Sir

Your most obedient

humble Servant

Chief Secretary

CW. 13/6

Jno 1681/1682 Way 15-6-83