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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

P.W.D DEPARTMENT

G.O. No. / B.P. No.	2927 W 2928	Press. / Mis.
Dated	23.11.1881	197 .

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

23rd November 1881, No. 2927 W.

Buildings and Roads.
Civil Works.

Read the following paper :—

No. 105. From F. N. THOROWGOOD, Esq., M. Inst. C.E., Superintendent, Madras Harbour Works, to the Secretary to Government, Public Works Department, dated Madras, 21st November 1881, No. 65 W.

Three accompaniments (photographs).

I have the honor to submit as detailed a report as I am able of the damage sustained by these works on 12th November. The destruction of the two piers is, however, so very extensive that, even at this date and without having lost any time, my information is somewhat meagre.

2. Precautions for bad Weather.—On the afternoon of the 11th November I received a private note from Captain Taylor warning me that the weather was suspicious; but, as I had taken all the precautions that were in my power to protect the works and the plant, I could do nothing more when this warning was received.

The two Titan cranes were withdrawn as far from the ends of the piers as I considered safe, and my reasons for leaving them where they stood instead of taking them quite back were these :—

I. On two occasions at the north pier, and on one occasion at the south pier, the work has been rather badly damaged nearer shore than where the Titans stood on these occasions to which I refer; and I have from long observation come to the conclusion that a position a short distance back from the end has hitherto been better than one nearer shore.

II. The position I selected as storm quarters for the Titans this season was where the blocks are more deeply founded than anywhere in their rear, and therefore less likely to be undermined. Moreover the surface of the piers was for 35 to 45 feet wide at these places, and consequently there was a good margin of block work on each side of each Titan (the span of which is 20 feet only); I therefore judged that, as in November 1879 and 1880 these machines had stood well in heavy seas on a narrower pier and shallower foundation, I was not incurring any unwise risk in firmly securing them at the commencement of the pier heads. And in this position they were made fast in every way possible.

3. Position of the "Hobart" and "Salisbury."—Similarly with the steamers *Hobart* and *Salisbury*, I had moved them from the south to the north of the harbour, and they were moored by three anchors and a stern fast in absolutely the best berth in the whole harbour during a north-east sea.

4. The Storm.—The sea rose in the night of the 11th and by 9 A.M. of the 12th was running very high, and making a clean sweep of the north pier and the Titan at the end. It was also attacking the outer portion from the curve of the south pier with great violence. The wind was not high, nor was there very much white water out to sea, but the waves were very much heavier than any I have seen here

before. At times a sea would strike nearly the whole length of the outer portion of the north pier at the same moment, then shoot up in the air and fall in a powerful cascade over the inner row of blocks. This is noteworthy, as will be seen when I describe the nature of the damage.

5. FORCE OF THE WAVES.—With regard to the force or height of the waves I have no good record. I have seen much heavier seas in the German Ocean, but I have not seen any equal to it during my five and a quarter years experience of Madras. I may mention that Mr. R. F. Chisholm, whose judgment in such a matter must be admitted to be very sound, informs me that he considered the seas of 12th November were much higher than those which accompanied the storm of 1872. I think this should be taken much into consideration, as there is a prevailing impression that, because there was not much wind, there could not be a very heavy sea.

6. LOSS OF THE TITAN CRANES.—At about 10 A.M. on the 12th the south Titan went over into the harbour suddenly, and much of the outer portion of the block work was destroyed. At 12 noon the north Titan subsided gently down behind, paused a little, and then was likewise overturned on its side. There it lay for some hours. The north pier was seen to be badly breached also, but the sea was now so very violent that nothing could be made out with certainty.

7. LOSS OF THE STEAMERS.—The steamers *Hobart* and *Salisbury* were all this time lying quietly at their moorings, and Mr. Boteler, the Mooring Foreman, who had gone on board in the morning remained there all day. As the vessels were lying quite steady, and no message was sent ashore from them hinting that they were not holding well I had no anxiety about them. At about 4 P.M., however, the hawser which answered as a stern fast broke, and almost at the same time the wind got more easterly. Shortly afterwards the fastenings which connected the two vessels gave way and they parted company and were then in danger of sinking. But now it was found impossible to get a boat or catamaran out, and the distance (300 yards) was too great for the rocket apparatus to be used, and hence ensued the lamentable loss of life by the foundering of the vessels already reported. Mr. Boteler, who went on board that morning, by a miraculous escape got ashore with a life buoy after being for a long time in the surf. Six of the crew were also saved by their own endeavours and exertions.

8. DAMAGE TO NORTH PIER.—I will now proceed to describe the damage sustained by the two piers commencing with the north. The bank of laterite rubble at the commencement of the pier known as the "surf-bank," which was completed in October 1876, is much knocked about by the waves on the north side, and a clean breach through was made just in the rear of the first concrete block, set in December 1876. Measuring from this point, the first 400 feet of pier is hardly affected at all. Beyond this distance the rails and sleepers have been torn off, and there are signs of the centre joint of the blocks having slightly opened for a length of 2,050 from the commencement. From 2,050 to 2,240 the centre joint has opened 5 or 6 inches, the opening being caused by the north row of blocks moving outwards. Never before has this result appeared with work founded at a depth of 19 feet below low water, but we have on other occasions invariably noticed that the result of a heavy sea has been to close the centre joint, even to grinding together of the blocks. On examining the rubble base on the outside of the wall along this part (2,100 to 2,300 about), I find that it has been scoured away for a depth of 5 and 6 feet, slightly undermining the blocks. The surface of the rubble is left now at a depth of 22 feet below low water. It formerly was heaped up well over the bottom course, but now the under side of that course is exposed. The slope of the base has been flattened, and what is swept from the top has been drawn out over the toe of the slope.

9. At a distance of 2,240 feet the ruin commences. There now follows nearly 100 feet of pier in which the outer or north row of blocks has been swept away, having fallen in the direction of the waves that struck it; the inner or south row of blocks however remain stationary up to 2,340 feet. From 2,400 to 2,800, all of which is on the curve, the destruction has been very severe, and for 100 feet in this length the blocks are moved to the very bottom, the blocks in the lowest course being in some places broken, and the upper blocks have fallen outward in such confusion

as to render it difficult to identify them. Some have fallen over the edge of the rubble bank. At places here we find the rubble lowered as much as 7 feet, and the blocks undermined, fallen over and broken.

10. From 2,800 outward (the curve terminates at 2,937 feet) for 200 feet the bottom blocks remain sound, but are slightly undermined on the north side, the rubble base having been scoured away for a width of 6 feet from the blocks. The upper blocks have here (and from here to the end) been knocked over into the harbour, and have not fallen towards the north.

11. From 3,000 feet to the actual end 3,870 feet, the lower courses remain in fair order, but a sort of hollow or ditch has been scoured in the rubble base in many places at a distance of 3 to 6 feet from the blocks, and in many spots the lowest block is undermined. The action of the waves against the wall has without doubt been felt at a depth of 24 feet below low water.

12. At the extreme end, which is founded at a depth of 25 to 26 feet below low water, the quadrant or corner block has stood well, but has settled down $2\frac{3}{4}$ feet.

(2·96)

Also twenty-one rows of blocks at the back of the quadrant remain in fair regularity on the outer side. On the inner or harbour side the top courses, and often the second and third courses, have been sent flying into the harbour. The rubble base at the very end was, before the storm, piled up 4 feet above the bottom of the blocks, and it is now scoured out to 4 inches below the blocks in one spot.

13. THE PIER HEAD.—The pier head, by which I mean the last 150 feet of the pier, has stood the sea fairly well, and has failed by sheer force of blows. It is true that only the northern half of it remains, but that remains with much regularity. This is the deepest founded part of the pier, it is the widest section, and on a wider rubble base than the rest. These add to its security. But another reason may be given besides, viz., that Mr. Parkes sanctioned the use of a greater quantity of cement per block in this part of the work, and as a consequence the blocks have not broken so much as in the other portions of the ruined wall.

14. The ruin of blocks along the inner or harbour wall of the pier has prevented my getting many observations of the bottom, but where Mr. Beardmore has sounded at present it seems that the rubble base has not been disturbed. This is clearly the case at the place where the north row of blocks have fallen over northward.

15. NORTH TITAN.—The Titan crane went completely over during the 12th November, and is now buried by the blocks of the pier head. It is useless to speculate on how it came to fall, but I fancy that first the hind wheels gave way and it then capsized, afterwards to tumble over in the general ruin.

16. SOUTH PIER DAMAGE.—There remains a greater length of the south pier intact than of the north, which no doubt is due to the protection given by the latter. The wall stands quite secure to 2,550 feet from the commencement, and there has been no opening of the centre joint as at the north pier. Up to nearly 2,800 from 2,550 there remains the inner or north row of blocks standing secure, but the outer row has been knocked over outwards. There then follows a gap of about 200 feet where the blocks have fallen southward in such confusion that at present I cannot say what has occurred, nor whether the bottom blocks remain in position.

17. Following the foundation outwards we next come to 100 feet where there appears to be no variation in the lower blocks which are the same as when set. But from this point (3,100) outward there is much undermining of the rubble on the outer wall, the depth of scour being in some places as much as 3 feet below the bottom of the lowest block. Throughout the remainder of the pier where damage has occurred the blocks have fallen inwards. From 3,100 to 3,140 there is much scour and undermining of rubble, whereas from 3,140 to 3,200 the rubble is heaped up against the blocks. There does not appear to be any place where the bottom blocks have actually disappeared, but the amount of sinking is most remarkable.

18. SOUTH PIER HEAD.—The actual end of the south pier has suffered severely, although founded at a depth of 26 feet below low water. The lower blocks alone

remain, and these are undermined by the eddy round the end. The upper blocks at this place have fallen over in hopeless confusion, and the whole seems to have sunk very much.

19. But the wreck of the south pier is not so great as of the north even in the outer portion, except at the very end, as there remain three sections or islands in the whole damaged length of 1,400 feet, the aggregate length of which is 210 feet. Whether this is in any way due to the fact that the base is chiefly formed of the Pallavaram stone instead of laterite I will not venture an opinion, but this difference between the two piers does exist. The first of these islands is 40 feet long and is at the end of the curve, at a distance of 3,020 feet from the commencement, where the bottom seems to have been undisturbed. Then again at 3,370 feet there remains a portion of the pier fairly complete for 50 feet, but greatly sunk down. Here there is no undermining of the base. Again at 3,720 feet from the commencement there is a length of about 100 feet of the pier which is hardly damaged at all, but sunk down to almost high water level. The rubble base at this point has not been scoured away from the bottom blocks. From this point to the end at 3,950 feet there has been very great settlement, but at present I cannot accurately give the amount. It appears to be quite 3 feet 6 inches. Levels will be taken when practicable.

20. SOUTH PIER TITAN.—The south Titan crane has fallen over into the harbour where it stood, and is not so much buried with blocks as the north crane. It is quite possible that this machine may be recovered.

21. DAMAGE TO COAST, NORTH.—The devastation caused by the sea of the 12th along the coast to the north is very great, but the harm done is almost entirely the result of actual wave blows, not of erosive action. The railway that we had constructed to carry material to the protective works is almost entirely destroyed, but the materials will be saved. The revetment along the road by Mr. Coleman's house is much flattened down, and the walls of compounds beyond are broken down by the waves washing over.

22. The sea encroached badly opposite the Biden Sailors' Home and all along that portion of the coast.

23. Further to the north the damage was not so serious. I have had many applications for repairing the walls which the sea has demolished, and I suppose I ought to repair them again as I did so in 1879. But it is pretty certain that, if there had been no harbour at all, such waves as we had on the 12th would have done much damage.

24. BUOYS.—Amongst other damage done in this storm there were six of the new buoys carried away. It is hardly necessary to say that they did not drag their moorings, but in every case some part of their chain gave way. The large buoy that was moored to four screws was one of the first to come ashore, and it is clear that the shackle of the chain failed in this case. My divers have not succeeded in getting the chain up yet as it buried itself in the sand when it fell. Four of the other buoys failed by the shackle giving way, and the sixth buoy failed by the mooring ring breaking.

25. The chains and shackles of these buoys are of first-rate workmanship and material, but there is no doubt that the pins of the shackles worked free, although secured in their places by a small turned pin of steel. This is generally split at one end to prevent its working out, but in these moorings there is no such split. The cables of all the buoys were rather taut, but it was absolutely necessary to have them so taut that the swivels were clear of the ground at low water. The buoy to which the two steamers were moored came ashore in the evening of the 12th.

26. MESSAGE TO MR. PARKES.—I telegraphed to Mr. Parkes on the 12th as follows:—"Heavy sea. Both Titans gone. Much damage to piers." And again on the 14th I telegraphed more details and of the sad loss of the steamers and crew. I received on the 18th the following message from Mr. Parkes:—"Passage taken 9th December. Wire, when known, state of remaining courses in damaged parts," and to this I have replied as concisely as I could.

27. More will be known when all our levels and sections have been plotted, but at present I have given all the information I have been able to get by means of divers and soundings. It is perhaps rather general, but I trust that it will serve to show the degree and nature of the damage done. In the meantime greater details are being obtained every day by Mr. Beardmore who is constantly afloat.

28. There are some protective works that might be done to the remaining portion of the north pier, but I really hesitate to do anything until Mr. Parkes has seen the work as it was on 13th November.

29. I forward some photographs of the damaged work with their descriptions written on the back. They form a painful contrast to the photograph I recently had the honor of submitting taken on 8th October.

No. 106. ORDER THEREON, 23rd November 1881, No. 2927 W.

RECORDED, in continuation of G.O., No. 2854 W., dated 15th November 1881, and a copy furnished to the Secretary of State.

2. A fully detailed report accompanied by explanatory plans and sections will be submitted as soon as these can be prepared. Meanwhile, and pending Mr. Parkes' arrival, the only work to which it seems desirable that Mr. Thorowgood should devote himself, in addition to the investigations he is now engaged upon, is that required for protection north of the harbour and for repair of damage in that direction.

(True Extract.)

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

To the Superintendent of the Madras Harbour Works.
" Marine Department.

Exd. E. C. Shunker.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1881) Madras.

PUBLIC WORKS.

25

THE SUPERINTENDENT OF THE
MADRAS HARBOUR WORKS.

&c., &c., &c.

Dated November, 23rd.

Issued.

Encl. Encl.

G.O., 23rd November 1881, No. 2937 W.

NOVEMBER.
Nos. 105-106.

Madras Harbour Works.—Report from Mr. Thompson regarding the damage to the [illegible], recorded with [illegible].

111 4

No. 65 W.

From Lt. Col. Sankey R.E.

THE SUPERINTENDENT,
MADRAS HARBOUR WORKS,

To Colonel R. H. Sankey, R.E. C.B.
Secretary to Government P.W.D.
Buildings & Roads
Fort St. George

Madras, 21st November 1881.

Sir,

3 accompaniments (photographs) I have the honor to submit as detailed a report as I am able of the damage sustained by these works on November 12th. The destruction of the two piers is however so very extensive that even at this date and without having lost any time my information is somewhat meagre—

Precautions for bad weather 2. On the afternoon of the 11th November I received a private note from Captain Taylor warning me that the weather was suspicious, but as I had taken all the precautions that were in my power to protect the works and the plant I could do nothing more when this warning was received.

The

The two Titan Cranes were withdrawn as far from the ends of the piers as I considered safe, and my reasons for leaving them where they stood instead of taking them quite back were these:-

I. On two occasions at the North Pier and on one occasion at the South Pier the work has been rather badly damaged nearer shore than where the Titans stood on these occasions to which I refer; and I have from long observation come to the conclusion that a position a short distance back from the end has hitherto been better than one nearer shore.-

II. The position I selected as storm quarters for the Titans this season was where the blocks are more deeply founded than anywhere in their rear and therefore less likely to be undermined. Moreover the surface of the piers was for from 35 to 45 feet wide at these places and consequently there was a good margin of blockwork

on

on each side of each Titan (the span of which is 20 feet only). I therefore judged that as in November 1879 and 1880 these machines had stood well in heavy seas on a narrower pier and shallower foundation, I was not incurring any unwise risk in firmly securing them at the commencement of the pier heads. And in this position they were made fast in every way possible.-

Position of the Hobart & Salisbury

3. Similarly with the steamers "Hobart" and "Salisbury". I had moved them from the South to the North of the Harbour, and they were moored by three anchors and a stern fast in absolutely the best berth in the whole Harbour during a North East sea.-

The Storm

4. The sea rose in the night of the 11th and by 9. o A.M. of the 12th was running very high and making a clean sweep of the North Pier and the Titan at the end. It was also attacking the outer portion, from the curve, of the South Pier

with

with great violence. The wind was not high, nor was there very much white water out to sea, but the waves were very much heavier than any I have seen here before. At times a sea would strike nearly the whole length of the outer portion of the North pier at the same moment, then shoot up in the air and fall in a powerful cascade over the inner row of blocks. This is noteworthy, as will be seen when I describe the nature of the damage.-

Force of the waves.

5. With regard to the force or height of the waves I have no good record. I have seen much heavier seas in the German Ocean, but I have not seen any equal to it during my 5½ years experience of Madras. I may mention that Mr R. F. Christolin, whose judgment in such a matter must be admitted to be very sound, informs me that he considered the seas of November 12th were much higher than those

those which accompanied the Storm of 1872. I think this should be taken much into consideration, as there is a prevailing impression that because there was not much wind, there could not be a very heavy sea.-

Loss of the Titan Cranes.

6. At about 10 A.M. on the 12th the South Titan went over into the Harbour suddenly, and much of the outer portion of the block-work was destroyed. At 12. 0 noon the North Titan subsided gently down behind, paused a little and then was likewise overturned on its side. There it lay for some hours. The North pier was seen to be badly breached also, but the sea was now so very violent that nothing could be made out with certainty.-

Loss of the Steamers.

7. The steamers Hobart & Salisbury were all this time lying quietly at their moorings, and Mr. Boteler, the Mooring Foreman who had gone on board in the morning remained there all day. As the vessels were lying quite steady and no message was sent ashore from them

hinting

hinting that they were not holding well
I had no anxiety about them. At
about 1.0 P.M. however the hawser
which answered as a sternfast broke, and
almost at the same time the wind got more
easterly. Shortly afterwards the fastenings
which connected the two vessels gave way
and they parted company and were
then in danger of sinking. But now
it was found impossible to get a boat or
catamaran out and the distance (300 yards)
was too great for the rocket apparatus to be
used, and hence ensued the lamentable loss
of life by the foundering of the vessels, al-
ready reported. Mr. Boteler who went on
board that morning, by a miraculous es-
cape got ashore with a life buoy after being
for a long time in the surf. Five of the crew
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and exertions.—

8th I will now proceed to describe the da-
mage sustained by the two piers commencing

Damage to North Pier

with

with the North. The bank of plate rubble
at the commencement of the pier known
as the "Turf bank" which was completed
in October 1876 is much knocked about by
the waves on the North side, and a clean
breach through was made just in the rear
of the first concrete block, set in December
1876. Measuring from this point, the
first 400 feet of pier is hardly affected
at all. Beyond this distance the rails
and sleepers have been torn off, and
there are signs of the centre joint of the
blocks having slightly opened for a
length of 2050 from the commencement.
From 2050 to 2240 the centre joint has
opened 5 or 6 inches, the opening being
caused by the North row of blocks
moving outwards. Never before has
this result appeared with work founded
at a depth of 19 feet below Low water,
but we have on other occasions invariably

noticed

noticed that the result of a heavy sea has been to close the centre joint even to grinding together of the blocks. On examining the rubble base on the outside of the wall along this part (2100 to 2300 about) I find that it has been scoured away for a depth of 5 and 6 feet, slightly undermining the blocks. The surface of the rubble is left now at a depth of 22 feet below Low water. It formerly was heaped up well over the bottom course, but now the under side of that course is exposed. The slope of the base has been flattened and what is swept from the top has been drawn out over the toe of the slope.-

9. At a distance of 2240 feet the ruin commences. There now follows nearly 100 feet of pier in which the outer or North row of blocks has been swept away, having fallen in the direction of the waves that struck it; the inner

or

or South row of blocks however remain stationary up to 2340 feet. From 2400 to 2800, all of which is on the curve, the destruction has been very severe, and for one hundred feet in this length the blocks are moved to the very bottom, the blocks in the lowest course being in some places broken and the upper blocks have fallen outward in such confusion as to render it difficult to identify them. Some have fallen over the edge of the rubble bank. At places here we find the rubble lowered as much as 7 feet, and the blocks undermined, fallen over and broken.-

10. From 2800 outward (the curve terminates at 2937 feet) for 200 feet the bottom blocks remain sound but are slightly undermined on the North side, the rubble base having been scoured away for a width of six feet from the blocks. The upper blocks have here (and from here to the end) been knocked over into the

Harbour

Harbour, and have not fallen towards the North.—

11. From 3000 feet to the actual end 3870 feet, the lower courses remain in fair order, but a sort of hollow or ditch has been scoured in the rubble base in many places at a distance of 3 to 6 feet from the blocks, and in many spots the lowest block is undermined. The action of the waves against the wall has without doubt been felt at a depth of 24 feet below Low water.—

12. At the extreme end which is founded at a depth of 25 to 26 feet below Low water, the quadrant or corner block has stood well, but has settled down 2¾ feet. (296) —. Also 21 rows of blocks at the back of the quadrant remain in fair regularity on the outer side. On the inner or Harbour side the top courses, and often the 2nd and 3rd courses have been sent flying into

The Pier Head

into the Harbour. The rubble base at the very end was, before the storm, piled up to 6 feet above the bottom of the blocks, and it is now scoured out to 6 inches below the blocks in one spot.—

13. The Pier Head, by which I mean the last 150 feet of the Pier, has stood the sea fairly well, and has failed by sheer force of blows. It is true that only the Northern half of it remains, but that remains with much regularity. This is the deepest founded part of the pier, it is the widest section, and on a wider rubble base than the rest. These add to its security. But another reason may be given besides, namely that Mr. Parkes sanctioned the use of a greater quantity of cement per block in this part of the work, and as a consequence the blocks have not broken so much as in the other portions of the outer wall.—

14. The ruin of blocks along the inner

or

or Harbour wall of the pier has prevented my getting many observations of the bottom, but where Mr. Beardmore has sounded at present it seems that the rubble base has not been disturbed. This is clearly the case at the place where the North row of blocks have fallen over Northward.-

North Titan

15. The Titan crane went completely over during the 12th November and is now buried by the blocks of the pier head. It is useless to speculate on how it came to fall, but I fancy that first the hind wheels gave way and it then capsized afterwards to tumble over in the general ruin.-

South Pier damage

16. There remains a greater length of the South Pier intact than of the North which no doubt is due to the protection given by the latter. The wall stands quite secure to 2550 feet from the commencement and there has been

no

17

no opening of the centre joint as at the North Pier. Up to nearly 2800 from 2550 there remains the inner or North row of blocks standing secure, but the outer row has been knocked over outwards. There then follows a gap of about 200 feet where the blocks have fallen Southward in such confusion that at present I cannot say what has occurred, nor whether the bottom blocks remain in position.-

17. Following the foundation outwards we next come to 100 feet where there appears to be no variation in the lower blocks which are the same as when set. But from this point (3100) outward there is much undermining of the rubble on the outer wall the depth of scour being in some places as much as 3 feet below the bottom of the lowest block. Throughout the remainder of the pier where damage has occurred the blocks have fallen inwards. From 3100 to 3140 there is

much

much scour and undermining of rubble, whereas from 3140 to 3200 the rubble is heaped up against the blocks. There does not appear to be any place where the bottom blocks have actually disappeared but the amount of sinking is most remarkable.—

South Pier Head

18. The actual end of the South pier has suffered severely, although founded at a depth of 26 feet below Low water.— The lower blocks alone remain, and these are undermined by the eddy round the end. The upper blocks at this place have fallen over in hopeless confusion, and the whole seems to have sunk very much.

19. But the wreck of the South pier is not so great as of the North even in the outer portion, except at the very end; as there remain three sections or islands in the whole damaged length of 1400 feet, the aggregate length of which is

is 210 feet. Whether this is in any way due to the fact that the base is chiefly formed of the Pallavaram stone instead of laterite I will not venture an opinion, but this difference between the two piers does exist. The first of these islands is 40 feet long and is at the end of the curve, at a distance of 3020 feet from the commencement where the bottom seems to have been undisturbed. Then again at 3370 feet there remains a portion of the pier fairly complete for 50 feet, but greatly sunk down. Here there is no undermining of the base.

Again at 3720 feet from the commencement there is a length of about 100 feet of the pier which is hardly damaged at all, but sunk down to almost High water Level. The rubble base at this point has not been scoured away

from

from the bottom blocks. From this point to the end at 3950 feet there has been very great settlement but at present I cannot accurately give the amount. It appears to be quite 3 feet 6 inches. Levels will be taken when practicable.

South Pier Titan

20. The South Titan crane has fallen over into the Harbour where it stood and is not so much buried with blocks as the North crane. It is quite possible that this machine may be recovered.

Damage to coast North.

21. The devastation caused by the sea of the 12th along the coast to the North is very great but the harm done is almost entirely the result of actual wave blows, not of grosive action.— The railway that we had constructed to carry material to the protective works is almost entirely destroyed but the materials will be saved. The revetment along the road by Mr. Coleman's house is much flattened down, and the

the walls of compounds beyond are broken down by the waves washing over.

22. The sea encroached badly opposite the Biden Sailor's Home and all along that portion of the coast.—

23. Further to the North the damage was not so serious. I have had many applications for repairing the walls which the sea has demolished, and I suppose I ought to repair them again as I did so in 1879. But it is pretty certain that if there had been no Harbour at all such waves as we had on the 12th would have done much damage.—

Buoys.

24. Amongst other damage done in this storm there were six of the new buoys carried away. It is hardly necessary to say that they did not drag their moorings but in every case some part of their chain gave way. The large buoy that was moored to

it screws was one of the first to come ashore and it is clear that the shackle of the chain failed in this case. My divers have not succeeded in getting the chain up yet as it buried itself in the sand when it fell. Four of the other buoys failed by the shackle giving way, and the sixth buoy failed by the mooring ring breaking.-

25. The chains and shackles of these buoys are of first rate workmanship and material, but there is no doubt that the pins of the shackles worked free although secured in their places by a small turned pin of steel. This is generally split at one end to prevent its working out, but in these moorings there is no such split. The cables of all the buoys were rather taut, but it was absolutely necessary to have them so taut that the swivels were clear of the ground at Low water

water. The buoy to which the two steamers were moored came ashore in the evening of the 12th.-

Message to Mr Parkes

26. I telegraphed to Mr Parkes on the 12th as follows "Heavy sea. Both "Titans gone. Much damage to piers." and again on the 14th I telegraphed more details and of the sad loss of the steamers and crew. I received on the 18th the following message from Mr Parkes. "Passage taken ninth December. Write "when known state of remaining courses "in damaged parts," and to this I have replied as concisely as I could.-

27. More will be known when all our levels and sections have been plotted, but at present I have given all the information I have been able to get by means of divers and soundings. It is perhaps rather general but I trust that it will serve to show the degree

and

and nature of the damage done. In the meantime greater details are being obtained every day by Mr. Beardmore who is constantly afloat.—

28. There are some protective works that might be done to the remaining portion of the North Pier but I really hesitate to do anything until Mr. Parkes has seen the work as it was on 2 November 13th.—

29. I forward some photographs of the damaged work with their descriptions written on the back. They form a painful contrast to the photographs I recently had the honour of submitting taken on October 8th.—

I have the honor to be,
Sir,
Your most Obedient Servant

F. Molesworth. M. Inst. C.E.
Superintendent
Madras Harbour Works

With C. Nos 6802-6804

Buildings & Roads

From P. W. C. No 6527

The Superintendent
Madras Harbour Works

No 65 W
Dated 21st November 1881
Rect 25.

No. of Accompaniments 3

Damage to the works.

Submits a detailed report of the — by the storm on the 12th November 1881. —

Complete file is with C. No. 6802.

C. 21. 11. 1881.

A
From orders

2927 W 12 15

PUBLIC WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

UNDER date the 23rd November 1881.

2 Read the following :—

Report by the Superintendent Madras Harbour Works } M. No 65 W of 21st November.

Recorded in continuation of G. O. No 2854 W of 15th November 1881 and a copy furnished to the Secretary of State.

2. A fully detailed report accompanied by explanatory plans and sections will be submitted as soon as these can be prepared - Meanwhile, and pending Mr Parkes' arrival, the only work to which

which it seems de-
-sirable that Mr Thorn-
good should devote
himself, in addition
to the investigations
he is now engaged
upon, is that required
for protection North
of the Harbour and
for repair of dam-
-age in that direction

Superintendent Madras Harbour Work

Marine Department

A
Immediate

15 16

To 114 — 23rd Nov/80
27285

The Right Honorable
The Secretary of State
for India

My Lord Marquis,

In
continuation of our
Despatch No. 71 of
25554
15th November 1880 we
have now the honor
to forward a report
from the Superintend-
-ent of the Madras
Harbour works giving
such information in
regard to the damage
to the works by the
recent Storm as he is
at present in a po-
-sition to afford. Mr
Thornwaite is ac-
-tively engaged on
a Survey and Sound-
-ings, and on com-
-pletion

completion of these, the full extent and nature of the damages will be reported, and illustrative plans and sections submitted. Meanwhile, and pending Mr Parkes' arrival in this Country next month, we have decided that the restoration of the Harbour Works shall be suspended.

3. The accompanying Photographs will give an idea of the present appearances of the Works.

Despd 28/11

S. of St. No. 650 of 21st Nov/11.

Sir,

I am instructed by the Secretary of State for War to transmit to you, for the information of Mr. Parkes, on his arrival in this Country, a Report by Mr. Thorowgood on the condition of the Harbour Works at Table Bay.

I am, Sir,
Your obedient Servant,
[illegible]

Yes – an excellent report! Mr Thorowgood had better act as he suggests

MSd
Nov 23/11

The Hon. Sir [illegible]
&c &c &c Capetown

29716

17

For order

I circulate Mr Thorowgood's report of the damage to the Harbour works at once as Govt. may desire to have it just in time with a simple forwarding despatch to the S of S by the next mail; it unfortunately reached me too late for despatch by today's mail

Probably some little time will elapse before a fully detailed report accompanied by explanatory plans & sections is completed

In the meantime & pending Mr Parkes's arrival (about X mas) the only work to which it seems desirable that Mr Thorowgood should devote himself

C 21.11.

in addition to the investigation he is now engaged on, is making an inter the Institute works north of the Harbour and preparing damage in that direction

21/11/51

Govt. of [1881] Madras.

PUBLIC WORKS.

To

Dated.

Issued

Recd. Encl.

G. O. 25th Nov 1881, No. 2027

2978/81

Nos. 105 - 106

Rcvd in Receipt Office.

Madras Harbour works. Report from Mr. Strange regarding the damage to the — recorded with remarks.

Madras Harbour works.

Forwarding a report from Mr. Stanwood regarding the damage to the Up works by the [illegible]