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# MADRAS RECORD OFFICE

Government of Madras

*Public Works* DEPARTMENT

|          |          |       |
|----------|----------|-------|
| G.O. No. | 1492 (w) | Press |
| B.P. No. |          | Mis.  |
| Dated    | 15-6-    | 1876  |

Not to be folded or roughly handled

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*Proceedings of the Madras Government, Public Works Department,  
15th June 1876.*

No. 261. Read the following letter from N. St. B. BEARDMORE, Esq., Officiating Superintendent, Madras Harbour Works, to Major-General G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 31st May 1876, No. 24 V. :—

SINCE the date of the last report, I have already had to announce to you the unwelcome intelligence of Mr. May's death on the 4th of this month; the first Superintendent of these important works, and a gentleman who perhaps had a larger experience in actual harbour construction than any other Civil Engineer living.

The embankment which leads to the northern breakwater has progressed favorably during the past month. We have advanced 115 feet since the 1st May, having advanced 85 feet since the commencement of this portion of the works on the 27th day of January last. The amount of stone deposited during the month has been 15,730 tons, being 3,000 tons in excess of that deposited during the month of April. On the 11th, 12th, 13th, and 14th days of May, the sea was somewhat

rough, and, as on former occasion, carried away a good deal of stone from the exposed end of the embankment. So a portion of these stones were carried round, as previously described, and deposited in a sort of groyne off the northern side of the pier where it helps to form a protection of the slope. It must not be supposed,

however, that when reports are circulated that 20 or 25 feet of the embankment have been washed away and the rails at the tip end are seen overhanging to a like extent without support, that damage is really done to the amount indicated by such reports founded on merely what is seen, for I have discovered by actual measurement that a great quantity of the stone so removed is drawn down and deposited along the bottom of the sea in front of the advancing embankment where it forms a bed for, and, in fact, part of, the embankment to be tipped on the following day. We discovered one day, after a boisterous surf had been dashing on the work, that there was stone spread out in advance of the embankment for a distance of 60 or 70 feet. These facts can easily be verified by any one who is curious enough to watch the displacement of the stone on a rough day when it will be observed that it is not so much the actual force of the surf breaking on the embankment, but it is the great draught of water following the breaking of the surf wave that draws down the stone with it and deposits it in front of the toe of the embankment as above described; some of the stone, as it is in the act of being drawn down, being caught by the advancing wave and thrown backwards on the north side of the pier.

I have before referred to the accumulation of sand on the southern, or what will be when the harbour is completed, the inner side of the pier, and I now submit to you some sections marked 1 and 2 showing this accumulation. These sections were first taken on the 20th April, and the red lines show the accumulation that has taken place between that date on the 29th day of May, when the survey levels were repeated. On the same sheet are shown sections marked A B C in a similar manner at right angles with the coast, but northward of, or what will be outside the

proposed harbour. These sections were taken in the first instance on April 29th, and again on the 26th and 29th of May. The positions of them are all shown on the plan that accompanies this report.

The accumulation of sand is only what could have been expected; for, during the past month, there has been a decidedly strong current running almost parallel to the shore from the southward. This current has been intercepted by the pier, and the particles of sand carried along with it are deposited in the angle. I have already given my opinion that I do not consider this accumulation of sand permanent, and that part of it will be swept away under the influence of the north-east monsoon, and that a certain line will be attained in which it will remain *in statu quo*.

I do not feel so certain that an indication of the encroachment of the sea along the shore to the north of the pier, as shown on the Sections A and C, is to be

attributed to the projection of our pier. The southerly current has, I believe, during the past month, been exceptionally strong along the coast, and I have observed lately that at St. Thomé, 4 miles to the south of the proposed harbour, the sea has also been encroaching and the sand eaten away in a miniature escarpment. In like manner such encroachments have occurred at former dates in the neighbourhood of Royapooram and Cassemode with considerable damage, and in the years 1872 and 1873 the roadway at a point three-quarters of a mile from the northern pier was washed away altogether; damage has also occurred at different dates near to Mr. Coleman's bungalow, only half a mile from the pier.

Platforms of brickwork and concrete, on which are to be constructed the large concrete blocks, are being built, 150 feet having been completed during the past

month. These platforms are enclosed by a line of railway laid on longitudinal sleepers, forming the Goliath road, and the great traveller now spans them, its erection having been nearly completed.

The mixing shed of the concrete station is being proceeded with, and the foundations of the other portions of the engine-houses are about to be put in.

The sidings in the Railway Company's yard at Royapooram, mentioned in the last report as being under construction, have been completed to the extent proposed, excepting the ballasting. These as all other portions of the work completed during the month of May are shown in red line on the accompanying plan; the length of the pier is also shown on the longitudinal section with two cross sections. The work remaining to be done on the block ground and the other railway sidings required to be constructed are shown in red dotted lines on the above-mentioned plan.

In accordance with the desire expressed by the Government that the southern pier should be forthwith commenced, I have addressed a letter to the President of the Municipal Commission to request permission to lay a line of railway on the beach road, and have telegraphed to England for the necessary railway material, a heavier and stronger description being required for this railway than that which we have now in stock.

The quarries at Ambatoor are being worked satisfactorily, large and hard stone at my special request having been sent down during the month in order to sustain

the heavy battering of the surf. The railway line described in the last report has been projected during the month for a further length of 330 feet. I would have ere this sent in a special report on these quarries as requested, if I had not been making inquiries of the Railway Company, which are not yet answered, as to our future arrangements for carrying the stone. I may mention that I am not desirous of disturbing the existing arrangements with the work-people there, until the northern surf bank, which is not to be projected a very much greater length, is completed, for it would only lead to delay in the supply of stone which even for a few days under the present circumstances and position of the embankment is most undesirable.

On Saturday, May 13th, arrived the Steam Barge *Salisbury*, constructed by Messrs. Thomas Wingate of Whitinch near Glasgow, for the works, being followed by

her sister the *Hobart* on May 23rd. These vessels are intended to be employed in the deposit of stone in the bottom of the sea. They are of somewhat less than hundred tons burthen, and the following are some particulars of their dimensions:—

Length 100 feet, breadth 20 feet, depth 9 feet. The engines, which are of about forty horse power, are a pair of compound direct-acting cylinders of 30 inches and 15 inches diameter and 18 inches stroke. They have horizontal tubular boilers of 75 lbs. to the square inch working pressure, but they have been tested to 150 lbs. pressure to the square inch. The heating surface is 600 superficial feet with 20 feet of grate surface; and the furnace is, I believe, capable of burning wood.

The centre compartment of the ship is constructed partly with a false bottom, that is to say, it opens out in divisions with hinges like doors nick-named "hoppers." When they are in work the stone is loaded into this centre compartment, and the vessel being steamed out and brought to a standstill over the point where it is desired to deposit the stone, by the sudden withdrawal of a bolt, the doors forming the false bottom fly open and the stone drops through on to the sand or partly raised bank below. The doors are then drawn up together again by means of chains and a windlass arrangement worked with a bar, and a barge returns to the jetty again for another load of stone. By this means nearly a 100 tons of stone may be deposited in the sea at each trip.

Two European Engineers have been engaged with each of these vessels for one year certain; the engagement after that period to be terminated at three months' notice on either side. The Chief Engineer in each vessel has a salary of Rupees 250, and the second Engineers have Rupees 200 each per month. These men may either be employed ashore or afloat, and they will at present be a useful addition to the mechanical department which is now busily employed in erecting or preparing the large quantity of machinery required for the works.

On Friday and Saturday, May 19th and 20th, arrived the *Duke of Devonshire*, the *Australia*, with the transhipped cargo of the *Surat* and the *Sea Gull*. The two former vessels brought 852 casks of Portland cement, but they were not all unloaded, for the *Duke of Devonshire* set sail for Calcutta with 201 casks still on board. Some of the

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15th June 1876.*

cement that was landed became wet, and many of the casks were broken, especially those transhipped from the *Surat*, and some percentage of cement thus wasted; but I am informed by some extraordinary Mercantile Law that the Ship's company are not liable for the loss in either one case or the other.

The *Sea Gull* brought one treble Gauntry Traveller for lifting light weights, to be used on the block ground to lift the concrete, after it is brought from the place where it is made, to a height that will clear the tops of the large boxes or moulds by the means of which the great concrete blocks are made. She also brought two boilers, completing with two others previously received the number we require, a pair of engines to work the concrete machinery, and a quantity of other machinery, there being two hundred packages in all.

The amount of money spent during the past month compared to the previous month, and also compared in figures (printed in large type) to the estimated cost is shown in the following table:—

| Heads of Estimate.                   | Cost for April 1876. | Cost for May 1876. | Total Cost to end of May 1876. | Estimated cost by New Estimate. |
|--------------------------------------|----------------------|--------------------|--------------------------------|---------------------------------|
| Detailed Survey .. .. .              | Rs. A. P. 19 10 3    | Rs. A. P. 131 2 0  | Rs. A. P. 649 2 7              | Rs. A. P. 5,000 0 0             |
| Railways, &c. .. .. .                | 1,845 12 4           | 4,742 2 5          | 32,642 7 7                     | 1,50,000 0 0                    |
| Opening Quarries .. .. .             | 11 3 6               | 483 10 2           | 1,770 14 1                     | 10,000 0 0                      |
| Preparing block ground .. .. .       | 10,678 6 1           | 16,403 11 5        | 1,464 3 9                      | 65,000 0 0                      |
| Rubble stone deposits .. .. .        | 4,789 0 9            | 732 9 10           | 63,934 11 5                    | Pert ton. 1 8 0                 |
| Concrete Blocks .. .. .              | 141 1 0              | 228 2 0            | 7,366 10 9                     | 13,07,000 0 0                   |
| Buildings .. .. .                    | 7 8 6                | 124 5 2            | 694 7 3                        | 75,000 0 0                      |
| Locomotive Engines .. .. .           | 4,623 13 8           | 373 11 5           | 2,157 15 5                     | 60,000 0 0                      |
| Rolling Stock .. .. .                | 61 9 0               | 1,250 0 0          | 1,250 0 0                      | 35,000 0 0                      |
| Floating Plant .. .. .               | 9 5 0                | 1,367 2 2          | 23,143 9 11                    | 1,45,000 0 0                    |
| Engines, Cranes, &c. .. .. .         | 3,600 0 3            | 826 0 6            | 4,654 3 6                      | 1,25,000 0 0                    |
| Quarry and General Tools .. .. .     | 34 7 7               | 133 0 0            | 651 5 7                        | 50,000 0 0                      |
| Buoys and Beacons .. .. .            | 217 2 5              | 3,421 11 7         | 678 0 0                        | 3,000 0 0                       |
| Office Furniture .. .. .             | 340 5 10             | 118 11 7           | 29,626 4 2                     | 2,000 0 0                       |
| Salaries .. .. .                     |                      | 173 11 1           | 554 13 7                       | 2,12,800 0 0                    |
| Office Contingencies .. .. .         |                      |                    | 3,198 13 1                     | 6,890 0 0                       |
| Travelling Allowances .. .. .        |                      |                    | 8,654 1 7                      | 20,000 0 0                      |
| Contingencies at 5 per cent. .. .. . |                      |                    |                                | 2,12,800 0 0                    |
| Total .. .. .                        | 26,379 6 2           | 30,509 11 4        | 1,83,724 6 1                   |                                 |

On the 1st of the month we removed to our new office on the works at Royapooram. The building was formerly a Mounted Police Station, and a story was added to it, and it was converted into an office by the District Engineer for our use, at an expense of Rupees 5,120. It is a good building and is conveniently situated; but does not house the whole staff that require offices, and will probably have to be enlarged.

No. 261-A. From Colonel W. T. F. FAREWELL, Officiating Deputy Chief Engineer, to Major-General G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 3rd June 1876.

In accordance with G.O., No. 663, dated 14th March 1876, I have the honor to report that I inspected the Madras Harbour Works in company with the Officiating Superintendent on the 2nd, 12th, 22nd, and 31st May.

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2. In the death of the Superintendent, James May, Esq., which took place on the 5th of the month, and was reported to Government, the works have sustained a great loss.

3. As the Officiating Superintendent's Progress Report of the Harbour Works accompanies my report, it appears to be unnecessary that I should adopt the form I did last month, and report in any further detail on the work.

4. The Progress Report shows that the work done during the month exceeds that of former months a good deal; each time I have visited the work, the quality and size of the stone I saw being delivered was very good, and generally the activity of all concerned in the work shows a desire to further its progress to the utmost.

5. The damage done to the stone pier during the past month has been about the same as that reported before.

6. The progress of the brickwork platforms for the concrete blocks, the Goliath Railway, concrete sheds, &c., has been very fair, and the work looks good. The Railway sidings in the vicinity of the works have been nearly completed, and some extensions have been made to the Railway Lines in the Ambatoor quarries. The screw Hopper Barges *Salisbury* and *Hobart* have arrived from England, and a great quantity of machinery and stores have also been received during the month.

7. In regard to contractors, tenders for a quantity of timber required have been advertized for.

8. A separate report, dated the 30th of May, in reference to the hard stone required for the concrete blocks, has been submitted.

9. South of the stone pier under construction, it will be observed, from the partial survey supplied by the Officiating Superintendent with his Progress Report for May, how the beach has advanced in the vicinity of the pier, but the survey has not been sufficiently extended down the coast to show where the effect of the pier in regards to the silting process commences to be felt; this point, however, is some distance south of the screw pile pier. The great quantity of sand that is being deposited, and the rapidity with which it has accumulated, is worthy of attention with reference to the work in its completed condition.

10. An accurate survey of the harbour site and the coast in its vicinity, with cross sections of the bed of the sea, is very much wanted. The Officiating Superintendent has applied for the services of a Marine Surveyor for this purpose, who, it is hoped, may be soon appointed and take this very desirable work on hand and continue to record all changes that take place from month to month.

11. At this time of the year a certain amount of erosion of the Madras Beach at certain points is always looked for, and it is evident that at one time this erosion had become so serious as to necessitate the provision of the existing short rough stone groynes for some distance north and south of Fort Saint George, and though during very heavy weather and cyclones occasional damage has accrued to the beach, yet under the normal condition of the coast these groynes have hitherto most thoroughly

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answered their purpose, and held the beach well. During the last month, however, north of the new stone pier, the tendency to greater erosion than has occurred at similar seasons in former years has shown itself, and the sea has washed away a great deal of the sand between the groynes, and in some places cut the beach to that most dangerous form for sand, viz., with an almost perpendicular face. The general condition of the erosion shows it to be caused by the southerly current being deflected upon the shore. It is true that the tides during May were higher than usual, but there has been no storm, and the southerly current has not been more rapid than it usually is at this time of the year; hence the only possible conclusion to arrive at is that deflection of the current in shore can only be attributed to the new stone pier, and there can be no doubt that until change of wind and current reverses its action, the eroding force on the locality noted, affected more or less by the state of the weather, must continue. It is therefore of paramount importance that the short rough stone groynes be carefully maintained to meet and resist this action as much as possible, and I am of opinion that the District Engineer, Presidency, should at an early date be directed to have these groynes and the beach between them attentively watched, and, when necessary, take immediate measures to secure these groynes from being out-flanked, and protect from any inroad of the sea on the shore between them. For effecting this he should use the cheapest expedients, such as gunny or mat, bags filled with sand, fascines, and so forth; a quantity of which materials should be collected and kept ready for any emergency. I consider that any permanent protective works would simply be a waste of time, money, and material; all that is wanted is work of the most temporary character, as four months hence it will in all probability be of no use whatever, and our attention will have to be directed to the beach south of the pier, where most of the sand accumulated will be washed away, &c., &c., &c., &c.

No. 262.

ORDER THEREON, 15th June 1876, No. 1,492.

CIVIL WORKS, No. 40.

HIS EXCELLENCY the Governor in Council has received with much regret the intelligence of Mr. May's decease. His more confidence and vigour, and was proceeding to act with

2. His Grace in Council notes with approval the accelerated progress made in deposit of material in the surf bank, and the use of larger and harder stone. 55,000 tons of laterite have now been expended in pushing out the surf bank with a top width of upwards of 30 feet to a length of 835 feet, while 158,125 tons have been allowed for a length of 1,100 feet with top width of 40 feet. It remains however to be seen how the monsoon will affect this rubble mound.

3. Much stress is not laid upon the results of surf action north of the pier. The Railway Authorities will continue to carry out measures for protection of their own property, leaving the question of compensation for decision hereafter, when the full extent of surf action shall have been recorded, and its cause ascertained. The Harbour Superintendent must supply such material as may be necessary to secure or extend existing groynes; but it should be in the shape of large laterite or granite boulders, which can be used over again, if not required when their temporary object has been

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accomplished. The Presidency District Engineer will arrange for receiving and depositing them; and a separate account will be kept up by both parties with a view to future orders as to the final debit of cost.

4. As to the sand deposit within the future harbour basin, the deposits should be noted and reported periodically; but at present the progress of the pier is not sufficient to allow of any certain opinion being formed. A certain amount will doubtless be permanently deposited during the course of construction of both rubble banks; probably it will not vary after they are both completed.

5. Progress with the block ground, buildings, sidings, &c., is reported as satisfactory; and steps are being taken towards arranging for commencement of a railway along the beach road to the southern pier; but no period is indicated for the commencement of southern surf bank.

6. The orders for railway material should have been submitted to Government for approval; and plans and sections of proposed line and the arrangements for accommodation of beach traffic and boat landings must be at once submitted to Government. Information is also needed as to how much additional material can be supplied daily from Ambatoor quarries by the Madras Railway, and deposited for the south pier without interfering with the progress of the north pier and concrete blocks. Further report on the Ambatoor quarries will be awaited, pending which existing arrangements for supply of laterite to the north pier need not be disturbed. The information regarding the Steam Hopper Barges is interesting, and was much wanted. Formal reports as to the state in which cargoes of cement, &c., have been landed will doubtless be made by the Public Works Store Department in due course for communication to the Secretary of State.

(True Extract.)

(Signed) G. W. WALKER, Major-General, R.E.,

Secretary to Government.

To the Superintendent, Madras Harbour Works.

- " Consulting Engineer for Railways.
- " District Engineer, Presidency.
- " Marine Department.

Exd. S. T. Austin.

Spare Copies

11/11  
From Major General Sir W. Waller  
Colonel W. P. Russell  
Officiating Dy. Chief Eng.  
Major General Sir W. Waller  
Chief Engineer and Secretary  
to the Government.  
Sir,  
In accordance with D.O. No.  
1663 dated, 14<sup>th</sup> May 1876, I have  
the honor to report that, I inspected  
the Madras Harbour Works in  
company with the Officiating Su-  
perintendent on the 2<sup>nd</sup>, 12<sup>th</sup>, 22<sup>nd</sup> and  
31<sup>st</sup> May.

1. In the death of the Super-  
intendent, James May, Esq., which  
took place on the 5<sup>th</sup> of the month,  
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2. As the Officiating Super-  
intendent's Progress Report of the  
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any further detail on the work.

4 The Progress Report shows  
that the work done during the month  
exceeds that of former months a  
good deal. Each time I have visited  
the work, the quality and size of the  
stone I saw being delivered was very  
good, and generally the activity  
of all concerned in the work shows  
a desire to further its progress to the  
utmost.

5 The damage done to the stone  
pier during the past month has  
been about the same as that reported  
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6 The progress of the brick work  
platforms for the concrete blocks  
the Goliath Railway, concrete  
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Railway siding in the vicinity of  
the

16  
works have been nearly completed,  
and some extensions have been  
made to the Railway Vines and  
the Umbagog Quarries. The Low  
Tupper Baigesse Salisbury, and  
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machinery and stores have also  
been received during the month.

8 In regard to Contractors,  
tenders for quantity of timber re-  
quired have been advertised for.

9 A separate Report dated the  
30<sup>th</sup> of May in reference to the  
hard stone required for the con-  
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Accumulation  
of sand.

10 South of the stone pier under  
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Survey has not been sufficiently extended down the coast to show where the effect of the pier in regard to the silting process commences to be felt; this point however is some distance south of the low-pile pier. The great quantity of sand that is being deposited, and the rapidity with which it has accumulated, is worthy of attention with reference to the work in its completed condition.

An accurate survey of the Harbor side and the coast in its vicinity, with cross sections of the bed of the sea, is very much wanted. The Offr. Superintendent has applied for the services of a Marine Surveyor

for this purpose, who, it is hoped, may be soon appointed, and take this very desirable work in hand, and continue to record all changes that take place from month to month.

At this time of the year, a certain amount of erosion of the Madras Beach at certain points is always looked for, and it is evident that at one time this erosion had become so serious as to necessitate the provision of the existing short rough stone groynes for some distance North and South of Fort St. George, and though during very heavy weather and Cyclones occasional damage has accrued to the Beach, yet under the normal condition of the coast these groynes have hitherto met thoroughly answered their purpose, and held

the beach well. - During the last month however, North of the new stone pier, the tendency to greater erosion than has occurred at similar seasons in former years has shown itself, and the sea has washed away a great deal of the sand between the groynes, and in some places cut the beach to that most dangerous form for sand, viz: with an almost perpendicular face. - The general condition of the erosion shows it to be caused by the southerly current being deflected upon the shore. - It is true, that the tides during May were higher than usual, but there has been no storm, and the southerly current has not been more rapid than it usually is at this time of the year, - hence

the only possible conclusion to arrive at is that deflection of the current in-shore can only be attributed to the new stone pier, and there can be no doubt that until change of wind and current reverses its action the eroding force on the locality noted, affected more or less by the state of the weather, must continue. - It is therefore of paramount importance that the short rough stone groynes be carefully maintained to meet and resist this action as much as possible, and I am of opinion that the District Engineer, Presidecy, should at an early date be directed to have these groynes and the beach between them attentively watched, and when necessary take immediate measures to secure these groynes

from being out-flanked, and protect  
 from any inroad of the sea on the  
 shore between them - For effecting  
 this he should use the cheapest  
 expedients, such as gunny, or mat,  
 bags filled with sand, fascines, -  
 and so forth - a quantity of which  
 materials should be collected, and  
 kept ready for any emergency -  
 I consider that any permanent  
 protective works would  
 - simply be a waste of time, money,  
 and material - all that is wanted  
 is work of the most temporary  
 character, as four months  
 hence it will in all probability  
 be of no use whatever, and our  
 attention will have to be  
 directed

directed to the beach south of  
 the pier, where most of the sand  
 accumulated will be washed  
 away - yee yee yee yee

I have the honor to be

Sir

Your most Obedt.

Wm. H. Coll

Offg. Dy. Chief Engr.

Madras  
 30 June 76

PM 1876 Departs  
No 4000 A.

From

The Offg Dy Chief Engr

To The Secretary of Govt  
P.N.2

Dated 3<sup>rd</sup> June  
Recd 5<sup>th</sup> Do 1876

Report of  
Progress on the  
Madras Harbour  
Works for the  
Month of  
May 1876.

261A  
Recd-13.6.76 P.N.15-6.76  
Cir. 6.6.76 P.N.13.6.76  
J. H. B. B. B.

GO No 1492 of 15 June 1876

No 24 W.

From

The Offg Superintendent  
Madras Harbour Works

To

The Secretary to Government,  
Public Works Department,

Fort Saint George  
Madras 31<sup>st</sup> May 1876

Sir,

Since the date of the last Report, I have already had to announce to you the unwelcome intelligence of Mr. May's death on the 11<sup>th</sup> of this month: the first Superintendent of these important Works, and a gentleman whose perhaps, had a larger experience in actual Harbour construction than any other Civil Engineer living.

Progress of  
Northern Breakwater

The embankment which leads to the Northern Breakwater has progressed favourably during the past month. We have advanced 115 feet since the 1<sup>st</sup> May having advanced 850 feet since the commencement of this portion of the

Works on the 27<sup>th</sup> day of January last.  
 The amount of stone deposited during the  
 month has been 15,730 Tons, being 3000  
 Tons in excess of that deposited during  
 the month of April. On the 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>  
 and 14<sup>th</sup> days of May, the sea was somewhat  
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 these stones were carried round as previously  
 described and deposited in a sort of groyne  
 of the Northern side of the Pier where it  
 helps to form a protection of the Slope.  
 It must not be supposed, however, that  
 when reports are circulated that 20 or  
 25 feet of the embankment have been  
 washed away and the rails at the tip  
 and are seen overhanging to a like extent  
 without support, that damage is really  
 done to the amount indicated by such  
 reports founded on merely what is seen;  
 for, I have discovered by actual measure-  
 ment that a great quantity of the stone  
 so removed is drawn down and deposited  
 along the bottom of the sea in front of

Sea Damage

Incorrect estimate  
of Sea damage

*[Faint, mostly illegible handwritten notes in cursive script, likely bleed-through from the reverse side of the page.]*

of the advancing embankment where it forms a bed for mud in fact; part of the embankment to be lifted on the following day. We discovered one day after a bristling surf had been dashing on the work that there was stone spread out in advance of the embankment for a distance of 60 or 70 feet. These facts can easily be verified by any one who is curious enough to watch the displacement of the stone on a rough day when it will be observed that it is not so much the actual force of the surf breaking on the embankment, but it is the great draught of water following the breaking of the surf wave that draws down the stone with it and deposits it in front of the toe of the embankment as above described: some of the stone as it is in the act of being drawn down, being caught by the advancing wave and thrown backwards on the North side of the Pier. —

Accumulation  
of Sand

I have before referred to the accumulation of sand on the southern, or what will be when the Harbour is completed,

17  
the inner side of the Pier and I now  
submit to you some sections marked  
1 and 2 showing this accumulation. These  
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with the coast, but northward of what  
will be outside the proposed Harbour. -  
These sections were taken in the first  
instance on April 29<sup>th</sup> and again  
on the 26<sup>th</sup> and 29<sup>th</sup> of May. The  
positions of them are all shown on the  
Plan that accompanies this report.

The accumulation of sand is  
only what could have been expected :  
for during the past month there has been  
a decidedly strong current running  
almost parallel to the shore from the  
southward. This current has been  
intercepted by the Pier and the particles  
of sand carried along with it are  
deposited in the angle. There already

given my opinion, that I do not consider this accumulation of sand permanent and that part of it will be swept away under the influence of the North East Monsoon and that a certain line will be attained in which it will remain in statu quo:-

Encroachment of the Sea

I do not feel so certain that an indication of the encroachment of the sea along the shore to the north of the Pier as shown on the sections A & C, is to be attributed to the projection of our Pier. The southerly current has I believe during the past month been exceptionally strong along the coast, and I have observed lately that at St Thome 4 miles to the south of the proposed Harbour, the sea has also been encroaching and the sand eaten away in a miniature escarpment in like manner. - Such encroachments have occurred at former dates in the neighbourhood of Royapooram & Cussermood, with considerable damage and in the years 1872 & 1873, the roadway at a point  $\frac{3}{4}$  of a mile from the Northern

Black Ground

Pier was washed away altogether; damage has also occurred at different dates near to Mr. Coleman's Bungalow, only half a mile from the Pier.

Platforms of brickwork and concrete on which are to be constructed the large concrete blocks, are being built, 150 feet having been completed during the past month. These Platforms are enclosed by a line of Railway laid on longitudinal sleepers forming the Goliath Road and the great Traveller now spans them: its erection having been nearly completed.

Engine Houses

The mixing shed of the concrete Station is being proceeded with and the foundations of the other portions of the Engine Houses are about to be put in. The Sidings in the Railway Company's Yard at Royapuram mentioned in the last Report as being under construction have been completed to the extent proposed excepting the ballasting. These as all other portions of the work, completed during the month of May are shown in red lines on the accompanying Plan: the length of the Pier

is also shown on the longitudinal section with two cross sections. The work remaining to be done on the Block ground and the other Railway sidings required to be constructed are shown in red dotted lines on the abovementioned Plan.

Southern Per.

In accordance with the desire expressed by the Government that the Southern Per. should be forthwith commenced, I have addressed a Letter to the President of the Municipal Commission to request permission to lay a line of Railway on the Beach Road and have telegraphed to England for the necessary Railway material, a heavier and stronger description being required for this Railway than that which we have now in stock.

Ambatoor Quarries

The Quarries at Ambatoor are being worked satisfactorily: large and hard stone at my special request having been sent down during the month in order to sustain the heavy battering of the surf. - The Railway Line described in the last Report has been projected during the month for a further length

of 330 feet. I would have ere this  
 sent in a special Report on these Quarries  
 as requested, if I had not been making  
 inquiries of the Railway Company, which  
 are not yet answered, as to our future  
 arrangements for carrying the stone;  
 I may mention that I am not desirous  
 of disturbing the existing arrangements  
 with the work people there until the Northern  
 Shelf Bank, which is not to be projected  
 a very much greater length is completed,  
 for it would only lead to delay in the  
 supply of stone which even for a few  
 days under the present circumstances  
 and position of the embankment is most  
 undesirable.

Floating Plant On Saturday, May 13<sup>th</sup> arrived the  
 Steam Barge "Salisbury" constructed by  
 Messrs Thomas Wingate of Whitinch near  
 Glasgow for the works, being followed by  
 her sister the Hobart on May 23<sup>rd</sup>. These  
 vessels are intended to be employed in the  
 deposit of stone in the bottom of the sea.  
 They are of somewhat less than hundred  
 tons burthen, and the following are

Some particulars of their dimensions:-  
Length 100 feet, Breadth 20 feet, depth  
9 feet. The Engines which are of about 140  
horse power are a pair of compound  
direct acting cylinders of 30<sup>in</sup> and 15<sup>in</sup> diameter  
and 18 inches stroke. They have horizontal  
tubular boilers of 75 lbs to the square inch  
working pressure, but they have been tested  
to 150 lbs pressure to the square inch. The  
heating surface is 600 superficial feet with  
20 feet of grate surface; and the furnace  
is capable of burning wood.

The centre compartment of the ship  
is constructed partly with a false bottom  
that is to say, it opens out in divisions  
with hinges like door nick-named "hoppers".  
When they are in work the stone is loaded  
into this centre compartment and the  
vessel being steamed out and brought to  
a standstill over the point where it is  
desired to deposit the stone, by the sudden  
withdrawal of a bolt the doors forming  
the false bottom fly open and the stone  
drops through on to the sand or partly  
raised bank below. The doors are then drawn  
(9)

up together again by means of chains and a windlass arrangement worked with a bar and the barge returns to the jetty again for another load of stone. By this means nearly a 100 tons of stone may be deposited in the sea at each trip.

Two European Engineers have been engaged with each of these vessels for one year certain: the engagement after that period to be terminated at three months notice on either side. The Chief Engineer in each vessel has a salary of Rs 250, and the second Engineers have Rs 200, each per month. These men may either be employed ashore or afloat and they will at present be a useful addition to the mechanical department which is now busily employed in erecting or preparing the large quantity of machinery required for the Works.

On Friday and Saturday May 19<sup>th</sup> & 20<sup>th</sup> arrived the "Duke of Devonshire", the "Australia" with the transhipped cargo of the "Shurat" and the "Sea Gull". The two former vessels brought 562 casks of Portland

Portland Cement, but they were not all  
unloaded, for, the Duke of Devonshire  
set sail for Calcutta with 201 barrels  
still on board. Some of the Cement  
that was landed became wet, and  
many of the barrels were broken especially  
those transhipped from the "Shrat" and  
some percentage of Cement thus wasted;  
but I am informed by some extra-  
ordinary mercantile law that the Ship's  
Company are not liable for the loss in  
either one case or the other.

### Machinery

The "Sea Gull" brought one treble Gantry  
traveller for lifting light weights, to be  
used on the Black Ground to lift the  
Concrete after it is brought from the  
place where it is made, to a height that  
will clear the tops of the large boxes or  
moulds by the means of which the great  
Concrete Blocks are made. She also  
brought two boilers completing with two  
others previously received the number  
we require, a pair of Engines to  
work the Concrete machinery and  
a quantity of other machinery.

# Expenditure

there being two hundred packages in all.-  
The amount of money spent during the  
past month compared to the previous  
month and also compared in red figures  
to the Estimated Cost is shown in the  
following table.-

| Heads of Estimate.       | Cost for<br>April 1876 | Cost for<br>May 1876 | Total cost<br>to end of<br>May 1876 | Estimated<br>Cost by<br>new<br>Estimate |
|--------------------------|------------------------|----------------------|-------------------------------------|-----------------------------------------|
| Detailed Survey          | 19 10 3                | 131 2 .              | 649 2 7                             |                                         |
| Railways &c              | 1845 12 4              | 4742 2 5             | 32642 7 7                           |                                         |
| Spinning Quarries        | " " "                  | " " "                | 1770 14 1                           |                                         |
| Preparing Block Ground   | 11 3 6                 | 483 10 2             | 1464 3 9                            |                                         |
| Rubble Stone Deposits    | 10678 6 1              | 16403 11 5           | 63934 11 5                          |                                         |
| Concrete Blocks          | " " "                  | 732 9 10             | 732 9 10                            |                                         |
| Buildings                | 4789 . 9               | 228 2 .              | 7366 10 9                           |                                         |
| Locomotive Engines       | 141 1 .                | 124 5 2              | 694 7 3                             |                                         |
| Rolling Stock            | 7 8 6                  | 373 11 5             | 2157 15 5                           |                                         |
| Hoisting Plant           | " " "                  | 1250 . "             | 1250 . "                            |                                         |
| Engines & cranes &c      | 1623 13 8              | 1367 2 2             | 23143 9 11                          |                                         |
| Quarry & General Tools   | 61 9 .                 | 826 . 6              | 4654 3 6                            |                                         |
| Buoys and Beacons        | 9 5 .                  | 133 . "              | 651 5 7                             |                                         |
| Office Furniture         | " " "                  | " " "                | 578 . "                             |                                         |
| Salaries                 | 3600 . 3               | 3421 11 7            | 29626 4 2                           |                                         |
| Office Contingencies     | 34 7 7                 | 118 14 7             | 554 13 7                            |                                         |
| Travelling Allowances    | 217 2 5                | 173 8 1              | 3198 13 1                           |                                         |
| Contingencies at Special | 340 5 10               | " " "                | 8654 1 7                            |                                         |
| Total                    | 26379 6 2              | 30509 11 4           | 183724 6 1                          |                                         |

*[The page contains faint, illegible handwriting, likely bleed-through from the reverse side.]*

Offg: Superintendent.

Edith March 6. N. 663.  
12 May 36. 1199

P. W. 1876 Dept  
Madras Harbour Works

From  
The Offg Superintendent  
To the Secretary to Government  
Public Works Department  
Fort St George

Dated 31<sup>st</sup> June  
Decd 3<sup>rd</sup> May 1876.

No 24. W.

Report of Progress  
of work during  
the month of May  
1876

Inclus: 3-  
30- and 40- and 50-  
Only —

Delia - 13.6.76  
 in - 6.6.76  
 Resp to 13.6.76

~~N<sup>o</sup> 1192~~

*Public Works Department.*

PROCEEDINGS of the MADRAS GOVERNMENT.

UNDER date the

READ the following:—

From the Engineer for } H.E. No 261 730 Bragg 76

Offg. Superintendent, }  
Madras Harbour Works } " 24 W. 7 31" — do — /

Atty. Gen. Chief Surg. 17 3<sup>d</sup> June 1876.

His Excellency the Governor in Council has received with much regret the intelligence of Mr. May's decease. His loss at the time when he had mastered all local details and was proceeding to act with more confidence and vigour, is greatly to be deplored.

2.

This grace in Council notes with approval the accelerated progress made in deposit of material in the Surf banks, and the use of larger and harder stone. He is satisfied that the Surf action in moderate weather such as has hitherto prevailed does not affect the Bank to a detrimental extent i.e. greater than is necessary to form a permanent base for the Rubble Mass, or than is provided for by Mr. Parker's estimate. This conclusion is arrived at from the fact of only 55,000 tons of labour having been

been expended in pushing out the Surf Bank with a hop width of upwards of 30 feet to a length of 835 feet; while 150,125 tons have been allowed for a length of 1100 feet with hop width of 40 feet. It remains however to be seen how the monsoon will deal with the Rubble mound.

3. Much stress is not laid upon the results of Surf action north of the Pier, which cannot be entirely attributable to its construction. The Railway authorities will continue to carry out measures for protection of their own property; leaving the question of compensation for

Jan 1881  
Sat 1881  
Monday 1881  
Tuesday 1881

for decision hereafter.  
when the full extent of  
dwarf action shall have  
been recorded. The  
Harbour Superintendent  
must supply such ma-  
terial as may be necessary  
to secure or extend ex-  
isting groynes; but it  
should be in the shape  
of large boulders or  
granite boulders, which  
can be used over again  
if not required when  
their temporary object  
has been accomplished.  
The Presidency District  
Engineer will arrange  
for receiving and deposit-  
ing them; and a separ-  
ate account will be  
kept by both parties  
with a view to future  
orders.

orders as to the final  
debit of cost.  
As to sand de-  
posit within the future  
Harbour Basin. This  
face the presence in  
Council observes that  
the information is de-  
ficient from want of  
perpendicular sections  
along its entire face.  
A certain amount will  
doubtless be permanently  
deposited during the  
course of construction  
of both rubble banks;  
probably it will not  
vary after they are both  
completed.

5. Progress with the Block  
ground, buildings, sidings,  
etc, is reported as satisfactory;  
and

and steps are being taken  
towards commencing a  
Railway along the Beach  
Road to the Southern Pier.  
Further Report on the Am-  
batory Quarries will be  
awaited, pending which  
existing arrangements  
for supply of lake water  
to the North Pier need  
not be disturbed. The  
information regarding  
the Phenix Hopper  
Barge is interesting  
and was much wanted.  
Formal reports as to  
the shake in which  
Cargoes of Cement, &c.,  
have been landed  
will doubtless be made  
by the Public Works  
Shore

Shore Department in due  
course for communica-  
tion to the Secretary of  
State.

Rept. on Harbor Works.  
Conf. for Rep.  
Pres. Presidency.  
Marine Dept.  
Atty.

N<sup>o</sup> 1492

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the

15<sup>th</sup> June 1876.

Read the following:—

~~From the Chief Engineer for~~  
~~Railways~~ } (H. No 261 of 31<sup>st</sup> May 76)

" Offg Supt. Madras  
Harbours Works } " 24<sup>th</sup> " 31<sup>st</sup> " do

" Offg Dy. Chief Engr. D.M. } ( " of 30<sup>th</sup> June 1876.

Ch. 3620

Engr. Supt.

His Excellency the Governor in Council has received with much regret the intelligence of Mr. May's decease. His loss at the time when he had mastered all local details and was proceeding to act with more confidence and vigour, is greatly to be deplored.

2. His Grace in Council notes with approval the accelerated progress made in

in deposit of material  
in the surf bank,  
and the price of larger  
and harder stone.  
55,000 tons of laterite  
have now been  
expended in pushing  
out the surf bank with  
a top width of upwards  
of 30 feet to a length of  
835 feet; while 158,125  
tons have been allowed  
for a length of 1,100 feet  
with top width of 40 feet.  
It remains however  
to be seen how the Mon-  
soon will affect this  
Rubble mound.

3. Much stress is not  
laid upon the results  
of surf action north  
of the Pier. The Rail-  
way authorities will  
Continue

Continue to carry out  
measures for protection  
of their own property,  
leaving the question of  
compensation for de-  
cision hereafter when  
the full extent of surf  
action shall have  
been ascertained and its  
cause ascertained.

The Harbour Superin-  
tendent must supply  
such material as may  
be necessary to secure  
or extend existing  
groynes; but it should  
be in the shape of large  
laterite or granite  
boulders, which can  
be used over again  
if not required when  
their temporary object  
has been accomplished.  
The Presidency District  
Engineer will arrange  
for

for receiving and de-  
positing them, and a  
separate account will  
be kept up by both parties  
with a view to future  
orders as to the final  
debit of cost.

As to the sand  
deposit within the fur-  
ture Harbour Basin,  
the deposits should be  
noted periodically,  
but at present the  
progress of the pier  
is not sufficient to  
allow of any certain  
opinion being formed.

A certain amount  
will doubtless be per-  
manently deposited  
during the course of  
construction of both  
puzzle banks; proba-  
bly it will not vary  
after

after they are both  
completed. (3)

5. Progress with the  
Black ground, buildings,  
sidings, &c. is reported  
as satisfactory, and the  
steps are being taken  
towards arranging  
for commencement of a  
Railway along the  
Beach Road to the  
Southern Pier, but no  
period is indicated  
for the commencement  
of Southern Surf bank.

6. The orders for  
Railway material  
should have been  
submitted to Govern-  
ment for approval  
and information.  
It is needed as to how  
much additional  
material can be  
supplied daily from

from Ambatour  
quarried by the Madras  
Railway and deposited  
for the South pier  
without interfering  
with the progress of  
the North Pier and  
Concrete Blocks.

Further Report on the  
Ambatour Quarries  
will be awaited pending  
which existing arrange-  
ments for supply of  
limestone to the North  
Pier need not be  
disturbed. The in-  
formation regarding  
the Steam Hopper  
Ranges is interesting  
and was much wanted.  
Formal reports as to  
the state in which  
cargoes of Cement &c  
have been landed  
will

will doubtless be made  
by the Public Works  
Shore Department  
in due course for  
communication to  
the Secretary of State.

Supt. Madras Harbour Works. See despd 15/6/78  
Cong. Engr. for Railways. ✓  
Dist. Engr. Presidency. ✓  
Marine Department. ✓

Dated 28/6/78

Y.H.

30861

Port of Madras  
PUBLIC WORKS.

2264 Wager

Harbor Works

Date

Issued

Recd

E. 4

G. O. 15 June 1876. No. 1472

No 26142

Madras Harbour

Passing orders on  
the Report of progress  
of the — for May  
1876.

But no stop  
20-8-76

No 261-262