

(1) Number of pages_____

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(3) Initials of the Referencer_____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	2568	Press	<i>Original</i>
B.P. No.		Mis.	
Dated	26-9-	1826	
		195-	

Not to be folded or roughly handled

Read the following papers —

- ✓ No 432 From F. N THOROWGOOD, Esq, C E, Superintendent of Madras Harbour Works, to Major-General G W. WALKER, R E, Secretary to Government, Public Works Department, dated Madras, 31st August 1876, No 67-W

I HAVE the honor to report that I assumed charge of these works as Superintendent on 7th August 1876, and I now submit the following report of progress

1 Plan of North Surf Bank showing alteration since 31st July	do	do	do
2 Sections of	do	do	do

during the month of August.

2 I increased the supply of laterite to the north surf bank to an average of 700 tons per day, which is as much as can be tipped into the sea at one pier under the present system of shifting the material from the railway wagons to the tipping wagons. The total amount of laterite deposited in the surf bank during the month is 13,387 tons, and the total from the commencement is 81,466 tons, not including what was deposited opposite Royapooram Station. The increase in length of the surf bank since 31st July is 35 feet, which makes the total length from the line of telegraph poles (or point A on accompanying plan) to be 955 feet to the top of the slope and 970 feet to the junction of the slope with the supposed mean sea level. This increase in length compared with the number of tons of stone deposited appear rather unsatisfactory, but I am decidedly of opinion, and I have Mr Parkes' support, that the widening of the slopes at the end and the general spreading of the laterite is precisely what should happen to rubble banks exposed to a breaking sea. On the 26th, 27th, and 28th of the month, the surf was very heavy and no visible progress was made, but, as soon as the sea moderated, the tipping began to gain and the surf bank to advance; and I am of opinion that it is desirable to push on with the surf bank as quickly as possible, so as to get ahead of the accumulation of sand on the south side. In order to expedite matters, I am very anxious to use the two hopper barges before the north-east monsoon breaks, but there are serious difficulties in the way. At present, they cannot be loaded from the surf bank, and during a heavy surf they cannot come within some distance. To build a special jetty which would reach into deep enough water would take some months. I therefore feel inclined, with the permission and assistance of the Master Attendant, to try to utilize the iron pier, and load the barges by means of a long shoot protected by a screen of chain at the end if necessary, to break the blow of the stone in falling. I have not, however, yet taken any steps towards carrying this plan out for want of rails and chairs. I believe that I can now obtain some rails from the Madras Railway Company. The rails that are ordered from England will probably not arrive here for a considerable time.

3. On the 14th August the first concrete block was made by hand labor, and, up to the present date, seventeen blocks have been made ready for the abutment or commencement of the north pier. The blocks are composed of one part of English Portland cement, three parts of sand, and seven parts of stone of various sizes. The stone used at present is chiefly from Palaveram on the South Indian Railway and, until the stone-breakers are erected, it will be better to use this than the Chunnamapett stone, for

although the Palaveram stone is exceedingly hard to quarry, it breaks easily under a hammer. About 400 tons of this stone have been received on the work for block-making, delivered here at a cost of Rupees 2 per ton. When the stone-breakers are completed, I am of opinion that the Chinnamapett stone will be the cheapest and best material to use.

- 4 The engine-house and buildings are being proceeded with as quickly as possible, and there are now four concrete-mixing machines fixed in position.

Engine-house and Machinery

The engine-house itself is now ready to receive the roof, and three of the boilers are in position. The chimney has been commenced to-day.

- 5 These have been proceeded with steadily, and one is very nearly completed.

Concrete Block Platform

The amount done being shown by a brown tint on the accompanying plan.

- 6 I have ordered that the Titan be proceeded with as quickly as is possible, and it has progressed so well during the past week that it is to-day being lifted up

Titan and Cranes

to be placed on the side-frames. It is my intention to try to have it ready to set blocks before the north-east monsoon sets in, as Mr. Parkes lays great stress on this, but it will I fear be more than can be accomplished with the present plant and appliances. The steam traveller or "Goliath" is completed, except that it will require some alteration before it can lift the concrete blocks to the required height. It has been used in erecting the Titan. The Trinity traveller is complete, and is used for shifting the block moulds in the making of the concrete blocks. I have made a slight addition to it by mounting a small winch on the top beams; this is found to be handy in raising or lowering the block moulds.

- 7 I have made two visits to Ambatore quarries during the month, and I consider that many improvements may be made in working them. The stone lies in such

Ambatore Quarries

irregular beds that often the quarryman, Dhonadee Vurdiah, has to shift many cubic yards of earth without getting any stone; he very naturally complains of this state of things. Both Mr. Beardmore and myself are inclined to try tramways in the quarry, but I am not sure that this would not increase the cost of getting the stone considerably. I have not yet advertised for tenders for the supply of laterite, although I consider it must be done eventually; I have delayed hitherto from uncertainty as to what amount per day to advertise for. The amount that can be disposed of a present in the north surf bank alone being less than half of what will be required when the work is fairly started at both piers and with the hopper barges. The amount of laterite to be supplied per day will no doubt affect the price of the tenders. I am also waiting to see the result of some alterations in the wagons that carry the laterite on the railway, and to hear finally if there is any chance of power to run tipping wagons on the Madras Railway Company's line, as all these questions will have some effect on the laterite supply.

- 8 On the 14th August I visited the quarries or hills on the South Indian Railway, in company with Colonel Shaw-Stewart,

Other sources of stone supply

Colonel Farewell, Mr. Fox, and Mr. Beard-

more, and I found on the west side of the line, at about the 15th mile, some very good

servicable stone within 150 yards of the railway, which, I think, might be used with advantage for the south surf bank, if the South Indian Railway were extended to the beach at Madras.

- 9 The stone is a species of trap-rock, and appears to be easily got in pieces of all sizes; it would be more suitable for the surf bank than for concrete-making.

- 10 At Palaveram I consider the stone to be very excellent in quality and it is near the railway; but the main hill is of such hard material that I think it would cost too much in quarrying.

- 11 At the 19th and 24th miles there are capital hills of granitic rock, but I do not consider that any great advantage would be got by using the South Indian Railway for block-making material, as it would all have to be taken to the block-making yard at Royapooram. But for material for the south surf bank and rubble base, I think the South Indian Railway would be very useful, and I consider that to extend the line to the beach at Madras would certainly be very desirable and of great advantage in constructing the Harbour Works.

- 12 I have entered into two small contracts during the month, one with a native builder to construct the engine house chimney, (the Harbour Works supplying the bricks), and another with a native boat-builder to build a diving boat.

Contracts

13. During the month three vessels have arrived with stores. The *Cheybassa* with gearing and bolts for the steam traveller. The *Khedive* with some diving apparatus with speaking tube, which I tested with Mr. Parkes in England, and the *Agra* with 915 casks of cement and other stores for the third Trinity traveller.

Cement and Stores.

14. I have made some further experiments on General Morgan's cement, and I am of opinion that with careful management good results can be obtained, but still the price of Rupees 40 per ton is high for a doubtful article when for Rupees 44 you can get perfectly good English cement. It appeared, at first, that General Morgan's cement would not carry sand, but in the latest experiments the proportion used was six of gravel, three of sand, and of one of cement (on 9 to 1) and the block carried a greater load than the English Wouldham cement, treated in precisely a similar way, and a less load than the Gillingham cement. When there is more of General Morgan's cement on the works, I intend to make further experiments with some small concrete blocks placed in the sea.

General Morgan's Cement

- 15 The staff is the same as was reported last month, excepting that the pay of the Managing Clerk, Mr. E. DeCaster, has been slightly increased, after consulting with the Examiner of Public Works Accounts and the Deputy Chief Engineer, and the employment of another clerk has been sanctioned.

Office Staff

16. On the 22nd August Mr. A. P. Agar arrived here to commence a survey of the Madras roadstead, but his services have since been dispensed with, and Mr. P. J. Falle and Lieutenant Jarrad, from Calcutta, have now taken the work in hand.

Marine Survey

Proceedings of the Madras Government, Public Works Department,
26th September 1876. No. 2,563.

No. 433. ORDER THEREON, 26th September 1876, No. 2,568.

CIVIL WORKS, No. 28

ORDERED to be recorded.

(True Extract.)

Colonel,

Offg. Under Secy. to Govt., P.W.D

N^o 67 W.

From

F. N. Thoroughgood Esq: &c.

Superintendent,

Madras Harbour Works.

Major General G. W. Walker P.C.,
Secretary to Government,

Public Works Department,

Fort St. George, -

Madras, 31st August 1876.

Sir,

I have the honor to report that I
assumed charge of these works as Superintendent
on August 7th 1876, and I now submit the
following report of progress during the month
of August:-

North Surf Bank

2. I increased the supply of laterite to
the North Surf Bank to an average of 700
tons per day which is as much as can be
tipped into the sea at one pier under the
present system of shifting the material from
the Railway wagons to the tipping wagons.
The total amount of laterite deposited in the
Surf bank during the month is 13387
tons - and the total from the commencement

is 81166 tons - not including what was deposited opposite Rayapooram Station - The increase in length of the surf bank since July 31st is 35 feet which makes the total length from the line of telegraph poles (or point A on accompanying plan) to be 955 feet to the top of the slope and 970 feet to the junction of the slope with the supposed mean sea level. This increase in length compared with the number of tons of stone deposited appear rather unsatisfactory - but I am decidedly of opinion, and I have Mr. Parkes' support, that the widening of the slopes at the end and the general spreading of the laterite is precisely what should happen to rubble banks exposed to a breaking sea - On the 26th, 27th and 28th of the month, the surf was very heavy and no visible progress was made - but as soon as the sea moderated the tipping began to gain and the surf bank to advance - and I am of opinion that it is desirable to push on with the surf bank as quickly as possible, so as to get ahead of the accumulation of sand on the south side -

Note

In order to expedite matters, I am very anxious to use the two Hopper Barges before the North East Monsoon breaks, but there are serious difficulties in the way. At present they cannot be loaded from the surf bank, and during a heavy surf they cannot come within some distance. To build a special Jetty which would reach into deep enough water would take some months - I therefore feel inclined, with the permission and assistance of the Master Attendant, to try to utilize the Iron Pier, and load the barges by means of a long shoot protected by a screen of chain at the end if necessary, to break the blow of the stone in falling - I have not, however, yet taken any steps towards carrying this plan out for want of rails and chairs - I believe that I can now obtain some rails from the Madras Railway Company - The rails that are ordered from England will probably not arrive here for a considerable time -

etc Blocks 3 On the 11th August the first concrete Block was made by hand labour, and up

to the present date 17 blocks have been made ready for the abutment, or commencement of the North Pier. The blocks are composed of 1 part of English Portland Cement, 3 parts of sand and 7 parts of stone of various sizes. The stone used at present is chiefly Palaveram on the South Indian Railway, and until the stone breakers are erected it will be better to use this than the Chinnamapett stone. For although the Palaveram stone is exceedingly hard to quarry, it breaks easily under a hammer. About 400 tons of this stone have been received on the work for block making, delivered here at a cost of Rupees 2 per ton. When the stone breakers are completed, I am of opinion that the Chinnamapett stone will be the cheapest and best material to use.

4 The Engine house and buildings are being proceeded with as quickly as possible - and there are now 4 Concrete mixing machines fixed in position. -

The Engine house itself is now ready to receive the roof and three of the boilers are in position. - The chimney has been commenced today. -

Concrete Block Platforms

Titan & Cranes

5 These have been proceeded with steadily, and one is very nearly completed - The amount done being shown by a brown tint on the accompanying plan. -

6 I have ordered that the Titan be proceeded with as quickly as is possible - and it has progressed so well during the past week that it is today being lifted up to be placed on the side frames. It is my intention to try to have it ready to set blocks before the N. E. monsoon sets in, as Mr. Parker lays great stress on this, but it will I fear be more than can be accomplished with the present plant and appliances. The Steam Traveller or Goliath is completed except that it will require some alteration before it can lift the Concrete Blocks to the required height. - It has been used in erecting the Titan. The Trinity Traveller is complete and is used for shifting the block moulds in the making of the Concrete blocks. I have made a slight addition to it by mounting a small winch on the top beams - this is found to be handy in raising or lowering the block moulds. -

7. I have made two visits to Ambatoor Quarries during the month - and I consider Ambatoor Quarries that many improvements may be made in working them. The stone lies in such irregular beds that often the quarryman Dhondel Vindial has to shift many cubic yards of earth without getting any stone - he very naturally complains of this state of things - Both Mr. Beardmore and myself are inclined to try tramways in the quarry, but I am not sure that this would not increase the cost of getting the stone considerably. I have not yet advertised for tenders for the supply of laterite, although I consider it must be done eventually. I have delayed hitherto, from uncertainty as to what amount per day to advertise for. The amount that can be disposed of at present in the North Surf Banks alone being less than half of what will be required when the work is fairly started at both Piers and with the Hooper Barges. The amount of laterite to be supplied per day will no doubt affect

13 4
the price of the tenders. I am also waiting to see the result of some alterations in the wagons that carry the laterite on the Railway, and to hear finally if there is any chance of power to run tipping wagons on the Madras Railway Company's line - as all these questions will have some effect on the laterite supply -

8. Other Sources of Stone supply. On the 14th August I visited the quarries or hills on the South Indian Railway, in company with Colonel Shaw-Stewart, Colonel Farwell, Mr. Fox and Mr. Beardmore. and I found on the west side of the line at about the 15th mile, some very good serviceable stone, within 150 yards of the Railway, which I think might be used with advantage for the South Surf Bank, if the South Indian Railway were extended to the Beach at Madras -

9. The stone is a species of trap rock, and appears to be easily got in pieces of all sizes - it would be more suitable for the surf bank's than for concrete making -
10. At Palaveram I consider the stone to be very excellent in quality and it is

appears to be
perfectly
laterite

near the railway; but the main hill is of such hard material that I think it would cost too much in quarrying.

11. At the 19th and 24th miles there are capital hills of granite rock - but I do not consider that any great advantage would be got by using the South Indian Railway for block making material, as it would all have to be taken to the block making yard at Royapooram. But for material for the South Surf bank and rubble base, I think the South Indian Railway would be very useful - and I consider that to extend the line to the Beach at Madras would certainly be very desirable and of great advantage in constructing the Harbour Works.

12. I have entered into two small contracts during the month - one with a native builder to construct the Engine house chimney, the (Harbour Works supplying the bricks), and another with a native boat builder to build a diving boat.

13. During the month three vessels have arrived with stores - The "Cheylassa" with
gearing

Represented
by
the
Supt.

Contracts

Cement and
Stores

5-5
gearing and bolts for the steam Traveller - The "Rhedive" with some diving apparatus with speaking tube which I tested with Mr. Parkes in England - and the "Agra" with 915 Casks of cement and other stores for the third "Trinity" Traveller.

General Morgan's
Cement

I have made some further experiments on General Morgan's cement and I am of opinion that with careful management good results can be obtained - but still the price of Rs 40 per ton, is high for a doubtful article when for Rs 14 you can get perfectly good English cement. It appeared at first that General Morgan's cement would not carry sand - but in the latest experiments the proportion used was 6 of gravel, 3 of sand, and of 1 of cement (or 9 to 1) and the block carried a greater load than the English Woudham cement, treated in precisely a similar way - and a less load than the Gillingham cement. When there is more of General Morgan's cement on the works I intend to make further experiments with some small concrete blocks placed in the sea.

15 The Staff is the same as was reported last month; excepting that the pay of the Managing Office Staff Clerk, Mr. C. D. Carter, has been slightly increased, after consulting with the Examiner of Public Works Accounts, and the Deputy Chief Engineer, and the employment of another clerk has been sanctioned.

16 On the 22nd August, Mr. St. P. Agar arrived here to commence a survey of the Madras Roadstead, but his services have since been dispensed with, and Mr. P. J. Fulle and Lieutenant Jarrad from Calcutta have now taken the work in hand.

17 It is desirable that their survey should be as elaborate as possible, as at present there is very little information as to the state of the Roadstead and even of the mean sea level.

18 I have not subjoined the monthly Expenditure up to the 31st August - but this shall follow as soon as possible.

19 I shall be glad to know if the present arrangement of the heads of the different subjects in the Report meet with the

approval of His Grace the Governor, in Council - if such is the case the same order shall be always preserved.

20 In conclusion I may mention that I have heard from Mr. Parkes that he leaves England for India on the 20th September.

I have the honor to be,
Sir,
Your most Obedient Servant,
F. H. Thoroughgood,
Superintendent

3023-8-76 No 2225.

P.W.D.
From 1 SEP 76
The Superintendent
Machao Harbour Works

To
The Secretary to Government
Public Works Department
Fort George

Dated 31st August 1876
Recd

N. by W

Submits report of progress
of the works during the
month of August 1876--

432

Recd - 18.9.76 Ptd 26-9.76
Plin - 5.9.76 Ptd 18.9.76
West 1-9-76

No 2

P 11/7

No
From Colonel R. P. Farwell
Officiating Dy Chief Eng
To Major General Sir Walker R
Secretary to Govt P.W.D.

Sir I have the honor to sub-
mit my usual report on the
Machao Harbour for the month
of August.

2. During the month, Mr
F. N. Thoroughgood, the Superin-
tendent appointed by the
Right Honorable the Secretary
of State joined the works, and
took charge of them.

3. A conference was held at
the Office of the Consulting
Engineer for Railways attended
by the Chief Engineers of both
lines

lines of the Railway, the Super-
intendent of the Madras Harbour
and his Assistant,
Korkis, the Consulting Engineer
for Railways, the Deputy Con-
sulting Engineer and myself,
at which the supply of stone and
the capabilities of delivery &c &c
were fully discussed. The car-
rying power available appears
to be ^{nearly} sufficient, but the questions
of loading, unloading, and the
supply of stone are still to be
matured.

4 Shortly after the Super-
intendent arrived in Madras
he accompanied me and the
Consulting Engineer for Railways
to inspect the three best quarries
for stone on the South Indian
line of Railway, noticed in
my last month's report.

No.

5 No new Contracts, ex-
cept verbal ones for petty task
work the Superintendent informs
me, have been entered into in
the past month, the necessary
increase to the Office Establish-
ment formed the subject of a
separate report already despatched
to your address in reply to G. O.

No 2138 dated 16th August 1876

6 The surf bank has ad-
vanced 35 feet in August, but
a good deal of stone has been
spread North and South of
it by surf action.

7 The steady accumulation
of sand continues and the surf
beats in front of the rubble stone
pier as far out as ever while
the extension of the line of
Breakers south of it in the same
line shows how the beach is

advancing seaward. The roughness of the surf has prevented any soundings being taken during the month, so I am unable to give any reliable information as to the extent to which silting may have taken place in front of the pier.

8. The construction of the Engine House and Machinery sheds has been pushed on well in August. Three Boilers are laid in situ and three of Messrs' concrete mixing machines have been swung into their permanent working positions. The Jotham and Spruce Cranes are completed and on the Titan a good deal of labour and attention has been concentrated

23
concentrated and the Block platforms and Crane Railways have made fair progress. The concrete blocks for the abutment pier have been commenced and 17 have been built. They are clean moulded and appear to be setting well.

[9. To the latter portion of para 4 of C. O. No. 663 dated 14th March 1876 directs Government should be informed of any difficulties which may arise in carrying out the original design. I beg to point out that the steady accumulation of sand and regular advancement of the line of Beach with that of the rubble stone pier keeping the surf speakers as far in front of the work as they used to be from the ordinary beach.

Advancing
on 6th July

Station 6th July

6
beach, renders it impossible
as originally intended at a
certain distance from the shore
to commence the rubble base
and lay the abutment blocks
of the breakwater from the surf
bank. That for the same reasons
no jetty can as contemplated
be constructed from the surf
bank from which the steam
Tug Boats could be laden
and thus these valuable vessels
are still lying idle at anchor
as they have been for the last
three months; and further except
by piling in a mass of concrete
blocks at the end of the surf
bank it cannot be protected
by regular built blocks, as hoped
for, before the monsoon commences

10 The rapidity with which²⁵⁷
the enormous mass of sand now
lying south of the surf bank under
construction has accumulated and
continues to accumulate tends to
prove that such could never have
been calculated upon vide para
17 and 18 of Mr Parkes Pulni-
nary Report, and that at the
present rate of progress, it would
take comparatively speaking
but a few years to accomplish
the predictions of General Orr.
As contained in para 13 of
the same report, the correctness
of the theory of which is laid
down by Professor Rankine
as a rule and not the exception
and its truth is admitted by
Mr Parkes in Para 14 of his
report, tempered however by the
qualification of time but now fully

demonstrated by what we have before us

11 The mode in which the sand has deposited itself south, or on the hitherto prevailing current quarter, as the surf bank went seawards, and then immediately its progress was reduced—catching it up, and running round it, appears to me conclusively to establish the fact that the sand in suspension is only that stirred up by surf action on the shallow shore, and is not moved from the bed of the sea, from deep water. Further, the soundings at the screw pile pier head, I am informed, show no change, though a great one has taken place inshore, I make the above remarks, as from the opinions advanced

by the Breakwater Committee it is useful I should do so, noting at the same time that there is nothing to prove the theories advanced by the Breakwater Committee are correct, while we have to deal with what has actually taken place.

12 Now that Mr. Parker is shortly to be at Madras and the difficulties noticed will be discussed, I beg respectfully to direct the attention of Government to Appendix F published with the Breakwater Committee Report containing a very imperfectly described project, one portion of which however, under the circumstances noticed in the preceding paragraph of this Report, I think commends itself

itself very strongly to attention
viz- that of crossing the surf
and shallow shore by open screw
pile piers, leaving the along
shore, or littoral current, free
in its action -

13. The Machias Screw pile
pier, which has been built for
many years now, is a standing
proof that such a structure ex-
erts in an almost inappreciable
degree does not intercept the current-
driven sand held in suspension
by our action, which we find
from the experience now gained,
travels up and down the coast
and not from the sea, thus
it would appear that the
substitution of open screw pile
piers, carried out to three fathom

11
water, for the solid rubble surf
banks would solve the sand
problem, overcome all difficul-
ties, and immensely facilitate
the speedy completion of a W.
Parke's grand conception -

14. It will be remarked that
the Open Water Committee con-
demned the general Project no
need in Appendix B. fearing
apparently that the current would
not be sufficiently powerful to
prevent the screened portions of
the Harbor being shoaled up
by the deposit of silt in sus-
= pension; but it will be observed
that no real evidence is ad-
= duced to prove that their fears
would be realized, and their
conclusions in the matter seem
to have been somewhat ar-
-bitrarily arrived at. It is

evident that the velocity of the littoral current, if any thing, would be increased by con- traction than otherwise and there is no reason to believe its direction would be changed from running along the shore, while the current from the Harbour entrance would doubtless tend rather to promote its deflection in shore & & but at all events admitting that some shoaling might, from unknown causes, take place, such would never be beyond the power of dredging, while on the other hand, if solid walls are used and the accumulated sand once runs round

round the ends of them into the Harbour entrance no dredging power in existence would save it.

15 I have no doubt the screw piled approaches will add considerably to the cost of a Mr. Parkes' design - possibly from 8 to 10 Lacks - but that would be a small matter in comparison with the probable loss of 60 or 70.

16 Summing up the whole question the stubborn fact to be dealt with is a mighty volume of sand in constant motion up and down the coast, which we have positive proof, if intercepted, will inevitably destroy the Harbour, that the only alternative is to interfere with nature as little as possible.

17-3-69 No 866 & 867
 - 27-4-76 - 1056.
 - 12-5-76 - 1197
 - 15-6-76 - 1492
 - 18-7-76 - 1802
 - 15-8-76 - 2117
 23-8-76 - 2228

P.W.D.

1 SEP 76

No 1320

From

Col. W. F. Farewell.
 Offg. Dy. Chief Engr.

Dated 1 Sept. 1876.

G.O. No. 2568

1/28 Sept 1876

Report on the Madras
 Harbour Works for the
 month of August 1876.

No 1320

Recd - 18-9-76 Mm 26-9-76
 G.O. - 6-9-76 Via 18-9-76

No 4

No 68 W.

From

J. N. Thoroughgood Esq: L.E.
 Superintendent,
 Madras Harbour Works.

To

Major-General G. W. Walker R.E.
 Secretary to Government,
 Public Works Department,
 Fort St George.

Madras, 14th September 1876.

Sir,

With reference to my letter No. 67 W.
 dated 31st ultimo, reporting the progress of
 these works to the end of the month of August
 1876, I have now the honor to annex a
 Statement showing the Expenditure on the
 works to the end of the same period.

I have the honor to be,

Sir,

Your most Obedient Servant,

J. N. Thoroughgood.

Superintendent

Statement showing the Expenditure on the Madras Harbour Works to the end of August 1876. —

Heads of Estimate	Cost for			Total cost
	July 1876	August 1876	to end of August 1876	
Detailed Surveys	160 13 8	197 5 6	1046 13 9	
Railways &c	5813 14 9	4913 4 7	48600 3 4	
Opening Quarries & quarrying	" "	" "	1875 14 1	
Preparing Block & ground	" "	1507 4 9	8335 9 5	
Rubble Stone to North Pier	2277 4 8	11705 14 5	11857 12 1	
Concrete Blocks for Abutment North Pier	117 10 6	1047 4 3	1898 2 7	
Rubble to North Pier under extra Estimate	" "	" "	150 13 10	
Rubble Stone to South Pier	1330 7 7	1050 2 2	2811 7 8	
Buildings	2606 "	2345 13	13222 1 4	
Locomotive Engines	41 3	42 6 3	797 15 9	
Rolling Stock	138 14 6	23 2	2614 13 5	
Floating Plant	10 4 3	" "	3344 14 2	
Engines, cranes &c	3298 7 6	2972 10	33554 4 8	
Quarry and General Tools	2260 4 7	504 14	7617 4 11	
Buoys and Beacons	" "	" "	651 5 7	
Office Furniture	99 5 10	58 3	1701 10	
Salaries	" "	3494 15 11	38109 8 9	
Office contingencies	47 13 2	47 14 4	674 7	
Travelling Allowances	241 14 2	490 7 3	4101 2 6	
Contingencies at 5 per cent	360 5 11	" "	9032 10 3	
Protecting the North Beach at Pappadam	1686 14 11	2338 8	4025 6 11	
Medicines	" "	10 10	10 10	
	41884 8 5 327 20 78 20778 5 11			

Madras
4th September
1876

J. N. Thoroughgood
Superintendent

P.W.D.

5 SEP 76

To
The Superintendent
Madras Harbour Works.

The Secretary to Government,
Public Works Department,
Fort St George.

Dated 4th
Recd 5th September 1876
No. 681 r.

Submits statement
showing expenditure on the
Harbour Works to the end
of August 1876.

No. 32 B.

Recd - 12-9-76 P.W.D. 1876-77
Recd to Govt. 5-9-76

P.W. Dept.

Letter from the Superintendent Madras
Harbour Works No. 68 W d 4th Sept 1876.

Circulated in con-
tinuation of Harbour
Superintendent's letter
No. 67 W dated 31st August
forwarding Progress
Report for August
1876.

* Circulated 5 Sept.

Major Genl. R. S.
Secretary to Govt. P.W.D.

401

12/12/1901

1911

What object-

11. 11. 11. 11

up to 24:1

Sept 21

Final

11-2-1945

1957

1151 -

11

I cannot but think that Colonel Farewell goes too far in assuming that, because the accumulation of sand, during the South West Monsoon, so windward of the Northern Surf Bank, has been exactly in excess of what was anticipated, therefore the whole space between the 2 piers will to a certainty be silted up. He makes no allowance for the action of the North East Monsoon in cutting away a great proportion of the sand deposited in the South West Monsoon.

2. What I think the experience of the past twelve months teaches us is, that (1) arrangements should have been perfected for enabling the whole material of each Surf Bank to be deposited in one Monsoon; (2) the South Surf Bank should have been deposited in the South West Monsoon.

Carried on in the harbours itself,
deteriorating it from year to year.

L. H. M. A. K. Major Genl. R. E.
 Chief Engineer D. M. W.

Obasarnund
16th September 1876

and
M

1101
9514

H. A. B. J. Schultze

PUBLIC WORKS DEPARTMENT.

Letter from the Superintendent, Madras Harbour Works,
No 67 W of 31st Aug/76.

Letter from the Deputy Chief Engineer, P.W. Dept.
No. dated 1st Sept. 1976.

FOR ORDERS.

Major Genl R.E.

Secretary to Govt. P.M.S.

Confess that I don't
understand the affe-
-rent reluctance about
Contracting for material
We are to extend trans-
ways &c &c.

ways etc. -
I confess that I do
have great fears of a literal
current caused by an open
current way unshored on
dampling grounds

9/9 M

I have read them up & down
with much interest. No
very great progress has been
made. but I do not think
this to be regretted - if
as seems probable some
considerable modification
of Mr. Parker's plan will
be required. I observe
Mr Parker will be here
in the middle of October.



619

FOR ORDERS.

No 2568

Public Works Department

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Under date the 26 Sept 76.
Read the following. —

From
The Supt Madras Harbours & Works { H.E. 1206/Wd/31st Aug/76
The Deputy Chief Engineer { H.E. 1206/Wd/31st Aug/76
Memorandum by the Chief Engineer of M. { H.E. 1206/Wd/31st Aug/76
Supt. Madras & Works — Ordered to be re
= Coded.

C.H.W.

Supt. M. & Works in the place
and repairs
Marine Dept.

Desd 10/10/76

6421/6317

Govt. of 1876 Madras.

PUBLIC WORKS.

To

The ~~Sup~~ ^{Sup} ~~re~~ ^{re} ~~as~~ ^{as} ~~Harbour~~ ^{Harbour} ~~Works~~ ^{Works}

Dated

Issued

Recd

Encl.

G. O. 26th Sept 1876, No. 2568

Nos. 232/33

Madras Harbour

Notice

The report
of progress of the —
for the month of
August 1876, recorded.

Not in Reg
9-10-76