ப. எண்ணிக்கை 22
மு. தி. நாள் மார்ச் 1991
அ. சேர்க்கப்பட்ட [illegible]

1941
27. 7. 1893

79/1947

27TH JULY 1893, No. 1941 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper:—

Despatch from the Right Honorable Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India office, London, 15th June 1893, No. 4 (Public Works).

Your Excellency's Public Works letters, quoted in the margin, forwarded, for my information, various reports on the progress of the Madras Harbour Works and the administration of the Harbour Trust Board.

Letter, dated 12th Sept. 1892, No. 11/2536 W.
" " 2nd Nov. " " 12/3011 "
" " 13th Dec. " " 13/3414 "

2. I now forward, for the information of your Government, copy of a report by Sir Alexander Rendel,* dealing with the subject of the defects in the wheels of the titan crane and with the question of the use of laterite for the substructure of the breakwaters.

* Dated 9th May 1893, and enclosure.

3. On the recommendation of Sir A. Rendel, I have sanctioned the acceptance of a tender from Messrs. Ransomes, the makers of the titan, for the four wheels of the central bogies, amounting to £160.

ENCLOSURES.

REPORT by Sir ALEXANDER RENDEL, K.C.I.E., dated 9th May 1893.

I have had until recently so little information upon the subject of the defects in the wheels of the titan and am still so uninformed upon the question raised in respect to the suitability of laterite as a base or substructure for the breakwaters, for which purpose laterite has been almost wholly used, that I have hitherto postponed commenting upon either, hoping that each successive mail would bring us further information.

I have, however, at length sufficient information to enable me to advise in respect of the wheels of the titan. The failure here is due, I think, to something more than the cause to which the papers sent to me attribute it, namely, the tyres being in two halves, *i.e.*, two ordinary tyres shrunk on the same wheel centre. It is due, I believe, to the construction of the wheel being generally insufficient to carry the heavy weight placed upon it, under the conditions of the titan being travelled daily from end to end of the breakwater. Had I calculated on the titan being moved about so much, I should probably have designed it with solid forged steel wheels, but I was disinclined to do so without a clear necessity on account of the great cost of such wheels as compared with that of the cast iron wheels tyred with steel which were adopted.

I hope, however, that the present wheels may be made to answer for the leading and trailing bogies of the titan and that only those of the centre bogies, by means of which the titan is travelled backwards and forwards, need be changed.

I have been in communication with the makers of the titan, Messrs. Ransomes of Ipswich, on the subject and have now to recommend that a tender they have sent to me and which I send, herewith, for the four wheels of the central bogies, amounting to £160, be accepted.

These wheels will be solid steel forgings and should prevent any further trouble. If the other eight wheels should give serious trouble they must be also replaced, unless, which is possible, they can be dealt with by the help of the locomotive factory in Madras in some simpler way.

In respect to the use of laterite for the substructure of the breakwaters, I have no further information than the statement by the Acting Resident Engineer in the papers sent to me that—it having been necessary to take up some portion of the substructure near the end of the north pier for the purpose of founding, as I have recommended, the superstructure at a lower level than had been originally intended—"the material, mostly laterite, to a large extent came up in the form of gravel, indicating the unsuitability of this kind of stone to form the base of a pier."

In the absence of any further report on the subject by the Resident Engineer himself, who resumed his duties some months ago and whose long connection with the works makes his opinion particularly valuable, I have thought it desirable to consult his predecessor, Mr. Thorowgood, for many years the engineer in charge of the works under the late Mr Parkes, and who is now in England, and Sir Guildford Molesworth, who reported upon the breakwaters after their destruction in 1881. Mr. Thorowgood has sent me a memorandum on the subject, dated 24th January 1893, by which it will be seen that, though he never liked laterite, he was and is of opinion that it may be safely used in the bases of the breakwaters. Sir Guildford Molesworth is also, I find, of the same opinion, provided the laterite be good. The fact is that laterite varies very much in quality. The best is fit for anything. The worst is fit for nothing. Good and bad will be found in the same quarry. The bad must be rejected and there is some reason to fear that by the time the ends of the breakwaters were approached the best of the laterite found in the Madras quarries had been exhausted. I should note here that the rubble base or substructure of the Marmagoa breakwater was built of laterite—so far with entire success—but the West coast laterite is supposed to be better than that found on the East coast.

If there be danger in the use of laterite, it does not, in my opinion lie in the smallness of pieces into which it breaks, but in the risk of its being gradually ground into mud by movement consequent on wave action, or on the rocking of the superstructure upon it, which Sir Guildford Molesworth tells me he observed. I saw myself no such rocking motion; but unfortunately during my visit the sea was perfectly smooth and therefore no such rocking could take place.

In respect to size, the breakwater at, the Tees, including its head, is founded at a level of about 10 feet below low water on a vast mound of iron slag, which has broken up into small pieces probably not larger than the laterite at Madras, and the head of the inner breakwater at Portland was founded at about 30 feet below low water on a mound of small stone principally from the "Chert Bed" of the Portland quarries. Neither work has suffered from any cause which could be attributed to the smallness of the material used in the substructure, though the Tees breakwater has already once suffered severely and been in danger of total destruction from the superstructure being founded on the substructure at too high a level. There is, therefore, in my opinion, nothing to be feared from the fact discovered in respect to the laterite at Madras, or rather supposed to have been discovered, for it will be seen by Mr. Thorowgood's note that it is possible that the laterite taken up was actually deposited in the form of gravel The more important question to my mind is—will the laterite degrade into mud? This appears to be a question of its original quality, on which only those upon the spot can form an opinion.

The conclusion, however, which I have come to is that, even if the laterite be of a quality which will not resist a gradual decay, the heads and ends generally of the breakwaters as now designed may be built upon a laterite substructure without risk of future serious injury. In the first place, being founded at so low a level, about 38 feet below low water, there is no risk of the superstructure being undermined by wave action, and, in the second place, there is very little substructure beneath it. Therefore, if the laterite should degrade, the result would only be a slight and gradual settlement of the superstructure, which would be attended with no risk of injury to it.

I do not think, therefore, that it is absolutely necessary under any circumstances to remove the existing substructure; but, if it should have been found by the further examination which doubtless by this time has taken place, that the laterite of which it is in part composed is softening and degrading into mud, then, as the cost of taking up that portion of it on which the heads will rest will not be large, it may be well to do so: either replacing the material taken up by good laterite or gneiss—and it does not seem to matter which provided the laterite be good—or by founding the heads at a somewhat lower level than is now intended. I return the papers.

Memorandum on Laterite by Mr. THOROWGOOD, dated 24th January 1893, referred to in Sir A. Rendel's Report.

The laterite used in the construction of the north pier of the Madras Harbour from January 1876 to the date of the damage of 12th November 1881 came from a district nine miles west of Mádras.

This laterite was used for building purposes, such as the wing walls of culverts, retaining walls, &c., round about the neighbourhood, and unquestionably does not deteriorate in process of time; possibly it even improves.

90
1947

The groynes which I found along the coast in the immediate neighbourhood of Ráyapuram and nearer to Fort St. George in 1876 were mostly made of large pieces of laterite, six to ten cubic feet each, and the sea water never had any damaging effect upon these during the twelve years that I observed them.

The approach to the north pier tipped in 1876 was entirely of laterite. In 1876 this bank was badly scattered by the surf, the laterite being spread along the shore. This scattered laterite, after lying several years amongst the shallowest breakers, was eventually picked up by my orders and used in the rubble base. No deterioration had taken place, but each piece was covered with shells.

I made experiments in 1876–77 with a cube of laterite dressed fair and weighed, then immersed in the sea at the iron pier head, afterwards taken up at intervals and weighed again. There was no loss of weight or wasting of the surfaces.

In 1879 or 1880 I wrote very strongly to Mr. Parkes, Engineer-in-Chief, against the use of laterite for the rubble base. Not because I feared that the salt water injuriously affected it (for I am certain such is not the case), but because in loading it into the hopper barges which deposited the base, the laterite got broken and crushed like coke or cinders. I drew up a memorandum of my "objections against laterite," but Mr. Parkes was not in any way alarmed or disturbed at my reports as to this breaking up in the act of loading Doubtless similar breaking occurred in the act of tipping into the sea subsequently

I have not a copy of this memorandum, but it will be found in the papers at the office of the Harbour Works at Madras. I know that the late Mr. Parkes took exception to my referring to the material as "this vile laterite" in a general way, but this strong expression only referred to the ease with which it was crushed and not to any fear of ultimate wasting away.

I have no doubt that the small material referred to in Mr. Wilson's report (paragraph 3) of 19th October 1892 is simply the broken laterite about which I so strongly complained, and I suspect it has only been dredged up in the form in which it was deposited in (about) 1880 and that it has not undergone a process of deterioration owing to exposure to salt water in motion. The position in the work at which this small gravel was dredged up perfectly agrees with this theory, as it was at the outer portion of the rubble bases that the hopper barges mostly worked.

It must be understood that, as laterite was the material selected by Mr. Parkes for the bases of the piers and sanctioned for that work by Government, it was my duty only to report this breaking up to the Engineer-in-Chief and for him to take such action as he thought necessary. Our whole correspondence on the subject must be at Madras (unless destroyed since I left).

In the report of Sir John Hawkshaw's committee on the reconstruction of the damaged portions of the piers, dated 23rd January 1883, it will be seen that Sir G. Molesworth remarks that the laterite used is small and "is sometimes so soft as to be still further reduced by the slightest movement." Although I am not prepared to endorse this statement, it shows that he agrees with me about its crushing with ease.

And, further, the same report says "the local laterite also does not appear to be of good quality and hence nothing but gneiss should be used in the additions to the rubble mounds."

I should remark that the local laterite is quite different in quality as a building material from that of the Malabar coast, in that the former is never better than when first quarried, while the West coast laterite hardens conspicuously by exposure to the air.

Order—dated 27th July 1893, No. 1941 W., Public Works.

Communicated to the Chairman, Harbour Trust Board, with reference to the undermentioned orders:—

Nos. 291–92, Marine, dated 13th August 1892.
No. 3011 W., dated 2nd November 1892.
„ 3414 W. „ 13th December „

(True Extract.)

Major, R.E.,
Under Secy. to Govt., P.W.D.

To the Chairman, Madras Harbour Trust Board.
„ Marine Department.

Exd. A. D. Xavier.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1893} Madras.

PUBLIC WORKS.

Dated July, 27th.

Recd. *Encl.*

G.O., 27th July 1893, No. 1941 W.

JULY.

Madras Harbour Works

Despatch from the Secretary of State forwarding copy of a report by Sir A. Rendel on the subject of the defects in the wheels of the titan crane and the use of laterite for the substructure of the breakwaters, communicated to the Chairman, Harbour Trust Board.

272/1941

India Office,
London, 15th June 1893.

Public Works,
No. 4.

1 Rec

To His Excellency The Right Honourable The Governor in Council, Fort St. George.

My Lord,

Your Excellency's Public Works Letters, quoted in the margin,* forwarded for my information various reports on the progress of the Madras Harbour Works, and the administration of the Harbour Trust Board.

2. I now forward, for the information of your Government, copy of a report by Sir Alexander Rendel,† dealing with the subject of the defects in the wheels of the Titan crane, and with the question of the use of laterite for the substructure of the breakwaters.

3. On the recommendation of Sir A. Rendel, I have sanctioned the acceptance of a tender from Messrs. Ransomes, the makers of the Titan, for the four wheels of the central bogies, amounting to 160*l*.

I have the honour to be,
My Lord,
Your Lordship's most obedient humble Servant,

Kimberley

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* Letter dated 12th September 1892, No. 11/2536 W.
Letter dated 2nd November 1892, No. 12/3011 W.
Letter dated 13th December 1892, No. 13/3414 W.

† Dated 9th May 1893, and enclosure.

22/3
1941
2 S 8

ENCLOSURES.

Report by Sir Alexander Rendel, K.C.I.E., dated 9th May 1893.

Madras Harbour.

I have had until recently so little information upon the subject of the defects in the wheels of the Titan, and am still so uninformed upon the question raised in respect to the suitability of laterite as a base or substructure for the breakwaters, for which purpose laterite has been almost wholly used, that I have hitherto postponed commenting upon either, hoping that each successive mail would bring us further information.

I have, however, at length sufficient information to enable me to advise in respect of the wheels of the Titan. The failure here is due I think to something more than the cause to which the papers sent to me attribute it, namely, the tyres being in two halves, *i.e.*, two ordinary tyres shrunk on the same wheel centre. It is due, I believe, to the construction of the wheel being generally insufficient to carry the heavy weight placed upon it, under the conditions of the Titan being travelled daily from end to end of the breakwater. Had I calculated on the Titan being moved about so much, I should probably have designed it with solid forged steel wheels, but I was disinclined to do so without a clear necessity, on account of the great cost of such wheels, as compared with that of the cast-iron wheels tyred with steel which were adopted.

I hope, however, that the present wheels may be made to answer for the leading and trailing bogies of the Titan, and that only those of the centre bogies, by means of which the Titan is travelled backwards and forwards, need be changed.

I have been in communication with the makers of the Titan, Messrs. Ransomes of Ipswich, on the subject, and have now to recommend that a tender they have sent to me, and which I send herewith, for the four wheels of the central bogies, amounting to 160*l.*, be accepted.

These wheels will be solid steel forgings, and should prevent any further trouble. If the other eight wheels should give serious trouble they must be also replaced, unless, which is possible, they can be dealt with by the help of the locomotive factory in Madras in some simpler way.

In respect to the use of laterite for the substructure of the breakwaters, I have no further information than the statement by the Acting Resident Engineer in the papers sent to me that,—it having been necessary to take up some portion of the substructure near the end of the North Pier for the purpose of founding, as I have recommended, the superstructure at a lower level than had been originally intended— “ the material, mostly laterite, to a large extent came up in the form of “ gravel, indicating the unsuitability of this kind of stone to form the “ base of a pier.”

In the absence of any further report on the subject by the Resident Engineer himself, who resumed his duties some months ago, and whose long connection with the works makes his opinion particularly valuable, I have thought it desirable to consult his predecessor, Mr. Thorowgood, for many years the engineer in charge of the works under the late Mr. Parkes, and who is now in England, and Sir Guildford Molesworth, who reported upon the breakwaters after their destruction in 1881, Mr. Thorowgood has sent me a memorandum on the subject, dated 24th January 1893, by which it will be seen that though he never liked laterite, he was, and is of opinion that it may be safely used in the bases of the breakwaters. Sir Guildford Molesworth is also, I find, of the same opinion, provided the laterite be good. The fact is, that laterite varies very much in quality. The best is fit for anything. The worst is fit for nothing. Good and bad will be found in the same quarry. The bad must be rejected, and there is some reason to fear that by the time the ends of the breakwaters were approached the best of the laterite found in the Madras quarries had been exhausted. I should note here that the rubble base or substructure of the Marmagoa breakwater was built of laterite,—so far with entire success,—but the west coast laterite is supposed to be better than that found on the east coast.

If there be danger in the use of laterite, it does not, in my opinion, lie in the smallness of pieces into which it breaks, but in the risk of its being gradually ground into mud by movement consequent on wave action, or on the rocking of the superstructure upon it, which Sir Guildford Molesworth tells me he observed. I saw myself no such rocking motion; but unfortunately during my visit the sea was perfectly smooth, and therefore no such rocking could take place.

In respect to size, the breakwater at the Tees, including its head, is founded at a level of about 10 feet below low water on a vast mound of iron slag, which has broken up into small pieces probably not larger than the laterite at Madras; and the head of the inner breakwater at Portland was founded at about 30 feet below low-water, on a mound of small stone principally from the "Chert Bed" of the Portland quarries. Neither work has suffered from any cause which could be attributed to the smallness of the material used in the substructure, though the Tees breakwater has already once suffered severely and been in danger of total destruction, from the superstructure being founded on the substructure at too high a level. There is therefore, in my opinion, nothing to be feared from the fact discovered in respect to the laterite at Madras; or rather, supposed to have been discovered, for it will be seen by Mr. Thorowgood's note that it is possible that the laterite taken up was actually deposited in the form of gravel. The more important question to my mind is, will the laterite degrade into mud? This appears to be a question of its original quality, on which only those upon the spot can form an opinion.

The conclusion, however, which I have come to is, that even if the laterite be of a quality which will not resist a gradual decay, the heads and ends generally of the breakwaters as now designed may be built upon a laterite substructure without risk of future serious injury. In the first place, being founded at so low a level, about 38 feet below low-water, there is no risk of the superstructure being undermined by wave action, and, in the second place, there is very little substructure beneath it. Therefore, if the laterite should degrade, the result would only be a slight and gradual settlement of the superstructure, which would be attended with no risk of injury to it.

I do not think, therefore, that it is absolutely necessary under any circumstances to remove the existing substructure. But if it should have been found by the further examination which doubtless by this time has taken place, that the laterite of which it is in part composed is softening and degrading into mud, then, as the cost of taking up that portion of it on which the heads will rest will not be large, it may be well to do so; either replacing the material taken up by good laterite or gneiss,—and it does not seem to, matter which provided the laterite be good,—or by founding the heads at a somewhat lower level than is now intended. I return the papers.

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388 234/1941

Enclosure in above.

Memorandum on Laterite, by Mr. Thorowgood, dated 24th January 1893, referred to in Sir A. Rendel's Report.

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This laterite was used for building purposes such as the wing walls of culverts, retaining walls, &c., &c., round about the neighbourhood, and unquestionably does not deteriorate in process of time; possibly it even improves.

The groynes which I found along the coast in the immediate neighbourhood of Royapuram and nearer to Fort Saint George in 1876 were mostly made of large pieces of laterite, six to ten cubic feet each, and the sea water never had any damaging effect upon these during the 12 years that I observed them.

The approach to the North Pier tipped in 1876 was entirely of laterite. In 1876 this bank was badly scattered by the surf, the laterite being spread along the shore. This scattered laterite, after lying several years amongst the shallowest breakers, was eventually picked up by my orders and used in the rubble base. No deterioration had taken place, but each piece was covered with shells.

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I have not a copy of this memorandum, but it will be found in the papers at the office of the Harbour Works at Madras. I know that the late Mr. Parkes took exception to my referring to the material as "this vile laterite" in a general way, but this strong expression only referred to the ease with which it was crushed and not to any fear of ultimate wasting away.

I have no doubt that the small material referred to in Mr. Wilson's report (paragraph 3) of 19th October 1892 is simply the broken laterite about which I so strongly complained, and I suspect it has only been dredged up in the form in which it was deposited in (about) 1880, and that it has not undergone a process of deterioration owing to exposure to salt water in motion. The position in the work at which this small gravel was dredged up perfectly agrees with this theory, as it was at the outer portion of the rubble bases that the hopper barges mostly worked.

It must be understood that as laterite was the material selected by Mr. Parkes for the bases of the piers and sanctioned for that work by Government, it was my duty only to report this breaking up to the Engineer-in-Chief, and for him to take such action as he thought necessary. Our whole correspondence on the subject must be at Madras (unless destroyed since I left).

In the report of Sir John Hawkshaw's Committee on the reconstruction of the damaged portions of the piers, dated 23rd January 1883, it will be seen that Sir G. Molesworth remarks that the laterite used is small and "is sometimes so soft as to be still further reduced by the slightest movement." Although I am not prepared to endorse this statement, it shows that he agrees with me about its crushing with ease.

And, further, the same report says "the local laterite also does not "appear to be of good quality and hence nothing but gneiss should be "used in the additions to the rubble mounds."

I should remark that the local laterite is quite different in quality as a building material from that of the Malabar Coast, in that the former is never better than when first quarried, while the West Coast laterite hardens conspicuously by exposure to the air.

945
1941

P. W. CURRENT No. 6573.

No 4

Public Works.

15th June 1893.

The Letter to Fort St. George

No 4 and enclosures

No. 13/3414 W. d/ 13-12-92
3414-15 W d/ 13-12-92
12/3011 W d/ 2-11-92
3011 W d/ 2-11-92
11/2536 W d/ 12-9-92
2536 W d/ 12-9-92
430 W d/ 12-2-92
1967 W d/ 23-7-91.
1422 W d/ 25-5-91
718 W d/ 13-3-91.

Regd. 26.7.93
S.S.C.

Recd 7-7
S.C. 4

Ord 10-7
Hm 8-7
Hm/2 10-7.

The cross of breakwater will be forwarded as called 38-4(?) under the A.P. which. These officers [illegible] necessarily in this case for the precautions suggested by H.E. [illegible] the latter into [illegible] to be enforced to [illegible] whereas [illegible] to them, rather of engineering will prevent deterioration from other causes.

H
20/7

For ordinary with experience to H.E's note — I should say that Sir A. Rendel would have been aj suggested this course the adopted if he had considered it advisable — In the case of his Dlas breakwater the top of rubble foundation was only 10' below low water — At Madras it is, I think about 25'. — Sir A. Rendel approves of the present arrangement

DWL
19.7.93

No. $\frac{13}{3414}$ Wd/ 13-12-92
3414-15 Wd/ 13-12-92
$\frac{12}{3011}$ Wd/ 2-11-92
3011 Wd/ 2-11-92
$\frac{11}{2536}$ Wd/ 12-9-92
2536 Wd/ 12-9-92
430 Wd/ 12-2-92
1967 Wd/ 23-7-91
1422 Wd/ 25-5-91
718 Wd/ 13-3-91

Regd: 26.7.53
S.S.C

Recd 1-7
S.C. 4

Ord 30-7
Hm 8-7
Hm/2 10-7.

O.W. The maps are not available.
Two plans only are received from the Harbour Trust Bd. with the quarterly reports. One goes to the Secy. of State and the other to the Govt. of India.

Rw
16/7

D.W

With reference to H.E.'s query, a memo to the chairman, H.T. Board, is submitted. The orde ma in the meanwhile issue.

R.C.R.
18/7.

Send me up the maps which accompanied the last Engineer's report

O.M.M.
18/7.

P.T.O.

P.W.D.

Communicated by
G.O. No. 8 July 1893
copy attached

Memo

With reference to Sir A. Rendel's report on the question of the use of laterite for the substructure of the Madras harbour breakwaters, the undersigned has the honour to request that the chairman, Harbour Trust Board, will be so good as to obtain the opinion of the Board's Engineer as to whether it would be possible to run a thin skin of cement over the laterite to preserve it. The Tees breakwater alluded to in Sir A. Rendel's report was, it is believed, only preserved from total destruction by adopting this treatment, which prevented the iron slag used in that breakwater from

as durable

rom being broken up by the
ction of the waves.

The Chairman, Harbour
Trust Board
with copy of G.O. No.
Ey. Jul 1893

Note for His Excellency the Governor

~~96~~ 9
1947

With reference to his Excellency's remarks it is submitted that the cases of the Tees and Madras breakwaters are not analogous - In the former the top of the ~~rubble~~ non clog foundations was only 10' below low water, whereas in the case of Madras, the superstructure at the end of the arms is founded at about 38' below low water, with but little laterite sub structure below—

Being thus un-exposed to wave action, the precaution suggested by His Excellency will not be necessary, as disintegration from other causes will not be prevented by encasing the laterite with a thin skin of cement—

Sir A. Rendel has approved of the present arrangement

OWB
20.7.93

JH/21/7

Secy W
23 July

21-7
21-7

Re ~~[illegible]~~

Sir A. Rendel's report on the laterite sub-structure in the Madras Harbour

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PUBLIC WORKS DEPARTMENT.

No. 1941 W dated 27 July 1893.

1941

PROCEEDINGS OF THE MADRAS GOVERNMENT.

READ the following

Despatch from the Rt. Hon. the Secy. of State No. 4. Public Works dated 15th June 1893

The Tees breakwater alluded to in Sir A. Rendel's report was only preserved from total destruction by running a thin skin of cement over the iron slag, wh. was being constantly broken up by the action of the waves. Would it not be possible to adopt the same treatment to the laterite, which is apparently ruined so rapidly? W.

W
16 July

JH 17/7/93

JH/18/7

Communicated to the Chairman Harbour Trust Board with reference to the undermentioned orders:—

No. 291-92 Marine dated 13.8.92.
" 3011 W. dated 2.11.92
" 3414 W " 13.12.92

OWB
8.7.93

JH/8/7

JH/18/7

To
The Chairman
Madras H. T. Board.
" Marine Dept.

10—500—23-5-92.

[illegible]

281
1941

C.W. 6593

Govt. of (1893) Madras.
PUBLIC WORKS.

Dated

Recd. Expd.

G.O. 27 July 1893. No. 1641 W.

Madras Harbour Works.

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Despatch from the Secretary of State forwarding copy of a report by Sir A. Rendel on the subject of the defects in the wheels of the titan crane and the use of laterite for the substructure of the breakwater, communicated to the Chairman H. T. Bd.

J.C. 27/VII