Archives I—10,006—16-8 77.

(1) Number of pages 60

(2) Date of repair

(3) Initials of the Referencer

AMIL NADU ARCHIVES

VERNMENT OF TAMIL NADU

P.-W DEPARTMENT

G.O. No. / B.P. No. 2533-W Press. / Mis.

Dated 17.10.1881 ~~197~~

V.S.M

be folded or roughly handled

2533 W
1

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

17th October 1881, No. 2533 W.

Buildings and Roads.
Civil Works.

Read the following paper :—

No. 67. Despatch from the Most Honorable the Secretary of State for India.

Public Works,
No. 25.

INDIA OFFICE, LONDON,
11th August 1881.

SIR,—Herewith is transmitted a report in original by Mr. Parkes, on the finishing of the pier ends of the Madras Harbour, which has been drawn up by him in accordance with the request contained in your Public Works Order, No. 1340 W., dated the 28th May 1881.

I have, &c.,
(Signed) HARTINGTON.

His Excellency the Honorable
The Governor in Council, Fort St. George.

From W. PARKES, Esq., C.E., to the Secretary to Government, Public Works Department, Madras, dated 23 Abingdon Street, Westminster, 18th July 1881.

Madras Harbour.

IN the Order of the Government of Madras, No. 1340 W., dated 28th May 1881, I am requested to report my "opinion as to the stability of the design as now modified for the pier ends, also whether a proper system of bonding and the use of joggles for all the work at the end should not have been originally adopted."

2. I am glad to have this opportunity of submitting to the Government my views as to the reasons of the partial failure which occurred, and as to the means adopted to prevent a recurrence of it.

3. Mr. Thorowgood furnished me with all the particulars of the failure immediately after it occurred, but his report to Government, upon which the order above quoted is based, I had not seen till printed copies were forwarded to me simultaneously by yourself and Mr. Thorowgood.

4. A somewhat more detailed description than that given by Mr. Thorowgood in his report is necessary to make intelligible the nature of the difficulty which necessitated the change of the plan, how we fell into that difficulty, and how Mr. Thorowgood has got out of it.

5. I may premise that this is the first attempt to make a finished termination to a pier constructed on this principle. The breakwater at Kurrachee has no proper finish. The circumstances there do not at present require one, but the action of the sea on the blocks at the extreme end of that work has furnished some useful lessons which I have endeavoured to apply at Madras.

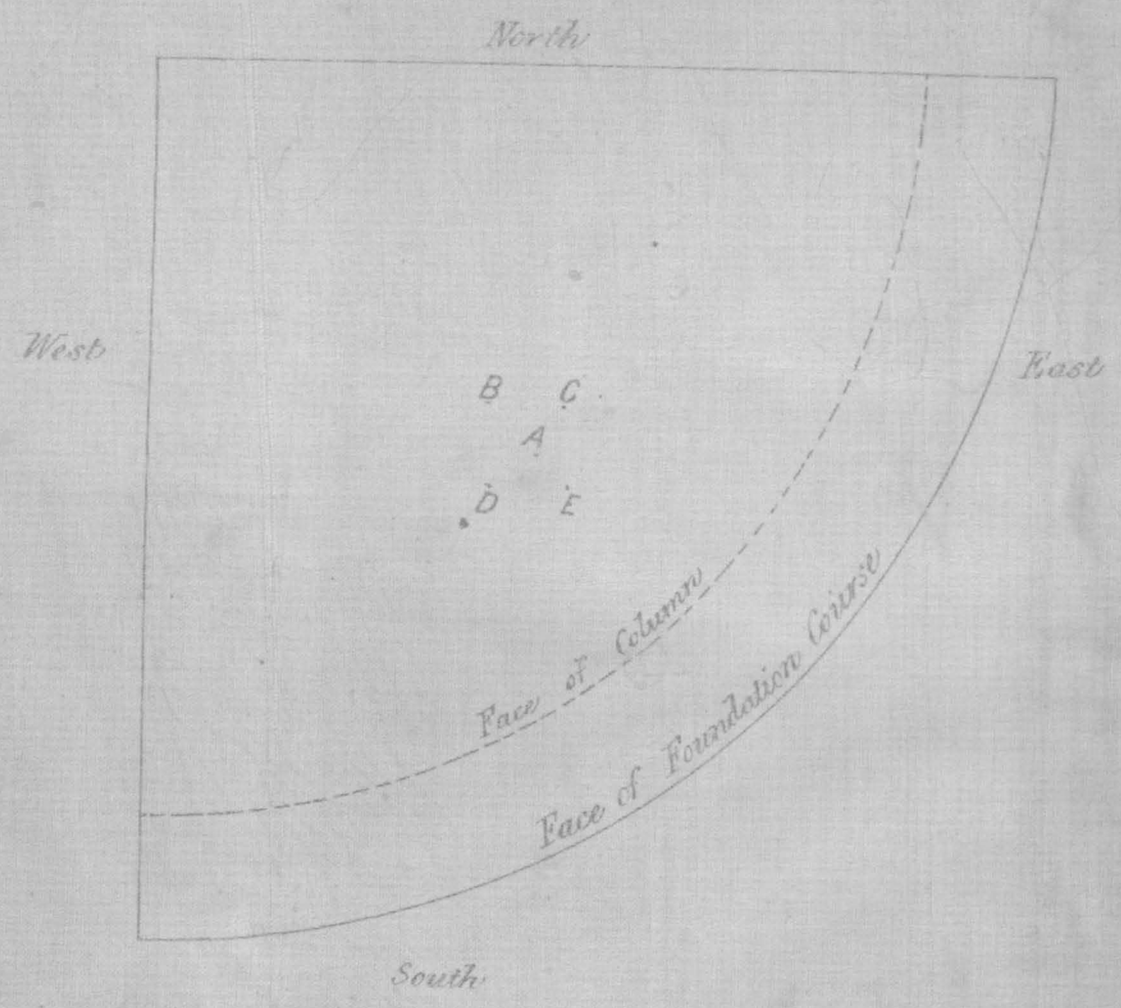
6. The first question which arose was how to form the south-east termination of the work. Having regard to the powers of the titan crane, and to obtaining from the restricted dimensions of individual blocks the greatest amount of resistance to the waves, it was determined to erect a column 37 feet high, forming on plan a quadrant of 12 feet radius. This would form a rounded corner to the end of the work. The one 12 feet side facing the north would form a finish to

the main line of blocks in the sea wall of the pier, the other 12 feet side a starting point for the return line of blocks forming the face of the pier head.

7. The question was considered whether this column should be set vertical or with its northern side leaning against the sloping face of the blocks set in the ordinary way. There were reasons in favor of both positions, but those in favor of the vertical seemed to preponderate. A number of wedge-shaped blocks were therefore made so as with their small ends placed downwards to fill up the triangular space between the battered work of the north wall and the vertical column, and another set with their small ends upwards to form a battered face to start the return wall from.

8. In order to carry out this plan, however, it was necessary to set up the column as an isolated structure, so as to stand for a time unconnected with the blockwork north and west of it. This is the part of the operation which was untried.

9. There was nothing however to indicate any want of stability, at least under such disturbing forces as it was liable to be exposed to. The accompanying sketch will illustrate the conditions of the question. It will be understood that when the resultant downward pressure passes through the centre of gravity of the area of the foundation, the column will be in perfect equilibrium without tendency to lean one way or the other. The foundation is a quadrant of 14 feet radius, on which a column of 12 feet radius stands, set back from the curved side as shown by the dotted line. The centre of gravity of the foundation area is at A, that of the whole column however is at B, nearer to the centre by about 12 inches. The first row of sloping blocks set on the west side would rest against the column, and their thrust would remove the resultant from B to C. Again, if the blocks on the north side had a similar effect (which they would not have) the resultant pressure would be transferred from C to E, and this point is 9 inches from A. Thus the resultant pressure on the foundation would always be within the small area B C E D, a square of about 15 inches. These are all the determinable disturbing forces to which the column could be subjected. I take no account of wave action, because it was not supposed the column would have to stand unsupported in bad weather. The actual power of resistance to these disturbing forces is quite indeterminable in figures. It depends on the degree of hardness of the foundation of rubble stone. If the foundation were incompressible rock the point E might be anywhere within the area of the 14 feet quadrant without the equilibrium of the column being disturbed, but as the rubble stone is a very compressible material, the fact of the pressure on the one half of the area being greater than on the other half would cause the column to lean over to that side.



2533
2

11. I thought, however, that the limits within which the position of the resultant pressure could be changed were so small compared with the whole area of the foundation that no serious amount of disturbance was possible. But in this I was mistaken.

12. The column was successfully set on Saturday, April 2nd. On the 4th and 5th there was a slight sea, and under the influence of this it swayed about more than was anticipated. Mr. Thorowgood then built up the wedge-shaped and leaning blocks on its *west* side, the effect of which, as I have explained, would be to transfer the resultant pressure from B to C, a distance of 15 inches. This was sufficient to cause the columns to lean over 4 feet to the eastward, which involved a compression of the foundation on that side of 18 inches. Some inclination in this direction was of course anticipated, but it was not all expected to go to so great an extent.

13. Mr. Thorowgood then took up all but the three lower courses of the column, cut down the fourth course to a wedge form, and reset the whole so as to give the courses above an initial inclination to the westward. The remaining work was then reset, and appeared to stand well.

14. The wedge-shaped blocks were then set on the north side. These, as I have before stated, would of themselves have no tendency to disturb the vertical column. Their tendency would be to fall away from it at the top, though in the act of settlement there might be a slight tendency to push out the foot, but this would be harmless. But unfortunately a new element has been introduced, by substituting for one solid block a bag of soft concrete, on the top of which a solid block was laid. This on being compressed vertically of course swelled laterally, thus giving something analogous to a hydrostatic pressure. Under this the column was forced to the southward, just as it had previously been forced to the eastward.

15. Mr. Thorowgood then decided to take up the whole of the work, and rebuild it on the principle of giving a batter to the southern face. In this, I think, he was justified under the circumstances. But in making this admission I must guard against its being understood in an exaggerated sense. The difficulties he met with were simply difficulties of execution. We had undoubtly over-estimated the resisting power of the rubble foundation. Six inches of compression seemed a much more profitable extent than 18 inches, and if it had only been to this amount, Mr. Thorowgood would have had confidence in the work settling ultimately to its proper position, as our past experience proves it has a tendency to do. But the compression of 18 inches introduced new questions, not of ultimate stability, but of the possibility of bringing the work into the required form. The great movement also put an undue strain upon the blocks, under which several of them were actually broken, and rendered unfit to remain in the work.

16. Thus the removal of the work done was absolutely necessary, and it was also obvious that some additional means must be provided for meeting the secondary effects of the excessive compressibility of the rubble base. It would have been quite possible to devise some means of holding the column to its required position till it settled down to a firm bed, and so have carried out the original design of a vertical face, but the greater facility of execution of the battered face outweighed the superior advantages in other respects of the vertical face, and this turned the scale in favor of altering the design.

17. Forty-three blocks in all were taken up, but the bulk of these will be reset. The work was stopped during the month of May and the early part of June, during which stormy weather generally prevents its satisfactory progress, but on the 13th June it was recommenced on the altered plan, and the setting of the quadrant column has been reported to me by telegram. I have approved the modifications proposed by Mr. Thorowgood with one exception, which is now matter of correspondence. Pending the settlement of this, the work has been suspended for a few days, but it will not involve serious delay.

18. The alteration made in the design will not affect the stability of the work as a whole in any way, provided the one point I have alluded to as at present under discussion be satisfactorily settled, as I have no doubt it will be. Nor will its appearance be materially altered, the only visible change being the substitution of a face with a batter of 3 inches to a foot for a vertical face for a length of 50 feet, and for the 6 or 8 feet in height of the pier, which is visible above water.

19. I cannot at present speak to the cost, but as the block-setting staff of the north pier were occupied about a month in the setting and removing of this portion of the work, and the monthly charge under this head varies from four to five thousand rupees, an approximate idea may be formed.

20. The above description of this partial failure will, I think, suggest the answer to the question whether a system of bonding or joggles should not have been originally adopted. The failure was entirely in the foundation, which could not have been solidified by any system of connecting the several parts of the superstructure. The possibility of giving additional stability to the superstructure by some such means as those suggested is a question which is kept constantly in view, but the contrivances most ordinarily adopted for this purpose, though useful over a solid foundation, are a source of weakness rather than strength over a compressible foundation, such as that with which we had to deal. When the work has settled down to a firm bed any portions of the superstructure which show a tendency to separate may be tied together, but as a rule the tendency has been for the parts to close up rather than separate, so that as yet no necessity for ties has been indicated.

21. In conclusion I may be permitted to remark that the incident which forms the subject of this report, though no doubt to be regretted from some points of view, is not without its use. I have pointed out where judgment was at fault, and so far as blame is to be awarded, I am myself the person to receive it, but it is only by slight failures such as this that the value of precautions in engineering works can be measured. Nearly 8,000 lineal feet of breakwater have been constructed at Madras, standing on an area of upwards of 200,000 superficial feet of equally treacherous foundation, without a single failure. It was not till we came to deal with a special case standing on an area of 500 square feet, in which some new elements entered into the question, that we had an opportunity of seeing what were the essential conditions of our previous success. I think the lesson is worth the cost at which it has been obtained.

No. 68. ORDER THEREON, 17th October 1881, No. 2533 W.

Recorded.

(True Extract.)

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

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

Exd. S. T. Austin.
Spare Copies

D.W.

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of [1881] Madras.

PUBLIC WORKS.

To

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

Dated October, 17th.

Issued

Recd. *Encl.*

G. O., 17th October 1881, No. 2533 W.

OCTOBER.
Nos. 67-68.

Madras Harbour Works.—Despatch from the Secretary of State transmitting a report by Mr. Parkes on the finishing of the pier ends of the —, recorded.

P. W. C. No 5943

No. 311

2533
4

From
THE SUPERINTENDENT,
Geological Survey of India,

To The Secy. to the Govt. of Madras
P. W. Department

Dated Calcutta, September 7th 1881.

Recd. 17 Oct.

C A W

Send me on receipt

13. 9. 81

G. O. 1668 ×1669 - 21-6-71.
" 2905 - 15- 11- "
" 891 - 4 - 4 - 72
" 152 - 23 - 7 - 73
" 561 - 28 - 5 - " Public
Letter No 17 - 26 - 4 - 80.
" " 216 - 28 - 6 - 80
G. O. 542 - 28 - 2 - 81
" 286 - 2 - 2 - 81
" 2220 W - 7 - 9 - 81
Despatch No 33 - 14 - 6 - 81.
P. L. S. 14/9 Cir 8/10/81.
G. O. 17/10/81

Sir,

With reference to the 4th para of my letter No 277 dated 23rd August 1881, I have the honor to inform you that I am sending you today by packet post two copies of Mr. King's Report on the Godavari Coal Fields, just received from the Press.

I have the honor to be
Sir,
Your most obdt. Servant,
H. B. Medlicott
Superintendent, Geol. Survey of India

Govt. Central Press.—No. 15 S. G. S. (5061), 30-81.—23-2-81.—200.

D.W.

I have no desire to deal in any captious way with the explanation by Mr. Parker still I cannot but think that taking into account the compressibility of the ~~laterite~~ in the rubble base a design which subjected a perfectly free standing Column to the pressures from the wedge shaped blocks on north and west faces was not judicious

~~Before hazarding definitely any opinion to Government~~ I should wish to know what evidence Mr Parker was in possession of as regards the compressible nature of the rubble

Resubmitted to C.E. 19.9.81 M 28.9.81 5.10.81

O.L.S. 5/9

base,

I asked you shortly since d/o to ascertain the total amount of subsidence has taken place in the blocks forming say the terminal 300 ft. of the north pier from their first being placed (before the weight of the ~~titan~~ was superimposed) to the present time, and if you will send me this information I shall feel obliged

In para 13 Mr. Parkes states ~~that~~ the Titan road has taken up all but the ~~three~~ lower courses of the column, and as I read the drawings from the beds of these [illegible] courses have each a cant from a plane? differing 18 inches in some 14 feet seaward, and if there be no vertical tenon or joggle of sufficient shearing strength to prevent sliding it seems to me ~~that~~ under the shock and vibration to which this angle of the work will be necessarily be exposed more than any other portion not only will there be a risk of the blocks sliding seaward, but if any disturbance take place in the rubble base at the toe of the blocks, the fall of the column unless well tied into the backing is not unlikely to occur

~~However before proceeding further with the matter I should wish you to call on Mr Thomson~~

AP 3
2533/13

of submitting to the Government my views as to the reasons of the partial failure which occurred, and as to the means adopted to prevent a recurrence of i

3. Mr. Thorowgood furnished me with all the particulars of the failure immediately after it occurred, but his report to Government upon which the order above quoted is based, I had not seen till printed copies were forwarded to me simultaneously by yourself and Mr. Thorowgood -

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5 I may premise that this is the

first attempt to make a finished termination to a pier constructed on this principle - The Breakwater at Kurrachee has no proper finish - The circumstances there do not at present require one, but the action of the sea on the blocks at the extreme end of that work has furnished some useful lessons which I have endeavoured to apply at Madras -

6 The first question which arose was how to form the South East termination of the work. Having regard to the powers of the Titan crane, and to obtaining from the restricted dimensions of individual blocks the greatest amount of resistance to the waves, it was determined to erect a column 37 feet high, forming on plan a quadrant of 12 feet radius - This would form a rounded corner to the end of the work - The one twelve feet side facing the North would form a finish to the

P.P.5
2533

main line of bloks in the sea wall of the pier; the other twelve feet side a starting point for the return line of blocks forming the face of the Pier head.

7. The question was considered whether this column should be set vertical or with its Northern side leaning against the sloping face of the blocks set in the ordinary way. There were reasons 7 in favour of both positions, but those in favour of the vertical seemed to preponderate. A number of wedge shaped blocks were therefore made so as with their small ends placed downwards to fill up the triangular space between the battered work of the North wall and the vertical column, and another set with their small small ends upwards to form a battered face to start the return wall from.

8. In order to carry out this plan however it was necessary to set up the

column as an isolated structure so as to stand for a time unconnected with the blockwork North and West of it. This is the part of the operation which was untried -

9. There was nothing however to indicate any want of stability, at least under such disturbing forces as it was liable to be exposed to. The accompanying sketch will illustrate the conditions of the question - It will be understood that when the resultant downward preſsure paſses through the centre of gravity of the area of the foundation, the column will be in perfect equilibrium without tendency to lean one way or the other. The foundation is a quadrant of 14 feet radius, on which a column of 12 feet radius stands, set back from the curved side as shewn by the dotted line. The centre of gravity of the foundation

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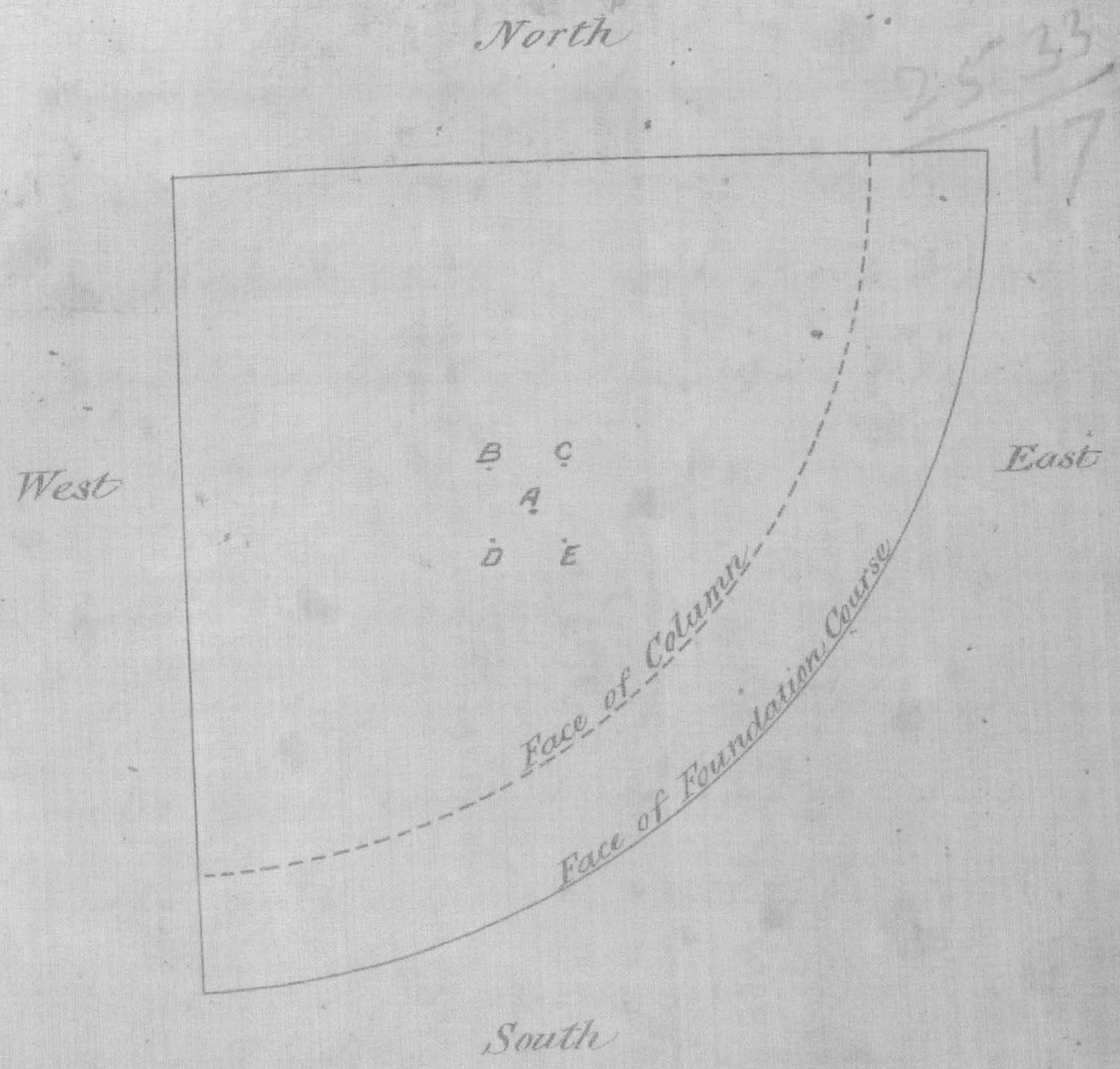

area is at A; That of the whole column however is at B, nearer to the centre by about 12 inches - The first row of sloping blocks set on the West side would rest against the column, and their thrust would remove the resultant from B to C - Again if the blocks on the North side had a similar effect (which they would not have) the resultant preſsure would be transferred from C to E and this point is 9 inches from A – Thus the resultant preſsure on the foundation would always be within the small area BCED, a square of about 15 inches – These are all the determinable disturbing forces to which the column could be subjected. I take no account of wave action because it was not supposed the column would have to stand unsupported in bad weather – The actual power of resistance to these disturbing forces is quite indeterminable in figures. It depends on the degree of hardneſs of the foundation of rubble stone – If the foundation were incompreſsible rock the point E might be anywhere within the area of the 14 feet quadrant without the equilibrium of the column being disturbed, but as the rubble stone is a very compreſsible material, the fact of the preſsure on the one half of the area being greater than on the other half would cause the column to lean over to that side -

11. I thought however that the limits within which the position of the resultant preſsure could be changed were so small compared with the whole area of the foundation that no serious amount of disturbance was poſsible - But in this I was mistaken -

12. The column was succeſsfully set on Saturday April 2nd. On the 4th and 5th there was a slight sea, and under the influence of this it swayed about more than was anticipated; Mr. Thorowgood then built up the wedge shaped and leaning blocks on its *west* side, the effect of which as I have explained would be to transfer the resultant preſsure from B to C, a distance of 15 inches - This was sufficient to

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a slight tendency to push out the foot, but this would be harmless - But unfortunately a new element has been introduced by substituting for one solid block a bag of soft concrete, on the top of which ~~is~~ a solid block was laid. This on being compressed vertically of course swelled laterally, thus giving something analogous to a hydrostatic pressure - Under this the column was forced to the Southward just as it had previously been forced to the Eastward

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MP12
2533

We had undoubtly overestimated the resisting power of the rubble foundation - Six inches of compreſsion seemed a much more profitable extent than 18 inches, and if it had only been to this amount, Mr Thorowgood would have had confidence in the work settling ultimately to its proper position, as our past experience proves it has a tendency to do. But the compreſsion of 18 inches introduced new questions, not of ultimate stability, but of the poſsibility of bringing the work into the required form. The great movement also put an undue strain upon the blocks under which several of them were actually broken, and rendered unfit to remain in the work.

16. Thus the removal of the work done was absolutely neceſsary, and it was also obvious that some additional means must be provided for meeting the

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secondary effects of the exceſsive compreſsibility of the rubble base. It would have been quite poſsible to devise some means of holding the column to its required position till it settled down to a firm bed, and so have carried out the original design of a vertical face, but the greater facility of execution of the battered face outweighed the superior advantages in other respects of the vertical face, and this turned the scale in favour of altering the design.

17. Forty three blocks in all were taken up, but the bulk of these will be reset. The work was stopped during the month of May and the early part of June, during which stormy weather generally prevents its satisfactory progreſs, but on the 13th June it was recommenced on the altered plan, and the setting of the quadrant column has been reported

to me by telegram - I have approved the modifications proposed by Mr. Thorowgood with one exception, which is now matter of correspondence. Pending the settlement of this, the work has been suspended for a few days, but it will not involve serious delay -

18. The alteration made in the design will not effect the stability of the work as a whole in any way, provided the one point I have alluded to as at present under discussion be satisfactorily settled, as I have no doubt it will be - Nor will its appearance be materially altered, the only visible change being the substitution of a face with a batter of 3 inches to a foot for a vertical face for a length of 50 feet, and for the 6 or 8 feet in height of the pier, which is visible above water

19. I cannot at present speak to the

BP 15 - 2533
25

cost, but as the block setting staff of the North Pier were occupied about a month in the setting and removing of this portion of the work and the monthly charge under this head varies from four to five thousand rupees, an approximate idea may be formed -

20. The above description of this partial failure will I think suggest the answer to the question whether a system of bonding or joggles should not have been originally adopted - The failure was entirely in the foundation, which could not have been solidified by any system of connecting the several parts of the superstructure - The possibility of giving additional stability to the superstructure by some such means as those suggested is a question which is kept constantly in view, but the contrivances most ordinally adopted for this purpose, though

See para 16

No 16
2533
2a

useful over a solid foundation, are a source of weakneſs rather than strength over a compreſsible foundation, such as that with which we had to deal -

When the work has settled down to a firm bed any portions of the superstructure which shew a tendency to separate may be tied together, but as a rule the tendency has been for the parts to close up rather than separate, so that as yet no neceſsity for ties has been indicated -

21. In conclusion I may be permitted to remark that the incident which forms the subject of this report, though no doubt to be regretted from some points of view, is not without its use - I have pointed out where judgement was at fault, and so far as blame is to be awarded, I am myself the person to receive it, but it is only by slight

20

AP 17
2533

failures such as this that the value of precautions in Engineering works can be measured - Nearly 8,000 lineal feet of breakwater have been constructed at Madras, standing on an area of upwards of 200,000 superficial feet of equally treacherous foundation, without a single failure - It was not till we came to deal with a special case standing on an area of 500 square feet, in which some new elements entered into the question, that we had an opportunity of seeing what were the essential conditions of our previous succeſs - I think the leſson is worth the cost at which it has been obtained -

I have the honor to be
Sir
Your most obedient servant

W Parkes.

D.W. 2533
25 23 W
4

Please ask Mr Simmons Good for some further explanation with reference to the Sections AB and GH

In view to carry out the design with a vertical face the three lower blocks were as I understand set with a perfectly horizontal base; but that under the forces acting on the columns the latter settled as much as 18 inches at the outer toe — If this be the case the beds of the 3 lower blocks should be shown with a cant corresponding to this settlement seaward instead of which the two blocks

O.L.S. Fq. 1/10
M. 28·9·81 — R. 30·9·81
Cun. 12·10·81 RD. 12·10·81
M. 15·10·81.

above the base block have their beds there perpendicular to the battered face line

The point is one you will see I placed some weight upon in my previous note, and I should certainly still wish the facts recorded in connection with these blocks

Among other things the objectionable bag of soft concrete would I presume still find a place in the section as it has not I understand been removed or otherwise interfered with ?*

As regards Mr Thomson Woods remark ~~that~~ he has every means for proving that the bases themselves

*At least would have been shown if the section I J K had as I proposed been drawn

---

approach the character of a natural concrete. As far as I am unable to understand the nature of the proof so far as concerns the inner portion or hearting of the mass, and whether this compression which after all may not as yet have affected the hearting may not have the effect of breaking up the too friable laterite, thus forming a mere crust of stuff little better than clay

2533/5

28/9/81

No. 861 N.

Supdt. Dr. H. W.

Please give the explanation asked for —

D. 30/9

23

D.r W.

The sections, herewith returned are an exact representation of the existing state of the end. Every block of the vertical work was taken up, and the sm amount of puff concrete which remained was removed.

All the blocks have their beds at right angles to the batter; the bottom course of the vertic groin was altered after bein taken up. The tracing is perfectly correct.

The attempt to back up with concrete was a failure, and hardly any of the concrete remained.* None could possibly be shewn on the sections whatever line was selected, as none exists.

I judge of the state of the base by the result of deep excavation in laterite that has been a long time deposited, and which is very hard to shift.

J.W.

W G

3.10.81.

* If however it had been left the section G H would have gone through it. I have now drawn Col. Sankey's proposed section IJK in pencil, and it will been seen why I ~~did~~ ventured to omit it. The foreshortening gives a wrong impression.

J.W.

Resubmitted to C. 4.10.81

OF 187

GOVT. OF MADRAS. 1881. P.W. DEPT.

33/6

M.H.W.
~~Fort St. George,~~ Sep. 16. 1881.

OFFICE NOTE.

To D.r W.

I have taken two sections today which will I think answer your questions. I did not adhere to the line IJK because you will observe it would have given a confused result owing to the batter from the point C. I trust that the section substituted will do as well.

It may doubtless be pretty fairly guessed that M.r Parkes and I have had a slight difference of opinion which I believe now is passed away. I was always bitterly opposed to the vertical groin, and on my own responsibility altered to the battering groin or quadrant now standing. The remarks therefore in Mr. Parkes's letter referred to in your note do not apply to the present state of affairs. The wedge-shaped blocks also were done away with, as I was very decidedly of opinion (& am so still) that it was they that pushed the vertical quadrant over.

I cannot put in the iron ties yet because I wish to trim the Titan first, and this may cause a slight settlement.

The 'column of concrete' shewn in my tracing herewith was rammed down after the blocks were set. Very strong Portland Cement concrete in a bag of stout canvas.

The 'blocks laid flat' are the result of Mr. Parkes's last

orders. I had set one row of stretchers next the quadrant & to this he very strongly objected – but the original row of headers had done harm before, so I would not replace them – and I was against setting the 'blocks in the flat' because they are so thin for their area, & moreover I had to cut both grooves round them for the slinging chains which made them still more likely to break.

There will be some more freestone thrown down on the slope of the rubble at the head, and perhaps some blocks as an apron. I think we have made a 'very good job' of the end thus far, but it has taken a dreadfully long time.

With regard to the compression of the base Mr. Parkes has been informed in every detail of this – and I have two years ago called his particular attention to it (& the attention of Sir J. also) as the cause of the cracking of the back top corner of many blocks.

It has been one of the greatest difficulties in the construction because we have had always to allow for the compression as the Titan passed over. There is however absolutely no further settlement after this first & great subsidence from compression. The Concrete becomes covered all over with barnacles & shells & the bases themselves appear a natural concrete in their structure. This of course I have every means of proving by examination of the base from time to time by the Foreman diver –

H.J.
S.M.H.W.

16. 9. 81.

Sent off 17. 9. 81.

P.W.

For information –

Personally I am not much of a believer in ties or joggles and doubt if their presence ever does any good ~~and~~ or their absence any harm –

In this case I think the ~~[illegible]~~ bag of soft concrete alluded to in para 12 of Mr Parkes' letter was at the bottom of the mischief –

D 19/9

No. 827 N. 7533/8

GOVT. OF MADRAS. } 188 . 8 { P. W. DEPT.

SECRETARY.

Chepauk, 15th September 1881.

OFFICE NOTE.

To

Supt. M. H. Works –

In para 6 of a letter d/ 18th July 1881, recently received, Mr Parkes writes – "The first question which arose was how to form the South East termination of the work – Having regard to the powers of the Titan Crane & to obtaining from the restricted dimensions of individual blocks the greatest amount of resistance to the waves, it was determined to erect a column 37 feet high forming on plan a quadrant of 12 feet radius – This would form a rounded corner to the end of the work – The one twelve feet side facing the north would form a junction to the main line of blocks in the sea wall of the pier, the

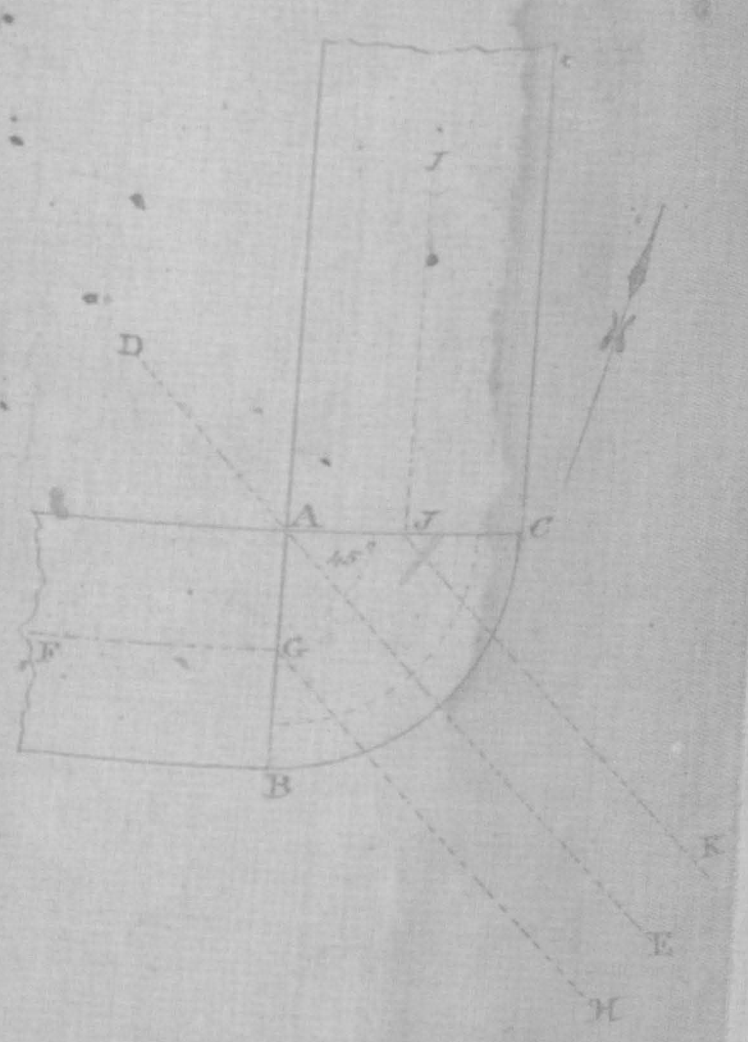
other

the twelve feet side a starting point for the return line of blocks forming the face of the Pier head"

With reference to the above, please furnish, for transmission to W., vertical sections through the part of the work alluded to, showing the bed of each course, and giving a brief statement regarding the position & action of the wedge blocks – also mentioning the nature of the vertical bonding.

In another part of the same report Mr Parkes states that you have taken up all but the three lower courses of the column, & it appears that the beds of these very courses have each a cant forming a plane dipping 18 inches in some 14 feet seaward – If there is no vertical tenon or pintle of sufficient shearing strength to prevent sliding, W. thinks that under the shock & vibration to which this angle of the work will necessarily be exposed more than any other portion, not only will there be a risk of the blocks sliding

PLAN



AJ = JC = 6 feet
AG = GB = Do
IJ and FG parallel to the respective faces
JK and GH parallel to DE bisecting the angle at A

Required

Sections IJK and FGH
IJ and FG carried back say 20 feet and JK and GH through the rubble base to a few feet beyond the toe of the same.

sliding seaward, but that if any disturbance take place in the rubble base at the toe of the blocks, the fall of the column, unless well tied into the backing, is not unlikely to occur.

Please say how this matter stands, & also whether you know what evidence Mr Parkes was in possession of as regards the compressible nature of the rubble base.

J

Ch

By W.

2533/9

India Office,
London. 11th August 1881.

Public Works

No. 25

Sir,

Herewith is transmitted a report in original by Mr. Parkes, on the finishing of the Pier ends of the Madras Harbour, which has been drawn up by him in accordance with the request contained in your Public Works order No. 1340 W. dated the 28th May 1881.

I have the honor to be,
Sir,
Your most obedient
humble Servant

Hartington

His Excellency
The Honorable
The Governor in Council,
Fort Saint George.

No 7.

Report by Mr Parkes,
dated 18th July 1881.

Referred to in Public Works Letter to
Madras, No 25, dated 11th Augt 1881.

[illegible] 234 W. of 28. 1. 81
" " 934 W. of 7. 4. 81
" " 1340 W. 23. 5. 81
No. 827 h. 15. 9. 81

No. 6.

Public Works
11th Augt. 1881

The
Letter to Fort St. George
No. 25

B & R
clerks

No. 2533 W. d/ 17th Octr 1881

Recorded.

15-10-81.

Supt. M. H. Works ✓
Marine Deptt. ✓

Do. 13
21/10/81

Recd 2d Septr. 81

Cw: 12. 10. 81. Rd. 14. 10. 81.

Sent back 16. 10. 81. [illegible] 9. 81 [illegible]
[illegible] 19. 9. 81 [illegible] 20. 9. 81
[illegible] 10

C. T. 3141.

Govt. of (1881) Madras.

PUBLIC WORKS.

To 18/10

Dated

Issued

Recd. Encl.

G. O. 17th Oct. 1881, No. 2533 W

Nos. 67 - 68

p29

Madras Harbour Works.

Despatch from the Secy. of State transmitting a report by Mr. Parkes on the finishing of the Pier ends of the —, wanted.

Entd. in Receipt Regr.