

- (1) பக்கங்களின் எண்ணிக்கை 48
 (2) புதுக்கித் திருப்பிய நாள் 10-90
 (3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம் 60

தமிழ்நாடு ஆவணக் காப்பகம்.

(23)

தமிழ்நாடு அரசு

P. W. D. துறை

அரசாணை எண். மு. கோப்புத் தாள் எண்.	2448	அச்சகம் பலவகை
நாள் :	4-9-1889	198

மடிக்கவோ கண்டபடி கையாளவோ கூடாது

24 Sheets 224 2 sheets

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper:—

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Acting Joint Secretary to Government, Public Works Department, dated Madras, 24th August 1889, No. 2998.

I have the honor to submit, for the information of Government, a letter from the Engineer, Harbour Trust Board, No. 563 $\frac{1}{2}$, dated 7th instant, reporting upon the progress made upon the Madras Harbour Works during the month of May 1889, with a comparative statement of expenditure for the same month in duplicate.

ENCLOSURE.

From A. LEE POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman, Harbour Trust Board, dated Madras, 7th August 1889, No. 563 $\frac{1}{2}$.

I have the honor to forward a report on the work done on these works during the past month of May, from which it will be seen that no progress was made at sea on either piers, but the staff were kept fully occupied at alterations and repairs to the machinery ready for an early start again in June.

2. I have not prepared a plan with this report on account of there being no progress to show, but the quarterly plan under preparation will embody everything.

3. *North and South Pier works.*—The state of the sea during the month of May this year was unusually calm and passed without any heavy seas washing over the piers. During this time several cross sections were taken of the piers and wavebreaker screens, which completes a series of sections throughout the new bonded work.

4. All the railway lines on shore were put in good order, and a connection between the beach railway and the south pier, forming a curve identical with the north pier arrangement of lines, was commenced, which will enable certain ground being handed over to the South Indian Railway authorities for their proposed new beach station.

5. *Pallavaram quarries.*—During May 12 trains were despatched from the quarries, which conveyed 2,541 tons of chips to the stone crushers for blockmaking. All railway lines were kept in good order and all drains were repaired and cleaned of silt for the usual rains.

6. *Concrete blockmaking.*—Blockmaking had to be stopped from the 5th to 27th of May, partly for want of chips, and repairs to the machinery, but during the nine working days 99 blocks were made, 40 of which were the large wavebreaker blocks. The total outturn of concrete was 1,702 cubic yards.

7. *Stores from England.*—The S.S. *Duke of Devonshire* arrived from England during the month of May with 430 casks containing 76 tons 15 cwt. 2 qrs. and 24 lbs. of Portland cement for these works.

RETURN OF WORK FOR MAY 1889.

Surveys.—Several cross sections were taken of the wavebreaker at both piers.

Railway lines.—The lines at the beach and the quarries were kept in repair during the month. One of the sidings, broad gauge, was taken up at the south pier, to supply materials for the new curve connecting the beach line with the south pier, which was commenced.

Quarries.—Twelve trains worked in the month bringing chips from Pallavaram.

Rubble.—None received since 30th April 1889.

Chips.—

	TONS.
Total quantity received up to 31st May 1889	138,038 $\frac{1}{4}$
Do. do. up to 30th April „	135,497 $\frac{1}{4}$
Received in May	2,541

Ballast.—None received.

North Pier Surf bank.—Nothing done since 30th November 1888.

Do. Rubble base.—Do. 30th April 1889.
Do. Superstructure.—Do. 31st March "
Do. Supplementary works.—Do. 30th April "
Do. Capping.—Do. 30th Nov. 1888.
Do. Cramps.—Do. 30th April 1889.
South Pier Surf bank.—Do. 30th " 1888.
Do. Rubble base.—Do. 30th " 1889.
Do. Superstructure.—Do. do.
Do. Supplementary works.—Do. do.
Do. Capping.—Do. do.
Do. Cramps.—Do. 31st December 1888.
Protective works.—Nothing done. 30th April 1889.

Concrete Blocks.

Description of blocks.	Made up to 30th April 1889.	Made in May 1889.	Made up to 31st May 1889.	PLACED IN WORK		In hand.
				Up to 30th April 1889.	Up to 31st May 1889.	
Old blocks						
Wavebreaker blocks	806		806			
Superstructure—	3,109	40	3,149	806	806	85
North pier bottom blocks				3,064	3,064	
Do. middle do.	227		227	212	212	15
Do. top do.	750		750	713	713	37
South pier bottom do.	248		248	233	233	15
Do. middle do.	459	9	468	340	340	128
Do. top do.	1,292	38	1,330	948	948	382
Special blocks	510	12	522	335	335	187
Counterbalance blocks	71		71	71	71	1
Special abutment blocks	1		1			
	46		46			46

1,702 cubic yards of concrete was made in the month.
Blockmaking was stopped on the 5th and resumed on the 27th.
748 tons cement was the balance at the end of the month.
212 superstructure and 16 wavebreaker blocks were transferred from north to south block ground.

TOOLS AND PLANT.

Elevators.—Two boxes were repaired.
No. 3 Crane on mixing platform was supplied with a new chain.
Concrete mixture No. 5.—The door catch was repaired.
Concrete mixture No. 6.—A new door catch was fitted.
Concrete skips.—Three were repaired.
Goliath Crane No. 3.—Two new valve seatings, four new valves to two pumps and sixteen new studs and nuts to hydraulic piston were made and fitted. A new hydraulic piston leather and two spanners were supplied.
Light Traveller No. 2.—A new travelling wheel and a new key to crab pinion were fitted.
Pontoon.—The manhole covers were removed and the buoys painted inside. Thirty-six $\frac{5}{8}$ -inch bolts were made and fitted to manhole covers and the joints remade. New plates were supplied to the suspending chains.
North Pier Titan.—The face of a crab travelling wheel was chipped and a new key fitted to the pinion. The "east and west" travelling shaft was straightened. Two wrought-iron fire bars were made. A new key was fitted to the pinion of hand-power travelling gear. The sheaves and chains of the chain blocks were examined and the blocks repaired.
The titan stood at its usual standing ground at the end of the month.
South Pier Titan.—A portion of the plank flooring was repaired and the cabin roof renewed.
The crane stood at its home station at the end of the month.
Wavebreaker Crane.—The wavebreaker crane stood at the shore end of the south pier as usual during the monsoon.
Miscellaneous.—Two new block frames were made. Fifty cotters and fifty washers were also made for the repairs of some of the old ones.
The fitting shop was supplied with a 1-inch die. A diver's boat and jolly boat were repaired, two spanners and five union nuts were made for the diver's air-pump, and a ladder repaired. Six lewis bars were straightened. No. 2 Locomotive engine was supplied with a

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shunting rope. Twelve bolts, six fiddle drills and a hand bellows were made for Pallavaram quarries. Four pick-axes were repaired. A survey boat and a riding trolley were also repaired.

Locomotive Engine No. 1.—A new cotter for coupling rod, a new blower pipe, a new nut for brake gear, new sand pipe and a new lead plug were supplied. The tyres of the wheels were chipped, the bearings of connecting and coupling rods were closed and cotters lined up. The eccentric straps were closed. The injectors were repaired and their steam valves faced. The boiler cocks and the safety and clack box valves were ground. The regulator valve and fire box roof stays were examined and copper stays of the fire box recaulked. The waste-water cock gear was set and the spark-catcher and ashpan were repaired.

Locomotive Engine No. 2.—The bearings of connecting and coupling rods and eccentric studs were supplied and the steam valves faced of the injectors. The boiler cocks and safety and clack box valves were ground. The waste-water cock gearing was set. The roof stays of fire box and brake nut and lead plug were examined. The spark-catcher was repaired.

Block Truck Nos. 2, 3, 5, 6, 7, 10, 11, 12, 15, 16, 18 and 19.—The brass bearings were eased, the keeps filled with waste and oil and the trucks painted. Nos. 14 and 18 were supplied with coupling chains.

Sand wagon No. 9 was supplied with a coupling chain.

HARBOUR TRUST.

Iron Pier.—Fifty-eight running feet, half with timber, was renewed. Two lamp-posts were fixed. A new gangway was fitted and the old one removed and fixed at the shore end of the pier.

Portable Crane No. 6 B was thoroughly repaired.

Trucks Nos. 29 and 32 were thoroughly repaired.

C. Class Cranes.—Extra balance box patterns were made.

Harbour Trust Office.—Twelve writing desks and six benches were made and supplied.

ORDER—dated 4th September 1889, No. 2448 W., Public Works.

Recorded.

(True Extract.)

Captain, R.E.,
Under-Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board.
" Marine Department.

Exd. P. L. Pereira.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated September, 4th.

Recd.

Encl.

G.O., 4th Sept. 1889, No. 2448 W.

SEPTEMBER.

Madras Harbour Works
Progress report of the — for May 1889,
recorded.

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19TH AUGUST 1889, No. 2277 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads
Civil Works.

READ—the following papers :—

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 17th July 1889, No. 2524.

I have the honor to forward herewith report (No. 440, dated 10th July 1889) of progress made on the Harbour Works during April 1889, with enclosures, and copy of the Board's resolution thereon passed at their meeting last evening.

2. With reference to the latter, I have the honor to solicit the attention of Government to paras. 3, 4 and 5 of the report, and to request the earliest possible orders by wire, if considered necessary, as regards the wavebreaker protection to the north arm. Should definite instructions not be received before the end of August at latest, protection cannot be afforded according to the sanctioned design before the north-east monsoon, and the spot which suffered most in the cyclone of 1881 will be left without the protection of random blocks as considered necessary by both the late Mr. Parkes and the Board's Engineer.

3. I venture further respectfully to submit that whatever north-east entrance may or may not be decided upon hereafter, it will not be Mr. Parkes' suggested No. 1 A, in reference to which only the deposit of these random blocks at this spot has been delayed; and I may add that the Trustees are very strongly of opinion that full protection, so far as appliances will permit, should be afforded according to the sanctioned design, so as to absolve them from all responsibility for further disaster.

ENCLOSURES.

From A. L. POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman, Harbour Trust Board, dated Madras, 9th July 1889, No. 440.

I have the honor to submit my report on the progress made on these works in April, with a lithographed plan of the harbour (submitted in triplicate) showing the new work in red.

2. With this report I have the pleasure also to forward one mounted and two unmounted copies of a three-plate panoramic photograph of the harbour and beach improvements, &c., taken from the top of the High Court, showing the progress to the 30th April 1889.

3. *North Pier Works.*—Works at the north pier during April was confined to protecting the length of superstructure built to the 31st March with wavebreakers. But owing to an alteration having been ordered by Government in the mode of depositing the wavebreaker blocks (*vide* G.O., No. 821 W., dated 19th March 1889) progress was considerably slower and more difficult, and I trust that before the close of this season or at latest the end of August, this order may be countermanded and the protection ordered to be changed to the random system in accordance with the sanctioned design, as the present arrangement of "set" blocks in the place of their being dropped is not in my opinion sufficient protection to the bonded work to stand a first-class cyclone, as the old wall is so much damaged at this point as to be of little or no protection.

4. Under the provisional instructions, 266 wavebreaker blocks were set by divers, and, to enable me to do this, 537 tons of rubble had to be spread over the base and levelled up so as to form a level foundation for these blocks.

5. This temporary protection is only 18 feet wide against a required width of 40 feet of wavebreaker protection, and is lighter, or weakens the stability of the curved length of the

north pier by a dead weight of 5,370 tons of material at one of the points where the works suffered most in the storm of November 1881.

6. By the 28th April 49 of the iron cramps for clamping each course together were fixed in cement and all temporary rails, &c., removed and the titan crane run on shore, closing work at this arm for the rough weather, usual in May.

7. *Concrete Blockmaking.*—In April blockmaking was carried on for 21 days when 224 blocks were turned out, which is equal to a make of 3,626½ cubic yards of concrete; of the 224 blocks, 211 were for the wavebreaker screen and 25 for the abutment, which completed the 46 special abutment blocks ordered to be made under G.O., No. 622 W., dated 2nd March 1889.

8. *South Pier Works—Rubble Base.*—In April the south pier rubble base was extended a short distance by adding 2,116½ tons of material, made up of 1,927½ tons of rubble from the quarries and 189 tons of old blocks fallen from the old wall, which were blasted by dynamite to the size of ordinary rubble.

9. *Superstructure.*—For want of old enough blocks no progress could be made at extending the south pier superstructure above sea level, but, as is usual at the close of the season's work, four of the lower blocks were set on the 6th April to prevent any movement in the lower blocks of the last finished course.

10. On the 7th the titan crane was lowered down on to its permanent rails, and on the 8th turned round into position for protecting the end of the new work with the wavebreakers.

11. As at the north pier, 54 iron cramps were fixed, clamping together all the new courses set during the season.

12. *Wavebreaker.*—The titan crane deposited wavebreaker blocks to protect the length of pier it stood upon, where the wavebreaker crane carried on the protection towards shore until the 15th of April, by which date these two cranes had dropped 164 large wavebreaker blocks.

13. The two cranes were run safely on shore by the evening of the 17th, and all temporary rails, sleepers, &c., were taken up, closing work for the season.

14. *Pallavaram Quarries.*—Thirty-six trains brought a supply of 7,660 tons of stone for the works, but only 3,557 tons of this quantity were chips supplied by the contractor for block-making, the remainder being rubble drawn from the stock supplied by the late contractor Mr. Abdoola Badsha Sahib.

15. *Stores from England.*—The following vessels arrived during the month of April with the following casks of cement:—

By the S.S. <i>Lindula</i> 1,100 casks of Portland cement containing ...	TONS. CWTs. QRS. LB.
By the S.S. <i>Goorkha</i> 934 casks of Portland cement containing ...	196 8 2 8
Total ...	2,034
	363 4 1 4

RETURN OF WORK FOR APRIL 1889.

Surveys.—Some cross sections were taken of the north and south pier bases.

Railway lines.—On the north pier 442 running feet metre gauge lines were taken up. On the south pier 537 running feet broad gauge lines and 276 running feet temporary titan road lines were taken up for the rough weather. The sand line was extended 130 feet and a bridge was commenced to span the new drain for carrying away storm water overflow for the intercepting sewer. 855 running feet broad gauge lines were laid to connect the Madras Railway Company with the iron pier.

Quarries.—Thirty-six trains worked during the month bringing stone from Pallavaram.

Rubble.		TONS.
Total quantity received up to 30th April 1889 ...	...	360,322½
Do. do. 31st March 1889 ...	...	356,219½
Received in April ...	...	4,103

Chips.		TONS.
Total quantity received up to 30th April 1889 ...	...	135,497½
Do. do. 31st March 1889 ...	...	131,940½
Received in April ...	...	3,557

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Ballast.—None received.

North Pier surf bank.—Nothing done since 30th November 1888.

North Pier Rubble Base.

	FORESHORE.		Base.
	Large rubble under wave-breaker.	Widening foreshore.	
Total quantity deposited up to 30th April 1889 ..	14,286½	54,051½	119,425½
Do. do. 31st March 1889 ..	13,749½	52,412½	119,425½
Deposited in April ..	537	1,638½	..

North Pier superstructure.—Nothing done since 31st March 1889.

North Pier supplementary works.—

Blocks deposited in wavebreaker.

	Number of blocks.	Contents, cubic yards.	Distance on pier.	Average breadth from face of pier.
Up to 30th April 1889 ..	2,194	39,807½	..	..
Up to 31st January 1889 ..	1,923	35,019½	..	..
In April ..	* 266	4,788	2,525 to 2,822	18 feet.

* Wavebreaker blocks.

North Pier capping.—Nothing done since 30th November 1888.

North Pier cramps.—Forty-nine cramps fixed in the month.

South Pier surf bank.—Nothing done since 30th April 1888.

South Pier Rubble Base.

	FORESHORE.		Base.
	Large rubble under wave-breaker.	Widening foreshore.	
Total quantity deposited up to 30th April 1889 ..	12,061½	38,389½	122,687½
Total quantity deposited up to 31st March 1889 ..	12,061½	38,389½	120,571
Deposited in April ..	..	..	† 2,116½

† 1,927½ Rubble from quarries.
189 Seven old blocks at 27 tons per block.

2,116½ Blasted by dynamite.

South Pier Superstructure.

	No.	Contents, cubic yards.
Blocks set up to 30th April 1889 ...	1,727	28,145½
Do. 31st March 1889 ...	1,723	28,076½
Set in April ...	† 4	68½

† Two bottoms and two middles to close the season's work.

Running feet of new wall built up to 30th April 1889 ...	1,132
Do. do. 31st March 1889 ...	1,132

Built in April ...

	FEET.
Total length of wall completed from E ...	3,519
Do. do. G ...	1,132

W

South Pier supplementary works—

Blocks deposited in wavebreaker.

	Number of blocks.	Contents, cubic yards.	Distance on pier.	Average breadth from face of pier.
Up to 30th April ..	1,689	29,389 ^{2 1/2}	..	..
Up to 31st March ..	1,525	26,437 ^{1 1/2}	..	..
In April ..	* 161	2,952	2,597 to 3,083	40 feet.

* Wavebreaker blocks.

South Pier capping.—Nothing done since 31st December 1888.
 South Pier cramps.—Fifty-four cramps fixed in the month.
 Protective works.—Nothing done.

Concrete blocks.

Description of blocks.	Made up to 31st March 1889.	Made in April.	Made up to 30th April 1889.	PLACED IN WORK.		In hand.
				Up to 31st March 1889.	Up to 30th April 1889.	
Old blocks	..	..	..	..	..	..
Wavebreaker blocks	806	..	806	806	806	..
Superstructure.	3,098	11	3,109	2,634	3,064	45
North pier bottom blocks	..	..	..	..	..	..
Do. middle	227	..	227	212	212	15
Do. top	750	..	750	713	713	37
South pier bottom	248	..	248	233	233	15
Do. middle	423	36	459	338	349	119
Do. top	1,195	97	1,292	946	948	344
Special ..	455	65	520	396	336	175
Counterbalance	71	..	71	71	71	..
Special abutment	1	..	1	..	..	1
..	21	25	46	..	..	46

Three thousand six hundred and twenty-six and seven-ninth cubic yards blocks were made in the month. Blockmaking was commenced on the 2nd and stopped on the 24th and again commenced on the 30th.

Seven hundred and fifty-eight tons cement was the balance at the end of the month.
 Seventy-nine superstructure and 64 wavebreaker blocks were transferred from north to south pier block ground.

Miscellaneous.—The south pier titan was turned in position for depositing wavebreaker blocks on the 8th.

The pontoon was taken to pieces on the 11th and was brought ashore on the 12th.

The south pier titan and wavebreaker cranes were brought to their shore stations on the 17th and the north pier titan was brought to its standing ground on the 28th.

Tools and Plant—Stationary Engine No. 2.—Donkey pump brass bearings were closed.

No. 2.—Brass bearings were closed.

No. 3.—A new eccentric jaw was fitted.

No. 4.—Two new side wedges were fitted.

No. 5.—An old side wedge was refitted, six hooks were repaired, and the iron work of a shoot was repaired.

Elevators No. 2.—A new shaft was fixed and four boxes were repaired.

Concrete Mixers—No. 1.—A new door-catch was fitted and two new pins were made and fitted to donkey pump.

No. 2.—A new door-catch and new intermediate spur wheels were fitted.

No. 3.—A new door-catch was fitted.

No. 4.—A new door-catch was fitted.

No. 5.—Two new door-catches were fitted.

No. 6.—A new handle was fitted to door.

No. 7.—Two new door-catches were fitted.

No. 8.—A new door-catch was fitted.

Concrete skips.—Two were repaired.

Cranes on Micing Platform—No. 1.—A new stay was made.

No. 3.—A new chain supplied.

Goliath Crane No. 3.—A new tumbler was fitted to the square shafts and a new hydraulic piston leather supplied.

100-ton Hydraulic Jacks, Nos. 1 and 2, were repaired.

Concrete Skip Trucks.—Four pairs of wheels were keyed and fitted.

Light Travellers No. 2.—The brackets of footboard were repaired.

10-ton Crab.—Taken to pieces and refitted with new spur wheels and pinions.

North Pier Titan.—A new travelling wheel was fitted to crab.

South Pier Titan.—A new driving pulley was made and fitted to the salt-water pump. The traverser was cleaned and tarred. The boiler feed pump repaired and a new stay rod made for the claws and a chain was supplied to secure crab to boiler when turning the crane.

Wavebreaker Crane.—Two pinch bars and special shackle and pin were made and supplied.

Sundries.—A shunting rope was made for No. 3 Locomotive engine. A hood was made for hearth for smiths' shop. Five dies were repaired and one $\frac{1}{2}$ " and one $\frac{3}{4}$ " dies were made. Six $1\frac{1}{2}$ " bolts were made and 18 repaired for block frames. Two bands were fitted to barrel buoys and eight pins and cotters were made for divers. A keel was made for the survey boat Grasmere. The wavebreaker claws were cleaned and painted.

Locomotive Engine No. 1.—Waste water cock gearing was fitted with a lever, a bracket, two studs and a new waste water cock.

No. 2.—Waste water cocks were ground and regulated and a new key was fitted to L.H. back gear sheave.

No. 3.—L.H. new valve spindle was fitted and slide valve reset.

Block Truck—No. 7.—A coupling chain was repaired and fitted.

No. 8.—Brass bearings were eased and keeps filled with grease and waste and the truck painted.

No. 13.—Dismantled.

Sand Wagon—No. 1.—Was generally repaired and painted.

No. 5.—A tail board hinge was repaired and fitted.

No. 19.—Was fitted with a coupling chain.

Harbour Trust—Iron Pier.—Eighty running feet half width timber work was renewed and a new pile cap was fixed. Four lamp-posts were fixed and fitted with frames for lamps.

No. 6 iron pier truck was repaired.

No. 25 iron pier truck was repaired.

A pattern was made of a turn-table for the iron pier.

A pattern was made of the fire bars for the portable steam cranes.

EXTRACT of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Tuesday the 16th day of July 1889.

8. Read letter No. 440, dated 10th July 1889, from the Engineer, Harbour Trust Board, reporting upon the progress made on the Madras Harbour Works during the month of April 1889.

Read note by Chairman.

Resolved,—that this report be submitted to Government and that early orders be solicited in reference to the wavebreaker protection at the north-east corner of the harbour, and that a reply by wire be requested.

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

Transferred to the Public Works Department.

(Signed) W. S. MEYER,
Asst. Secretary.

20th July 1889.

From Sir RICHARD BARLOW, Bart., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 18th July 1889, No. 2613.

I have the honor to acknowledge the receipt of telegram from Public Works Department, dated 12th instant, directing that the abutment be placed in the north

19TH AUGUST 1889, No. 2277 W., PUBLIC WORKS.

arm at the spot now reached, and to confirm reply sent the same day, copies enclosed, also to submit for the orders of Government copy of resolution passed by the Trustees at their meeting of the 16th idem.

2. The Board's Engineer has been directed to stop all work at the north arm until further orders.

3. The Trustees are strongly of opinion that as this abutment is only required for the late Mr. Parkes' suggested entrance No. 1 A, and that as this plan has been condemned by all authorities consulted, it is worse than useless to make provision for it, inasmuch as it must leave a weak spot in the wall just where it should be strongest, and it will very seriously delay the construction of the north arm as already pointed out, thus preventing protection being greatly increased against the approaching north-east monsoon.

4. The Board solicit the very earnest attention of Government to these points, and would strongly urge that orders be issued at a very early date to proceed with the north arm on the lines of the sanctioned design, securing it with random wave-breakers as it progresses.

ENCLOSURES.

Copy of telegram from Government, dated 12th July 1889, to the Chairman, Harbour Trust Board.

Your telegram 9th. Abutment should be put in at point now reached by north arm, namely, 2,862 feet.

From the Chairman, Harbour Trust Board, Madras, to the Secretary to Government, Public Works Department, dated 12th July 1889.

Work stopped north arm. Abutment blocks ready, but sea too rough to set them. Rendel's report makes it clear that the abutment will never be required. If insisted on it will delay work seriously and make a weak place in the wall just where it should be strongest in section.

EXTRACT of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Tuesday the 16th day of July 1889.

2. Read telegram from the Secretary to Government, Public Works Department, dated Ootacamund, 12th July 1889, and the Chairman's reply of same date in reference to proposed abutment in the north arm of the harbour.

Read note by the Chairman and letter No. 2487 addressed to the Engineer directing him to at once stop work at the north arm until further orders.

Resolved,—that the further orders of Government be awaited

EXTRACT of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Tuesday the 23rd day of July 1889.

3. Read note by the Chairman circulating, for the consideration of the Trustees, draft letter to Government, dated 18th July, in reference to telegram from the Secretary to Government, Public Works Department, directing the setting of abutment blocks in the north arm of the harbour.

Read minutes by Captain W. L. C. Baddeley, R.E., and Mr. Turnbull.

Approved and resolved that this letter be forwarded to Government.

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

19TH AUGUST 1889, No. 2277 W., PUBLIC WORKS.

Transferred to the Public Works Department.

26th July 1889.

(Signed) W. S. MEYER,
Asst. Secretary.

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 22nd July 1889, No. 2614.

I have the honor to acknowledge the receipt of your telegram, dated 20th instant, and have directed the Engineer to comply with the order therein contained, and set the abutment blocks, the moment the weather renders it feasible to do so.

2. I beg at the same time to submit, for the information of Government, and any notice they may consider advisable, a tracing and short explanation prepared by the Board's Engineer showing how an abutment can be placed in either arm of the harbour, at any time and at any spot, without delaying the work.

ENCLOSURES.

From A. L. POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman, Harbour Trust Board, dated Madras, 22nd June 1889, No. 364.

In continuation of my letter No. 351, dated 20th instant, I have the honor to inform you that I have just come to the conclusion that *no abutment* is required in the north pier as a provision for opening an entrance under Mr. Parkes' condemned plan A, and I trust the sketch-plan now submitted will be clear enough to convince the Trustees that *no abutment is necessary*, since I have shown how the ordinary work can be removed and the special blocks (reduced to 36 in number against the 55 required in Mr. Parkes' abutment) set afterwards by the present appliances, when this form of entrance has (if ever) been decided upon.

2. The advantages gained under my proposal by leaving out the abutment altogether, are—

1stly.—No delay in the present progress of the north arm.
2ndly.—That the piers will be of a uniform strength throughout, with a continuous bond whereas the abutment once set will in my opinion always be a weak point, besides being a most uncertain and difficult piece of work to build, with the present appliances at hand, as I have already reported.

3rdly.—That my form of abutment (which will not be required until the entrance has been opened) is of the same bonded section as the present sanctioned piers, and possesses the advantage that each course can set independently of the next, which is the principle on which the Madras piers are built.

3. When Mr. Parkes as Chief Engineer stated that an abutment *was* necessary in case a north-eastern entrance, under his plan A, should eventually be adopted, it was not for me to question the matter; in fact, I never gave it a second thought, as my time was fully occupied with other work; but now that I have no such Engineer to refer to, I have gone into the question of the necessity of such a provision myself, and I find that not only am I correct in stating that I can open an entrance at any point in the piers without the abutment, but that Mr. Parkes must have also considered it possible, as in his report printed under G.O., No. 3127 W., dated 19th December 1884, para. 73, he states that the south pier can be cut through and an entrance formed leading to the proposed boat harbour he therein suggests, where no abutment has been built, so that, if it is possible to do so in the south pier, the undertaking will be no more difficult at the north pier.

4. I trust under this new discovery, which sets aside the necessity of an abutment at all, I may receive immediate orders to proceed without Mr. Parkes' unnecessary abutment, and I only regret the way out of the difficulty had not struck me at an earlier date so as to have saved all the past correspondence.

EXTRACTS from Mr. Parkes' letters, dated 19th October 1888 and 11th January 1889.

"If you have anything materially different from this to suggest, you had better send me the details of your proposal privately and at the same time ask for a formal reference to me."

"Prepare abutment blocks. When this is communicated to you it will rest with you to carry it out in your own way, making such use as you think proper of the information you have

as to the object and intention of the order; you are in no way bound by the details given in my tracing, but you are bound to carry out the order."

W. PARKES.

Telegram from the Secretary to Government, Public Works Department, to the Chairman, Harbour Trust Board, dated 20th July 1889.
My telegram 12th July ordering abutment to be put in at 2,862 feet is confirmed.
Orders follow.

EXTRACT of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Tuesday the 23rd day of July 1889.

4. Read telegram from the Secretary to Government, Public Works Department, dated 20th instant, confirming his telegram of 12th idem, directing that the abutment blocks be set in the north arm at the spot now reached.

Read again letter from the Board's Engineer, No. 364, dated 22nd June 1889.
Read draft letter to the Chief Secretary to Government, Marine Department, dated 22nd July 1889, submitting, for the consideration of Government, the proposals of the Board's Engineer read above for placing an abutment in either arm of the harbour at any time and at any spot without delaying progress.

Approved.

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

Transferred to the Public Works Department.

26th July 1889.

(Signed) W. S. MEYER,
Asst. Secretary.

Note by the Ag. Joint Secy. to Govt., Public Works Department, dated 1st August 1889.

ORDER—dated 19th August 1889, No. 2277 W., Public Works.
On reconsideration, the Government resolves to withdraw its orders * in which.

* No. 622 W., dated 2nd March 1889. the construction of an abutment in the north arm of the harbour was insisted upon. In accordance with the recommendation in para. 6 of Colonel Mead's note printed with Proceedings, No. 821 W., dated 19th March 1889, the "set" blocks in the wavebreaker of the north arm may now be placed in random, and the work may be proceeded with in accordance with the sanctioned design.

2. A copy of these Proceedings will be forwarded to the Secretary of State for information.

(Here enter No. ¹⁶ 2277 W., dated 19th August 1889.)

(Signed) (True Extract.)

To the Chairman, Madras Harbour Trust Board.
" Marine Department.
R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

Exd. J. Henricus.
Spare Copies

2448
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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated August, 19th.

Recd.

Encl.

G.O., 19th Aug. 1889, No. 2277 W.

AUGUST.

Madras Harbour

Orders dispensing with the construction
of the proposed abutment in the north arm
of the —.

2468
8

27TH MAY 1889, No. 1396 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper :—

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board,
to the Secretary to Government, Public Works Department, dated Madras,
10th May 1889, No. 1676.

I have the honor to submit, for the information of Government, letter (in original)
from the Engineer, Harbour Trust Board, No. 141, dated 2nd May 1889, reporting
upon the progress made upon the Madras Harbour Works during the month of March
1889, with a tracing in duplicate.

2. The quarterly report called for in G.O., No. 1062 W., dated 18th April 1889,
will follow in due course.

ENCLOSURE.

From A. L. POGSON, Esq., Engineer, Madras Harbour Trust Board, to the Chairman,
Harbour Trust Board, dated Madras, 2nd May 1889, No. 141.

I have the honor to submit my report on the progress made on these works during the past
month of March 1889.

2. Accompanying this report is a lithographed plan of the harbour (submitted in triplicate)
showing the work done during the month in red.

3. *North Pier Works Rubble Base.*—At the north pier 2,544½ tons of rubble stone was
tipped which went to make up the base immediately under the pier and widening out the
foreshore.

4. *Superstructure.*—The progress at this arm was rapid and regular throughout the month,
which is shown by 29½ courses of blocks being set in 26 working days or 294 blocks being set by
divers, extending the north pier by 177 running feet, which nearly completes the north pier curve.

5. *Concrete Blockmaking.*—The work of blockmaking was carried on from the 5th to 27th
March, which was as long as the supply of stone for this purpose lapsed. During these 20
working days 233 blocks were made containing 3,852½ cubic yards of concrete.

6. *South Pier Works Rubble Base.*—After blasting 18 of the old 27-ton blocks thrown from
the old ruined wall and lying in the way of the new work (which adds 486 tons of material to
the base), the rubble base was extended a short distance by depositing 1,959 tons of stone by
boats; thus the total materials added to the base in March was equal to 2,445 tons.

7. *Superstructure.*—Unfortunately the progress at this arm was limited, owing to the want
of blocks, over three months old, caused through the constant stoppages to block making for
want of chips.

8. From the 1st to the 4th, 40 blocks were set which added a length of 25 feet to the pier, bringing up the total length of the masonry pier to 3,519 feet from the first block set in shore.

9. *Wavebreaker.*—As the titan crane could no longer be supplied with superstructure blocks, the work of protecting the new length of pier built this season was commenced earlier than necessary. By the end of March 276·30 ton blocks had been deposited with the wavebreaker crane to a width of as near 40 feet from the bonded work as possible.

10. *Pallavaram Quarries.*—Thirty-two trains brought a supply of 6,861 tons of stone for the works, but only 2,357½ tons of this quantity were chips supplied by the contractor.

11. *Stores from England.*—The following vessels arrived during the month of March with the following casks of cement:—

By the S.S. "Rewa" 1,350 casks of Portland cement		TONS. CWTs. QRS. LB.			
		containing			
Do.	"Golconda" 500 do.	do.	...	241	1 1 20
Do.	"India" 930 do.	do.	...	89	5 2 24
		do.	...	166	1 1 20
Total ... 2,780		Total ...	496	8	2 8

MADRAS HARBOUR WORKS.

RETURN OF WORK FOR MARCH 1889.

Railway Lines.—On the north pier 72 running feet titan permanent-way was relaid, 1,172½ running feet single rail for mixed gauge, 442½ running feet temporary metre gauge siding and 184 running feet temporary broad gauge lines were laid. On the south pier 810 running feet permanent titan road and 119 running feet temporary titan road were laid.

Quarries.—Thirty-two trains worked in the month bringing stone from Pallavaram.

Total quantity received up to 31st March 1889		Rubble.		TONS.	
Do.	do.	28th February 1889	...	356,219½	...
		28th February 1889	...	351,716½	...
Received in March ...				4,503½	

Total quantity received up to 31st March 1889		Chips.		TONS.	
Do.	do.	28th February 1889	...	131,940½	...
		28th February 1889	...	129,582½	...
Received in March ...				2,357½	

Ballast.—None received.
North Pier surf bank.—Nothing done since 30th November 1888.

North Pier Rubble Base.			
	FORESHORE.		Base.
	Large rubble under wave-breaker.	Widening foreshore.	
Total quantity deposited up to 31st March 1889	13,749½	52,412½	119,425½
Total quantity deposited up to 30th April 1887	11,826½	52,280½	118,935½
In March ...	1,922½	132	489½

North Pier Superstructure.

		NO.		Contents.	
				C. YDS.	
Blocks set up to 31st March 1889	...	1,184	...	19,105½	...
Do. 28th February 1889	...	890	...	14,334½	...
In March ...		294	...	4,770½	...
Running feet of new wall built up to 31st March 1889	...	...	...	775	...
Do. do. 28th February 1889	...	...	...	598	...
In March ...		...	...	177	...

Total length of wall completed from B	...	...	...	2,825
Do. do. F	...	...	...	775

North Pier supplementary works.—Nothing done since 31st January 1889.

Do. capping.—Nothing done since 30th November 1888.

Do. cramps.—Do. 31st May 1887.

South Pier surf bank.—Do. 30th April 1888.

South Pier Rubble Base.

	Large rubble under wave-breaker.	Widening foreshore.	Base.
Total quantity deposited up to 31st March 1889	12,061½	38,389½	120,571
Total quantity deposited up to 28th February 1889	10,102½	38,389½	120,085
In March ...	1,959	...	* 486

* Eighteen old blocks blasted by dynamite at 27 tons per block.

South Pier Superstructure.

		NO.		Contents.	
				C. YDS.	
Blocks set up to 31st March 1889	...	1,723	...	28,076½	...
Do. 28th February 1889	...	1,683	...	27,416½	...
In March ...		40	...	659½	...
Running feet of new wall built up to 31st March 1889	...	...	...	1,132	...
Do. do. 28th February 1889	...	...	...	1,107	...
In March ...		...	...	25	...

Total length of wall completed from E	...	...	...	3,519
Do. do. G	...	...	...	1,132

South Pier supplementary works.—

Blocks deposited in wavebreaker.

	Number of blocks.	Contents, cubic yards.	Distance on pier.	Average breadth from face of pier.
Up to 31st March 1889	1,525	26,437½	...	...
Do. 28th February 1889	1,249	21,484½	...	...
In March ...	+ 276	4,952½	3,179 to 3,465 3,119 to 3,159 3,083 to 3,104	40 feet.

+ 273 wavebreaker blocks.

1 old blocks.
1 do.
1 do.

Picked up by north pier titan from site of work at north pier.

South pier capping.—Nothing done since 31st December 1888.
Do cramps.—Do. 31st October 1888.
Protective works.—Nothing done.

Concrete Blocks.

Description of block.	Made up to 28th February 1889.	Made in March.	Made up to 31st March 1889.	PLACED IN WORKS.		In hand.
				Up to 28th February 1889.	Up to 31st March 1889.	
Old blocks	806	..	806	806	806	..
Wavebreaker blocks	3,092	6	3,098	2,361	2,634	464
<i>Superstructure.</i>						
North pier bottom blocks	227	..	227	152	212	15
Do. middle do.	750	..	750	537	713	37
Do. top do.	248	..	248	175	233	15
South pier bottom do.	387	36	423	330	338	85
Do. middle do.	1,093	102	1,195	922	946	249
Do. top do.	387	68	455	327	335	120
Special	71	..	71	71	71	..
Counterbalance	1	..	1	..	..	1
Special abutment	..	21	21	..	..	21

3,852½ cubic yards blocks were made in the month.

Blockmaking was commenced on the 5th and was stopped on the 27th.

Nine hundred and thirty-three tons cement was the balance at the end of the month.

One hundred and twenty-three superstructure and 48 wave breaker blocks were transferred from north to south block ground.

Tools and Plant—Stationary Engine.—Two lubricator cocks were ground and the doors and windows of the engine-room repaired and painted.

No. 1 Boiler.—Was disconnected and removed from seating.

No. 4 Boiler.—Joints of safety valve seating were remade.

Donkey Pump No. 2.—All brass bearings were closed.

Stonecrushers.—Twelve hooks, seven crowbars and a shoot repaired.

No. 1.—A new front jaw, brass bearing, two side wedges and set plates were fixed.

No. 2.—A new eccentric shaft, a new brass bearing for eccentric jaw, two new white metal bearings for eccentric shaft and a new brass bearing were fixed.

No. 3.—A new side wedge and set plates fixed.

No. 4.—A new front jaw and set plates fixed.

No. 5.—Two new side wedges supplied and fixed.

Pump in Running-shed No. 1.—The foot valves were repaired.

Elevator.—Six boxes were repaired.

Concrete Mixers.—Four new canvas water-pipes were supplied.

No. 1.—A new catch and hinges were fixed to door of hopper. Four new brass bearings, four new buckets and four new brass washers for plungers; two new bushes for guide and brackets and a new loose pulley were fixed to the pump and the pump handle was repaired.

No. 6.—A new door-catch was fixed.

Concrete Skips.—Six were repaired.

Goliath Crane No. 1.—A travelling wheel was chipped and a new key fitted.

Goliath Crane No. 2.—A new tumbler was fixed for the square shaft and a new hydraulic piston leather supplied.

Goliath Crane No. 3.—Two new tumblers were fixed for the square shaft, the faces of two crab wheels were chipped and a new hydraulic piston leather was supplied.

Light Traveller No. 2.—A new chain was supplied to the crab winch.

Light Traveller Nos. 1, 2, 3 and 4.—All footboards were repaired and painted.

North Pier Titan.—A new screw and nut were made for the releasing gear brake. The valves were ground and joints remade to the boiler feed pump. The teeth and pinion of the travelling gear of crab carriage were chipped. A new pall wheel and a new lever for pall were fitted and the crane was painted. The crane stood at the end of the new work at the end of the month.

South Pier Titan.—A ¾" shunting chain was supplied. The crane stood at the end of the new work at the end of the month.

Wavebreaker Crane.—Two broken teeth were cut out and wrought iron ones fitted on the spur wheel of heaving up gear, and the releasing gear brakes were lined with new blocks. The crane stood at 3,094 feet on south pier at the end of the month.

Block Frames.—Nine block frames were altered for the new special "abutment blocks."

Miscellaneous.—A new handle was made for a riding trolley. Two brake ropes were made for titan cranes. Seventy-six cramps were made for north and south piers. Twelve iron rowlocks

and two rudder hooks were made for the divers' boats. Twelve rubble dogs and three pairs of toe caps for divers' boots were made; 135 pickaxes were repaired for the block ground and twelve knee-pieces were made for Lewis wedges.

Locomotive Engine No. 1.—L.H. dummy gland joints were made, waste water cocks were set and two water gauge column cocks were ground.

Locomotive Engine No. 2.—L.H. dummy glands were made. The lead plug was examined. The brass bearings of connecting and coupling rods were closed and the boiler cocks ground.

Locomotive Engine No. 3.—L.H. dummy gland joints were remade. A new waste water cock, a new bracket nut and new bolts to coal bunker were fitted. A new spring hanger was made and fitted, one old stud was drilled out and a new one fitted. A buffer was repaired and fixed.

Block Truck No. 17.—Rebuilt and painted.

Block Truck No. 19.—A coupling chain and a cotter pin were made and fitted.

Sand Wagon No. 1.—Four new pedestals were fitted.

Sand Wagon No. 2.—Four new pedestals, four pins to doors, and two pins to draw hook and chain were fitted, the wagons painted.

Sand Wagon No. 6.—A new wheel was fitted.

Sand Wagon No. 11.—Two cotter pins were made and fitted.

Sand Wagon No. 20.—A cotter pin was made and fitted.

Harbour Trust—Beach improvements.—A new line of railway to connect the iron pier with the Madras Railway was laid out and commenced.

Iron Pier.—Seventy running feet half width of the timber work were thoroughly renewed.

Two turn-tables in the Custom-house were supplied with new footplates.

No. 10 B portable crane was thoroughly repaired.

ORDER—dated 27th May 1889, No. 1396 W., Public Works.

Recorded. The progress during the month of March is very satisfactory.

2. A separate report for the last month of the quarter is not required by Government. The quarterly report for the Secretary of State will contain sufficient information.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board.
" Marine Department.

Exd. J. Henricus.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Gobt. of {1889} Madras.

PUBLIC WORKS.

Dated May, 27th.

Recd.

Encl.

G.O., 27th May 1889, No. 1396 W.

MAY.

Madras Harbour Works

Progress report submitted by the Chairman, Harbour Trust Board, of the — for March 1889, recorded with remarks.

2448
19TH AUGUST 1889, No. ¹⁶_{2277 W.} PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

LETTER—to

THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA.

MY LORD,

With reference to your Lordship's despatch No. 8, Public Works, dated 20th June 1889, we have the honor to forward a copy of our Proceedings, No. 2277 W., dated 19th August 1889, from which your Lordship will observe that we have permitted the Madras Harbour Trust Board to dispense with the construction of the proposed abutment in the north arm of the harbour. We have arrived at this decision on perusal of Sir A. M. Rendel's report of 7th June 1889, in which he stated that he attached no great importance to the abutment; on the strong representations of the Harbour Trust Board that the construction of the abutment will seriously delay the progress of the works; and on a report by our Chief Engineer, who personally inspected the works and satisfied himself that the abutment is unnecessary.

We have the honor to be,

My Lord,

Your Lordship's most obedient, humble servants,

(Signed) CONNEMARA.

(„) C. G. ARBUTHNOT.

(„) H. E. STOKES.

(„) J. H. GARSTIN.

OOTACAMUND,
19th August 1889.

Ed. J. Henriens.

2000

May

1889.

Cutting on Work up to 31st March 1889
 No. — during the current year (from 1st April to 31st March 1889).
 No. 30,337.8-6-7
That the cutting up to 31st May 1889.
 No. 31,357.21-8-7

MADRAS,
8th August 1889.

1889.

Wm. Chas. Carpenter
Secy. and Treas.
of Works Office.

Adel Popov
Engineer, Harbour Trust Board,
Superintendent,
Molokai Harbour, Waia.