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(2) Date of repair_____

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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 1593-98 (W) Press
B.P. No. Mis.

Dated 26-6- 1876.

Not to be folded or roughly handled

No. 518 Read the following Endorsement of the Chief Secretary to Government, dated Ootacamund, 8th June 1876, No. 847 —

From J. H TAYLOR, Esq, Lieutenant, R.N R, Master Attendant, Administrative Department, Madras, to the Honorable W HUDLESTON, Chief Secretary to Government, Fort St George, dated Madras, 5th June 1876, No 3,775

I HAVE the honor to acknowledge receipt of, and to make the following report upon, the order of Government in the Public Works Department, No 884, of date 4th April 1876, on the subject of tidal observations in the Indian seas

2. Judging from the tenor of the despatch from the Secretary of State for India, and the letter from Sir William Thomson to the address of General Strachey, R E, I concluded that it was the desire of those authorities that the tidal observations therein suggested should be carried out on the same model as those already observed at Kurrachee under the supervision of Mr Parkes, C E I accordingly placed myself in communication with the officer in charge of the Kurrachee Harbour Works, through the General Superintendent of Public Works Stores and Workshops at Madras, and I enclose the papers marginally noted as the result of that reference for the information of Government in the Public Works Department From these papers it will be seen that the self-registering tide-gauge at Kurrachee is worked by a pendulum clock, and from the description of the apparatus I am of opinion that the mechanism is of too delicate and complicated a nature to be adopted generally on a surf-bound coast and utilised in a sea-way. It appears to be intended more for adoption in harbours and quiet waters and fitted to piers or quays, and for accuracy of observations, under such conditions, it is doubtless highly valuable Each gauge, I note, costs Rupees 525, delivered in India, to which must be added the cost of the house to protect the gauge, quoted at 325 Rupees I would recommend that three of these instruments be obtained from England through the Secretary of State, and be set up at the ports of Cochin, Negapatam, and Cocanada for trial, under the management of the Masters Attendant of those ports, as a preliminary step. Mangalore offers the same facilities, but I have no officer there to entrust the duty of observation At Madras, where there is a pier, but where a rough sea prevails, I would recommend that a tide-gauge be put up by the Department of Public Works on the same general principle as the one put up on the Madras Pier in 1864, subject to sundry improvements suggested by former defects This gauge, which cost Rupees 520, was damaged subsequently in heavy weather, and this is a danger which the pier gauges will always be exposed to. There is no post on the eastern sea-board where such delicate observations could be taken between Cocanada and False Point in Bengal, where the Government of India will doubtless have a station

Copy of letter from the Superintendent of Kurrachee Harbour Works, to the General Superintendent, Public Works Stores and Workshops, dated 16th May 1876, No 363.

Description of the self-registering tide-gauge in use on the Kurrachee Harbour Works

Self-registering tide-gauge paper

3 In the Madras Presidency there is but very little rise and fall of tide, and on the sea-board *no ebb and flow*. The motion of the sea is entirely that of currents guided by monsoon winds; hence it is to be observed that even in fine weather the wave oscillation in the gauge will completely nullify any useful result, while the

uncertainty of the number of rough days will vitiate any average drawn from a number of such fine observations On this account I do not recommend Tuticorin or Paumben, but would beg to suggest Colombo and Trincomallee, both harbours This would make a reliable chain of observations Bombay, Cochin, Colombo, on the west side, Trincomallee, Negapatam, Cocanada, and False Point on the eastern; might all be fitted with self-registering instruments on the Kurrachee model

4 Finally, I would respectfully represent that all expenditure incurred on account of tidal observations should be met from Imperial Funds

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From W. W PRICE, Esq, MICE, Superintendent, Kurrachee Harbour Works, to J N GRAINGER, Esq, General Superintendent of Public Works Stores and Workshops, dated Manora, 16th May 1876, No 363

With reference to your No 467 of 6th May, yesterday received, I have the honor to state that there is in this Office no drawing of the tide-gauge which was sent out from England, and just now there is so much pressing work on hand that I cannot have one prepared for you

I shall endeavour to send you a sketch after a time if you still require it, but meanwhile transmit, for your information, a memorandum descriptive of the gauge, also a pattern paper

2 The gauge is fixed on a pier in the harbour in smooth water, that is, where there never is a wave of more than 1½ feet in height

The depth to the ground at low water is 4 feet, the bottom of the gauge pipe extends 5½ feet below low water, or about 1½ feet into the ground, having a small opening 1½ inches × 1 inch in the side at about 3 feet below low water

The rise of tide is—

Maximum springs	.	10½ feet
Average springs	...	9½ „
Neaps	..	6 „

Barnacles and weeds do not interfere with the working, but the pipe requires to be cleaned occasionally outside

3 The cost is stated, as far as I can give it, in the accompanying memorandum

4 I should say, if you require such a gauge, the best plan would be for you to order it from the same firm who supplied ours (through the India Office), Elliott Brothers, of London

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MEMORANDUM

Description of the Self-registering Tide-gauge in use on the Kurrachee Harbour Works

The machine is on Bunt's principle and made by Elliott Brothers, of London, of whom a similar instrument could no doubt be obtained

2 It comprises a pendulum clock which causes a drum to make one revolution in 24 hours

3 The drum is 24 inches in circumference, so that every hourly space equals one inch

4 On this drum is fixed a blank diagram paper, secured to it by a movable brass slip and pinch screws Care is taken in setting the paper that the datum line on the one side of the brass slip may, if produced, meet the same line on the other side A pencil moved by the rise and fall of the tide marks its path on the drum The pencil moves 1 inch for every foot of actual fall or rise of water Thus it may be said that the horizontal and vertical scales are respectively 1 inch to an hour and 1 foot

5 The arrangement for actuating the pencil in recording the heights is by a chain attached to a float and passing over a spiked wheel, each link being caught by a spike which prevents the chain from slipping, and tends to correct the alterations of the vertical scale caused by the opening of the links and lengthening of the chain

6 The float moves with the tide in an iron cylinder, having an aperture sufficient to cause the rises and falls inside and out to correspond If the aperature be too large, every ripple on the water will be communicated to the float, and will cause a thick irregular line on the diagram paper

7 The resultant of the two motions, *viz*, the clock turning the drum at the rate of one inch per hour, and the motion given to the pencil by the float and weight, forms the curves as shown on the attached tracing, which has been taken from one of the original diagrams of the machine

8 The whole of the machinery is enclosed in a small house which is fixed to the Harbour Works Pier at Manora A man at Rupees 20 per month attends to this gauge and to another, situated about 4 miles off, at Napier Mole Bridge near Kurrachee He also attends to the Anemometer which is situated at Manora

9 The registry is supervised by Mr Humby who has for several years had charge of these observations

10 As regards cost, it may be mentioned that the two gauges in use here cost Rupees 1,042, *i e*, Rupees 521 each delivered, and the setting up and house for each cost about Rupees 325, exclusive of the main pier or jetty to which they are fixed

(Signed) W. W PRICE, MICE,
Superintendent, Kurrachee Harbour Works

Transferred to the Department Public Works

(Signed) W HUDLESTON,
Chief Secretary.

No 519 Order thereon, 26th June 1876, No 1,597.

CIVIL WORKS, No 61

His Grace the Governor in Council approves of the recommendations made by the Master Attendant for the record of tidal observations at the points specified on the coasts of the Madras Presidency, and resolves to forward the papers for the information of the Government of India, and for provision of the funds necessary to carry the arrangements into effect The gauge tried at the Madras pier in 1864 appears to have failed With the improvements now suggested, its cost will be about the same as that at Kurrachee. The Master Attendant is requested to be good enough to state in detail his reasons for preferring the pattern formerly tried at Madras to that recommended for adoption at other ports, and to explain more fully the difficulties anticipated in fixing at the Madras pier a tide gauge, properly guarded, on the model of the Kurrachee gauge

(Here enter No 1,598, dated 26th June 1876)

(True Extract)

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

To the Marine Department
„ District Engineers concerned
Exd F R Bantleman
Spare Copies

PUBLIC WORKS DEPARTMENT,
FORT ST GEORGE, 26*th June* 1876

No 520

No 1,598

FROM

MAJOR-GENERAL G W. WALKER, R E,
Secretary to the Government of Madras,
Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
Public Works Department.

CIVIL WORKS, No 62

SIR,—I am directed to acknowledge the receipt of the Proceedings of the Government of India, No. 81—5 M, dated 14th March 1876, on the subject of tidal observations in the Indian sea, and, in reply, to forward the accompanying papers showing the arrangements proposed to be adopted in the Madras Presidency. I am to request that a special assignment of funds under Imperial may be made to meet the cost of the observations Further information has been called for from the Master Attendant as to the difficulties anticipated in setting up at Madras a gauge similar to that in use at Kurrachee; and, on receipt of his reply, the Government of India will, I am directed to say, be again addressed on the subject

I have the honor to be,
Sir,
Your most obedient servant,

Colonel,
Offg Under Secy to Govt, P W D,
For *Secretary to Government*

Exd F R Bantleman
Spare Copies

alterations

Q. Anom. 317/2c.

P. & Bolliffe
3

No 363 of 1876

From The Superintendent H. M. Works

To The General Superintendent
P. W. D. Stores & Workshops

Kurrachee Harbours Works Office
Manora 16th May 1876.

Sir,

With reference to your No 267 of 6th May yesterday received, I have the honor to state that there is in this Office no drawing of the tide gauge which was sent out from England, and just now there is so much pressing work on hand that I can not have one prepared for you

I shall endeavour to send you a sketch after a time if you shall require it, but meanwhile I am sent for your information a memo description of the gauge also a pattern paper.

The gauge is fixed on a Pier in the Harbours in smooth water that is where there never is a wave of more than 1½ feet in height.

The depth to the ground at low water is 4 feet, the bottom of the gauge pipe extends 5½ feet below low water or about 1½ feet into the ground having a small opening 1½" × 1" in the side at about 3 feet below low water.

I shall

alterations

The rise of tide is

Maximum springs 10/4 ft

Average do 9/2

Neaps 6

Barnacles & weeds do not interfere with the working, but the pipe requires to be cleaned occasionally outside.

3. The cost is stated as far as I can give it in the accompanying memo.

4. I should say if you require such a gauge, the best plan would be for you to order it from the same firm who supplied ours (thro' the India Office) Elliotts Brothers of London.

I have the honor to be

Sir

Your most Obedt Servt

(sd) W. H. Price Executive Engr

Supdt K. H. Works

(True Copy)

J. Cranmer

Agent Exec Engr W. H. Works

Memo.

Description of the Tide Registering Machine

The machine is on Bento principle and made by Elliotts Brothers of London of whom a similar instrument could no doubt be obtained

If compress a pendulum clock which causes a drum to make one revolution in 24 hours.

The drum is 24 inches on circumference so that every hourly space equals one inch.

On this drum is fixed a blank diagram paper secured to it by a moveable brass slip and pinch screws. Care is taken in setting the paper that the datum line on the one side of the brass slip, may if produced meet the same line on the other side. A pencil moved by the rise and fall of the tide marks its path on the drum. The pencil moves one inch for every foot of actual fall or rise of water. Thus it may be said that the horizontal & vertical scales are respectively 1 to an hour & one foot.

The arrangement for actuating the pencil recording the height is by a chain attached to a float and passing over a spiked wheel, each link being caught by a spike which prevents the chain from slipping and tends to correct the

alterations

alterations of the vertical scale caused by the opening of the links and lengthening of the chain.

The float moves with the tide in an iron cylinder having an aperture sufficient to cause the rises and falls inside and out to correspond. If the aperture be too large every ripple on the water will be communicated to the float and will cause a thick irregular line on the diagram paper.

The resultant of the two motions viz the clock turning the drum at the rate of one inch per hour and the motion given to the pencil by the float and weight forms the curves as shown on the attached tracing, which has been taken from one of the original diagrams of the machine.

The whole of the machinery is enclosed in a small house which is fixed to the Harbour Works Pier at Mamora, a man at Rs 20 per month attends to this gauge and to another situated about 4 miles NE at Chapsee Nole Bridge near Kurrachee. He also attends to the anemometer which is situated at Mamora.

The registry is supervised by Mr. Hunter who has for several years had charge of these observations

As regards cost it may be mentioned that the two gauges in use here cost Rs 1042 i.e Rs 521 each, delivered and the setting up and house for each cost about Rs 325 exclusive of the Masonry Pier or Jetty to which they are fixed.

Superintendent H. H. Works

Lt. Col. H. H. Works

Administrative Department.

MADRAS,
Marine Office,
5th June 1876.

No 3775

From

J. H. TAYLOR, Esq, Lieut, R.N.R.,
Master Attendant,
Administrative Department,
Madras,

To

The Honorable W Hudleston

Chief Secretary to Government,
Marine Department,
Fort Saint George.

SIR,

I have the honor to acknowledge receipt of, and to make the following report upon, the Order of Government in the Public Works Department, No 884, of date 4th April 1876, on the subject of Tidal observations in the Indian Seas.

2 Judging from the tenour of the despatch from the Secretary of State for India, and the letter from Sir William Thomson to the address of General Strachey R E, I concluded that it was the desire of those authorities that the tidal observations therein suggested should be carried out on the same model as those already observed

Admitted to Record
Fort St. George
5/6/76.

Chief Secretary to Government
Marine Department
Fort St. George

Admitted to Record
5/6/76.

A. Lennie 5/6/76.

observed at Kurrachee, under the supervision of Mr. Parkes b C. I accordingly placed myself in communication with the officer in charge of the Kurrachee harbour works, through the General Superintendent of Public Work Stores and Workshops at Madras, and I enclose the papers marginally noted as the result of that reference, for the information of Government, in the Public Works Department. From these papers it will be seen that the self registering Tide Gauge at Kurrachee is worked by a pendulum clock, and from the description of the apparatus, I am of opinion that the mechanism is of too delicate and complicated a nature to be adopted generally on a surf bound coast, and ultimately in a seaway. It appears to be intended more for adoption in harbours and quiet waters, and fitted to Piers or Quays; and for accuracy

Copy of letter from the Supt of Kurrachee Harbour Works to the Genl Supt P.W. Stores and Workshops, dated 18th May 1876, No 363.

Description of the self registering tide gauge in use on the Kurrachee Harbour Works.

Self registering tide gauge paper.

accuracy of observations, under such conditions, it is doubtless highly valuable. Each gauge, Iron, costs Rupees 525, delivered here in India, to which must be added the cost of the house to protect the Gauge, costing at 325 Rupees. I would recommend that 3 of these instruments be obtained from England, through the Secretary of State, and be set up at the ports of Cochin, Negapatam and Coconada, for trial, under the management of the Master Attendant of those ports, as a preliminary step. Mangalore offers the same facilities, but I have no officer there to entrust the duty of observation. At Madras, where there is a Pier, but where a rough sea prevails, I would not recommend that a tide Gauge be put up by the Department of Public Works, on the same general principle as the one put up in the Madras Pier in 1864, subject to sundry improvements suggested by former defects. This Gauge, which cost

cost Rupees 520 ——, was damaged subsequently in heavy weather, and this is a danger which the Pier Gauges will always be exposed to. Here is no post on the Eastern seaboard, where such delicate observations could be taken between Cocanada and Hatia Point in Bengal, where the Government of India will doubtless have a station.

3 In the Madras Presidency there is but very little rise and fall of tide, and on the sea board no ebb and flow. The motion of the sea is entirely that of currents, guided by monsoon winds. Hence it is to be observed that even in fine weather the wave oscillation in the Gauge will completely nullify any useful result, while the uncertainty of the number of rough days will vitiate any average drawn from a number of such fine observations On this account, I do not recommend

Tuticorin

3

Tuticorin or Pamben, but would beg to suggest Colombo and Trincomalee, to the Admiralty. This would make 6 stations. This would afford a reliable chain of observations. Bombay and Karachi on the West side: — Cochin, Colombo on the West side: — Trincomallee, Negapatam, Cocanada, and Hatia Point on the Eastern. Each station would be fitted with self registering instruments on the Kewracker model.

4 Finally, I would respectfully represent that all expenditure connected with tidal observations should be met from Imperial Funds.

I have the honor to be
Sir
your most Obedt Servant
W Taylor
Master Attendant
Administrative Department

P. F. 1876 Department

8c 4601

Crown

Theo Marine Department

Received 8th June } 1876.
Registered 28th " }

Enclos. 3 No 847

PUBLIC WORKS DEPARTMENT.

215

Endorsement by the Chief Secretary, No. 847 dated 8th June 1876, on letter from the Master Attendant Administrative Department No. 3775 d/s 5th June 1876.

FOR ORDERS.

Major Genl. R.C.

Secretary to Govt. P.W.D.

Marine (1876) Department
Steam

With Master Attendant's Administrative Department's Endorsement No. 847 dated 8th June 1876 to Govt. Marine Department

Port Blair 8th June 1876

Enclosure

Referred to Executive Engineer with request to submit Estimate.

Secretary to Govt. P.W.D.

No. 3775

Master Attendant's Office
Port Blair 5th June 1876

Forwarded for the orders of Government the accompanying Estimate for the repairs of the Steam Launch "Nemesis" which is required for the Survey Service.

Nemesis

Estimate for Repairs of Steam Launch "Nemesis"

Hull

Repairs to Hull as per Survey Report No. 518 dated 26th May 1876 ... Rs. 2,000

Engines

Repairs to Engines as per Survey Report No. 478 dated 23rd May 1876 ... Rs. 1,000

Total ... Rs. 3,000

Port Blair 23rd May 1876

Engineer

Examined and forwarded for sanction.

Port Blair 26th May 1876

Executive Engineer

Recommended for sanction.

Port Blair 26th May 1876

Superintending Engineer

Received 8th June 1876

Examined & submitted for orders.

Port Blair 8th June 1876

Master Attendant

8

Public Works Department

No. 1597

PROCEEDINGS of the MADRAS GOVERNMENT.

UNDER date the 26 June 76

READ the following —

In endorsement by the Chief Secretary No. 817 dated 8th June 1876 on letter from the Master Attendant Administrative Department No. 3795 dt 5th June 1876.

His Grace the Governor in Council approves of the recommendations made by the Master Attendant for the record of tidal observations at the points specified on the Coasts of the Madras Presidency, and resolves to forward the papers for the information of the Government of India and for provision of the funds necessary

6

P.C. No. 1590 dy 26 June 76

25.

To

The Secretary to the
Government of India

Sir,

I am directed to
acknowledge the receipt
of the Proceedings of the
Government of India
No. 81-5 M, dated 14th
March 1876 on the sub-
=ject of Tidal Observa-
=tions in the Indian
Sea; and in reply to
forwd and the accom-
=panying papers show-
=ing the arrangements
proposed to be adopt-
=ed in the Madras Presi-
=dency. I am to request
that a special assign-
=ment of funds under
Imperial may be made
to meet the cost of the
observations. Further
information

to carry the arrangements into effect. The gauge tried at the Madras Pier in 1864 appears to have failed. With the improve-ments now suggested its cost will be about the same as that at Kurrachee. The Master Attendant is requested to be good enough to state in detail his reasons for preferring the pattern formerly tried at Madras to that recommended for adoption at other ports, and to explain more fully the difficulties anticipated in fixing at the Madras Pier a Tide Gauge, properly guarded, on the model of the Kurrachee Gauge.

Marine Department.
District Engineer's
Condirned
Dated 6/7/76

information has been called for from the Master Attendant as to the difficulties anticipated in setting up at Madras a Gauge similar to that in use at Shorncliffe; and on receipt of his reply, the Government of India will I am directed to say, be again addressed on the subject.

////

Dated 6/11/76

No 578-520

Abol. of Hist. Section
PUBLIC WORKS.

Nos 378 - 526

Tidal observations in the Indian Seas - Papers ordered on letter from the Master Attendant, Madras, reporting on the subject of ——

Tidal observations in the Indian Seas - Papers ordered on letter from the Master Attendant, Madras, reporting on the subject of —

Forwarding papers showing the proposed arrangements to be adopted in the Madras Presidency on the subject of Tidal observations in the Indian Seas requesting a special allotment of funds Imperial may be required to meet the cost of the observations —