Archives I – 10,006 – 16-8 77.

(1) Number of pages 40

(2) Date of repair 20.11.86.

(3) Initials of the Referencer

TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Public Works DEPARTMENT

G.O. No. 2748 W
B.P. No.
Press.
Mis.

Dated 3.11.1878 ~~197~~.

Not to be folded or roughly handled

2748/1

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

3rd November 1879, No. 2,748 W.

Buildings and Roads.
Civil Works.

Read again G.O., No. 1,969-A W., dated 28th July 1879.

Read also—

✓ No. 1. From Captain Baird, R.E., dated 30th September 1879, No. T 58-186.

✓ No. 1-A. From the General Superintendent, Public Works Stores, dated 19th September 1879, No. 2,500 W.

✓ No. 1-B. Do. do. do. dated 27th September 1879, No. 2,609 W.

✓ No. 1-C. Do. do. do. dated 10th October 1879, No. 2,843 W.

✓ No. 1-D. From the Master Attendant, through Marine Department, dated 1st October 1879, No. 7,390.

No. 2. ORDER THEREON, 3rd November 1879, No. 2,748 W.

BY the Government Order read above an estimate of Rs. 345 was sanctioned for the re-erection of the self-registering tide gauge under the T end of the Madras Pier, the arrangements for working it on shore as devised under Captain Baird's supervision having failed, the cost to be defrayed from Port Funds.

2. Before any action was taken on this order it was suggested by Captain Baird, R.E., the officer in charge of the tidal observations, that the gauge might be more conveniently worked on shore by means of a long siphon of 1" pipe.

3. Certain experiments made at the Public Works Workshops by Captain Baird, in communication with the General Superintendent, having shown promise of success, His Grace the Governor authorised the working of the gauge in that manner as proposed by Captain Baird. A sum of Rs. 230 has been thus expended, out of the grant of Rs. 345, and also Rs. 60 [illegible] by the Marine Department on the alteration of the clock belonging to the recording apparatus, and Rs. 47 on certain experiments with a 3" vertical pipe.

4. After a thorough and careful trial it has been found that the apparatus cannot be properly worked by means of the siphon and the scheme has been abandoned. Captain Baird now submits a plan for working the apparatus by means of a vertical pipe 7" in diameter fixed under the middle of the pier, in a manner very similar to that adopted in the experiments by the Marine Department referred to in the preceding paragraph.

5. The cost of this design if carried out by the Public Works Department is estimated by the General Superintendent, Public Works Stores and Workshops, at Rs. 219 in addition to Rs. 327 already expended, but both that officer and the Master Attendant consider that it can be done more cheaply by the Marine Department, the latter undertaking to complete it for a sum of Rs. 120 in addition to the original grant of Rs. 345, or for an expenditure of Rs. 138 in addition to that already incurred.

6. His Grace the Governor in Council concurs in this view and sanctions Captain Baird's design, with the modifications suggested in Lieutenant Baddeley's letter No. 2,843 W., of the 10th instant, for execution by the Master Attendant.

7. Orders will be passed in the Marine Department appropriating from Port Funds the sum of Rs. 120 in addition to the original grant of Rs. 345.

(True Extract.)

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

To the Marine Department.
" the General Superintendent, Public Works Stores and Workshops.
" Captain Baird, R.E.
" the Examiner of Public Works Accounts.

Exd. C. Howarth.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1879) Madras.

PUBLIC WORKS.

To

The MARINE DEPARTMENT,
&c., &c., &c.

Dated November 3rd.

Issued

Recd. Encl.

G.O., 3rd November 1879, No. 2,749 W.

NOVEMBER.

Nos. 1-2.

Tide Gauge at the T end of the Madras Pier—[illegible] the erection by the Master Attendant, Captain Baird's [illegible] for working the [illegible] the additional sum to be provided for by the Marine Department from Port Funds.

No. T $\frac{58}{186}$ of 1879

2748/3

From

Captain A. W. Baird R.E.
Asst. Supdt. Survey of India
Incharge Tidal & Leveling Operations

To,

The Secretary to Govt of Madras
P. W. Department.

Dated Poona 30th September 1879

Sir,

The order of Government dated 28th July 1879 regarding the erection of the Tide Gauge at the T end of the pier in Madras, was given, "upon the understanding that the S. R. Tide Gauge is so fixed as to leave the entire platform of the T end of the pier free for work and that it is fixed under the platform". After consulting Captain Taylor, I felt convinced that it would be impossible to fit up the apparatus in a small house under the pier and secure it sufficiently to resist the action of the sea, when the weather was at all heavy, and that in rough weather there would be every probability of the whole being carried away.

[illegible]

certainly

2. It occured to me that

we should get over all the difficulties, by having an overhead syphon connecting the cylinder of the present observatory with deep water at 600 feet out. A vertical pipe was taken from 8 or 9 feet below Low Water and lashed to one of the inner piles of the pier, to a height of about 10 feet above High Water, and carried nearly horizontally (having an upward slope of about 3 feet in the whole 600 ft) inshore to the Observatory and then taken down to the bottom of the iron cylinder. An air chamber was provided and a means devised for exhausting the air given off by the water when relieved of atmospheric pressure by a system of double stop-cocks. The first trial seemed to promise success but after a short time it was obvious that the air chamber had been made too small. I consulted all the books I could find that touched on the subject and found the amount of air suspended in water was greater than I anticipated: a larger air chamber was constructed, providing ample space for the system working for 12 hours at a time but further trial showed that the air remained in the long length of pipe and

would

would not of its own accord seek the air chamber. During the time I was carrying on the experiment I was in constant communication with Lieutenant Baddely R.E. who assisted me in every way in his power. Major Pennycuick kindly gave orders for carrying out the modifications I suggested, and I have now heard from Major Pennycuick and Lieutenant Baddely that the overhead syphon system is impracticable for such a length of nearly horizontal piping: we cannot arrange it otherwise, for if the slope was increased the action of gravity would be insufficient to raise the water to the necessary height: and we cannot lower the piping without rendering it liable to be smashed in heavy seas.

3. It appears to me then that we must be content with a less depth of water than that at the end of the pier and erect an upright pipe for the float to work in at the Ticket House on the South side of the pier (some 600 feet out from shore). There is a small house available there which at present has three of its sides open, these could be boarded up, and afford sufficient protection for the S. R. Tide Gauge —

and if 3 or 4 lengths of 7 inch pipes were fixed vertically to a spar for the float to work in similar to what I proposed for the T end of the pier, I should be able to modify the apparatus to suit. I attach a sketch of what I would propose (this has been drawn for memory and the measurements may not be very correct). A stout spar or pile should be driven well into the sand and fixed as vertically as possible, so that the top should reach just outside the Ticket House and leave a space of about 9 or 10 feet available between the pile and the inner side of the house for the instrument. To this pile 3 or 4 seven inch (7") socket pipes should be firmly lashed, and these should be well fitted into each other. The lowest length of this upright pipe should be 3 feet from the ground, and it should be plugged at the bottom with a piece of wood about 1 foot long having a brass tube 1/8 inch diameter fixed through its centre for ingress and egress of water. A piece of about 1 foot long of copper pipe about 2 inch diameter and sloping out like a funnel should be secured to the bottom of the plug the mouth of the funnel being the

36' 6 lengths

closed by a "grating" or "rose" 6 inch in diameter and having 40 or 50 small holes in it. The upper end of the copper pipe should be covered by a plate having 20 or 30 small holes (not more than 1/16 inch diameter) and there should be a space of about 1 inch left between this plate and the end of the 1/8th inch brass tube. In this way I believe the action of the sea in heavy weather will not be much felt, and yet the direct communication of the large pipe with the sea will give the level inside and outside exactly the same. The flooring of the Ticket House could be extended up to the spar so as to bring the portion of the instrument, where the float works directly over the upright pipe.

4 I hope Government will authorize this being carried out, and if sanction is given I shall be very much obliged if you will order the pile and upright piping, to be fixed very securely as I have pointed out. As regards the modification of the apparatus I can easily manage that. I had the float made to suit this 7 inch pipe before I left Madras, and also I had the escapement clock altered to suit the instrument.

I shall either come myself or

send one of my assistants to Madras to set up the instrument properly as soon as the upright pipe has been fixed in position, and secured by bracing to the piles of the pier.

5 I regret that the expenditure was made in trying to work the apparatus with the overhead syphon, but as far as I could see, it seemed to promise perfect success without having to move the instrument and cylinder from the present site: and as the piping could be returned to store I did not consider the cost could be very heavy while the advantages if successful were obvious.

6 The (7") seven inch piping can be obtained in Madras, for Captain Taylor the Master Attendant had two lengths brought over from the Municipality for me to see, and he also had a spar available which would have done very well for the purpose, at that time when he was under the impression the Marine Department would have to make the arrangements

I have the honor to be
Sir
Your most obedient Servant
Baird Captain R.E.
Assist Supdt. Survey of India
Incharge Tidal & Levelling Operations

I don't think the fact of
the experiment not having been
made is a subject for report
at all, though its failure is

P.W.D.
30779
No.

TO BE RETURNED
WITH REPLY

Eo. 1967 A.W. 28.7.79

Dy W will
3-10

No. 2500 P.

Presidency P. W. Workshops
Madras 19th September 1879

From

The General Superintendent
Public Works Workshops

The Deputy Chief Engineer
P. W. D.
Fort St George

2768

Sir

1. I have the honor to report that since I last spoke to you about the Tide Gauge, I have been endeavouring to make the Syphon work ~~but~~ without success, and I am now convinced that it is practically impossible to fill the Registering Cylinder by this process, or rather to maintain such a perfect column of water between the sea and cylinder that their levels will correspond at very minute intervals of time.

2. I have already sent you a sketch shewing the arrangements, and all that now remains is to describe what has been done.

1st The piping was tested up to 40 lbs, and the needle of the gauge stood at this point for some considerable time without the slightest deviation, thus shewing that the pipes were air tight, each pipe was tested as it was put in, and lastly the whole length in my presence.

2nd The apparatus was filled up with water, the ends in the sea and cylinder being plugged up, whilst water was poured in the air chamber was left open to allow the air to escape, and this process was continued until no more water would go in, and until there was no sign of any air coming out

3d. Between 10 A.M. on Tuesday the 16th instant and 10 A.M. on Wednesday the 17th, the indicating float remained in position shewing that no alteration had taken place in the position of the water and affording an additional proof that there was no leak in the piping

4th. Assuming therefore that the system was now complete I opened the cocks, and the immediate result was, that the water in the pipes escaped into the cylinder, and probably also into the sea, thus clearly shewing that there was air in the pipe, although in 24 hours it had not been able to find its way to the highest point of the system, (of the air chamber)

3 This I consider places it beyond doubt that the fault in the system is want of sufficient slope to the long length of piping which connects the two legs of the Syphon, the length being 600' and the slope about 4 ins in 100' or a total rise of 2' 0" in the 600' which is not sufficient to induce the air to find its way to the air chamber.

A

2748/8

4 A greater slope to this length is unfortunately not practicable as the sea end would be brought too close to the surf and be carried away in rough weather.

5 In addition to filling by means of a funnel, I have also tried pumps both force and suction, but even if a partial success had been obtained by these means, that is to say if water had been induced to flow from the cylinder to the sea or vice versa, it does not at all follow that the syphon would have answered its purpose, for although at first there appears no reason why when once a complete column of water has been established between [illegible] cylinder and the sea, the level of th[illegible] should not rise and fall with the tide, making allowance for a slight loss of time in filling and emptying the cylinder by a long and small pipe, a further consideration of the matter will shew that in the case when water is flowing from the Cylinder to the sea, it is extremely improbable that any bubbles of air given up by the sea, would be able to find their way along the whole length of the pipe with sufficient rapidity not to stop the action, but on the other hand the

result of the experiments made, shew that owing to the want of slope the air has no tendency to leave the long nearly horizontal portion of the system.

6 The difficulty of getting at any part of the Syphon except the shore end without scaffolding has necessarily made the experiments occupy a considerable time, and without the assistance of Captn Taylor who lent me divers and put up scaffolding for my workmen underneath the pier it would have been impossible to have taken any steps in the matter without excessive [illegible]diture

In conclusion, I would beg to s[illegible] that I am convinced no syphon wi[illegible] ever [illegible]rk for any length of time where ther[illegible] is a long stretch of nearly horizontal piping between the two legs of a syphon, even of the approved form with two legs of considerable slope and an air chamber at their junction would continue to work first in one direction and then in the opposite, as in the case of a cylinder connected with tidal water, for as the levels of the waters approach more nearly

to each other, so will the action become more sluggish until at slack water the action will practically cease, and the chance of air accumulating in one of the legs will be far greater than in the case of a Syphon working in one direction with a constant head or difference of level between the two fluids where the continual rise of the water up the receiving leg will always tend to assist the air to escape into the air chamber.

I have the honor to be
Sir,
Your most obed Servt

[illegible] Baddeley Lieut R.E.
Ag Genl Supt G W Workshops

C.E. No 3011-23-9-79

P.W.D.
1035279

No 6717

From

The Ag Genl Supdt
P W Workshops Madras

To

The Dy Chief Engineer
D P W Workshops

No 2500 W
Dated 19th Sept 1879
Despatched 19 — Do

Subject

Reports on the working
of the Madras Tide Gauge at
the Madras Pier

G. O. No 2758 W 9th-10-79

Cir 1-10-79
Rec Octy 1-10

No 2609 W.

PRESIDENCY PUBLIC WORKS WORKSHOPS,
Madras, 27 Sept 1879.

From
THE GENERAL SUPERINTENDENT,
PUBLIC WORKS WORKSHOPS,

2768/10

To The Deputy Chief Engineer D P W
Fort St George

SIR,

With reference to your Memo: No 3011 dd 23d September 79 I have the honor to report that the expenditure up to date, on the Syphon, is Rs 214 a 10 -, and that the further expenditure that will be incurred in taking down the 600 feet of piping from underneath the Pier and carrying to the Workshops will make the total cost 230 Rs.

I have the honor to be,
Sir
Your most obedient Servant
Lieut R.E.
Ag. Genl. Supdt Prey. P.W. Workshops

G. No. 3011-23-9-79

Presidency P. W. Workshops.

From

The General Superintendent,
P. W. Workshops,
Madras.

G.O. 3.11.79 No. 2975 Rr

To

The Dy Chief Engineer
D. P. W.
Fort St George

No. 2609 W

Dated 27 } September 1879
Despd. 27 }
Received }

Enclosure 1

Subject.

Reports the expenditure
up to date on the Syphon [illegible]
expenditure that will be incurred
in taking 3" or 4" [illegible] of piping
from [illegible] with the [illegible]
it to the Workshops

Rr 3.10.79

13

No.

Presidency P. W. Workshops
Madras October 1879

2768/11

From

The General Superintendent
P. W. Workshops and Stores

To

The Deputy Chief Engineer
D. P. W.
Fort St George

Sir

*enclosures returned

Enclosures 4
1 Letter } Recd
1 Plan }
1 Estimate
1 Plan

1 With reference to your Memo No. 3110 dated 6th instant, I have the honor to submit an Estimate for the work indicated in Captain Baird's letter No. T 62/186 of 30th September 1879.

2 As directed I have included the cost of the Syphon experiments, the expenditure incurred by the Master Attendant on an experiment for obtaining direct action with the sea without excessive movement of the float, and also Messrs Orr & Sons bill for altering a clock to suit the method of working the Tide Gauge by direct communication with the sea.

3 Captain Baird's plan is practically the same as that experimented upon by the Master Attendant, only the piping used by the latter is 3" diameter instead of 7". I am not aware of any reason why a 3" pipe should not answer for working the Tide Gauge, and if Captain Baird has no valid objection to its use, there remains now nothing to be done but to set up the Instrument and work it with the 3" pipe which has been placed in position by the Master Attendant.

4 I enclose a drawing of a 7" pipe shewing the method adopted by the Master Attendant for partially closing the end of the 3" pipe, which, I think, is preferable to that given by Captain Baird in one respect, viz. the protection of the copper pool

by a stout iron one, which would prevent the former being damaged and broken off in rough weather, but I consider that the cone at the top of the wooden plug is unnecessary and would form a trap to catch sand.

5 In lieu of the Casuarina spar shewn in Captain Baird's drawing, the Master Attendant has utilized some spare iron tie rods which answer very well, and I would recommend that they should be used with the 7" pipe if it is resolved to reject the 3" pipe, as a wooden support would have to be coppered up to H.W. mark.

6 The Master Attendant has made no experiments with a flexible pipe, but as I have shewn, he has carried out as an experiment, a system almost identical with what is proposed by Captain Baird, the only difference being in the size of the piping, the nature of the support and the details of the arrangement to reduce the movement of the water inside the pipe.

7. With regard to the opinion entertained by the Master Attendant I would beg to state that sometime ago in communication with Capt. Baird, he made arrangements for procuring some 7" piping from the Municipality and for erecting it in the manner described, which he considers will be found to give good results in so far that the movement of the water inside the piping will be confined within such limits as to render the working of the Clock and Apparatus practicable, which has hitherto been the objection to any method of direct communication with the sea.

8 The Master Attendant is of opinion

2748/13

opinion that he can put up the 7" piping and make all necessary arrangements for 140 Rs which would bring the total expenditure up to Rs 466.

9 I would observe that the Workshop cannot supply and fit up a 7" pipe for the amount stated by the Master Attendant, for in the one case no charges need be made for labour, the work being done by the Pier Establishment, while in the other, not only will the actual cost of labour have to be charged against the work, but also the Workshop percentages on all labour and materials.

10 In conclusion, I would suggest that it should first be definitely settled whether a 3" pipe will not answer, for if so no further expenditure will be necessary, except in fitting up the house for the protection of the Instruments.

I have the honor to be
Sir,
Your most obed Servant

H.C. Biddulph Lieut R.E.
Ag Genl Supdt R.W. Workshops

P.W.D.

G.O. No 2742 of 3-11-79

No

From

The Ag Genl Suptt
P.W. Workshops,
Madras,

To The Ag Dy Chief Engineer
P.W.D.
Fort St George

No 2843 W

Dated 10th October 1879
Despd 10 Do

Subject

Forwards, as directed, an Estimate for Rs 540- being cost of Madras Tide Gauge.

2748/13

Memorandum

	Rs	A	P
To 125 wrought iron bolts 3½ and ½ inch with nuts as per bill from the General Superintendent Public Works Stores	19	13	-
" a Teakwood rod 25' long 2/3" diameter for pier tide Gauge as per bill from Do.	3	6	-
" repairing and cleaning a driving clock as per bill from Orr and Sons	50	-	-
" 1 brass tube 54 × 2¾ weighing 5½ lbs as per bill from A. Poonasawmy	5	10	-
" 1 brass tube 33 × 5½ weighing 7 lbs, 3 pieces teakwood, 4 pane glass, 3 lbs shot, 2 sheet rammed brass, 4 brass screws, 2 pollams solder as per bill from Do.	17	11	9
" amount expended by Lieutenant Baddeley on Syphon experiments	230	-	-
Rupees	326	8	9

Madras
Marine Office
1st October 1879

W Taylor
Master Attendant
Administrative Department

2768/79

Administrative Department.

No. 7390

Madras,
Marine Office,
1st October 1879.

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

To
C. G. Master Esquire
Acting *Chief Secretary to Government,*
Marine Department,
Fort Saint George.

Sir,

I have the honor to report, for the information of His Grace the Governor in Council, that Lieutenant Baddeley has decided to abandon the attempt to construct a syphon Tide Gauge of gas pipe, and is removing the pipe. It was extremely improbable that syphon action could be maintained through (600) six hundred feet of such small pipe, and such a small body of water, as the Cylinder contains at one end. The exact state of tidal affairs at Madras is as follows.

2 I have constructed a perfect vertical Gauge out of 3 inch pipe, and have succeeded in removing all tendency to pumping from the swell, hitherto the drawback to former efforts. This is at the Ticket house half way out on

the Pier and quite free of all Pier traffic. This Gauge, however, is not large enough to work the Self registering apparatus, but I can, if desired, set up a (7) seven inch gauge of which the materials are all at hand, and the expense will be very slight, if I do it departmentally, giving my personal superintendence. Captain Baird is very anxious to continue the self registering observations, and this seems the best way to meet the wishes of the Government of India. So far as all questions of sea level connected with Harbour Works, or Canal, railway or drainage levels are concerned, the present Tide Gauge 7 is sufficient, it only wants careful levelling from the Pier to some convenient Bench mark, say the one on the Prince of Wales' stone, for convenient reference levelling should also be continued to De Havilland's stone at the Fort Gate, to settle the question of its accuracy. I cannot understand how it is, but although levels have been taken within the last (2) two years, by the Naval Surveyors, by the Harbour Works, by the 8 Engineering College, and lately by Lieutenant

Love,

Love, none of the observations agree, and no definite reading is yet obtained. 2748/15

I have since writing the above heard from Captain Baird that he approves of the (7) seven inch Gauge, and is addressing the Madras Government on the subject.

I append a statement of accounts connected with the recent grant of Rupees (345) Three hundred and forty five, as per G.O. Marine, dated 30th July last, No. 407, and beg respectfully to suggest that the construction of the (7) seven inch Gauge be left to the Marine Department to complete, and further that an additional sum of Rupees (120) one hundred and twenty may be placed at my disposal for the work, as I think, with a careful utilization of materials now available, this amount will suffice.

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

No. 1957

Forwarded to the Public Works Department, with reference to the order in that department dated 28 July/79. N—.

Chester
Ag. Chief Secy.

O. Recommended
7 October /79
to the Public Works Department.

Marine (1879) Report
(Tidal Observations)

From
The Master Attendant,
Administrative Department,
Madras,

G.O. No. 2748 W. of 3rd Novr. /79

To
The Ag. Chief Secy. to Govt.,
Marine Department,
Fort Saint George.

~~1189~~

Dated 1st }
Received 4th } October 1879.
4.

No. 7390.

Enclosure. 1

States that Lieut. Baddely has decided to abandon the attempt to construct a syphon Tide Gauge of gas pipe and is removing the pipe. Recommends the construction by the Marine Department of a seven inch gauge. Encloses statement of accounts connected with the recent grant of Rupees 345 and requests a further sum of Rupees 120 to be placed at his disposal.

With Endorsement

2748/16

No. 2748 W. P. W. Department. B. R. Civil works

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 3rd Novr. 1879 Read the following

G.O. No. 1969 Civ. of 28th July 1879.

From Captain Baird R.E.	Lr. No. $\frac{I\ 58}{186}$ of 30th Sept. 1879
" Genl. Superintendent P.W. Stores	Lr. No. 2500 W of 19th Sept./79
" Do Do	" " 2609 W " 27th do
" Do Do	" " 2843 W " 10th Oct./79
" Master Attendant thro' Marine Dept.	" " 7390 " 1st do

By the G.O. read above an estimate of Rs. 345 was sanctioned for the re-erection of the self registering tide gauge under the T end of the Madras Pier, the cost to be defrayed from Port Funds.

19/10

The arrangement for working it has [illegible] designed [illegible] Superintendent [illegible] failed

2. Before any action was taken on this order, it was suggested by Captain Baird R.E. the officer in charge of the tidal observations, that the gauge might be more conveniently worked on shore by means of a long siphon of one inch pipe.

3. Certain experiments made at the Public Works Workshops by Captain Baird in communication with the Genl. Supdt.

2768/17

having shown good promise of success, His Grace the Governor authorised, ~~a~~ the trial working of the gauge in ~~of the apparatus~~ [illegible] on the proper site. [illegible] Baird

proper ~~On this trial a sum~~ of Rs 230 has been

them expended, out of the grant of Rs 345, and in addition Rs 50 has also been expended by the Marine Dept. on the alteration of the clock belonging to the recording apparatus, and Rs 47 on certain experiments with a 3" vertical pipe.

4. After a thorough and careful trial it has been found that the apparatus cannot be properly worked by means of the siphon and the scheme has been abandoned. Captain Baird now submits a plan for working the apparatus by means of a vertical pipe 7" in diameter fixed under the middle of the pier, in a manner very similar to that adopted in the experiments by the Marine Dept referred to in the

preceding para

5. The cost of this design if carried out by the P.W. Dept. is estimated by the Genl. Supdt., P.W. Stores and Workshops at Rs 219 in addition to Rs 327 already expended, but both that officer and the Master Attendant consider that it can be done more cheaply by the Marine Dept, the latter undertaking to complete it for a sum of Rs 120 in addition to the original grant of Rs 345,

or for an expenditure of Rs 138 in addition to that already incurred.

6. His Grace the Governor in Council concurs in this view and sanctions Captn. Baird's design, with the modifications suggested in Lieut. Baddeley's letter No. 2843 W of 10th instant, for execution by the Master Attendant.

7. Orders will be passed in the Marine Dept. appropriating from Port Funds the sum of Rs 120 in addition to the

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2248/19

original grant of Rs 345.

D. 13.10

15-10-79

Marine Deptt with the plans and estimates
Genl. Scott Mr Stow & Workshops
Captain Baird R.E.
Hamner P.W.D.

Despd
7-11-79

Cos 7635

Govt. of {1879} Madras.

PUBLIC WORKS.

To

Dated

Issued

Recd.

Encl.

Recd
4-11-79

G. O. 3 Nov 1879, No. 2748 W

Nos. 1 – 2

Tide gauge under the T end of the Madras Pier — Sanctions, for execution by the Master Attendant, Capt Rands design for working the ___, the additional sum to be provided for by the Marine Dept from Port funds.