

- (1) பக்கங்களின் எண்ணிக்கை 16
- (2) புதுக்கித் திருப்பிய நாள் Nov 90
- (3) ஆதரங்குறிப்பவர் சுருக்கொப்பம் less

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

P. D துறை

14

அரசாணை எண்.	938	அச்சகம்
மு. கோப்புத் தாள் எண்.		பலவகை
நாள் : 21-3-1892		198

மடிக்கவோ கண்டபடி கையாளவோ கூடாது

8 Shells

ஆவண. கடி—18,006—15-6-87.

Shells

2

21st MARCH 1892, No. 938 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper :—

From Lieut.-Colonel A. C. SMITH, R E., Superintending Engineer, VI Circle,
to the Chief Engineer, Public Works Department, dated Trichinopoly, 16th
March 1892, No. 1330 M.D.

With reference to the concluding sentence of para. 2 of G.O., No. 1077 W.,
dated 18th April 1891, I have the honour to inform you that the lightning conductor
attached to the lighthouse at Pámban was tested by Supervisor V. Nityananda
Mudaliar on the 20th ultimo and a copy of his report with its enclosures is herewith
forwarded for information.

ENCLOSURES.

REPORT on the lightning conductor attached to the lighthouse at Pámban, tested on the 20th
February 1892.

Date of erection and height of lighthouse.—The lighthouse (*vide* sketch herewith) was built
in 1846 and raised 5 feet in 1862. It is about 69 feet measured from ground surface or nearly
100 feet above mean sea level.

2. *Putting up and examination of conductor.*—The conductor appears to have been put up
about ten or twelve years ago. It is not known whether the efficiency was duly tested by any
specialist or electrician since erection.

3. *Nature of soil.*—The soil is sand uniformly, the lighthouse being situated on the beach
and 250 feet from water edge. Sand is admitted generally to be a good conducting medium
except when the temperature stands very high.

4. *Description of conductor.*—The conductor is a copper rod $\frac{3}{8}$ " diameter from summit to
base of the building and thence to earth plate, which is buried at 200 feet from the building; it
is a copper rod $\frac{1}{2}$ " diameter. The $\frac{3}{8}$ " rod above ground is continuous and without joint, whereas
the other $\frac{1}{2}$ " rod, which is taken in a trench $\frac{1}{2}$ foot below surface, is made up of 10 feet length,
joints rivvited and soldered. The upper extremity of the $\frac{3}{8}$ " rod is a cone fitted with four copper
points in cardinal directions. The "Earth" is a copper plate $3" \times 3" \times \frac{1}{8}"$, buried about 3 feet
below surface and in permanent water level.

5. *Internal and external metal.*—Of internal and external metal there is not much. There
are three iron bands flat bar $2" \times \frac{1}{2}"$ round the column (*vide* sketch); 1" iron vertical rods 4 feet
high all round the platform on top with a $\frac{3}{8}"$ iron rod binding them in the middle. The conic
canopy over the light chamber is sheet copper $\frac{1}{8}"$ thick. This last alone is connected with a
conductor by a copper rod $\frac{3}{8}"$ diameter (in sketch) which also serves the purpose of a strut to
the upper terminal of the conductor.

6. *Result of testing conductor.*—The conductor is mechanically and electrically perfect from
summit to ground line and the "Earth" (*vide* test sheet hereto annexed) offered a resistance of
 $4\frac{1}{2}$ ohms only, the minimum resistance allowed as per code of instructions being 10 ohms.

7. *Earth for testing.*—There are no conductor "Earths" in the vicinity to balance with the
conductor "Earth" of the lighthouse, nor are there any wells. In testing auxiliary copper
plates were used and were placed in pits dug in the sea-shore 100 feet apart from each other and
from the conductor "Earth" under test.

8. *General observation for further improvement of conductor.*—The conductor throughout may
be allowed to stand as it is, but when there is any occasion in future to repair or refix it, the
following points, as may as practicable, may be attended to :—

(1) It does not look well to suspend the conductor rod, as it is done, away from the column,
not to speak of the great strain thrown on clips, of which there are only a few and the likelihood

of their getting loose quickly. The rod may be taken close to the column with proper holdfasts, bending it at cornices and mouldings therein.

(2) All clips used should be of copper and not some of iron as is the case now.

(3) The iron hands round the column may be connected with the conductor. This can be done easily by passing the hands round the column after the conductor is taken close to it.

(4) The iron vertical rods round the platform on top should be connected with the conductor. This can best be done by replacing the iron rod $\frac{3}{8}$ " diameter binding the vertical rods in the middle by a copper rod $\frac{1}{2}$ " to $\frac{3}{4}$ " diameter and joining it to the conductor where it will intersect it.

(5) The "Earth" plate is buried 3 feet below surface, and though it is more or less in permanent water level, its efficiency will be increased if it is put another 3 feet deeper which is quite practicable.

(6) The "Earth" plate is buried in a horizontal position, but according to rules it ought to be in a vertical position. There is no charcoal about it and it will be worthwhile to put some above, below and at sides.

Tests of lightning conductor of the lighthouse at Pámban taken on 20th February 1892.

X represents lightning conductor.

Y do.

Z do. auxiliary "Earth" in a pit dug on the sea-shore.

do. do.

Tests taken with Bucknell's electrical balance.

L represents resistance of leads or leading wires.

R do. of conductor from summit to ground line.

$L = 5 \text{ \& } 5$ } Mean = 5 ohms.

$L+R = 5 \text{ \& } 5$ } Mean = 5 ohms.

In earth testing.

$L+X+Y$ in circuit

Do. with poles of battery reversed

$L+X+Z$ in circuit

Do. with poles of battery reversed

$L+Y+Z$ in circuit

Do. with poles of battery reversed

$X = \frac{1}{2} - \{ W' + W'' - W''' - L \} = 4\frac{1}{2}$ ohms.

$Y = \frac{1}{2} - \{ W' + W''' - W'' - L \} = 22\frac{1}{2}$ do.

$Z = \frac{1}{2} - \{ W'' + W''' - W' - L \} = 7\frac{1}{2}$ do.

28th February 1892.

(Signed) V. NITYANANDA,
Supervisor.

ORDER—dated 21st March 1892, No. 938 W., Public Works.

Communicated to the Marine Department with reference to G.O., No. 1077 W., dated 18th April 1891. The suggestions for improving the efficiency of the conductor will be duly considered by the Superintending Engineer.

(True Extract.)

To the Superintending Engineer, VI Circle.
" Marine Department.

Exd. S. J. Pereira.
Spare Copies

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

938
/2

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1892} Madras.
PUBLIC WORKS.

Dated March, 21st.

Recd.

Encl.

G.O., 21st Mar. 1892, No. 938 W.

MARCH.

Pamban Lighthouse

Report on the testing of the lightning
conductor attached to the — by Supervisor
V. Nityananda Mudaliar, communicated to
the Marine Department with remarks.

Tests of Lightning Conductor of the Light House
at Pamban taken on 20th February 1892

X represents Lightning Conductor.

Y represents Auxiliary Earth in a pit dug at the sea-shore

Z represents Do do do

Tests taken with Bucknell's Electrical Balance.

L represents resistance of leads or leading wires.

R do of conductor from summit to ground line.

$L = 545$ } Mean = 5 ohms.

$L + R = 545$ } Mean = 5 ohms.

27/3

In earth testing.

$L + X + Y$ in circuit = 30 }
Do do with poles of battery reversed = 34 } Mean = 32 = W'

$L + X + Z$ in circuit = 15 }
Do do with poles of battery reversed = 19 } Mean = 17 = W''

$L + Y + Z$ in circuit =
Do do with poles of battery reversed =

$X = \frac{1}{2} [W' + W'' - W''' - L] = 4\frac{1}{2}$ ohms

$Y = \frac{1}{2} [W' + W''' - W'' - L] = 22\frac{1}{2}$ do

$Z = \frac{1}{2} [W'' + W''' - W' - L] = 7\frac{1}{2}$ do

18/3/92 Ec E.



938/4

State of erection
height of light
house.

Putting up
examination of
conductor.

Nature of soil.

Description of
conductor

① ②

938/4

Report on the lightning conductor
attached to the light house at Pambour.

Tested on the 20 February 1921

The light house (vide sketch here-
with) was built in 1846 and raised
5 ft in 1862. It is about 69 feet
measured from ground surface or
100 feet above mean sea level.

2. The conductor appears to have
been put up about 10 or 12 years
ago. It is not known whether its
efficiency was duly tested by
any specialist or electrician since
erection.

(3) The soil is sand & gravel
light house 250 feet from
beach and is admitted generally
edges. Same conducting medium
to be a good one the temperature
except is high.

stair's conductor is a copper rod
(4) The conductor is a copper rod
3/8" diameter and attached to
of the house, which is buried in
earth plate.

200 feet from the building, it is a copper rod $\frac{1}{2}$ " diameter. The $\frac{3}{8}$ " rod above ground is continuous and without joints whereas the other $\frac{1}{2}$ " rod, which is taken in a trench $\frac{1}{2}$ feet below surface, is made up of 10' lengths, joints riveted and soldered. The upper extremity of the $\frac{3}{8}$ " rod is a cone fitted with 4 copper points in Cardinal directions. The "Earth" is a copper plate 3' x 3' x $\frac{1}{4}$ " buried about 2 feet below surface and in permanent water level.

6) Of internal and external metal. Internal 4' 3" in. 2 ft. much. There are 3 internal metal rods $\frac{1}{2}$ " high at 1' 1" cross the platform on top with round rod binding them in with a $\frac{3}{8}$ " wire. The cone ca. 7' over middle chamber is sheet copper the light. This last plate is $\frac{1}{8}$ " thick. A conductor the copper plate with a diameter 1/2" in. which also is the purpose of a street to the

Result of testing conductor.

938/4

Earth for testing

the upper terminal of the conductor. (6) The conductor is mechanically and electrically perfect from summit to ground line and the "Earth" (vide test sheet hereto annexed) offered a resistance of $\frac{1}{2}$ ohms only, the minimum resistance allowed a percentage of distribution being 10 ohms.

(7) There are no conductor earths in the vicinity to balance with the conductor Earth of the Light house. Nor are there any wells. No testing auxiliary copper plates were used and were placed in pits dug in the sea shore 100 feet apart from each other and from the conductor "Earth" under test.

General observations for further improvement of conductor.

(8) The conductor throughout may be objection for further improvement, but when there is any occasion in future to repair or refine it, the following points, as may as practicable may be attended to.

1) It does not look well to suspend the conductor rod, as it is aimed, away from the column, not to appear

apart of the great strain thrown on
clips of which there are only a
few and the likelihood of their
getting loose quickly. The rod may
be taken close to the column with
proper holdfasts, bending it at con-
nices and mouldings therein.

ii. All clips must be of
copper and not some inferior alloy
the case rods.

iii. The iron bands round the column
may be connected with the conductor.
This can be done easily by passing
the bands round the column after the
conductor is taken close to it.

iv. The iron vertical rods round
the platform on top should be con-
nected with the conductor. This can
best be done by replacing the iron

rod $\frac{3}{8}$ " diameter by a copper rod
vertical rods in the middle by
a copper rod $\frac{1}{8}$ " to $\frac{1}{4}$ " diameter
and joining it to the conductor
where it will intersect it.

v. The "Earth" plate is buried
3 feet below surface, and though
it is more or less in permanent
water

water level, its efficiency will
be increased if it is put another
3 feet deeper which is quite
practicable.

and vi. The "Earth" plate is buried
in a horizontal position, but
according to rules it ought to
be in a vertical position. There
is no charcoal about it and it
will be worth while to put some
about, below and at sides.

(Signed) W. Kithiananda Mudaliar
28.2.92. Supervisor

(True copy)
(Signed) A. H. Barrett.
Ex. Engineer

12.3.92.

Measure Br.

(True copy)

Alst. with L. H. M. R. L.

16.3.92

Suptg. Engineer
S. Birch

OFFICE OF THE SUPERINTENDING ENGINEER.

6th CIRCLE.

Trichinopoly, 16th March 1892.

From

Lt. Col. A. C. Smith R.E.
The Superintending Engineer,

6th CIRCLE.

To

The Chief Engineer,

PUBLIC WORKS DEPARTMENT.

SIR,

With reference to the
Concluding sentence of para 2
of G. O. No. 1077 M. of 18th April 1891,
I have the honor to inform you that
the lightning conductor attached
to the Light House at Panumbur
was tested by Supervisor
V. Nityananda Mudaliar on the
20th ultimo and a copy of his report
with its enclosures, is herewith for-
warded for information.

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

A. Smith Lt. Col. R.E.

Suptg. Engineer
6th Circle

No. 1330 M²

ENCLOSURES. 3

- 1. Copy of report.
- 1. Sketch
- 1. calculation sheet.

Encls No. 1556 M² 1330 M²
16-3-92

P. W. D. 2927

P. W. D. 6th CIRCLE

From The Superintending Engineer,
6th Circle.

To THE CHIEF ENGINEER,
PUBLIC WORKS DEPARTMENT.

No. 1330 md

Dated 16
Received 18

Enclosures. 3

Improving that the lightning
conductors attached to the high
tower at Amoy are broken
by Supr. & H. J. on Monday
morning on the 20th ult.
and a forward copy of
report —

- No. 314 of 3-2-91
- " 1077 of 18-4-91
- " 1561 of 19-5-91
- " 3036 of 13-11-91

The S.E. VI circle
Marine Dept.

With order

6m 988
1st R
civil works
Wks
21 Mar

Communicated to
the Marine Depart-
ment with reference to
G.O. 1097 of 18 April 1891.
The suggestions for
improving the efficiency
of the Conductor will
be duly considered by
the Supdy. Engineer.

S 1891

1893
1895

938
/8

C. No. 2927
Govt. of (1892) Madras.
PUBLIC WORKS.

Date

Page

Encl.

21st March 1892 No. 988 W

Pamban Lighthouse

Report on the testing of
the Lighthouse lightning
conductor attached to
the — by Supervisor
V. Nityanantha Mudaliar,
Comd to the Marine
Dept with remarks.

(8)

60
14

22/3

J.C. 22/3