

Public Works (1896) Department.

G.O., No. 1806

DATED 17-1-96

[Despatch Abstract.]

Lightning Conductor: Letter from Supy.
Engineer, I Circle, submitting copy of a
report of testing of the — at Santopilly,
and stating that it would be advisable
to remove it, Coust. to the Marine
Dep^t.

BACK PAPERS.

FURTHER PAPERS.

FROM *A. H. Garrett Esq*
SUPERINTENDING ENGINEER

FIRST CIRCLE.

TO

PUBLIC WORKS DEPARTMENT.

DATED 20th
DESPATCHED 31st December 1895.
RECEIVED

No. 664 v. z.

ENCLOSURES, /

SUBJECT.

Lightning Conductor at Santa Fe.
— Submits copy of a report on
the — by Sgt. Cornwell.

24. W-85 R-2619 W

Communicated to
the Marine Dept, with
reference to para 4
of G.O. No 288 bearing
date 2-10-1895

CITM
1996

10/1/90

No. 664 V.Z.

FROM

A. H. Lane & Son
SUPERINTENDING ENGINEER

FIRST CIRCLE.

Enclosures. 1 Refat. TO

THE CHIEF ENGINEER

PUBLIC WORKS DEPARTMENT.

DOWLAISHWERAM, 20. 12 1895.

SIR,

With reference to G.O. no. $\frac{26190}{24.10.95}$, I have the honour to submit copy of a report by Sergt Cornwell who recently tested the lightning Conductor at Santopilly.

2. As pointed out by Sergeant Cornwell the Conductor for the Office seems rather a source of danger than otherwise and I think it would be advisable to remove it.

I have the honour to be

Sir,

Yours Most obedt. Sr.

Ed. A. H. Lane & Son.

Sub Engineer 18. Circle

J. V. Cornwell
Engineer

In Sub Engineer 18. Circle

Santopilly Lighthouse.

Report on Inspection of Lightning Conductor - made by Sergeant J. W. Cornwell. Supervisor P. W. D. on 26th November, 1895.

Test was made in dry weather with a Beckwith's Balance and 4 Cells Leclanché.

The main Conductor is a single pointed copper rod platinum tipped which rises from the masonry platform - on which the lantern is constructed. Against a masonry shaft built to support the Conductor. The upper terminal is some 4 or 5 feet higher than the finial on the top of the Lantern Cupola it consists of a copper rod which is fastened into a $1\frac{1}{2}$ " copper tube which runs down the N. side of the shaft above referred to and forms the Conductor to ground line. This tube is connected with a $1\frac{1}{2}$ " Galvanized Iron wire rope which forms the conductor from the base of the Lighthouse tower to the "Earth".

The "earth" is a copper plate 3 ft Sq. buried in a well at the foot of the Hill on which the Lighthouse tower is constructed, and about 25 ft from the platform.

I am informed by the Lighthouse keeper that this well is 15 feet deep and that the plate is at permanent water level, but as the conductor is in good order and the resistance low, the earth was not dug up or disturbed. For this reason it is not known how the copper plate is connected to the iron wire rope.

Note. A better method of joining is described in Chap. III para 20 of the manual above referred to.

The copper tube forming the conductor from top to ground line is joined to the wire rope by fraying out the end of the rope dropping in the

tube and splicing the wire rope round it. This is also on the same authority; as this joint is in the masonry of the platform, and could not be examined without breaking up the masonry ^{a proceeding} ~~providing~~ which was unnecessary as the Conductor was found to be in good order.

As there was only 1 "Earth" available - 2 Auxiliary ^X ~~Earth~~ were laid in the usual manner* for purposes of the test. These were laid on the S. side of the light house remote from the Conductor earth and from each other. The leads used were of Cotton-covered

Copper wire, and gave a resistance before & after testing of 2 Ohms. The readings recorded were as follows:-

X represents Conductor Earth.

Y " " " Auxiliary Earth.

Z " " " the other " "

X+Y in circuit gave a mean Resistance = 130 Ohms

Y+Z " " " " " 255 " "

X+Z " " " " " 135 " "

whence

$$\begin{aligned} X &= \frac{1}{2} \{ 130 + 135 - 255 - 2 \} \\ &= \frac{1}{2} \{ 265 - 257 \} \\ &= 4 \text{ Ohms} \end{aligned}$$

which may be considered fairly good - the maximum resistance admissible being 10 Ohms*

The Resistance from top of terminal to ground line was "nil"

A 2^d terminal has recently (1892) been erected on the roof of the office, which is on the same platform as the lantern and adjacent to it.

In the centre of the office roof (terraced) an iron tripod some 10 ft has been erected to support this conductor. The terminal is a piece of $\frac{1}{2}$ "

^X See manual of Instructions on testing Lightning Conductors circulated under Chief Eng^r C. J. No 29406 d/10 June 1892 Chap IV § 2.

Chapter III para 5 Manual of Instructions.

^X See also quoted manual chapter III para 29.

round copper rod, round the foot of which is twisted a Copper tape $1 \times \frac{1}{8}$ ". This tape is twisted spirally round 1 of the legs of the conductor, comes to the roof and passes Nwards and horizontally along the roof then vertically down the wall to the level of the platform, then takes a right angled bend Notherwards along the platform about 6 feet then turns again at ^{right} angles and passes Eastwards & joins the main conductor.

There are several objections to this conductor. In the first place the primary Object of a Conductor is to provide an easy path to earth for an electrical discharge. To this end all sharp bends should be avoided and the conductor should be brought to earth by the most direct route available outside the building to be protected. It is I consider extremely improbable that an electric flash if it did strike this terminal, would follow the tortuous path described by this conductor.

The necessity of this 2^d terminal is not very apparent. It was probably erected on the principle that a conductor protects a space included in a cone having the point of the terminal for its apex and a base whose radius equals the height of the rod above ground. or in other words protects everything within an angle of 45° from the top of the lightning rod.

This principle is not acted upon now. At the power station of the Madras Electrical Tramway Coy. is a high shaft 10 Sft. which forms the Chimney for the boiler furnaces. A lightning Conductor was

fixed to this last year. This Chimney is 3 ft wide at top and it would have been very easy to apply the principle of the cone to this as it would only have needed a rod 6 ft above the level of the chimney top. The rod actually fixed rises some 2' 6" above the chimney top on its outer fall. As this was fixed presumably by specialists, I enquired of the Electrical Engineer in charge, why this was not raised higher. He explained that a conductor had a considerable "Sparking" power, or power of attracting a flash, and that the principle of the cone was erroneous. ~~again~~ in terraced/roofed buildings of considerable extent - e.g. the ^{General} ~~several~~ Hospital Madras. The application of this principle of the cone would necessitate the erection of many hundreds of rods on a single building.

On the whole although this 2^d terminal is in electrical contact with the main Conductor I should consider the Building better protected without it.

Narsapur }
29-11-95- }
(Sd) F. W. Cornwell Esq.
Supervisor P. W. D.

(True Copy)

F. W. Cornwell
Esq.

For Sup^t Engr, 1st Circle.

Pls 8.1
100/96

26
25/12