

Number of pages. 8
Date of repair. 14-9-31
Initials of Repairer.

M.R.O. 1-82,400-22-11-30

MADRAS RECORD OFFICE.

Government of Madras.

Public DEPARTMENT.

G.O. No.	986	Press
		~~Mis.~~
Dated	22-9	1865.

P.O. No. 125-126

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Department,
22nd September 1865.*

No. 125. Read the following letter from E. C. BAYLEY, Esq., Secretary to the Government of India, to the Honorable A. J. ARBUTHNOT, Chief Secretary to the Government of Fort Saint George; dated Simla, 12th August 1865, No. 949.

Home Department.
Revenue.

I am directed to transmit a copy of the letter noted on the margin, and to request an expression of opinion on the necessity of legislation for giving full effect to the scheme proposed therein for inspecting and preserving the stations of the Trigonometrical Survey, and for restoring such as have fallen into disrepair, or have been destroyed.

From the Superintendent, Great Trigonometrical Survey of India, No. 337, dated 22nd June 1865.

2. It appears to the Governor General in Council that it would be well to have a law, making it obligatory on one of the village office bearers, such as the Putwaree (village Accountant) or head man, or even the Zemindar, to take care that these stations are not damaged.

From Lieutenant Colonel J. T. WALKER, R. E., Superintendent, Great Trigonometrical Survey of India, to the Secretary to the Government of India, Home Department; dated Dehra Doon, 22nd June 1865, No. 37-337.

I have the honor to report, as requested in your No. 2106, dated 7th March, and also in paragraph 41 of the Resolution of the Government of India in the Financial Department, No. 3996, dated 22nd December 1864, on the organization of a scheme for inspecting and preserving the stations of the Trigonometrical Survey, and for restoring such as have fallen into disrepair, or have been destroyed.

2. Our principal stations are of two kinds—Towers and Platforms. In triangulating over plains, it is necessary to erect Towers to surmount all irremovable obstacles on the lines between the mutually adjacent stations. On hills and on mounds of sufficient height to give the required range of view, Platforms are constructed. In both cases, a central masonry pillar is built for the support of the instrument employed in measuring the angles; this is surrounded by a Platform, which carries the Observatory Tent, the Observer and his Assistants, and is built of the cheapest materials available.

3. The central pillar contains the markstone, which, in Towers, is fixed on the ground level,—a shaft being carried up through the pillar, to enable the Observer to see the mark below, and centre his instrument truly over it. In Platform Stations, the markstone is necessarily placed on the surface of the pillar, and is consequently more exposed to injury than in Towers. In these stations, it is customary to fix a series of markstones within the pillar, one above the other, either of which will suffice for reference, in ordinary circumstances, if the upper markstone is removed; but for first class triangulation, it is always necessary to refer to the upper mark, for the practical difficulty of truly centering a series of marks over an invisible object below is great, and there is no possibility of verifying the accuracy of the operation. Lower marks are therefore only referred to when they are known to have been placed in position by officers of experience; but such officers are too few in number, and too valuable to permit of their being ordinarily employed in superintending the construction of pillars.

4. I may here state, in reply to a question in your 2nd paragraph, that it is very rarely found necessary to take up land for the site of a Tower; the extent of ground required is very small, not more than 10 yards by 15, for which payment is never asked, excepting when the ground is taken up in a town or village, and only then, when the removal of existing buildings is entailed, which occurs so seldom that I only remember one instance in the course of my per-

*Proceedings of the Madras Government, Public Department,
22nd September 1865.*

sonal experience. No engagement for the protection of a Tower is entered into with the owner of the land on which it stands. The Towers are entrusted to the care of the Department of Public Works,* and in some few instances they are cared for by the officers of that Department; but it is obvious that the majority of them must be far beyond the range of effective supervision by these officers.

5. The total destruction of a station is of such rare occurrence, that I am not able to cite more than three or four instances from my personal knowledge. The removal of the upper markstone is unfortunately of frequent occurrence.

6. In any scheme for the protection of the stations, it must be remembered that a station bereft of all its markstones will still be quite as valuable as ever for all practical purposes connected with Topographical and Revenue Surveys, if any portion of the central masonry pillar is left standing; for the original position of the mark will be known to certainty within a foot, and probably to within three inches, however rudely the pillar may have been originally constructed, and an error of a foot will have no appreciable effect on the operations of those surveys. The injury caused by the removal of the markstone falls on the Trigonometrical Survey alone, and compels our Officers, whenever they are starting a new series of triangles, and find the mark removed from which they were to have started, to go back over the old triangulation, until they come to marks which have not been disturbed.

7. The stations which essentially require protection are consequently those which may have to be re-visited by our Officers, and of these the greatest care is needed for the Base Line Stations, and for those appertaining to the great Arc measured by Colonels Lambton and Everest, which extends from Cape Comorin to the Himalayas.

8. In corroboration of this opinion, I may state that it has been remarked by one of the greatest living authorities on such subjects, Sir John Herschel—"that the ends of a base line should be guarded with religious veneration." The late Professor F. G. Struve, the celebrated Astronomer of the Russian Government, has said, in his description of the Russian Arc, that—"it is an object of importance to fix the centres of the Trigonometrical Stations, the extremities of the base lines, and more particularly the Astronomical Stations, in a durable manner. It should always be possible to re-measure a base, or to return to it to start a new series of triangles. History tells us, that it is often indispensably necessary to revise the work of past times, with the aid of more perfect instruments and superior methods of observation."

9. I propose, therefore, that the stations of the great Arc, and those at the extremities of our base lines, should be considered to be under the special care of the Superintendent of the Trigonometrical Survey, who will arrange to keep them in repair, and to restore such as may have already been destroyed. For this purpose, he will employ any available Officer, or, if necessary, divert one of the field parties from the execution of triangulation in new districts.

10. But the stations whose protection and restoration will thus be provided for scarcely comprise a tenth part of the total number of our stations which are scattered all over India. Fortunately, the remaining nine tenths need no more care than to be protected from wilful injury, such as has been brought to my notice, in the case of one of the stations of Colonel Lambton's base line at Madras, the stones of which had been removed by the natives of an adjacent village to employ in the construction of a pagoda, but so many years ago, that the officer conducting the triangulation in the Madras Presidency, though assisted by the local Magistrates, was unable to bring the offence home to the real culprits. Another station was found to have been destroyed, and that very recently, by one of the Engineers of the East India Railway, for it was situated on the summit of a high mound in the vicinity of the Railway line, on which he built a house, removing the station for the purpose.

11. I propose, therefore, that some persons should be deputed to visit the stations, and place them under the protection of the senior Native officials of the villages in whose lands they are erected, advantage being taken of the opportunity to effect any petty repairs of which they may stand in need. Each person so deputed should be accompanied by a Native official, speci-

*Proceedings of the Madras Government, Public Department,
22nd September 1865.*

ally selected for the purpose by the District Officer, who will point out the proper authority in the village to whose care the station will be entrusted.

12. Our markstones are, I believe, most frequently removed by the natives, either for domestic purposes, such as grinding curry powder, or out of mere curiosity to see whether there is anything hidden below the mark. I propose to obviate this, in future, by an arrangement, which, while concealing the mark from view, will enable Topographical and Revenue Surveyors to refer to it, with almost as much accuracy as if they could set up their instruments visibly over it. On the surface of the present pillars grooves will be cut in straight lines from the circumference to the edge of the markstone in such directions that, if they were carried over the stone, they would intersect each other at right angles on the mark; then a square masonry pillar, of which each side will be about two-thirds of the diameter of the circular pillar, will be raised over the latter to a height of about four feet, leaving visible the extremities of the lines below. It will be easy, by reference to these lines, to draw two corresponding lines in the same vertical planes on the surface of the square pillar; the intersection of the upper lines will give a point which should be truly over the station mark, and to which no amount of bungling could possibly give an error of two inches. The pillar will serve for Topographical and Revenue Surveyors to set their instruments upon, centering them over the intersection of the upper lines. The mysterious looking markstone, with its circle and dot, and its smooth surface so well adapted for the preparation of curry powder, will be concealed from view, and nothing will be visible, but a mass of plain brick work, which will neither excite cupidity, nor arouse curiosity.

13. A list, enumerating the stations which have been thus protected, may be prepared and sent to the District Officer, who should be called on to direct the respective officials in charge of the stations to send him a quarterly or half-yearly report of their condition. From these reports, he should frame an annual report to send to the Superintendent, Great Trigonometrical Survey. In case of wilful injury to any station, the District Officer should take steps to punish the offenders.

14. It will be desirable to give each person in charge of a station a copy of a printed Memorandum in English, as an authority for him to show to mischievous Europeans, to Railway Engineers in quest of lofty sites for their houses, or to pious natives seeking materials for the construction of a temple.

15. The Governor General in Council has been pleased to remark* that the recommendations of Colonel Dickens, which originated this report, involve an amount of additional expense that cannot at present be exactly estimated.

16. By the arrangement suggested in my 9th paragraph, the protection and restoration of the stations of the great Arc and the base lines may be effected without incurring additional expense, though of course the outturn of new triangulation will be diminished in consequence of a portion of the field establishment being employed on these operations.

17. With regard to all other stations, I think it will not be necessary to undertake the restoration of such as may have been destroyed; the number of these bears a very small proportion to that of those still standing, and it would not be worth while to suspend the triangulation of the parts of India in which our operations are now commencing, for the sake of restoring stations in districts where already enough exist for Topographical Survey purposes. These alone need protection; their number, in the three Presidencies of Bengal, Madras, and Bombay, may be estimated to be about 1600.

18. It is impossible to form any exact estimate as to the cost that will be incurred in visiting and repairing these stations. The persons employed in so doing will have to traverse a distance of probably not less than 25,000 miles, in proceeding to the different series of triangles, and zigzagging from one station to the next in succession. The lowest estimate of expense would be Rupees 50 per station, or Rupees 80,000 in all. Whatever the expense may be, it must be divided over a number of years, as the work must evidently be one of some time. I

* Paragraph 40, Resolution of Government in Financial Department, No. 3996, dated 22nd December.

*Proceedings of the Madras Government, Public Department,
22nd September 1865.*

propose that a sum of Rupees 10,000 be added to the Budget of the Trigonometrical Survey for this year, and placed at my disposal, to enable me to initiate the necessary operations. At the end of the year, I hope to be able to estimate the future expenses with some accuracy. By reference to paragraph 28 of the Report, No. 171A., dated 10th April, which was submitted by Colonel Thuillier and myself on the re-organization of the Survey Department, it will be seen that our recommendations involved a saving of Rupees 23,011 on the Budget expense for the whole Survey Department, so that, should they be sanctioned, no additional grant will be required for these operations, but merely a transfer of funds to this branch of the Survey Department.

19. I will here recapitulate the proposals contained in this letter:—

- 1st.—The Superintendent of the Trigonometrical Survey will take steps to repair or restore all stations along the Great Arc of Colonels Lambton and Everest, and the stations at the extremities of the respective base lines.
- 2nd.—Other stations than the above, which may have been destroyed, will not be restored; but all existing stations will be visited, repaired, and placed under the protection of the head official of the village in whose lands each station is built, who will receive a document authorizing him to protect the station; he will send in quarterly or half-yearly reports to the District Officer, stating whether the station is uninjured.
- 3rd.—The District Officer will send an official with the person deputed to visit and repair the stations in his District, to point out the proper parties to take charge of them in future. He will prosecute any persons accused of wilfully injuring them, and will send in an annual report to the Superintendent, Trigonometrical Survey, of the condition of the stations in his District.
- 4th.—A sum of Rupees 10,000 to be placed at the disposal of the Superintendent, Great Trigonometrical Survey during the current official year, to enable him to initiate the necessary operations for the protection of the stations not appertaining to the Great Arc and the base lines, which latter he will arrange to protect and restore with the means already at his disposal.

No. 126. ORDER THEREON, 22nd September 1865, No. 986.

Ordered that the following letter be despatched to the Government of India, and that the Board of Revenue be requested to issue the necessary instructions on the subject.

To the Secretary to the Government of } (Here enter 22nd September 1865,
India, Home Department. } No. 987).

(True Extract).

W. HUDLESTON,

Acting Secretary to Government.

To the Board of Revenue.

Exd. J. H. Burns.

No. 949 -

FROM

E. C. BAYLEY, Esq.,

Secretary to the Government of India,

TO

*A. J. Arbuthnot Esq.
Chief Secretary to the Govt. of
Fort St. George*

Home Dept.

Revenue.

Simla, the 12th August 1865.

SIR,

I am directed to transmit a copy of the letter noted on the margin, and to request an expression of opinion on the necessity of legislation for giving full effect to the scheme proposed therein for inspecting and preserving the stations of the Trigonometrical Survey, and for restoring such as have fallen into disrepair, or have been destroyed.

2. It appears to the Governor General in Council that it would be well to have a law, making it obligatory on one of the village office bearers, such as the Putwaree (village Accountant) or head man, or even the Zemindar, to take care that these stations are not damaged.

I have the honor to be,

SIR,

Your most obedient Servant,

E. C. Bayley

Secretary to the Government of India.

6487 10 Aug 1885 No 18429

Public 1885-Depar't
Pres of Dep't
Secretary to Government
London Home Dept
No 949

Dated 12th August 1885
No 3107 August 1885

Enclosure to Mr. C. P. C. P.
C. P. C. P.

No 1165

Request for opinion as to the
necessity of erecting a
low walling in connection
with the village authorities
to take care of the stations
of the Great Pygmy
Culinary.

1885

1885

1885

Public Department

Proceedings of the Madras Government

Read the following
letter from the Secretary to
the Government of India,
Home Department.

Recd letter 12th Aug 1885 No 949

Under the date 22nd September 1885 No 986

Ordered that the
following letter be despatched
to the Government of India,
and that the Board of
Revenue be requested to
issue the necessary instruc-
tions on the subject.

1111

To the Secretary to the Govt of India
Home Department
Recd letter 12th Aug 1885 No 949

To the Board of Revenue desd 22/9

Pro. 4477
Public 1885 Sept
17-986.

Proceedings of the

1885-22 Sept 1885