



17TH AUGUST 1888, No. 1528 L., LOCAL AND MUNICIPAL.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper :—

From J. P. HEWETT, Esq., Under Secretary to the Government of India, Home Department (Municipal), to the Chief Secretary to the Government of Madras, dated Simla, 23rd July 1888, No. 2-122.

In continuation of Home Department circular, No. 4-140-149, dated the 14th October 1887, I am directed to invite attention to the article at pages 313-14 of the "Indian Engineering," dated 21st April 1888, giving a further account of the artesian boring in the Sunderbuns and the estimated cost of such undertakings.

ORDER—dated 17th August 1888, No. 1528 L., Local and Municipal.

Communicated to all District Boards and Municipal Councils and to the Municipal Commissioners of Madras, in continuation of G.O., dated 15th November 1887, No. 2179 L.

2. Copies of the journal referred to may be had on application to the Editor, Mr. Pat Doyle, at Calcutta. The price is one rupee per copy.

(True Extract.)

*Under Secy. M. S.*  
for Ag. Chief Secretary.

To all Presidents of District Boards.  
„ all Chairmen of Municipal Councils,  
through the Collectors concerned.  
„ the President, Municipal Commission, Madras.  
„ the Public Works Department.  
„ the Revenue Department.  
„ Mr. Pat Doyle.

Exd. A. Raitt.

Govt. of 1888 Madras.

LOCAL AND MUNICIPAL.

*Order thereon. No. 2761 w/d / 6 Sept 1888*

*Recorded in con-  
tinuation of G.O. No 3433 w  
dated 16 December 1887  
20/ J. O. H.*

Issued

Recd.

Encl.

G.O., 17th August 1888, No. 1528, L.

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AUGUST.

*Ch. & for I.*

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14TH JULY 1888, No. 2141 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.  
Military Works.

READ—the following papers :—

G.O., dated 21st April 1888, No. 2693, Military.

Read—the following letter from Lieutenant-Colonel E. COLLEN, Secretary to the Government of India, Military Department, to Brigadier-General A. KENNEY-HERBERT, Secretary to the Government of Madras, Military Department; dated Fort William, the 12th March 1888, No. 557-M.W.

Barrack Department—Supplies.

With reference to the correspondence on the subject of transferring the duty of supplying and repairing barrack furniture in the Madras Presidency from the Commissariat to the Public Works Department, I am directed to state, for the information of the Governor in Council, that this question has been again brought under the consideration of the Government of India.

2. It appears to the Government of India that unless there are very strong reasons to the contrary the duty should now be transferred to the Public Works Department, and that, at any rate in Burma, the change should be carried out from 1st April next. There is in Burma a very competent Public Works Department staff, while the Commissariat Department is overworked; moreover, the duty is foreign to the ordinary business of the latter.

Order—dated 21st April 1888, No. 2693, Military.

Communicated to His Excellency the Commander-in-Chief for favor of opinion with reference to Proceedings of Government, No. 722, dated 9th February 1878, to the Commissary-General and Public Works Department.

2. The Commissary-General will be requested to at once take the necessary steps for carrying out the change in Burma, and he will report on the subject, as regards the Madras Presidency, through Army Head-quarters (Quartermaster-General's Department).

3. The Public Works Department will, with reference to G.O., No. 321 W., dated 19th January 1878, be asked whether the duty of supplying and repairing barrack furniture can now be undertaken by that department.

(True Extract.)

(Signed) A. KENNEY-HERBERT, Brigdr.-Genl.,  
Secretary to Government.

From Colonel M. PROTHEROE, C.B., C.S.I., Officiating Quartermaster-General, to the Secretary to Government, Military Department, dated Ootacamund, 4th May 1888, No. 1468 B. :—

With reference to Proceedings of Government, No. 2693, dated 21st April 1888, I have the honor, by order, to state, for the information of Government, that, in the opinion of His Excellency the Commander-in-Chief, the duty of supplying and repairing barrack furniture in the Madras Presidency should be transferred from the Commissariat to the Public Works Department, the Barrack Masters being at the

same time placed under the orders of the Public Works Department instead of being subordinate to the officers of the Quartermaster-General's department as is at present the case (*vide* G.O.G. No. 477, dated 21st December 1866, para. 4).

I am also to state that if the change of system be sanctioned it would be desirable that it should be extended to all the divisions and districts in this command, whether included within the Madras Presidency proper or in other local administrations, which, therefore, ought to be prepared for the contemplated addition to the duties of the Public Works Department under their orders.

No. 3070, Military.

Referred to the Public Works Department for favor of remark with advertence to para. 3 of Proceedings of Government, No. 2693, dated 21st April 1888.

2. The duties of Barrack Masters are defined in G.O.G. No. 477 of 1866.

(By Order.)

OOTACAMUND,  
7th May 1888.

(Signed) A. KENNEY-HERBERT, Brigdr.-Genl.,  
Secretary to Government.

From Colonel J. C. GUNNING, Commissary-General, Madras, to the Secretary to Government, Military Department (through the Quartermaster-General), dated Madras, 7th May 1888, No. 1053.

With reference to para. 2 of Proceedings of Government, No. 2693, dated 21st April 1888, relative to the supply of barrack furniture being transferred to the Public Works Department, I have the honor to state, for the information of Government, that contracts at the several stations in India and Burma have been already concluded for the current official year except at Belgaum, Mandalay and Bangalore.

- (a) At Belgaum furniture, both for barracks and hospitals, is made by the Public Works Department in accordance with the custom prevailing there before the station was transferred to the Madras command.
- (b) At Mandalay no contract has as yet been entered into, but the Superintending Engineer declines taking over the furniture supply unless he receives direct orders from Bengal.
- (c) At Bangalore a commissariat workshop has for some time been established, but it can be closed if the Public Works Department is prepared to supply and repair furniture.

2. Under the above circumstances, and as no previous notice of the intended change was given by Government, I have the honor to suggest the advisability of the transfer of the supply of barrack and hospital furniture from the Commissariat to the Public Works Department being postponed until the 1st April next.

No. 1539 B.

Forwarded.

2. His Excellency the Commander-in-Chief considers that the proposed change, if made, should be introduced simultaneously in all the divisions and districts of the Madras command.

OOTACAMUND,  
9th May 1888.

(Signed) M. PROTHEROE, Colonel,  
Officiating Quartermaster-General.

No. 3234, Military.

Forwarded to the Public Works Department in continuation of Military Department endorsement No. 3070, dated 7th May 1888.

(By Order.)

OOTACAMUND,  
14th May 1888.

(Signed) A. KENNEY-HERBERT, Brigdr.-Genl.,  
Secretary to Government.

Telegram from the Commissary-General, dated 19th May 1888, No. 137.

Telegram from the Secretary to the Government of Madras, Military Department, to the Commissary-General, Madras, dated Ootacamund, 21st May 1888, No. 3444.

"Your 137, dated 19th May 1888. Proposal to transfer Barrack Department to Public Works Department is now under consideration.

"Change will in all probability not take effect before 1st April next.

"Change of system in Burma this year already ordered (*vide* para. 2 of Proceedings of Government, No. 2693 of 1888").

From Colonel M. PROTHEROE, C.B., C.S.I., Officiating Quartermaster-General, to the Secretary to Government, Military Department, dated Ootacamund, 4th June 1888, No. 2094 A.

In returning the papers referred under Military Department No. 3184, dated 11th ultimo, I am desired to submit a memorandum showing the present strength, pay, distribution, &c., of the Madras Barrack Department.

2. From this it will be observed that a large proportion of the department is employed in commands with which the Madras Public Works Department has no concern; and it is presumed that when the new system is introduced, the Public Works Department of each of the other local administrations concerned will be required to take over the proportion of the department serving within such administration.

3. It is accordingly suggested for consideration that the necessary communication on this point be made to the Government of India in view to the several local administrations receiving timely information in regard to the matter.

4. In connection with this subject opportunity is taken to note that under the present system reliefs of staff of the Madras Barrack Department in Burma are periodically carried out; if however the part of the establishment now employed in that province is transferred to the Burma Public Works Department, the individuals concerned will become incorporated into that department for permanent service and will have a claim to receive the extra allowances which it is believed other members of the department receive in consideration of service in that distant and expensive province.

ENCLOSURE.

#### MEMORANDUM.

Staff.—The staff of the Madras Barrack Department consists of—

|                               |                                 |
|-------------------------------|---------------------------------|
| 4 Barrack Masters, 1st class. | 17 Barrack Sergeants 1st class. |
| 1 " " 2nd "                   | 9 " " 2nd "                     |

Staff salaries.—The staff salary of each grade is—

|                           | RS. | A. | P. |                             | RS. | A. | P. |
|---------------------------|-----|----|----|-----------------------------|-----|----|----|
| Barrack Master, 1st class | 120 | 0  | 0  | Barrack Sergeant, 1st class | 17  | 8  | 0  |
| " " 2nd "                 | 70  | 0  | 0  | " " 2nd "                   | 10  | 8  | 0  |

Pay.—The pay of individuals varies according to the army rank of each, promotions from the non-commissioned to the warrant rank and from one grade to another of warrant rank being made as in other departments without fixed establishments according to the average service in the non-commissioned rank or in the different grades of warrant rank of the staff of other department having fixed establishments, i.e., Commissariat, Ordnance and Public Works Departments.

The annexed roll A shows the army and departmental rank of the present staff, and the statement B attached to it shows how it is distributed.

Office and Peon Establishments.—In addition to the staff above referred to, office and peon establishments, as shown in the annexed distribution statement C and drawing salaries noted, form part of the department.

*Duties.*—Barrack Masters have the general charge of public quarters where such exist and of buildings occupied by troops with their furniture (including soldiers' boxes) and fixtures. They inspect all buildings, &c., in their charge monthly, carry out petty repairs, and act as mediums of communication between corps and Commissariat Department as regards the supply and repair of furniture, and between corps and Public Works Department regarding buildings and fixtures.

In stations where there are no Barrack Master, *e.g.*, at Bellary, Wellington, Cannanore, Thayetmyo, and Tounghoo, officers of the Quartermaster-General's department or Station Staff Officers perform the duties of Barrack Masters; Barrack Sergeants are employed under Barrack Masters in the duties generally and in clerical work preparing returns in their offices; they inspect all buildings, furniture and fixtures weekly to note damages both wilful and fair wear and tear. They also attend at the Commissariat stores to give in or receive barrack furniture on account of corps, &c.

G.O.G. No. 477 of 1866, paras. 2216, 2252 of the (now obsolete) Madras Army Regulations, and paras. 1080, 1081, 1082 and 1089 of the Madras Public Works Code, give further details as to certain duties of Barrack Masters and Barrack Sergeants.

The duties of the conicopillays at Bangalore and Bellary and Secunderabad are to assist in the scriptory work of the offices of the Barrack Department at those stations.

The peons are employed as messengers and to look after the barrack offices.

OOTACAMUND,  
4th June 1888.

(Signed) M. PROTHEROE, Colonel,  
Officiating Quartermaster-General.

A.—ROLL of Warrant and Non-Commissioned Officers employed in the Barrack Department, Madras Presidency.

| Rank and Name.                                            | Station.                                   | Remarks.              |
|-----------------------------------------------------------|--------------------------------------------|-----------------------|
| <i>First-class Barrack Masters (4).</i>                   |                                            |                       |
| Deputy Assistant Commissary. John Daily .. ..             | Fort St. George.                           |                       |
| Conductor .. ..                                           | Patrick Kilcoin .. ..                      | Bangalore.            |
|                                                           | John Kirkwood .. ..                        | Secunderabad.         |
|                                                           | Mark Shea .. ..                            | Rangoon.              |
| <i>Second-class Barrack Masters (1).</i>                  |                                            |                       |
| Conductor .. ..                                           | Tom Crouch .. ..                           | Kamptee.              |
| <i>First-class Barrack Sergeants (17).</i>                |                                            |                       |
| Sub-Conductor .. ..                                       | Kenneth Grant .. ..                        | Fort St. George.      |
|                                                           | Lewis James Roffey .. ..                   | Bangalore.            |
|                                                           | Thomas White .. ..                         | Secunderabad.         |
|                                                           | Joseph Buxton .. ..                        | Bellary.              |
|                                                           | Arthur Wheeler .. ..                       | Upper Burma .. ..     |
|                                                           | Edward Marchant .. ..                      | Kamptee.              |
|                                                           | Henry Tucker .. ..                         | Wellington.           |
|                                                           | George Drew .. ..                          | Bangalore.            |
|                                                           | Michael James Croghan .. ..                | Rangoon.              |
|                                                           | Daniel Mellor .. ..                        | Port Blair.           |
| Sergeant .. ..                                            | Robert McCullam .. ..                      | Thayetmyo.            |
|                                                           | George Hortick .. ..                       | Secunderabad.         |
|                                                           | John Key .. ..                             | Tounghoo.             |
|                                                           | Herbert Rodwell .. ..                      | Upper Burma .. ..     |
|                                                           | Thomas Stone .. ..                         | Do. .. ..             |
|                                                           | George Easter .. ..                        | Poonamallee .. ..     |
|                                                           | Edwin Winkwork .. ..                       | Upper Burma .. ..     |
|                                                           | <i>Second-class Barrack Sergeants (9).</i> |                       |
|                                                           | Alfred Coloille .. ..                      | Upper Burma .. ..     |
|                                                           | Edward Pluckrose .. ..                     | Do. .. ..             |
| Sergeant .. ..                                            | George H. Priest .. ..                     | Cannanore .. ..       |
|                                                           | Joseph Elder .. ..                         | Fort St. George .. .. |
|                                                           | Charles Cann .. ..                         | Rangoon .. ..         |
|                                                           | Charles Robert Locke .. ..                 | Do. .. ..             |
|                                                           | George Henry Walden .. ..                  | Secunderabad.         |
|                                                           | John McGill .. ..                          | Bellary.              |
|                                                           | Frederick Whittington .. ..                | St. Thomas' Mount.    |
| <i>Second-class Barrack Sergeants, sub. pro tem. (6).</i> |                                            |                       |
| Sergeant .. ..                                            | George Pendleton .. ..                     | Secunderabad.         |
| Corporal .. ..                                            | Archibald Martinant .. ..                  | Kamptee.              |
| Sergeant .. ..                                            | D. Downey .. ..                            | Do. .. ..             |
|                                                           | F. Bartells .. ..                          | Pallavaram.           |
| Corporal .. ..                                            | Charles Witt .. ..                         | Bangalore.            |
| Sergeant .. ..                                            | William Harmer .. ..                       | Secunderabad.         |

OOTACAMUND,  
4th June 1888.

(Signed) M. PROTHEROE, Colonel,  
Officiating Quartermaster-General.

B.—DISTRIBUTION statement of the Staff of the Madras Barrack Department.

| Administration.     | Command.                   | Station.                | BARRACK MASTER. |               | Barrack Sergeants. |
|---------------------|----------------------------|-------------------------|-----------------|---------------|--------------------|
|                     |                            |                         | First Class.    | Second Class. |                    |
| Madras .. ..        | Eastern District ..        | Madras .. ..            | 1               | ..            | 2                  |
|                     |                            | Poonamallee .. ..       | ..              | ..            | 1                  |
|                     |                            | Pallavaram .. ..        | ..              | ..            | 1                  |
|                     |                            | St. Thomas' Mount .. .. | ..              | ..            | 3                  |
|                     |                            | Bangalore .. ..         | 1               | ..            | 1                  |
|                     | Bangalore Division.        | Wellington .. ..        | ..              | ..            | 1                  |
|                     |                            | Cannanore .. ..         | ..              | ..            | 2                  |
|                     | Southern District.         | Bellary .. ..           | ..              | ..            | ..                 |
|                     |                            | Ceded District ..       | ..              | ..            | ..                 |
|                     | Total ..                   |                         | 2               | ..            | 12                 |
| Hyderabad ..        | Hyderabad Subsidiary Force | Secunderabad .. ..      | 1               | ..            | 5                  |
|                     |                            | Total ..                | 1               | ..            | 5                  |
| Central Provinces.. | Nagpore Force ..           | Kamptee .. ..           | ..              | 1             | 3                  |
|                     |                            | Total ..                | ..              | 1             | 3                  |
| Burma .. ..         | Burma Division ..          | Rangoon .. ..           | 1               | ..            | 3                  |
|                     |                            | Thayetmyo .. ..         | ..              | ..            | 1                  |
|                     |                            | Tounghoo .. ..          | ..              | ..            | 1                  |
|                     |                            | Total ..                | 1               | ..            | 5                  |
|                     |                            | Port Blair .. ..        | ..              | ..            | 1                  |
| Andamans ..         | ....                       | Total ..                | ..              | ..            | 1                  |
|                     |                            | Grand Total ..          | 4               | 1             | 26                 |

N.B.—The number of Barrack Sergeants of each grade at each station is not fixed, but is liable to vary according to circumstances. The roll shows present distribution. In addition to the above six Barrack Sergeants of the Madras Barrack Department are employed in Upper Burma (one as a Barrack Master and five Barrack Sergeants) being seconded and their places in the department being filled sub. pro tem. (vide roll).

OOTACAMUND,  
4th June 1888.

(Signed) M. PROTHEROE, Colonel,  
Officiating Quartermaster-General.

C.—DISTRIBUTION statement of the Office and Peon Establishments of the Madras Barrack Department.

|                     |                            |                         | ESTABLISHMENT.                  |                   |
|---------------------|----------------------------|-------------------------|---------------------------------|-------------------|
| Administration.     | Command.                   | Station.                | Conicopillays<br>at Rs. 10-8-0. | Peon at<br>Rs. 5. |
| Madras .. ..        | Eastern Division..         | Madras .. ..            | ..                              | 2                 |
|                     |                            | Poonamallee .. ..       | ..                              | 1                 |
|                     |                            | St. Thomas' Mount .. .. | ..                              | 1                 |
|                     |                            | Bangalore .. ..         | 1                               | 1                 |
|                     |                            | Bellary .. ..           | 1                               | 1                 |
|                     |                            | Ceded District ..       | Total ..                        | 2                 |
| Hyderabad ..        | Hyderabad Subsidiary Force | Secunderabad .. ..      | 1                               | 2                 |
|                     |                            | Total ..                | 1                               | 2                 |
|                     |                            |                         | ..                              | 1                 |
| Central Provinces.. | Nagpore Force ..           | Kamptee .. ..           | ..                              | 1                 |
|                     |                            | Total ..                | ..                              | 1                 |
|                     |                            |                         | ..                              | 1                 |
| Burma .. ..         | Burma Division ..          | Rangoon .. ..           | ..                              | 1                 |
|                     |                            | Total ..                | ..                              | 1                 |
|                     |                            | Grand Total ..          | 3                               | 10                |

N.B.—The Barrack Master at Madras receives an allowance of Rs. 30 per mensem to provide a writer for his office (vide Proceedings of Government, Military Department, No. 6908, dated 8th November 1887).

OOTACAMUND,  
4th June 1888.

(Signed) M. PROTHEROE, Colonel,  
Officiating Quartermaster-General.

No. 4370, Military.

Forwarded \* to the Public Works Department with reference to its memorandum No. 140 D., dated 8th May 1888.

\* From the Quartermaster-General, No. 2094 A., dated 4th June 1888, with enclosures. 2. On receipt of intimation that the Public Works Department is prepared to take over the duties of supplying and repairing barrack furniture, the Government of India will be addressed as requested in para. 3 of the Quartermaster-General's letter No. 2094 A., dated 4th June 1888.

(By Order.)

OOTACAMUND,  
28th June 1888.

(Signed) A. KENNEY-HERBERT, Brigdr.-Genl.,  
Secretary to Government.

ORDER—dated 14th July 1888, No. 2141 W., Public Works.

Communicated to the Superintending Engineers III, IV and V Circles, who will report, as soon as possible, on the proposals for transfer to the Public Works Department of—

- (1) The existing staff of the Barrack Department with their duties.
- (2) The supply and repair of barrack furniture now undertaken by the Commissariat Department.

2. It should be stated whether the present Public Works establishments, supplemented by the additions of the Barrack Staff, will suffice for carrying out the new duties, and, if not, what additional establishments will be needed.

(True Extract.)

(Signed) J. O. HASTED, Colonel, R.E.,  
Secretary to Govt., P.W.D.

To the Superintending Engineer, III Circle.

" " " IV "  
" " " V "  
" Military Department.

Exd. S. J. Pereira.  
Spare Copies

BUILDINGS AND ROADS.  
MILITARY WORKS.

Govt. of (1888) Madras.

PUBLIC WORKS.

*Dated July, 14th.*

*Recd.*

*Encl.*

G.O., 14th July 1888, No. 2141 W.

JULY.

**Barrack Department**

Communicating to the Superintending Engineers III, IV and V Circles, correspondence relative to the proposal for the transfer of the — to the Public Works Department.

15TH NOVEMBER 1887, No. 2179 L., LOCAL AND MUNICIPAL.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper :—

From J. P. HEWETT, Esq., Officiating Under Secretary to the Government of India, Home Department (Municipalities), to the Chief Secretary to the Government of Madras, dated Simla, the 14th October 1887, No. 4—140.

I am directed to invite attention to the articles in the "Indian Engineering," dated the 30th July and 13th August 1887, on the artesian boring in the Sunderbunds, in which a suggestion is made for the extension of such borings generally in India. They might, in the opinion of the Government of India, be usefully brought to the notice of the Committees of some of the larger Municipalities and of Local Boards.

ORDER—dated 15th November 1887, No. 2179 L., Local and Municipal.

Communicated, with a reprint of the articles referred to, to all Presidents of District Boards and Chairmen of Municipal Councils, and to the President of the Municipal Commission, Madras.

(True Extract.)

H. E. STOKES,  
*Chief Secretary.*

To all Presidents of District Boards.  
„ Chairmen of Municipal Councils,  
    through the Collectors concerned.  
To the President of the Municipal Commission, Madras.  
„ Public Works Department.  
„ Sanitary Commissioner for Madras.

Exd. E. Fernandez.

[Appendix.

## APPENDIX.

## ARTESIAN BORING IN THE SUNDERBUNDS.

By FRANK J. AGABEG, M.E., Superintending Engineer, Port Canning and Land Improvement Co.

("Indian Engineering," 30th July 1887.)

The marshy and unhealthy country to the south-east of Calcutta, known as the Sunderbunds, has been formed, as most of your readers are aware, from the washings of Upper Hindustan, brought down in pre-historic times by pre-historic rivers and streams, which used to empty themselves into the sea at present known as the Bay of Bengal, and, geologically speaking, is only of recent formation. It is thickly overgrown with jungle and is intersected by innumerable small nullahs and khals of salt water, all of which have their connection with the sea in one way or another. In some places the land is so low that it is only with the aid of bunds and dams that the large tracts which have been reclaimed and under cultivation are prevented from being submerged during the flood tides, and the utmost care has to be taken in keeping them in order.

The soil generally is fertile and yields good crops of rice yearly, but the greatest drawback that the inhabitants find is the want of fresh water. At times the villagers have to walk miles before they can get a drop either for drinking or culinary purposes, and what water they do get is not of the very best kind, and far from wholesome. During the hot weather most of the fresh water tanks are dry, and should there be a little water left it turns quite brackish.

The Port Canning and Land Improvement Co. (Ltd.), the largest Zemindary Company in Bengal, have an estate of over 100,000 acres in these parts. This Company, who take a lively interest in the welfare of their tenants, have, from time to time, gone to a great deal of expense in excavating tanks on different parts of their holdings for their benefit, but with all this, still the want of good water is badly felt. I may mention here that in digging a tank in this district you can only go to a certain depth, say, 8 or 9 feet; for if you go too deep you come upon clays impregnated with salt and which allow the brackish water of the innumerable khals to percolate through it.

Mr. Cowasjee Eduljee, the Company's Agent at Canning, having heard of the good results obtained from artesian wells in Europe and elsewhere, proposed to his Directors at Bombay that they should try an experimental well in some part of their estate which might lead to favorable results. The Directors, after consideration, agreed to the proposal and the necessary plant was sent for from England.

Many who heard of what the Company intended doing were of opinion that the result would be a failure, as the probabilities were that any water met with in the alluvium below would be nothing more than the percolation from the sea. The only information that I could get in regard to the geological formation of the country was that the alluvium was supposed to extend to a depth of 700 feet; therefore, the country being flat and the geological section not known, it was quite unnecessary to select any particular spot for the well. But for convenience sake the site chosen was in the compound of the Agent's residence at Canning and about 200 yards from the Mutla river (*vide* Plate I).

It was agreed that the diameter of the boring for the first 100 feet should be 5 inches; then reduced to 4 inches below; and tubed from top to bottom with wrought-iron tubes 10 feet long flush joints both inside and outside, screwed into each other (Fig. 1, Plate II). The depth was to be 250 feet, and as this was not very great, steam power was not required. The work was started by sinking a pit 12 feet deep 7'6" inside diameter, and lined with brickwork. Into this was fixed the necessary tackle for lowering down the tubes (Fig. 2, Plate II). On top of the pit was erected a wooden platform on which the men worked the rods. By this arrangement both operations of boring and forcing down the tubes could be proceeded with simultaneously.

The method carried out for forcing the tubes was as follows:—In the well A (Fig. 2, Plate II) at about 4'6" from the bottom, were fixed horizontally two rail girders, *b, b*, set into brickwork and bolted down; on these girders, with their heads downward, were clamped two screw-jacks, *c, c*, capable of exerting together a power of about 18 tons. The tube was inserted into the hole and passed between the two girders, *b, b*, and on it was fixed a driving clamp made of flat iron, 6" x  $\frac{3}{4}$ " x 1'10". The pressure brought to bear on the clamps *d*, by the screw jacks drove the pipe down, and as the pipe got to within one foot of the bottom another one was screwed on, the clamps raised, and the same operation performed as before. The rods were worked up and down by tillers attached at a convenient height. At first 8 men were employed in the work, but as the boring progressed, extra 3 were taken on. At 100 feet the tillers were dispensed with as the rods became rather heavy to lift and another method used. This was by attaching to the top rod a rope carried over a pulley in the sheer legs and coiled with three turns round the drum of a crab winch, the end of the rope being held by a man. The handles of the winch were turned and the rope held taut till the rods were raised a sufficient height when the rope was slackened and slipped, whereupon the rods fell and struck the required blow. In this work, the chisel was discarded altogether, the clays being so soft that an ordinary shell pump tipped with steel was used, which did the work of cutting and digging at the same time.

Superintending Engineers III, IV and V Circles, correspondence relative to the proposal for the transfer of the — to the Public Works Department.

## PLATE II. PORT CANNING BORING.

METHOD USED FOR FORCING DOWN THE TUBES.

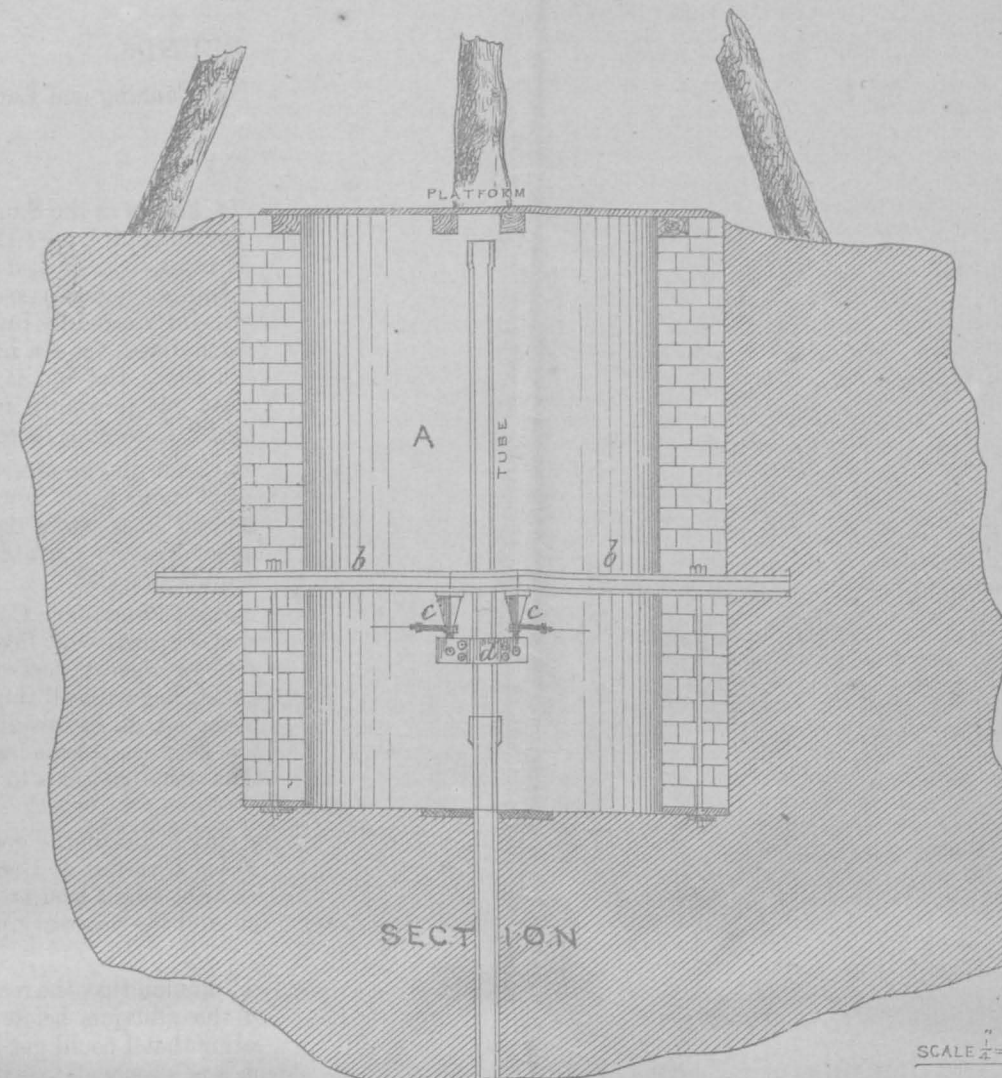


FIG. 2.

WROUGHT IRON TUBE FLUSH JOINTED

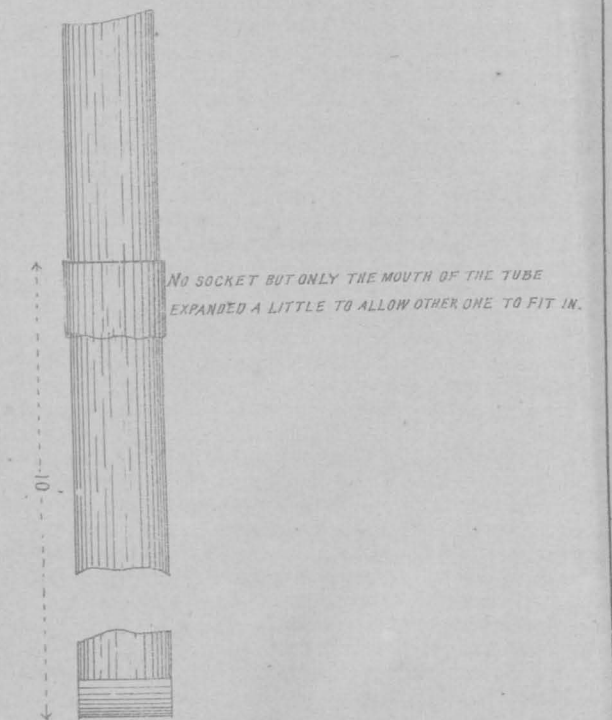


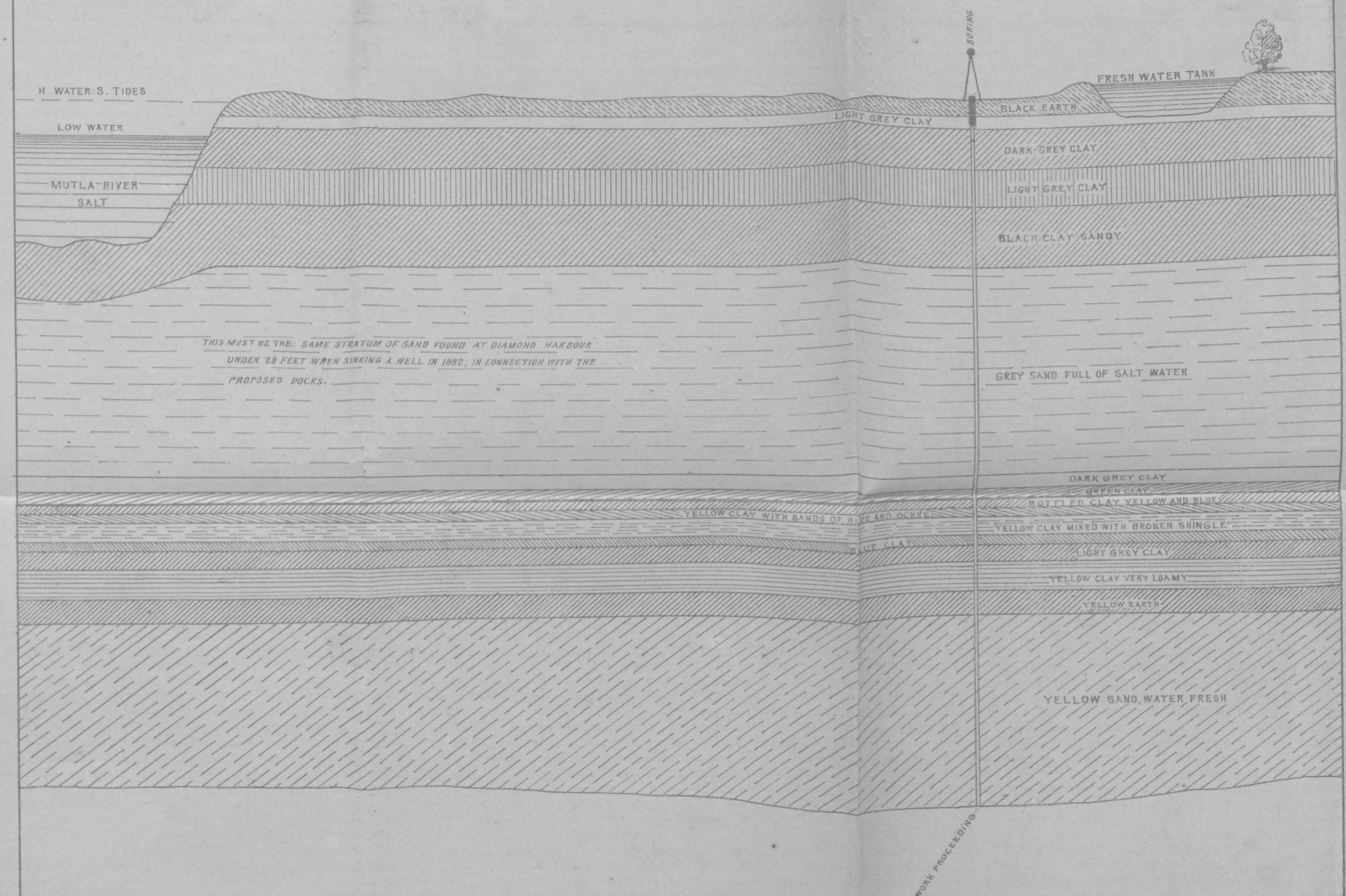
FIG. 1.

## PLATE I.

### SECTION OF ALLUVIUM GONE THROUGH AT PORT CANNING ARTESIAN WELL BORING

HORIZONTAL SCALE 100 FEET TO THE INCH.

VERTICAL SCALE 40 FEET TO THE INCH.



("Indian Engineering," 13th August 1887.)

The work proceeded rapidly to the depth of 55 feet, when dark grey micaceous sand, very watery (salt), was struck. In cutting the first 20 feet of this the silting was not of much consequence, but after this depth it became so great that sometimes it was impossible to progress even six inches after a hard day's work and it was only by forcing the tubes every time the blow was struck that any headway could be made. The silting at times used to be as much as 30 and 40 feet and one day it rose to 50 feet. The greatest care had to be taken in this sand to prevent the rods jamming, so much so that if they were allowed to remain stationary for over three minutes, it took 6 men at the crab winch to lift them again; this was owing to the sand closing over the pump below. When it was required to raise the tillers the rods had to be hoisted 5 and 6 feet and then the tillers adjusted.

This sand was passed through at 126 feet, when the tool struck dark grey clay mixed with sand.

At 130 feet it struck green clay with streaks of salt in it.

At 135 feet mottled clay yellow and blue mixed with broken shingle.

At 138 feet blue clay.

At 140 feet yellow clay mixed with broken shingle. The clay here becomes sweet, and salt seems to disappear.

At 145 feet yellow clay with bands of blue and ochre. The water which used to stand at about 12 feet from ground level gradually begins to get lower showing that the top water had been jammed off by the tubing.

At 150 feet light grey clay, very stiff mottled with yellow.

At 156 feet yellow clay, very loamy. Water in hole loses about 90% of its salt and stands 80 feet below ground level.

At 166 feet yellow earth.

At 173 feet yellow sand (micaceous). Water rises in the boring to within 8 feet of top and perfectly fresh.

From 173 feet to the present depth, viz., 235 feet, the boring is still in this sand which is very watery (fresh) and rich in yellow mica; when washed it looks like gold dust, but unfortunately, as your readers are aware, "all is not gold that glitters."

The work is still progressing, and the deeper the boring goes the higher the water rises in the hole. The silting in this sand is very great, as much as 40 feet at times. I have not been able up to the present to get a satisfactory idea of the volume of water, but hope to give the necessary information later on.

Although the proposed depth of the boring is only to be 250 feet, and notwithstanding the fact that we have come upon fresh water, still it would be advisable to go deeper down and strike a lower porus stratum, the water in which I am sanguine would have a greater hydrostatic pressure, and which we are bound to get. I have come to this conclusion from the section of alluvium already passed through, which up to the present has proved that it is composed of alternate layers of permeable and impermeable strata, and I have advised the Company accordingly.

The idea that the water in the alluvium below would be salt has exploded by the results obtained from this boring, and no one, I think, knowing anything about the laws that govern hydraulics would ever have expressed such an opinion.

It is very evident that any porus stratum which is fed by water from a higher level than the sea would naturally eject a greater pressure than the sea-water, and would remain fresh till it had passed out of the stratum and mingled with the waters of the same, as water follows the same laws underground as it does on the surface.

The benefits derived from fresh water in a country like India are incalculable, and it is worth all the time and expense in putting down wells. There may be a good many failures, but I am sanguine the majority would be successful.

In all future borings, never mind by whom undertaken, a correct record of the section passed through in each well should be forwarded to the Superintendent of the Geological Department for reference; by doing this, not only would we be able to get a thorough knowledge of the formation of different parts of the country, but the records would act as a guide for new operations.

Borings of any importance ought to be placed under the supervision of a really competent Engineer, who must be well up in the work and understand the laws of hydraulics and know something about geology. No engineering operations require so much skill and ingenuity at times as boring work. A well placed in charge of a man of no resources may be lost and thousands of rupees wasted, while if the same had been under an Engineer who was never at a loss for an idea, it would have been a success.

The tackle must be carefully examined daily and any suspicious looking places rectified at once, for, by the want of this care, a whole year's labor and expense may be lost. How many wells have been abandoned through sheer carelessness!

In conclusion, I beg to suggest that the advisability of pushing on boring work in India not only requires the consideration of Government but all Public Boards who are interested in the supply of water in the different towns. A good supply of wholesome water from wells in all parts of the country during the hot months would greatly lessen the annual mortality from cholera, *et hoc genus omne*.

Gobt. of (1887) Madras.

LOCAL AND MUNICIPAL.

Communicated  
to officers of the Public  
Works Department.

(sd) J.O.H.

W

Issued

Recd.

Encl.

G.O., 15th Nov. 1887, No. 2179 L.

NOVEMBER.

Artesian Boring.

Communicating to all Presidents of District  
Boards and Chairmen, Municipal Councils, &c.,  
letter from the Government of India inviting atten-  
tion to the articles in the "Indian Engineering"  
on the —.

With order

Gobt. of (1888) Madras.

Returned with thanks

V. Rajawade  
Asstt. Secy. Local & Mun. Dept.

27-8-88

6th: Engr for Linsen  
Cousg. Engr for Rys  
Suptg: Engrs  
C.A. to Goud.

Govt. of (1888) Madras

Govt. of (1888) Madras.

LOCAL AND MUNICIPAL.

29 AUG. 88

For C. No.

8469

MEMORANDUM.

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REQUESTED ~~for reference~~ the undermentioned paper:—

"Indian Engineering" of 21.4.88,  
lent to L. & M. Dept on 2.8.88 for Cw  
2546 -

*Chimbor*  
*2. Aug 88*

PUBLIC WORKS SECRETARIAT,

*25/4* 1888

To

The

*Ant L. & M. Dept -*  
*2nd*

Issued

Recd.

Encl.

G.O., 17th August 1888, No. 1528, L.

AUGUST.

Artesian Boring.

Communicating to all District Boards and Municipal Councils and the Municipal Commissioners of Madras, letter from the Government of India, drawing the attention of this Government to an article in the "Indian Engineering" giving a further account of the — in the Sunderbuns and the estimated cost of such undertakings.

17TH AUGUST 1888, No. 1528 L., LOCAL AND MUNICIPAL.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper :—

From J. P. HEWETT, Esq., Under Secretary to the Government of India, Home Department (Municipal), to the Chief Secretary to the Government of Madras, dated Simla, 23rd July 1888, No. 2-122.

In continuation of Home Department circular, No. 4-140-149, dated the 14th October 1887, I am directed to invite attention to the article at pages 313-14 of the "Indian Engineering," dated 21st April 1888, giving a further account of the artesian boring in the Sunderbuns and the estimated cost of such undertakings.

ORDER—dated 17th August 1888, No. 1528 L., Local and Municipal.

Communicated to all District Boards and Municipal Councils and to the Municipal Commissioners of Madras, in continuation of G.O., dated 15th November 1887, No. 2179 L.

2. Copies of the journal referred to may be had on application to the Editor, Mr. Pat Doyle, at Calcutta. The price is one rupee per copy.

(True Extract.)

J. F. PRICE,  
Ag. Chief Secretary.

To all Presidents of District Boards.  
„ all Chairmen of Municipal Councils,  
    through the Collectors concerned.  
„ the President, Municipal Commission, Madras  
„ the Public Works Department.  
„ the Revenue Department.  
„ Mr. Pat Doyle.

Exd. A. Raitt.

Gobt. of (1888) Madras.

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