379 C 3.2.87.
3085 w 20.11.86.

P.W.C. No 1503

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

19th February 1887, No. 1011.

Sanitary.

Read the following papers :—

No. 219. *From Colonel W. H. BURTON, R.E., Superintending Engineer, V Circle, to the Chief Engineer, Public Works Department; dated Chepâk, Madras, 13th October* 1886, *No.* 3517.

In reference to G.O., No. 2139-W, dated 26th August 1886, giving cover to a memorandum of the Army Sanitary Commission, I have the honor to inform you that scarcely a correct description of the barracks is given in para. 12, and that in my opinion the sickness amongst the troops may, in some measure, be due to the following :—

(1) The men in all the barracks live on stone floors in several places raised less than 12 inches above the ground, and rarely more than 24 inches above the ground.

(2) That none of the barrack floors are damp-proof.

(3) That all the rain-water falling from the roofs soaks into the ground equally under the barrack floors as in the surrounding ground, owing to the absence of efficient surface gutters round each barrack by which such water might be led away.

2. This is a defect duly noted against the Secunderabad barracks in para. 17, and to it is attributed the sickness at Secunderabad; perhaps the sickness at Bangalore is due as much to this as to the water which ought by theory to be so very bad as to be unfit to drink, but is not in my humble opinion so very bad when ample in quantity.

3. I would call attention to the growing evil at Bangalore of the number of small communities which are allowed to spring up and multiply on ground (sometimes the property of Military Department and sometimes private property) in and about the cantonment; the municipal authorities take but scant notice of the conservancy requirements of such places; the number of inhabitants in the so-called syce and grasscutters' lines of the Mounted Corps seldom seemed to me to be regularly checked and limited.

4. As to para. 16, the action of the Municipality and Sanitary authorities at the station in past years in regard to the drainage of Shoolay has been such as to saturate the valley between the British cavalry stables and the Arab parade ground (site of one Native Cavalry, one Native Infantry Regiment) with sewage. The British Cavalry riding schools near this have recently, I understand, had to be abandoned, and the Public Works Department were called upon to make more riding schools in consequence but a little further off.

5. The whole valley requires, in my opinion, to be agriculturally drained, enclosed, and laid down in grass, and the bund of the small Sonehalli tank to be breached.

6. I may say (para. 13) that admission of water down the western channel of the Ulsoor tank might be regulated, so that all stagnant water left in the present unhealthy-looking swamp, called the Sappers' Pontoon Ground, might be passed away, without entering Ulsoor tank, at small cost. This would greatly diminish the impurity washed into the Ulsoor tank by the monsoon rains; this is an improvement more readily described at the tank side than in writing from here.

7. There are but few latrines and urinals in and about the closely built over outlying portions of Bangalore; if the number and sites for these places were laid down by some authority which had not to pay for them, the use of the smaller feeders of the Ulsoor tank would no longer be used as latrines and urinals; the Municipal Commission will take a very long time before it voluntarily supplies enough latrines and urinals, and it is the executive authority alluded to in para. 16.

8. I believe that, if remedies such as I have here suggested be adopted, the sanitary condition of the troops at Bangalore would be greatly benefited.

No. 3594-C.

Transferred to the Military Department, with advertence to G.O. (Military) No. 4761, dated 9th August 1886.

(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Government, P.W.D.
15*th October* 1886.

No. 6565.

Referred to His Excellency the Commander-in-Chief.

(By Order.)

(Signed) A. KENNEY-HERBERT, Lt.-Col.,
Secretary to Government.
19*th October* 1886.

To the Quarter Master General.

No. 220. *From Brigadier-General E. FAUNCE, Quarter Master General, Madras Army, to Lieutenant-Colonel A. KENNEY-HERBERT, Secretary to Government, Military Department; dated Ootacamund, 7th February* 1887, *No.* 262-*B.*

With reference to para. 2 of Proceedings of Government, No. 4761, dated 9th August last, bringing to notice the unhealthy conditions prevailing at Secunderabad and Bangalore referred to in the memorandum of the Army Sanitary Commission on the health returns of British troops in the Madras Command for 1884, and the recommendations made in para. 23 of that memorandum embodied in the Proceedings of Government above quoted, I am desired to submit the following report for the information of Government:—

I.—Bangalore.

(*a*) The question of the improvement of the water-supply of Bangalore is now in the hands of Government.*

(*b*) The sanitation of the town receives every attention from the Municipality, the whole place being cleaned out daily, the streets daily swept, and the drains flushed once or twice weekly during the hot weather; the flushing of the drains daily throughout the year cannot be carried out as funds are insufficient and water is not always available, and when available it has to be carried long distances by carts, which is costly.

Endeavours are also being made to remedy the evil brought to notice in para. 16 of the report of the Army Sanitary Commission, regarding the main drain of Richmond Town and Shoolay, by extending it a mile beyond the barracks and the riding school, and, it is hoped, that thus all cause for complaint will be removed.

The Municipality has also recently improved one of the chief feeders to the Ulsoor tank, with the result that so much of the sewage of the town does not flow into the tank now as formerly. The work of deepening the Ulsoor tank was also undertaken by the Municipality in 1885, but owing to the rains the work was stopped and the tank having been pretty full ever since, further work has been impossible. A small tank above the Ulsoor tank was also purchased last year by the Municipality at a cost of about Rs. 7,000, with the object of allowing the drainage from the open country on that side to flow into the Ulsoor tank and so increase and improve its waters.

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* Proceedings of Government, No. 6229, dated 6th October 1886.

II.—Secunderabad.

(*a*) The matter of a pure water-supply, in combination with a drainage scheme for the town of Secunderabad, is now under the consideration of, and is being dealt with by, the Resident at Hyderabad, in communication with the Government of India. Its completion is admitted to be a necessity and is believed to be purely a financial question.

The water-supply of the troops is believed to be above suspicion, yet enteric fever prevails. If it arises from water as stated by the Deputy Surgeon-General, Bangalore, then the theory of the General Officer Commanding the Bangalore Division that one chief cause is that soldiers drink impure water, &c., when visiting native huts, &c., is strengthened.

(*b*) With reference to wet cultivation at this station, the Military authorities have repeatedly and continuously moved the Resident to have such cultivation put a stop to in the vicinity of the barracks occupied by British troops; but although frequent promises have been made, no improvement has actually taken place and can hardly be expected, unless Government are prepared to pay the owners of the paddy-fields the difference between the value of wet and dry cultivation. As regards the Native troops, it has been decided that the expense of compensating the owners of a very limited area of paddy cultivation in cantonment for the loss they would suffer would be prohibitive.

(*c*) The General Officer Commanding the Hyderabad Subsidiary Force reports that it is impracticable to raise the floors of the barracks so as to have thorough ventilation underneath and to protect ground floors from sub-soil damp. None of the plinths can be considered low, and as the water drains freely away from the barracks, the tendency for moisture to rise through the stone floor is minimised. The only remedy considered at all likely to prove successful in effectually resisting damp is to point the joints in the stone with asphalte; an estimate for this work has been called for, and it will be carried out as soon as funds are available.

(*d*) About 2,000 trees were planted in the year 1884-85 in the vicinity of the barracks and lines of British and Native troops at Secunderabad. It is believed that the remark of the Surgeon-General, regarding the want of trees as a protection against unhealthy winds, referred to the hutting lines of Native troops, and not to the substantially built barracks of the British portion of the garrison.

III.—Kamptee.

Steps are being taken to carry out at once some of the suggestions made by the Deputy Surgeon-General, Nagpur Force, towards improving the latrine accommodation for the British Infantry Regiment at this station, such as the removal of the front splash boards of the latrines and the raising of pans so as to touch the seats, and the General Officer Commanding is of opinion that, by devoting more attention to the use of dry-earth by carrying out these alterations and by cleansing the pans by fire before they are tarred, the offensive smell complained of may be diminished.

The Deputy Surgeon-General, Nagpur Force, has brought to notice other points, such as the provision of asphalte flooring, want of ventilation, walls coming down to the ground, level partition being too high, the existence of a double row of seats, &c., but these appear to be defects inherent to the standard plan on which the latrines were built, and therefore a matter for consideration of Government in the Public Works Department.

No. 221. *From Brigadier-General E. FAUNCE, Quarter Master General, Madras Army, to Lieutenant-Colonel A. KENNEY-HERBERT, Secretary to Government, Military Department; dated Ootacamund, 7th February 1887, No. 263-B.*

In returning Reference Order No. 6565 of 19th October last, referring letter No. 3517 of 13th idem from the Superintending Engineer, V Circle, regarding cause of sickness among the British troops at Bangalore, and in continuation of this office letter No. 262-B of this date, I have the honor, by order, to state that, in the opinion of the Medical authorities at that station, the prevalence of enteric fever is due chiefly to the impure water-supply as borne out by statistics and as mentioned in my letter of this date quoted above; the question of the improvement of this water-supply is now in the hands of Government.

2. With reference to dampness of floors of barracks being a source of sickness amongst troops, I am to say that the Deputy Surgeon-General, Bangalore Division, does not concur in the opinion expressed by the Superintending Engineer, and that no complaints have ever been made on this subject; surface drains, however, to receive and carry off rain-water from the roofs, would no doubt be an improvement, but the cost of providing such drains would be very great. Should Government desire it, estimates will be called for and submitted.

3. The measures adopted for the improvement of the drainage of Shoolay are detailed in this office letter of this date quoted above.

No. 222. ORDER THEREON, 19th February 1887, No. 1011.

Ordered that the foregoing correspondence be forwarded to Her Majesty's Government.

2. The defects in regard to the construction of the latrines at Kamptee brought to notice in the concluding portion of the Quarter Master General's letter No. 262, dated 7th February 1887, will be referred to the Government of India for the issue of such orders as may be deemed necessary.

3. It is observed that the Government of India have been addressed in the Public Works Department with reference to the provision of funds to carry out the Bangalore water-supply project.

Proceedings of Government, No. 2293-W, dated 20th September 1886.

No. 223. *To the Secretary to the Government of India, Military Department; dated 19th February 1887, No. 1012.*

(True Extract.)

A. Kenney Herbert Lt.-Col.,
Secretary to Government.

To the Quarter Master General.
,, Adjutant-General.
,, Surgeon-General, Her Majesty's Forces, Madras.
,, Sanitary Commissioner, Madras.
,, Public Works Department. with 13 copies

Exd. E. C. Shunker.

B. 2d 601 W d/28 Feby/87

B

Comd. to the Supg Engr V Circle with refce to his No 3517 dated 13th October /86

25-2-87

Jolt 7/2/87

3594 c 15.10.86!
2292–3 w 10.9.86! ✓
2139 w 26.8.86 ✓
318 D 30.6.86 ✓
177 D 26.5.86 ✓
1814 w 25.7.84 ✓
1473-4 w 13.6.84 ✓
× 829–30 c 1.3.86
× 206 3 w 4.9.85
× 1924 w 19.8.85
× 1807 c 14.5.86
2795 w 5.10.83 ✓
2794

SE V C ✓ D
28/2

P.W.C. No. 1471

Govt. of {1887} Madras.

MILITARY.

To
THE QUARTER MASTER GENERAL,
&c., &c., &c.

13-SC

Dated February, 19th,

Issued

Recd. 24-2-87 *Encl.*

G.O., 19th February 1887, No. 1011.

B. 2d 601 W d/28-2-87

FEBRUARY,
Nos. 219—224.

Sanitary.

British troops at Bangalore and Secunderabad.—Correspondence reporting on the cause of sickness among the —, forwarded to Her Majesty's Government, and the defects in regard to the construction of the latrines at Kamptee brought to notice by the Quarter Master General, referred to the Government of India for issue of the necessary orders.

2 Copies to ooty

1886.

P. W. DEPARTMENT.

Current No. 8003

From
The Supdg: Engr: V Circle

Enclos.—

No. 3517
Dated 13th October 1886
Received 14th — " —

Subject.

Sickness at Bangalore – Affords certain information in connection with the — and offers his observations thereon —

Disposal.

No. 3594 C Dated 15th October 1886.

Transferred to the Mily: Dept, with advertence to G.O. No. 4761 dated 9th August 1886.

(Sd) J. O. Hasted, Col. RE
[illegible] to Govt. P.W. Dept.

W d/ 28 Feby

No. 2139 W d/ 26-8-86

P. W.

Papers relative to Bangalore Water supply submitted.

It will be seen that a letter on the subject from the Resident was received on 16.4.86, & that further information is awaited.

Cu
19.4.86

The subject should be kept in view, and a reminder sent to the Resident after a reasonable interval.

19.4.86

SAW

C. No 2968

File submitted in

2 Parts.

had any objection to certain parts of Capt. Romilly's project.

Cu
15-4-06.

It would be well to draw the Residents attention to that letter.

W.
15/4

S.A.W.

Please have reminder prepared accordingly.

Cu
15-4-06

(The papers are on R.H.'s table at Madras. Arnold knows about them)

C.A.W.

Herewith a letter recd. yesterday on the subject. I have kept back the bulky file.

F.B.
17.4.6.

To D.W.
For information

L.
17/4/06

No 601.W d/28 Feb

What is the present position of the Bangalore Water Supply Scheme?

What was the last reference on the subject?

15·4·86

W

The papers on the subject are at Madras.

The last reference was a letter to the Resident stating that this Govt. proposed to carry out Capt. Romilly's project C, leaving the Municipality to carry out certain other work commenced by that body, & inquiring whether the Municipality

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No 1807 C of 14-5-86

P.W. Department.

To

The Resident in Mysore.

Sir.

With reference to your Assistant's letter No $\frac{1022}{705}$ of the 15th ultimo, I am directed to ask that an early reply to his ~~your Assistant's~~ No $\frac{902}{705}$, dated 7th April 1886, to the address of the Chief Secretary to the Dewan of Mysore, may

may be obtained and communicated to the Government of Madras.

2. The subject of the introduction of an improved water supply for the garrison & civil population of Bangalore is one of great importance, and an early settlement of the question is most desirable.

6/5/86

8.5.86

Despd
14/5/86

No. 1807 C d/ 14-5-86

Enteric Rept. [illegible]

No. 829 C d/ 1st March /86

To
The Resident in
Mysore.

C. No. 1510

(Referring for remarks letter from the Govt of India, acknowledging receipt of reports on enteric fever among the troops at Bangalore & requesting to be informed what further action has been taken to improve Bangalore Water Supply)

Sir,

I am directed to invite your attention to letter from this Dept. No: 68. W. 8 8.1.86 regarding the proposed improvements to the Bangalore water supply, and to request the favor of an early reply thereto.

26/2/86

26.2.86

No. $\frac{829}{830}$ Capt-3-86

No. 830 Capt 1st March 86

Memo.

In reply to refce no: 1199+ S 23/2/86, the undersigned has the honor to state that it has been decided that the most appropriate method of securing a pure water supply for the troops & civil population of Bangalore is to adopt the proposals÷ made by the late Capt Romilly as set forth in his Project B, with the addition of the first seven of the Estimates which compose Project C. This addition has been made ~~[illegible]~~ on the recommendation ~~[illegible]~~ of H.E. ~~[illegible]~~ Sir Fredk Roberts, who expressed his preference for Project B "provided

+ herewith returned.

÷ Spare copy of Capt Romilly's report enclosed.

"that at the same time the conservation of the Halsur ~~[illegible]~~ Tank will be taken in hand by Govt and the catchment area increased."

The proposed improvements require in the first place the approval of the Mysore Govt to two of the items:- viz.-
(1) Diversion of the Town Drainage &
(2) New supply channel & compensation,
and a letter+ has been addressed to the Resident in Mysore on the subject.

+ No: 68. W. 23/1/86.

Should the Resident's reply be favorable, the matter will be laid before the Govt of India for final sanction.

The whole of the correspondence will then be printed & comd. to the Mily Dept.

26.2.86

26/2/86

To the Mily Dept

B/68 W a/ 8-1-86
No 173 Ca/ 2-6-85
Capt Romilly Report a/ 16-11-85

Memo

No. 829/830 Ca/ 1-3-86

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

27th July 1885, No. 4085.

Cantonments—Water-supply.

Read the following papers :—

No. 414. *From Brigadier-General R. C. STEWART, Quarter Master General, to Lieutenant-Colonel A. KENNEY-HERBERT, Officiating Secretary to Government, Military Department; dated Ootacamund, 15th July 1885, No. 1619-B.*

In Proceedings of Government, No. 2718, dated 7th June 1884, Government sanctioned, as a temporary measure, the boiling of water supplied to the British Troops at Bangalore from the Ulsoor tank.

2. When application was again made this year by the General Officer Commanding Bangalore Division for renewal of this sanction, the matter was referred to the Surgeon-General, Her Majesty's Forces, whose reply is attached.*

3. As the Commander-in-Chief is of opinion that it is practicably impossible to prevent the gathering ground and supply-channels of the Ulsoor tank from being constantly defiled in the manner stated by the Deputy Surgeon-General, Bangalore, His Excellency considers that, until some new system of supplying the troops with water is adopted, the conditions which the Surgeon-General mentions as requiring the water to be boiled will continue to exist, and he therefore desires me to solicit that Government may be moved to sanction as a permanent measure, while the Ulsoor tank water is used, a charge of Rs. 6 per diem for the wood required to boil it before drunk by the troops.

From J. IRVINE, Esq., M.D., Surgeon-General, Her Majesty's Forces, Madras, to the Quarter Master General; dated Ootacamund, 11th July 1885, No. 231.

With reference to your No. 1537,† dated 7th July 1885, I have the honor to inform you that in my opinion the analysis of the Ulsoor tank water still indicates the necessity of having it both boiled and filtered in order to render it usable.

2. On this subject I beg to enclose you a copy of a letter, No. 887-M., dated 8th July 1885, from Deputy Surgeon-General Tarrant to the Assistant Quarter Master General, Bangalore Division, regarding the present most unsatisfactory state of the water-supply in Bangalore, and to state that I consider that, as long as the water-shed and drains supplying the Ulsoor tank are allowed to remain in the condition therein described, the system of supplying the men with boiled and filtered water should be continued.

From T. TARRANT, Esq., Deputy Surgeon-General, Her Majesty's Forces, Bangalore Division and Ceded Districts, to the Assistant Quarter Master General, Bangalore Division; dated Bangalore, 8th July 1885, No. 887-M.

I have the honor to report, for the information of the Officer Commanding, that on the 4th instant I made a careful personal inspection of that portion of the Ulsoor tank where it meets the upper tank, separated by a bridge consisting of eight arches, " seven of these contained human fæces ;" the upper tank was for the most part dry. Following up the superficial drain situated in this tank to the outlet of the nullah which conveys the rainfall from Baderhully direction, I found that it was in a very insanitary state, especially in the neighbourhood of native villages it was converted into a "vast latrine;" so were also the arches of the bridge over this nullah on the Cavalry road. Following up the nullah I came to a small ravine about two hundred yards in length, and on the edge of it has been erected a latrine No. 12-47; this, I was informed, was for the use of the Natives of Cundasawmy's tannery, which is close by on a higher level than ravine or nullah. I inspected this tannery and found it in a most filthy state, several square pits on the ground full of decomposing animal matter; soakage from these places and the latrine must reach the nullah. Close to Baderhully I observed several heaps of rubbish deposited close to the edge of the nullah, and twelve graves, one actually in the bed of the nullah, the remaining eleven close by. Above Baderhully are situated two small tanks used principally by natives for washing cloths, the overflow from these goes into the nullah. From the foregoing it is quite evident that the water-supply reaching the Ulsoor tank from Baderhully direction is fouled by every abomination it is possible to conceive.

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* No. 231, of 11th July 1885, with enclosure, from Deputy Surgeon-General, Bangalore.

† Enclosures herewith returned.

On the 7th instant I made a careful inspection of the water-channel commencing at the Queen's Own Sappers and Miners' works. The channel between the latter and bridge on St. John's road contained a quantity of decomposing vegetable matter. The bridge consists of six arches, "five contained human fæces;" the water-channel from the bridge to back of old market comparatively clean, except where crossed by a bridge; "arches used as a latrine." In the neighbourhood of back of the old market "latrine No. 20-67" was erected, not a foot from wall of water-channel, and it was quite apparent that soakage had been going on from the former into the latter. At the bridge of Blackpully road there was present in the "water-channel" a large quantity of most "offensive sewage;" this was accounted for by an Inspector who was present, and informed me that the sewage drain was stopped, and in consequence sewage escapes into the "storm water drain" and from that into "main water-channel." It appears that this serious defect exists in all the system of drainage throughout the cantonment. I have carefully inspected the numerous superficial drains conveying rainfall to the Ulsoor tank from time to time and they contained "human excrement." I am of opinion that proper supervision is not maintained, and it is absolutely necessary some active steps should be at once taken to cleanse all nullahs, drains and water-channels conveying water to the Ulsoor tank and maintain them in a proper sanitary state.

No. 1162.

Copy forwarded for information of the Surgeon-General, Her Majesty's Forces.

8th July 1885.

(Signed) T. TARRANT,
Dy. Surgeon-General, H.M.'s Forces,
Bangalore Division and Ceded Districts.

No. 415. *With report from Controller of Military Accounts; 17th July* 1885, *O.-F.*

No. 416. ORDER THEREON, 27th July 1885, No. 4085.

Sanctioned pending further orders.

No. 417. *To the Secretary to the Government of India, Military Department; dated 27th July* 1885, *No.* 4086.

(True Extract.)

(Signed) A. KENNEY-HERBERT, Lt.-Col.,
Offg. Secretary to Government.

To the Quarter Master General.
„ Commissary-General.
„ Surgeon-General, Her Majesty's Forces, Madras.
„ Controller of Military Accounts.
„ Public Works Department.

Exd. E. C. Shunker.

No. 1924 W of 19th August/85.

Communicated to the
Superintending Engineer
V Circle for information

(Sd) J.S.S.
13.8.85

Superintending Engineer
Fifth Circle

Govt. of (1885) Madras.

MILITARY.

To
THE QUARTER MASTER GENERAL,
&c., &c., &c.

Dated July, 27th.

Issued

Recd. *Encl.*

G.O., 27th July 1885, No. 4085.

No. 1924 W 19th August/85.

JULY.
Nos. 414—417.

Cantonments—Water-supply.

Bangalore.—Charge of Rs. 6 *per diem* for firewood required for boiling drinking water supplied to the British troops at — from the Ulsoor tank, sanctioned pending further orders.

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

August 1885, No. .

Sanitary.

Read the following paper :—

No. . *From Colonel G. CHESNEY, Secretary to the Government of India, Military Department, to Lieutenant-Colonel A. KENNEY-HERBERT, Officiating Secretary to the Government of Madras, Military Department ; dated Simla, 17th August 1885, No. 854-C.*

Sanitary.

In reply to your letter No. 4086, dated the 27th July 1885, I am directed to say, for the information of the Governor in Council, that the Government of India sanction an annual assignment of Rs. 2,190 being made in future under Grant 14 of the Madras Military Budget to meet the cost of boiling the water supplied to the British Troops at Bangalore from the Ulsoor tank, until such time as the water supply at this station is placed on a proper footing.

No. . ORDER THEREON, August 1885, No. .

Communicated to the Provincial Commander-in-Chief and Departments concerned, in continuation of Proceedings of Government, No. 4085, dated 27th July 1885.

(True Extract.)

(Signed) A. KENNEY-HERBERT, Lt.-Col.,
Offg. Secretary to Government.

To the Quarter Master General.
„ Commissary-General.
„ Surgeon-General, Her Majesty's Forces, Madras.
„ Controller of Military Accounts.
„ Public Works Department.

Exd. E. C. Shunker.

No 2063 Wa/4 Sept/85.

Communicated to the Suptg. Engineer V Circle in continuation of G.O. No 1924 W dated 19th August 1885.

(Signed) J.H.

S.E. V Circle

P.W.D.

Govt. of {1885} Madras.

MILITARY.

To

The QUARTER MASTER GENERAL,
&c., &c., &c.

Dated August,

Issued

Recd.

Encl.

G.O., 31 August 1885, No. 4780.

No 2063 Wa/4 Sept/85

AUGUST.

Nos.

Sanitary.

Annual assignment of Rs. 2,190 to meet the cost of boiling the water supplied from the Ulsoor tank to the British Troops at Bangalore, sanctioned temporarily by the Government of India.

With order

20th October 1887, No. 2810 W., Public Works.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Military Works.

Read—again the following paper :—

From the Government of India, No. 1182 M.W., dated 14th June 1887, recorded in G.O., No. 1924 W., dated 18th July 1887.

Abstract.—Requesting that further investigation may be made into the subject of providing the troops at Bangalore with an improved water-supply.

Read also—

Letter from the Government Solicitor, dated 27th September 1887.

Order—dated 20th October 1887, No. 2810 W., Public Works.

His Excellency the Governor in Council resolves to publish the following notification in the *Fort St. George Gazette* and leading newspapers :—

NOTIFICATION.

"The investigations which have been made of late years with the object of procuring a pure water-supply for the troops stationed at Bangalore having failed in so far that no scheme for an absolutely pure water-supply has been brought forward that will not involve an expenditure per head far in excess of that which is in other large towns considered reasonable, the Government resolve to offer a reward of Rs. 1,000 for the best essay which shall bring forward a workable and economical scheme for the supply of pure drinking water for the troops in Bangalore. Such scheme must be original and not simply a modification of any of the undermentioned proposals hitherto laid before the Government, though any one or more of the suggestions contained in such proposals may be applied if necessary to such scheme. A further sum of Rs. 1,000 will be given if such essay is adopted as the foundation of any scheme which the Government may resolve to carry out for the above purpose. It will rest with the Chief Engineer to decide whether any essay fulfils the required conditions and his decision will be final.

"The following are brief descriptions of the schemes which have already been before the Government :—

I. General Sankey's Scheme.

(1) The construction of a reservoir on the third mile of the Bellary or Tumkur road at a level giving what was deemed to be a sufficient command of the whole station to secure water distribution by gravitation.

(2) The supply of this reservoir by the formation of channels to intercept the drainage of approximately the whole area of ground available on a level higher than that of the tank itself.

(3) The distribution of the water to the several parts of the station by means of conduits, pipes, &c.

This scheme was designed to effect a radical improvement of the water-supply of the whole military and civil population of Bangalore, excepting the Pettah, which had a fairly good supply.

II. GENERAL MULLINS' SCHEME.

(Elaborated by Captain Romilly.)

The source of supply to be the Agaram tank. The water from it to be collected in settling beds and conducted thence by earthen pipes to a well in a pumping station situated below the tank weir at its north-west extremity. From this well the water to be pumped on to filter beds, whence it would gravitate into a clear water basin. From this basin the water to be pumped up over a stand-pipe through cast-iron mains up to the existing cisterns at the various barracks, whence it would be drawn as required by the present distributing pipes and stand-cocks.

ALTERNATIVE PROJECTS BY CAPTAIN ROMILLY.

III. Project B.

The source of supply to be the Halsur tank and Dhobies' wells as at present. Condensing apparatus and cisterns for evaporating a supply of pure drinking water to be located at the rock, the condensers drawing their supply from the tank. New mains to be laid from the drinking water cisterns at the rock to the barracks, communicating with stand-cocks, whence drinking water only would be drawn. Arrangements to be made for direct pumping to the barracks from the Dhobies' wells station.

IV. Project C.

The source of supply to be the Halsur tank and the Dhobies' wells as at present,—to be improved by the complete diversion from the tank of the western feeder which brings the drainage of the cantonment bazaar into the tank. The construction of a new feeder to bring in the drainage from about 2½ square miles new catchment to the east of the tank. An increase to the capacity of the tank by raising the present water level. The provision of new engines, the construction of additional wells, &c.

V COLONEL VIBART'S SCHEME.

The source of supply to be the Arkavutty river. The water to be stored at a point some 15 miles from Bangalore, not far from Savandroog, and, if necessary, to be pumped up to Bangalore.

VI. SUGGESTION BY THE GOVERNMENT OF INDIA.

Flooring with concrete a space on high ground commanding the station, of such an extent that the ordinary rainfall thereon would give a sufficient supply of drinking water for the troops. The discharge to be collected in reservoirs and thence distributed by pipes.

"Complete papers on the subject of the schemes above described, and information regarding the number of troops and quantity of water to be supplied, with other particulars, can be obtained on application at the office of the Chief Engineer, Public Works Department, Madras.

"The essays should be submitted to the Chief Engineer, Public Works Department, on or before 31st March 1888."

2. A sum of Rs. 2,000 will be reserved in the Military Works budget of 1888-89 to meet payment of the honoraria above mentioned.

(True Extract.)

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

To the Superintending Engineer, V Circle.
„ Examiner, Public Works Accounts.
„ Military Department.
„ Public „
„ Editor's Table.

Exd. J. Moses.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of (1887) Madras.

PUBLIC WORKS.

Dated October, 20th.

Recd. *Encl.*

G.O., 20th Oct. 1887, No. 2810 W.

OCTOBER.

Bangalore Water-supply

Ordering the publication of a notification regarding the resolution of Government to offer a reward for the best essay which shall bring forward a workable and economical scheme for the supply of pure drinking-water for the troops in Bangalore.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Military Works.

Letter—from

Colonel J. SHAW-STEWART, R.E.,
Secretary to the Government of Madras,
Public Works Department,

To

The RESIDENT in MYSORE.

Sir,

Adverting to my letter, No. 2795 W., dated 5th October 1883, I am directed to forward, for the information of the Government of His Highness the Maharajah of Mysore, the accompanying copy of proceedings of Government, No. 1473 W., dated 13th June 1884, with which is recorded Colonel Mullins' report on the question of water-supply to Bangalore, and to request that all needful assistance may be rendered to the officer who has been intrusted with the duty of working out the project which it has been decided to adopt.

I have the honor to be,
Sir,
Your most obedient servant,
(Signed) J. SHAW-STEWART, Colonel, R.E.,
Secretary to Govt., P.W.D.

Ootacamund,
13th June 1884.

Exd. E. Fernandez.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of 1884 Madras.

PUBLIC WORKS.

Dated June, 13th.

Recd. *Encl.*

13th June 1884, No. 1474 W.

JUNE.

Bangalore Water Supply

Copy of orders on Colonel J. Mullins' report on the — forwarded, with remarks, to the Resident in Mysore.

GOVERNMENT OF MADRAS.

MILITARY DEPARTMENT.

9th August 1886, No. 4761.

Sanitary—Reports and Returns.

Read the following :—

No. 95. *Military Despatch from the Right Honorable the Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George; dated India Office, London, 15th July 1886, No. 9.*

Para. 1. I forward, for your information, seventy * copies of a memorandum by the Army Sanitary Commission on the Health Returns of British Troops in the Madras Command for 1884.

2. The unhealtby conditions prevailing at Secunderabad and Bangalore, as evidenced by the returns of sickness at those stations, call for earnest consideration at the hands of the proper authorities.

* Twelve by mail ; fifty-eight by parcels post.

Memorandum of the Army Sanitary Commission on the following papers :—

1. Sanitary Report of Madras Army, 1884, by Surgeon-General J. Irvine, M.D.
2. Remarks on the above by the Commander-in-Chief, Madras.
3. Report on Enteric Fever in the Madras European Army, 1884, by Surgeon-General J. Irvine, M.D.

These papers are separate references, but we shall include our remarks on them in one memorandum. There is a separate paper by Surgeon-General Irvine, "Sanitary Report of British Troops in the Madras Command for 1884," which we shall also include, because all of them refer to the same subject.

1. The average strength of non-commissioned officers and men in the Madras European Army in 1884 was 10,812, as given by the Surgeon-General. But the average strength given by Dr. Stephen in his statistical tables differs slightly from the Surgeon-General's estimate; it is 10,785. The difference is so slight that we shall adopt that given in the Madras report. The year's facts will, therefore, stand as follows :—

		Ratio per 1,000.
Average strength	10,812	...
Admissions to hospital	11,960	1,106·18
Total deaths	93	8·60
Invalids sent home	350	32·37
Average daily sick	639·49	57·5

Dr. Stephen's returns differ from the Surgeon-General's in giving ninety-two deaths instead of ninety-three, and he states the average daily sick at 620. The two returns, therefore, differ from each other somewhat, but not to any material extent.

2. The really important points are given in this abstract, which shows satisfactory progress in army health.

—	1874—83.	1884.
Admissions per 1,000	1,173·87	1,106·18
Deaths ditto	13·98	8·60
Invalids ditto	40·10	32·37

As we shall presently see, there are disease and death causes still in existence which ought to be abolished, but the results of the 1884 statistics show a very substantial gain to army efficiency in all its elements.

3. As usually happens the admission rates vary considerably at different stations and in different years, but some of the stations have persistently high admission-rates.

Kamptee, for example, showed a ten years' average admission-rate of 1,460·27 per 1,000, and in 1884 the rate was 1,377·92 per 1,000. There must, of course, be some cause for this, and that it has something to do with locality appears to be shown by the fact of the high rate of 1884; there was due to fevers 587·2 per 1,000, to dysentery and diarrhœa 55·3 per 1,000. Bangalore had a ten years' admission-rate of 1,145·81 per 1,000, and in 1884 of 1,006·48 per 1,000. In the same way Secunderabad, with a ten years' admission-rate of 1,145·81 per 1,000, yielded a rate in 1884 of 1,077·53. These cases have an important bearing on the question of army efficiency, because of the number of troops stationed in the localities, although the admission-rates are not all due to local diseases.

4. The admission-rate for the whole Madras Army in 1884 was, as has been already stated 1,106·18 per 1,000; of this ratio 242·70 was due to venereal diseases, leaving for all other admissions a rate of 863·48 per 1,000. In the same way, of the Kamptee rate of 1,377·92, the venereal rate was 242 per 1,000; of the Bangalore rate 343·2 and of the Secunderabad rate 284·5 were due to syphilitic diseases.

5. Of mitigable or preventable fatal diseases, the most important were enteric fever, which yielded 129 admissions and eighteen deaths, and cholera, for which twelve were admitted, and ten of them died. The most fatal disease of the year was, however, hepatitis, to which twenty-two deaths were referred, and there were nine deaths from apoplexy. There were twelve deaths out of hospital, to be deducted from the ninety-three, which leaves eighty-one deaths, fifty-nine of which were due to these four diseases.

6. The death-causes of the year were as follow, including the above :—

Diseases.	Deaths.	Diseases.	Deaths.
Cholera	10	Hepatitis	22
Small-pox	1	Respiratory diseases ...	1
Enteric fever	18	Heart disease	1
Apoplexy	9	Phthisis pulmonalis ...	3
Delirium tremens ...	1	Wounds, &c.	1
Dysentery	4	All other causes ...	7
Diarrhœa	2	Deaths out of hospital ...	12

Taking the more important death-causes in order, we find that of the ten cholera deaths three took place at Madras, one at St. Thomas' Mount, one at Poonamallee Depôt, three at Bangalore, one at Secunderabad, and one at Kamptee. Out of twelve cases of cholera in the Madras Army ten died.

7. In connection with these cholera deaths, it should be remembered that there were 75,476 deaths from the disease among the civil population at the same time. There was a severe epidemic in the Presidency, during which the Native Army had a cholera death-rate of 1·46 per 1,000, while the rate in the European Army was 0·92 per 1,000, both of which may be favorably contrasted with the rate of 2·7 per 1,000 which ruled among the civil population.

8. *Enteric Fever.*—As already has been stated there were eighteen deaths entered under this head in 1884, which was the mortality in 129 cases of enteric fever, and we shall first show the relation which this fever has borne in time past to the general fever history of the Madras Army. Assuming the strength, in round numbers, at 10,800, the admissions and deaths for eleven years have been as follow from all fevers :—

Fever Types.	1884.		Total in ten years 1874 to 1883.	
	Admitted.	Died.	Admitted.	Died.
Enteric fever	129	18	367	145
Simple continued fever ...	284	1	6,996	30
Febricula	626	...	4,607	...
Remittent fever	104	...	907	28
Ague	762	...	14,594	1
Total ...	1,905	19	27,471	204

The average admission rate from all fevers was for the ten years 253·33, and for 1884 it was 176·39 per 1,000. The corresponding death-rates were for ten years 1·88, and for 1884 1·76 per 1,000.

9. Of late years the nomenclature of this fever has been unsettled, on account of discussions on the subject of diagnosis of fever cases. This is well shown in the preceding table and in the following abstract prepared by the Surgeon-General :—

Years.	Ratios per 1,000.		
	Admissions.	Deaths.	Deaths to treated.
1880	2·43	1·07	440.
1881	·86	·48	416·66
1882	4·34	2·12	479·17
1883	8·86	2·73	298·97
1884	11·94	1·67	134·33

This table shows that the diagnosis was unsettled, and it seems doubtful if all the cases entered under the head in 1884 were due to developed enteric fever. But it is also known that the mortality due to this fever does vary in particular years, and the Surgeon-General accepts the diagnosis. Hence, if we agree with his view on this point, we must adopt the consequence which follows from it, that of late years enteric fever has become a more prevalent disease in the Madras European Army.

10. We shall next show where the disease occurred, and we shall place together in the same table the admissions and deaths from cholera :—

Stations.	Enteric Fever.		Cholera.	
	Admissions.	Deaths.	Admissions.	Deaths.
St. Thomas' Mount ...	1	1	1	1
Cannanore	4	1	...	...
Malapuram	1	1	...	...
Bangalore	60	1	4	3
Bellary	3	1	...	...
Wellington	1	...	...	...
Secunderabad	39	10	2	1
Kamptee	15	3	1	1
Thayetmyo	1	...	...	...
Port Blair	3	...	...	...
Madras	...	...	3	3
Poonamallee	...	...	1	1

There was a case of enteric fever among troops on march, which recovered. On looking at the data in this table, it seems very doubtful if the sixty enteric fever cases at Bangalore, of which fifty-nine recovered, were really due to this fever. One thing, however, must be admitted and this is that there were sixty fever cases of so severe a character as to take rank with the most fatal of Indian fevers in the estimation of medical officers who treated them. But as the question is a very grave one, it may be suggested whether medical officers in their reports might not, with advantage, define what they mean by enteric fever, so as to avoid the confusion so far as it may be possible to do so. If we accept the data thus far as they stand, we shall have the conclusion forced upon us that, out of 168 station fever cases, of which eighteen died, 114 cases and fourteen deaths took place at three stations, Bangalore, Secunderabad, and Kamptee, while at the same three stations there occurred seven cases and five deaths from cholera out of a total of twelve cases and ten deaths in the Madras Army.

11. It is hence clear that in the present much improved sanitary state of the Madras Army there are nevertheless certain stations where there is preventable disease, and these are the stations where, in conformity with the sanitary economics, a further reduction in the sick and death-rates ought first to be sought.

12. The chief sanitary defects at these stations have been so long known that it seems almost unnecessary repetition to refer to them, but as they form part of the Surgeon-General's Report we may restate them. He says, "Enteric fever has increased steadily during the last four years, the increase being most marked in Bangalore, where the water-supply is always bad, and where it was scanty as well as bad in 1884. It seems probable, therefore, that the quality of the water has something to do with the spread of this disease. At Bangalore the barracks are all in good sanitary condition, but some of them are, as stated in last year's report, too close to densely-populated quarters which are under municipal authorities, and about the sanitation of which frequent complaints are made."

The remark made by the Adjutant-General on the water question is very much the same as has presented itself year after year, viz., that "the question of improving the water-supply for the troops at Bangalore, by abandoning the Ulsoor tank as a source of supply, is under consideration of Government."

This tank was condemned a quarter of a century ago, and even then it had been shown for years to have been a probable disease cause.

13. In last year's Report on the Madras Army one Medical Officer referred to the probable influence of malaria proceeding from the drying up of the edges of the tank in summer on the amount of fever among the troops, and in the present report the Surgeon-General tells us that the water-supply was "scanty as well as bad," and this fact implies concentration of all the water impurities under evaporation and absence of rain. We have thus to deal with a quite unsafe water-source which, as has been long known, receives its supply from a foul gathering surface, is liable to pollution from influx of foul drainage at Bangalore, its soluble impurities being liable to concentration by drying up, and the margins in all probability yielding unwholesome emanations at the same time. But, besides the dangers resulting from drying up of the tank, a fall of rain may increase the amount of filth in the water, for Surgeon-General Madden states that twenty-two cases of enteric fever, out of thirty, admitted to the north station hospital occurred in July and August, when much impurity was washed by the monsoon rains into the Ulsoor tank, while organic decomposition was rapid and offensive in all low-lying localities.

14. We are glad to learn that the whole subject of the water-supply of troops has been under consideration, and that several projects have been brought forward, but we should be glad to learn within what time the Ulsoor tank and its surroundings are to be finally abolished.

15. But the Surgeon-General's brief remarks raise other very important questions. The civil population of Bangalore is that of a large city, and we are told in the present year's report that "frequent complaints" have been made about the manner in which the municipal authorities perform their sanitary duties in parts near the barracks.

16. In the present report it is also remarked that "the discharge of the filth from the main drain of Richmond Town and Shoolay, within 200 yards of the old Lancers' Riding School, had probably something to do with the prevalence of the disease amongst the men of the "12th Lancers." As there are executive authorities on the spot, it would, of course, be advisable that they should do their work. But what if they neglect to do it? Are the troops to suffer on this account? And would it not be better to make such changes in the law or practice as would ensure that the part of this town near the barracks should be kept clean and otherwise in good sanitary condition?

17. The following statement by the Surgeon-General regarding Secunderabad throws some light at least on febrile disease causes there. He says, "The main defects at Secunderabad are the want of trees to check the force of the monsoon winds, and of surface drains to carry off the rain-water. At present this water percolates into the soil and foundation of the buildings."

Where foundations are raised above the ground level with free perflation of air between the ground surface and the barrack floor, this defect of the subsoil is of less importance, but where the floors are laid without air spaces in malarial climates fever is a necessary result.

But wet cultivation, with night-soil as a manure, is still carried on at no great distance from the barracks. As regards surface drainage, the Adjutant-General states that the cost of a complete system is prohibitive. But, in the meantime, it may be suggested whether raising the floors of the barracks in the way suggested would not remove much of the evil.

18. We are glad to learn from the Adjutant-General's letter that a scheme for the drainage of Secunderabad town is now under consideration. No complaint appears to have been made about the water-supply of troops at this station, so that the local causes of fever appear to be those connected with damp malaria producing subsoil under and around barracks, and probably emanations from wet sewage culture.

19. In this and indeed in all cases probably the effect of foul unhealthy bazaars and houses visited by the troops must not be overlooked. The subject is dwelt on by Medical Officers at stations, and the remedy is a long known one, viz., keeping the outskirts of stations free from disease causes.

20. The fifteen cases and three deaths from enteric fever at Kamptee have led to the following expression of opinion as to the cause by the Surgeon-Major:—"In my opinion the *probable* cause of the disease is the *latrines*. The men will not carry out the dry-earth system properly. I have constantly noticed a fæcal smell in the neighbourhood of these buildings. All the cases of enteric fever were admitted to hospital during the rainy season, when there is a very damp and close condition of the atmosphere which produces rapid putrefaction and fermentation. The latrines are cleared out morning and evening, and I think it very probable that a man visiting the latrines early in the morning before the pans are cleared out would run the risk of contracting enteric fever." The large amount of enteric fever at Lucknow had previously been attributed to this state of the latrines as a probable cause by the Deputy Surgeon-General.

21. It is an old sanitary proverb that "all smell indicates disease and loss of money." Where badly managed latrines and filth are the causes of smell, the first part of the proverb will always hold good, and the second also if the profitable application of manure be neglected. We have here instances of two stations having latrines on what is called the dry-earth system, while it is not so. Sewage emanations are the result, and we may rest assured that these are active as disease causes beyond the limits of perceptible odour, and then we have enteric fever among the troops; and as to the remedy, the Adjutant-General states that additional sweepers are required to go round and put dry earth in the pans after use by the men. We have had the subject so often before us that it seems scarcely necessary to restate the principles involved in the dry-earth system, but the practical remedy suggested by the Adjutant-General is the only one unless a suitable mechanism be provided in each seat. We may, however, report what has been said year after year since the report of the Royal Commission, that in such climates as exist in India there is no safety where there is sewage odour. This, and not the occurrence of enteric fever cases, is the real mark of danger, and whoever is charged with sanitary inspecting work should report on it again and again until the evil is dealt with.

22. The only other disease requiring notice is hepatitis, the mortality from which is differently stated in the reports and in Dr. Stephen's statistics. We have adopted the number of twenty-two deaths given in the statistics as the finally corrected one. Of these twenty-two deaths it is important to remark that nine took place at Secunderabad; but we have no recent account of the causes.

23. The account given of the general sanitary condition of stations does not call for remark, as there seems every disposition to render the barracks and stations healthy, and indeed the low death and in efficiency rates of 1884 show how much good work has been done. There are, nevertheless, exceptional cases where sanitary improvement is needed, and we shall confine our recommendations to these.

1st. The proposed new water-supply for Bangalore should be pressed forwards as quickly as possible, and authority should be brought to bear on the municipality to make them keep all that part of the town nearest the barracks in the best practicable sanitary condition.

2nd. It cannot be said that Secunderabad is as healthy as it ought to be. What appears to be required is the town drainage, regulation of wet culture, and in some way protecting ground floors from subsoil damp. Probably partial subsoil drainage around the barracks would be of use, or raising the floors. We would further suggest that some account of the reasons why so many men die there of liver disease should be forthcoming. Tree planting, if carried out so as not to interfere with ventilation, would, no doubt, be an advantage.

3rd. As regards the latrine details at Kamptee, the remedy is obvious, but we must state that neither at Kamptee nor anywhere else ought such a state of latrine accommodation to be permitted.

8th June 1886.

PWD

No. 96. ORDER THEREON, 9th August 1886, No. 4761.

Communicated to His Excellency the Commander-in-Chief and the Surgeon-General, Her Majesty's Forces.

2. The Government invite the attention of His Excellency the Commander-in-Chief to para. 2 of the above despatch.

(True Extract.)

A. Kenney Herbert Lt.-Col.,
Secretary to Government.

To the Adjutant-General, with 8 copies of the memorandum.
,, Quarter Master General, with 12 copies of the memorandum.
,, Surgeon-General, Her Majesty's Forces, Madras, with 15 copies of the memorandum.
,, Surgeon-General with the Government of Madras, with 20 copies of the memorandum.
,, Sanitary Commissioner, with 2 copies of the memorandum.
,, Public Department, with 10 copies of the memorandum.
,, Public Works Department. ✓

Exd. E. C. Shunker.

3/8D-30-6-86-

No 2139 W d/26-8-86

B

Communicated to the Supdg. Engrs III, IV & V circles, for information.

2. The question of improving the water supply of the troops at Bangalore is at present under reference to H. E. the Commander in-chief.

20-8-86

S. E. III circle ✓
" IV " ✓
" V " ✓
Mily. Dept

P.W.C. No 6530

Govt. of 1886 Madras.

MILITARY.

To

The ADJUTANT-GENERAL,
&c., &c., &c.

Telephoned for 10.S.C 24/8/86. Recd. 25/8/86.

25.S.C

Dated August, 9th.

Issued

Recd. 23.8.86 *Encl.*

G.O., 9th August 1886, No. 4761.

No 2139 W d/26-8-86

AUGUST.
Nos. 95-96.

Sanitary—Reports and Returns.

Memorandum by the Army Sanitary Commission on the Health Returns of British Troops in the Madras Command for 1884, communicated to His Excellency the Commander-in-Chief and the Surgeon-General, Her Majesty's Forces.