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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 427

Press
~~Mis~~

67-68

Dated 3. 2. 1866.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
3rd February 1866.*

No. 107. Read the following Proceedings of the Madras Government in the
Military Department:—

Communicating, with orders, certain corres-
pondence relative to the proposed experimental
trial to determine the supply of carts, &c.,
required to carry out the dry earth sewage
system. } (Here enter 29th January 1866, No. 387.)

No. 108. ORDER THEREON, 3rd February 1866, No. 427.

MILITARY WORKS, No. 13.

Communicated to the Superintend-
ing Engineers.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Superintending Engineers,

Ed. S. T. Augustin.

MILITARY DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following papers:—

From the Quarter Master General.... Here enter 20th September 1865, No. ⁵⁵⁵₉₁₉₇
 Report from the Controller of Mily. Accts... „ 15th December „ C.
 From the Asst. Secy. to the Govt. of India .. „ 30th November „ „ 1330.
 Memorandum from the Quarter Master General, Head Quarters, Ootacamund, 20th September 1865, No. ⁵⁵⁵₉₁₉₇; to the Secretary to Government, Military Department.

Forwarded to Government for sanction.

From the Officer Commanding Mysore Division, Head Quarters, Bangalore, 18th September 1865, No. 319; to the Quarter Master General, Head Quarters, Ootacamund.

In forwarding for special sanction the enclosed indent for one urine barrel cart for the use of the European portion of the Head Quarters Sappers and Miners, I have the honor to state, for the information of His Excellency the Commander-in-Chief, that I consider the supply to be one of urgent necessity.

Under the provisions of G. O. G., No. 191, of the 5th September 1848, the services of only one toty are now available.

With Report from the Controller of Military Accounts, 15th December 1865, C.

From the Secretary to the Government of India, Military Department, Fort William, 30th November 1865, No. 1326; to the Quarter Master General.

Having laid before Government your letters, No. 1138B, dated 22nd June last, and No. 1759B, dated 21st ultimo, I am directed to acquaint you, for the information of the Commander-in-Chief, that, whilst the Right Honorable the Governor General in Council quite concurs in His Excellency's opinion that no further trial is necessary to prove the superiority of the dry earth sewage system, the

Sanitary Commission,* it will be seen, * See annexed copy of their letter, No. 389B, dated 13th ultimo, have represented the necessity of a careful trial for three months, in order that it may be ascertained how many carts and receptacles will be required properly to carry out the system.

2. I am therefore to request that you will move His Excellency to cause the proposed trial to be made with the carts and utensils suggested by the Commission in their letter just adverted to, either at the stations mentioned in my letter, No. 355, dated 23rd September last, or elsewhere, as may be thought best.

3. Government sanctions the supply of the various appliances recommended by the Commission in pages 7 and 8 of their report on the system, dated 2nd September, a copy of which is annexed; and the results of the trial should be carefully recorded in regard both to the number of carts and receptacles that will be required, and to the best means of drying the earth during the rainy season; the quantity of fuel necessary for the latter purpose being carefully noted.

4. The attention of the Barrack Department might be directed towards the invention of some description of hopper, as suggested in page 4 of the report, to ensure the immediate application of the dry earth on the man rising from his seat; and the Public Works Department will also be requested to consider whether this desideratum can be practically attained.

5. The recommendation of the Commission that two receptacles be allowed to each cook-room, to be painted white in order to distinguish them, is approved.

6. I am also to draw attention to the suggestion in the additional note attached to the report, that, on the introduction of the dry earth system, the number of bleesties employed under the present system may be reduced.

No. 1330.

Copy of the above, with copies of the Report of the Sanitary Commission, and of their letter, No. 389B, dated 13th ultimo, forwarded to the Secretary to Government, Fort Saint George, Military Department, for the information of His Excellency the Governor in Council.

By order,
(Signed) B. E. BACON, Lieut. Colonel,
Asst. Secy. to the Govt. of India.

From the President of the Sanitary Commission for Bengal, Simla, 13th October 1865, No. 389B; to the Secretary to the Government of India, Military Department.

In reply to your letter, No. 362, dated 27th June 1865, and in accordance with the instructions conveyed in your docket, No. 256 of 23rd September, I have the honor to communicate the opinion of the Commission with regard to the best form of conservancy cart and receptacle, and the number of each which will be required for the dry earth system.

2. Regarding the proposed cart, it is only necessary to remark that it is well adapted for the purpose, and that it would prove in the end the most economical arrangement to have it made of well-seasoned wood and other really good materials. The receptacle designed in the plan will also, it is believed, be found to answer exceedingly well; but as much depends on its being made exactly after the model, and on the cover fitting accurately, the Commission would recommend that these vessels be made at Roorkee at least for all Up-country stations. To receive the urine and cook-house refuse no alteration in them is required; but if such a large vessel were filled with sewage from the latrines, where the dry earth system was followed, the weight would be greater than could be conveniently lifted. The receptacles intended for the privies should therefore be cut down in height from 16 inches to 10 inches. The diameter of all would thus be preserved the same, an object of some importance with reference to the arrangements made in the cart for their reception.

3. As regards the number of carts and receptacles required for the dry earth system, the Commission observes that this system of conservancy is about to be experimentally introduced into Regiments of British Infantry at Rawul Pindee, Lucknow, Dinapore and Dum-Dum, and it would recommend that the number of carts and receptacles required to carry it out should at the same time be practically tried, and the result of the whole experiment reported after it has been fairly worked for three months. For this trial 4 carts and 68 receptacles should be allowed to each Regiment, 25 of these latter being of the reduced size recommended for privies. The Commission believes that with careful management the total number of receptacles may be reduced; but before recommending a reduced number, some experience is desirable. The general use of these air-tight vessels in lieu of wooden ones is an improvement, the introduction of which need not be delayed, pending the result of the experiment, as regards the latrines. Two should be allowed for each cook-room; and the suggestion that they should be distinguished by being painted white, ought not to be neglected.

Report by the Sanitary Commission for Bengal on earth-sewage as applicable to British Regiments.

On the 25th June 1864, the Officiating Deputy Secretary to the Government of India in the Military Department, forwarded

1. Letter No. 1012B, dated 28th May 1864, from the Quarter Master General, to the Secretary to the Government of India in the Military Department.
 2. Letter No. 146B, dated 19th May 1864, from the Assistant Quarter Master General, Meerut Division, to the Assistant Quarter Master General.
- a printed paper by the Reverend H. Moule on the efficacy of dry earth as a deodorizer, along with copy of the correspondence marginally noted, and requested that Government might be favored

with the opinion of the Sanitary Commission, and their suggestions in detail, as to the manner in which the dry earth system, if approved, can best be carried out in British Regiments, and the various appliances which should be supplied for the purpose.

In the preceding March, the Indian Jail Committee of 1864, having personally tested the extraordinary efficacy of dry earth as a deodorizer, issued a memorandum strongly recommending the universal adoption of the system, not only in barracks, hospitals, jails and all public institutions, but in schools and private families.

The subject was at once taken up by the Sanitary Commission. Copies of Mr. Moule's paper, with practical directions extracted from Dr. Mouat's Prison Code, were widely disseminated, and the various Local Governments with their several heads of departments, including Medical and other Officers, were requested to adopt the system and give it a fair trial. From time to time the Government of India has forwarded reports regarding the means adopted in different parts of the country for carrying out the system, and the results which had been obtained. The Commission has now before it a mass of evidence derived from Medical Officers in charge of European Regiments, of Native Corps, of Jails, of Officers Commanding Regiments and Stations, and of various Boards which assembled by order of His Excellency the Commander-in-Chief to consider this question. These various opinions and suggestions have been most carefully colated by the Secretary.

Agreeably to letter No. 4, dated 1st August 1865, addressed by the Secretary to the Government of India in the Military Department, to the Quarter Master General, copy of which was forwarded to this office for information and guidance, sanction was accorded to a joint report on the general working of the dry earth system of sewage being drawn up by that officer in communication with this Commission.

The questions which appear to demand consideration are:—

I. Is dry earth the perfect deodorizer described by Mr. Moule? Does it possess those qualities which he claims for it, and to the extent affirmed? Does its application to fecal and other evacuations "stop the emission of offensive smells"? Does it "prevent fermentation," and are "these results so complete and lasting that the mass of soil and earth can be removed without any offence"? With the evidence before it, the Commission cannot hesitate to answer this question in the affirmative. Nearly every Officer whose opinion is recorded, speaks in the highest terms of the results, and the few who have failed, have failed evidently because they did not carry out the essential points to be observed. The opinion expressed by the Jail Committee, as to "the extraordinary efficacy of dry earth as a deodorizer," cannot be doubted.

II. But admitting the efficacy of dry earth, is its use superior in efficiency to any other system which has been tried? On this point also there is not much room for question. The Commission has before it the testimony of many Boards, and individual officers of all ranks and classes, that the experimental introduction of the earth system has been attended with marked success, and that the state of latrines under it contrasts most favorably and strikingly with their previous condition. The use of lime as a deodorizer is now admitted greatly to increase rather than to diminish the noxious effluvia it was so long employed to correct. Charcoal has been found of but little use. The question then is, shall we employ an agent which is confessedly an admirable deodorizer, or shall we revert to a system such as that known as the "dry surface system" in which no deodorizer is employed at all, the efficient working of which is entirely dependent on the immediate removal of all evacuations, and their reception in an air-tight vessel? Even Dr. Ross, who most ably urges the obstacles in the way of the practical working of the scheme, admits that "there can be no doubt of the perfect success of the earth system worked on such a plan" as that described by Mr. Mouat.

III. What are the conditions essential to the success of the dry earth system of conservancy?

They are, *first*, that the earth shall be thoroughly dry; *secondly*, that it shall be in a state of fine powder; *thirdly*, that its application shall be immediate; *fourthly*, that it be applied in sufficient quantity. The amount recommended by Mr. Moule, is three half pints, or 2½ lbs., for each use of an earth closet; but by passing the united and dried mass through a large sieve, the quantity, he says, can be greatly economized by being used again and again up to ten times. The exact amount required to deodorize an ordinary evacuation, is a question which has not been dis-

cussed in the various reports with that precision which is desirable. Dr. Ross, who has entered into the subject fully, calculates that 3 lbs. of earth will be required for each evacuation, which he estimates at 1 lb, viz., 11 oz. of urine and five of feces. For each use of the urinal, and he allows three uses per man per diem, he calculates that 2½ lbs. will be requisite. These data seem to have been collected with great care, and may therefore be accepted as generally accurate. *N.B.*, the scrupulous avoidance of all water in cleansing the pans.

IV. In order to secure these essential conditions, what appliances are necessary?

To secure dry earth during the rains is a matter of some difficulty. Most officers recommend that, for use in this season, it should be stored in buildings erected for the purpose. But independent of the expense of such an arrangement, would the earth so stored be sufficiently dry? When the atmosphere is loaded with moisture, sufficient dryness even inside a house could not be secured; and it is believed that earth dug from a few feet below the surface of the soil, will be quite as dry as any that may have been stored. In the shape of sun-burnt bricks piled up under cover, the storage might perhaps be most efficiently carried out; but even this plan could not be regarded as perfect. To secure really dry earth during the rainy season, it must be daily heated, and means might easily be arranged for this purpose; at other seasons there is no difficulty. Dr. Beatson, General Hospital, Allahabad, finds no difficulty in the rains in drying the quantity required for daily use, by placing the earth in a *naund* supported on a few bricks, and supplying fuel from wood saved in the cooking.

In order that the earth may be in a state of fine powder it must be beaten and then sifted. For these operations short mallets and sieves would be required.

To secure its immediate application, and that in sufficient quantity, is one of the difficulties urged and presently to be considered. A scoop made so as to contain a certain fixed quantity, is essential. Boxes to hold earth for use within the latrines have been generally recommended, but small enclosures made of *kutchu* masonry would answer the same purpose, be more durable and less expensive. One should be allowed to every three pans.

The scrupulous avoidance of water is a greater difficulty than would at first sight appear. The sweepers, unless narrowly watched, insist on its use. In their estimation the pans cannot be cleansed without it, and every drop used is detrimental.

In addition to the mallets, sieves and receptacles for the earth, a scraper should be allowed to each sweeper to assist in cleansing the pans, and a cart or carts provided for carrying off the sewage, and bringing back a fresh supply of earth.

V. Assuming then that "earth sewage" is the most perfect system of conservancy yet introduced, are there any practical obstacles in the way of its general adoption in British Regiments, and if so, to what extent?

The difficulties which have been urged are, *first*, that in some cases earth is not to be had. This is a difficulty which can be felt only in a Presidency town. In no station in the Provinces can it occur, and the special position of Calcutta in this respect need not be considered in discussing the general adaptability of the system.

The necessity of storing the earth in the rains is the next obstacle which has been urged; but this proposal would appear to have been made under a misconception of the results that would be so obtained, and to have been disposed of in a preceding paragraph.

Next, it is objected that the European soldier cannot be induced himself to apply the earth after rising from the seat. Printed notices have been hung up in the latrines, and Non-Commissioned Officers have pointed out what was required and the advantage of the system, but in vain. It has always been found necessary to place a sweeper in attendance for the purpose. But although it would be better if the soldier could be induced to attend to such a simple matter, the earth system does not thereby labor under any peculiar disadvantage. The "dry surface" system requires the constant presence of a mehter to remove and empty the pan as soon as it has been used. Practically therefore the only difference is that, in one case, he remains outside the latrine, and in the other, waits in the passage.

But an arrangement might easily be devised similar to the hopper described by Mr. Moule as part of his earth-closet. If this were of simple construction, and placed so as to be under charge and command of the sweeper, the end would be attained without the necessity of his being inside the privy—a necessity which must be disagreeable to the soldier.

But lastly, it is objected—and this is the real difficulty to be considered and met—that the addition of earth will so increase the weight of the resultant mass, that practically the scheme cannot be carried out without a large increase to the present establishments.

While acknowledging this difficulty to a certain extent, it is at the same time to be remarked that not a few Officers have reported that no such difficulty has been experienced, and that the dry earth system has been carried out by them, and carried out well, without any increase of establishment. It requires no demonstration however that the addition of earth, at least in the urinals, must largely increase the weight, and therefore either the carriage must have been more than was required under the old system, or it must be inadequate for the new.

To what extent is the sewage increased by the earth supplied in proper quantities? Dr. Ross has so fully entered into this question, that the Commission cannot do better than avail itself of his data. In his further report of the 3rd October 1864, he estimates that each man will use the latrine once per diem; that this evacuation will consist of 1 lb weight, 11 oz. being fluid and 5 solid; that on an average, 3 lbs. of dry earth will be required for each such evacuation (more being needed in the wet weather than in the dry); that for 910 men there will thus be required for the *latrines alone* 34 maunds and 1 seer of dry earth per diem; and that there will be a resultant mass of 45 maunds and 5 seers of sewage to be removed every 24 hours.

As regards the urinals, he observes that the evil is still greater. Allowing 39 ounces to be passed by each of 910 men in 24 hours, and to be passed at three different times, and each time 2½ lbs. of dry earth to be needed, the result will be that 76 maunds of fresh earth will be required daily, and that 98 maunds of sewage would have to be carried away.

That altogether, therefore, for a Regiment of 910 men, 110 maunds of dry earth will be requisite, and the total sewage to be removed will amount daily to the enormous quantity of 143 maunds and 5 seers, and that leaving the women and children altogether out of the calculation.

Independent of this, moreover, Dr. Ross urges that unless the pans are immediately emptied, flies collect; and "if the pan be removed directly it is used, where," he asks, "is the gain over the present system?" "On the contrary," he continues, "there is the large weight of earth to bring in, the constant attention required to put it on; moreover the number of receptacles would have to be increased as their present number and size are apportioned to the bulk of the excrementitious matter alone."

In conclusion, he remarks that "he considers the introduction of the earth system to Barrack *latrines* as quite practicable, although he does not see the advantage or utility that would be gained by it."

The Inspector General of Her Majesty's Hospitals has endorsed Surgeon Major Ross' views, and has reported to His Excellency the Commander-in-Chief in his letter, No. 42 of the 23rd February 1865, that "the new system does not appear to have sufficient advantages over the old to make it advisable that Government should incur extra expense in carrying it out."

The quantity of earth estimated by Dr. Ross might, it is believed, be considerably reduced were it daily heated during the rains, as previously recommended; but allowing the figures to stand exactly as he has given them, there is one most important point which he has not alluded to. In comparing the present "dry surface," or, as it might more aptly be called, "wet system," with Mr. Moule's plan, the water used in the former must be taken into account. According to it, each time the pan is used, 2 inches of water are first placed in it, and after use it is cleaned by means of water. What may be estimated as the amount of water so used? Water filled to the depth of 2 inches in a pan, will amount to 2 pints, and allowing $\frac{1}{2}$ a pint for subsequent cleansing, we have a total of 2½ pints of water to each evacuation, equal in weight to 3 lbs. 2 oz.

As regards the latrines, therefore, the comparison between the two systems may be thus stated:—

"Dry surface system."				"Dry earth system."			
	lb.	oz.			lb.	oz.	
Feces...	0	5	...	...	0	5	
Urine ...	0	11	...	...	0	11	
Water ...	3	2	...	...	3	0	
Total ...	4	2	...	...	4	0	

The advantage in the *latrines* is, therefore, in favor of the earth system, as regards the very point in which exception has been taken to it.

But allowing the two results to be exactly equal, the practical question as regards *latrines* is, shall we employ for each evacuation 3lbs of water, every drop of which increases effluvia and the production of noxious gases, or shall we employ 3lbs. of earth, which is a perfect deodorizer, and renders the mass portable and innocuous?

It is urged, however, that the evacuations, under the present system, are at once removed into air-tight receptacles, so that no gases can escape. Theoretically this may be true, but any one who is sceptical on the point, has only to follow in the wake of a Cantonment Conservancy Cart, to satisfy himself that abundant noxious gases are given out and contaminate the air in every direction.

Dr. Ross, who has favored the Commission with his opinion on this point, thinks that practically not more than one pint of water is placed in each pan. But even accepting this and allowing one-fourth more for rinsing the pan, still the extra amount of sewage to be removed per diem under the dry earth system, will amount only to the insignificant quantity of 17 maunds, to remove which and to bring in 34 maunds and 1 seer of fresh earth daily, require very little, if any, extra establishment.

The fact, however, remains that the surface system, as laid down in the Quarter Master General's Circular, renders the resultant mass of sewage from the *latrines* heavier than what it would be under the dry earth system.

As regards the urinals, the difficulty is admitted, and if dry earth be used so as to absorb the whole, the bulk will be enormously increased. The digging and carting of 76 maunds of earth equal to six cart-loads, daily, is a matter of no small expense. And when it is remembered that for use during the rains 420 cart-loads would be required, where is such a quantity to be stored, if storage were the plan adopted, and where would the daily supply be heated and dried? The Commission regrets that it cannot but consider the difficulty as practically insuperable. But it believes that if dry earth were placed under the urinals, if they were of glazed earthenware and of the simplest construction, if they were frequently emptied, and each time before being replaced were rubbed thoroughly dry by means of earth, great benefit would be derived.

Fresh urine has little or no unpleasant or noxious odour. It is the unclean and corroded vessel which renders the urinary foul and unwholesome.

The great object to be attained is, in the Commission's opinion, to deodorize the faeces. They and not the urine would appear to form the centre for spreading cholera and other diseases, and any method of conservancy which fails in deodorizing them, ought not to be allowed to stand. If the modified system of earth sewage, which has been recommended, be adopted in the urinaries, both they and the *latrines* ought to be altogether free of unpleasant odours.

But to carry out any system of conservancy with success, constant and unremitting attention must be directed to it. The Quarter Master of each Regiment should be held strictly responsible that the *latrines* and urinaries are, in every respect, as they should be, and the Officer of the day should satisfy himself that such is the case, by inspecting at least two of these buildings. If they are in the state they should be, then the duty would entail nothing unpleasant; if they reek with offensive smells, then it is all the more requisite that they should be attended to; for is not the first duty of an Officer towards his men to see that they are subjected to no remediable influence which is calculated to injure their health?

The great and only cogent argument against the dry-earth system is that it will cause extra expense; but the modified plan here recommended not only leads to no expense, but may actually effect a saving, for the use of lime and all other so-called disinfectants is done away with, and no deodorizer is used but dry earth, which can be had for nothing and carted in at little or no extra expense.

The use of lime or of any deodorizer except dry earth should be absolutely prohibited.

VI. How ought the sewage to be disposed of? This is a question of very great importance, and one to which the Commission is not yet in a position to give any decisive reply. The manner of the action of dry earth does not yet appear to be definitely understood. Is it mechanical merely, and if so, will the "Poudrette" be as noxious as ever so soon as the mass becomes acted on by water? If the original deodorization by earth be complete before any water is added, then

its presence ought not to have any ill effect—but this is a point on which some observation and experiments are required. At the suggestion of Dr. Mouat, Inspector General of Prisons in Bengal, experiments are now being instituted with a view to determine how long after deodorization the addition of water causes the "Poudrette" to emit any smell, and the result of them will be communicated hereafter. In the meantime the contents of both privies and urinals ought to be removed and buried at a distance from the Barracks as heretofore, the solid and liquid evacuation, however, being as now buried separately.

There are one or two other points on which the Commission would be glad to have experiments instituted,—*first*, as to the best kind of earth to employ; *second*, as to the precise quantity of earth that is needed for each evacuation; *third*, how much dry earth is required to deodorize urine alone? The quantity of organic matter which it contains is but a very small part of the whole, and it ought not to be necessary to absorb the whole in order to produce the desired result,—*fourth*, it is of importance to know what changes take place in the solid and fluid evacuations buried. They should be examined at intervals of a few months and the results reported.

The practical conclusions at which the Commission has arrived with regard to the adoption of the dry earth system in British Regiments may thus be summarized.

1. The amount of dry earth required to absorb the urine of 910 men is so enormous, that the dry system cannot be carried out as regards the urinals. Much benefit, however, may be derived from a layer of earth spread under the vessels placed to receive the urine, by removing the urine frequently and by having the vessels rubbed *thoroughly dry with earth* each time before being replaced. To carry this out a very few maunds would be sufficient.

2. Pans for *latrines* and urinals should invariably be made of glazed earthenware and not of iron, which in time always corrodes and emits unpleasant odours, in spite of all efforts to keep it clean.

The urinals in particular should be of the simplest description,—a number of glazed earthenware vessels raised on a platform for the sake of convenience, and that platform covered with a layer of dry earth. They could be easily and cheaply supplied by the Jails, and the various heads of that Department might be communicated with on this matter. The use of these vessels is not essential to the dry-earth system, but their employment is strongly recommended.

3. That the dry earth system should be rigidly applied to all *latrines*. This the Commission regards as a point of the greatest importance; comparing the two systems the question is simply this,—are we to lay aside an agent which on all hands is admitted to be a perfect deodorizer, and are we, with our eyes open, to employ another agent which actually encourages the evolution of deleterious gases? If we disregard the simple and perfect means placed at our disposal, and which can be adopted at trifling expense, who can tell how much sickness may be thereby occasioned? The question is a most momentous one; even if there be any doubt in the matter, would it not be well to err on the safe side?

4. That a few pans on the patterns suggested by General Travers, and Lieutenant Brandreth, *n. r.*, for separating the urine and faeces in each evacuation, *with certain modifications* should be experimentally tried, and the result reported. If they prove successful, the quantity of dry earth daily required will be materially reduced, in all probability to one-third of what would be necessary in an ordinary pan. For if three lbs. of earth are enough for urine and faeces combined, one lb. will certainly answer for the solid evacuation by itself.

5. That a hopper, if possible, be fitted to each pan on the principle suggested in a preceding paragraph, so that the necessity for the immediate presence of the sweeper inside the latrine, may be done away with.

6. That the pans in the *latrines* be provided with covers, but that if this is not found sufficient to prevent the collection of flies, the pan be emptied each time it is used. The dry earth system, does not lay claim to save labor, but to efficiency in preventing the escape of noxious gas.

7. That the following appliances are necessary:—small mallets and sieves for preparing the dry earth, two of each being allowed to each latrine; for every three pans, a scoop so made as to contain exactly $1\frac{1}{2}$ lbs. of earth; one scoopful before and one after each use make a total of $2\frac{1}{2}$ lbs. for each evacuation; and should more be required, it can be added afterwards. Receptacles capa-

ble of containing twenty-four hours' supply for every three pans should also be made of *kutchha* masonry; they should not be wider than actually needed to allow the use of a scoop, the bowl of which should be at right angles to the shaft. Earth is much more likely to keep dry if kept in a deep layer, than if spread out exposed to the atmosphere. A scraper for each sweeper.

8. That means be devised for drying the earth daily required during the rains. It is then, of all times, most important that the earth should be dry, and the system efficiently worked.

9. That vessels as air-tight as possible continue to be provided for the temporary reception and removal of both urine and dry earth deodorized feces. For the latter they may in time be dispensed with, and the expense of these receptacles saved. They should be thoroughly rubbed with dry earth daily.

10. That the soil be removed to a distance from the Barracks, and that the solid and fluid evacuation be buried as hitherto in separate pits.

Hereafter it is hoped that experience will warrant the use of both, to a certain extent, in the soldiers' gardens; but in the meantime no doubtful experiment should be tried. How far "Poudrette" and urine can be immediately utilized in agriculture without any bad sanitary consequences, is now being tried in several of the jails of the North-Western Provinces, and should the attempt prove successful, as it promises to do, then the Natives will in time learn the value of such manure, and be glad, if not to pay for it, at least to remove it at their own cost.

11. In order to carry out these recommendations, the present buildings used as latrines need no alteration.

12. The question of the number of filth carts and receptacles to be allowed under any system of conservancy, is now under the consideration of the Commission, and a report on this subject will be submitted as soon as it is known what system of conservancy is to be adopted. Even if the scale recommended should be found insufficient for carrying out the dry earth system, the addition of one sweeper bildar, and one cart, would be amply sufficient, and this could be provided at the small extra cost of Rupees 250 per annum for a British Regiment of Infantry. Should extra wood be required to heat the dry earth during the rains, the cost of this would for three months be insignificant.

13. Should the system be introduced, a code of rules will be required in order to secure its being strictly carried out.

Major Lumsden, Deputy Quarter Master General, who attended the Meeting of the Commission at which this subject was discussed, on the part of the Quarter Master General, concurs in the above remarks and recommendations.

SIMLA,
2nd September 1865.

(Signed) J. STRACHEY, President,
Sanitary Commission for Bengal.

NOTE to be added to the Report by the Sanitary Commission for Bengal, on Earth Sewage as applicable to British Regiments.

Since the Report was written, it has come to the knowledge of the Commission that two bheesties are allowed to each Battery of Horse and Light Field Artillery, and one to each Battery of Heavy Field or Garrison Artillery, to each Troop of Cavalry, and to each Company of Infantry, for the express purpose of scouring the drains, privies, &c. As the privies under the dry earth system ought not to be cleansed in any manner with water, the services of at least some of these men might be dispensed with. Taking a Regiment of Infantry as the example which has been followed in the Report, the Commission believes that five bheesties might be discharged, were the scheme of sewage adopted which has been recommended. This would give a saving of Rupees 25 per mensem, or Rupees 300 per annum—Rupees 50 more than the greatest possible expense which the modified earth system would entail. It remains to be seen whether any extra cart or bildar sweeper will really be needed.

JOHN STRACHEY, President,
Sanitary Commission for Bengal.

ORDER, No. 387, 29th January 1866.

Ordered that the foregoing letter and enclosure from the Government of India be communicated to the Commander-in-Chief, Sanitary Commission and Departments concerned.

2. The Governor in Council is of opinion that the proposed experimental trial to determine the supply of carts, receptacles, &c., required to carry into effect the dry earth system, should be undertaken also in this Presidency, at one or two stations occupied by European Troops as His Excellency the Commander-in-Chief may select, the result being reported for the information of Government.

Proceedings of Government, Nos. 2629, 15th July and 2991, 12th August 1865.

3. It is observed, with regard to paragraph 4, that a description of hopper has been sanctioned for trial here.

4. With reference to the application submitted by the Quarter Master General in memorandum, No. $\frac{555}{2107}$, above recorded, the Governor in Council considers that it will be preferable to introduce the dry earth system for the European portion attached to the Sappers and Miners—the establishment required being provided under the sanction in paragraph 2 of this Order.

(True Extract.)

Hamilton Cof
Deputy Secretary to Government.

To the Quarter Master General.

- .. Controller of Military Accounts, with 3 enclosures.
- .. President Sanitary Commission.
- .. Commissary General, with indent in triplicate.
- .. Military Accountant.
- .. Examiner Pay Department.
- .. Examiner of Commissariat Accounts.
- .. Barrack Master, Presidency,.....
- .. Adjutant General,.....
- .. Principal Inspector General Medical Department,.....
- .. Inspector General of Ordnance,.....

for information.

Public Works Department With 10 spare Copies.

Ed. T. Stubbs.

18th Aug A. 1865-2397

13th 7th 1866 Dep't
Pro. of Govt. for February
No. 433.

No. of Govt. in the
Mil'y Dep't
of 29 Jan'y 1866
Feb 4

No. 387

with orders,
certain correspondence
relative to the proposed
experimental trial to de-
termine the supply of
cartage required to carry
out the dry earth sec-
-orage system.

No. 107.108

with an order
No. 427-30 July 1866

List

Spent 8th 1865 }
2nd 1866 }
1866 }

Judge Engineers

Comd'g the

1867

1866

255

Staff 8th 1866