

C.E. No 3047 of 16-12-81

P. W. DEPARTMENT-1879-80.

MEMORANDUM.

Current No. _____

Office Note
Letter Number 939

dated the 13 Dec 1881

from the Supg. Engineer of Sar P. W. A.

The Chief Engineer
has the honor to request
that the Supg. Engr.
3 Circle will be good
4 Circle
enough to report where
he would wish the
head quarters of the
C Project Division
B
be located -
(By order)

Cy

15.12.81

Dr. S. W.

To the S. S. 3 Circle
u - 4 Circle

10/1/82

10/1/82

Supg. Engineer's Office, 4 Circle.
Camp Sholaghermy, 19 Dec 1881.

No. 557

From, The Superintending Engineer
4 Circle.

To, The Chief Engineer
P. W. D. Madras.

Sir,
In reply to your Memo No. 3047
dated 16 Dec 1881, I have the honor to
inform you that I have already been
in communication with the Chief Engineer
for Irrigation regarding the Head Quarters
of the B. Project Division and that for
the present it is located at Baroor and
I propose it shall be remain there until
the out door work and field work of that
Project is completed and as soon as this
is done I propose removing it to Tripatore
where I believe accommodation can
be obtained on reasonable terms. Tripatore
is conveniently situated for the Salem
Projects (Maramdabully the Veniar
and

and Krishnagerry) it is a post town
and situated on the line of Railroad.

As soon as these Projects are completed
which I hope will be in about 2 months
time (except the Krishnagerry where
boring and careful examination of
the site is necessary before anything
can be done) Should no other Project
be taken up in Salem and I much
fear there is no hope of any I propose
that the Head quarters shall be at
Coimbatore.

Should the above meet your approval
I will move the Head quarters to
Tripatore on about the 15th January '82
reporting the same leaving for the
present the further change to Coimbatore
to be settled hereafter.

I have the honor to be,

Sir,
Your most O^bl. Servant

M. M. M. — Major M. E.

Supg. Engineer, 4th Circle.

Bel^o 47 Waf 7th January 1882.

From

The Superintending Engineer,
Fourth Circle.

The Head Quarters
of the B Project
Division will for the
present be fixed at
Baroor. Hence they
may be removed to
Coimbatore about the
15th January next
as suggested by the
Supg. Engineer.

22.12.81

Attt

22.12.81

C.E. for I ✓

S.E. 4 Circle ✓

Exor. P.W. D. ✓ Perused
18/1/82 7-1-82

Bel^o 47 Waf 7th January 1882.

Dated 19th } Decr. 81.
Recd: 21st }

No. 554

Head Quarters of B.
Project Division: -

Informing that the
— is at Baroor at
present, and that it
will remain there until
the out-door & field
work is completed,
after which it will
be removed to Tirupatūr.

Subd. in Receipt Regd.

19TH DECEMBER 1882, No. 3360 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

General
Establishment.

No. 137.

READ—the following letter from Colonel J. BEATTY, R.E., Superintending Engineer, Fourth Circle, to the Chief Engineer for Irrigation, dated Camp, Gudiyátam, 20th November 1882, No. 189:—

As the surveys and levels for the Vaniar and Krishnagiri Reservoir Projects are now complete, I have the honor to request your sanction to the transfer of the head-quarters of the B. Project Division from Tirupatūr to Coimbatore.

2. I may mention that the plans, estimates, &c., of the Marandahully Project are in my hands, and I hope to forward them to you shortly.

3. Lieutenant Romilly is to rejoin the division from privilege leave on the 1st December.

No. 138.

ORDER—dated 19th December 1882, No. 3360 W., Public Works.

The transfer of the head-quarters of the B. Project Division from Tirupatūr to Coimbatore is sanctioned.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, Fourth Circle.
" Chief Engineer for Irrigation.
" Examiner, Public Works Accounts.

Exd. S. T. Austin.
Spare Copies

GENERAL.
ESTABLISHMENT.

Govt. of (1882) Madras
PUBLIC WORKS.

Dated December, 19th.

Recd.

Encl.

G.O., 19th Dec. 1882, No. 3360 W.

DECEMBER.
Nos. 137-138.

B. Project Division.

The head-quarters of the — transferred
from Tirpatūr to Coimbatore.

No. 17

From,

Supg. Engineer's office IV Circle
Coimbatore, 15th January 1883.

The Superintending Engineer
IV Circle

To,

The Chief Engineer
P.W. Department

Sir,

The transfer of the Head Quarters
of the B Project Division from Tirpatūr to
Coimbatore having been sanctioned in G.O.
No. 3360 W of 19th Dec. 1882, I have the honor
to request you will be so good as to obtain
the sanction of Government to hire a lunga-
law on a monthly rent of Rs 45 per men-
-sem for the accommodation of the office,
there being no room available in the Supg.
Engineer's or Division Offices for the purpose.
I may also mention that house rent is
always high in Coimbatore and that
there is now only one lungalaw vacant
so that the Project Officer has no
choice.

3360 W

J

I have the honor to be

Sir

Your most obt^l servant

L. Beatty - Col: TPE
Supt: Engineer IV. Cich

LB

R. No. 794 of 19-1-83

No 1072 of 18 Jan/83
To C

For record

Chl

No. 870
22-1-83
W. 18/1/83 Dg. W.

No objection from this office
point of view. It is within the
powers of Govt. to sanction the
change. vide G.O. No. 302 Wd/3/2/51.

Agd.
22/1/83
Ag. C.

B. No. 2727 H. 26-11-80
2728

" 302. H. 3-2-81

" 47. H. 7-1-82

Ex. 33 H. 19-12-82

Ch. No. 3047-16-12-82

RECEIVED
19 JAN 83

From

The Supg. Engineer,
Fourth Circle.

Dated 15th Jan: 1983.
Desd: 17th

No. 17.

No. 274 W of 24-1-83

B. Project Division:-

Requesting to
obtain sanction of Govt.
to hire a Bungalow on
a monthly rent of
Rs. 45 per mensem for
the accommodation
of the office of the—

To

No 274 W of 24 Jan/83
Public Works Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following

Letter from the Supg. Engineer,
Fourth Circle } H. E. No 17 d/15th January/83
office note from the S^r }
P. W. Secy } 870 of 22nd

The hire of a
house in Coimbatore
at Rs 45/ per mensem
as an office for P. W. Project
Division is sanctioned.

S. V.

Chl
23/1/83

Sept 25/1/83
The Supg. Engineer, Fourth Circle
" Enamur, P. W. Secy

P 12401 11/11/01

RECEIVED

W. C. 6/17

Govt. of (1882) Madras.
PUBLIC.

No 275 w of 24 Jan 1883
Communicated to
Suptg. Supp. Commr.

D 23/1

Att

23/1/83

No 274 w of 24. 1. 83

Issued

Recd. 23/1/83

Encl.

G.O., &c., 30th December 1882,
Nos. 1652, 1652-A.

DECEMBER.

No 275 w of 24-1-83

Co 2845. 11. 30. 10. 82
Dup. $\frac{45}{2846. 11}$ 30. 10. 82

Sanitation.

Passing orders on despatch from Secretary of State, forwarding copies of a memorandum by the Army Sanitary Commission on the report of the Sanitary Commissioner, Madras, for 1880.

S. Es

Recd. 25/1/83

Entd. in Receipt Rep.

W. C. 6/17
Entd. in Receipt Rep.

Entd. in Receipt Repr.

The different divisions of the city yielded the following varieties of death-rates:—

Divisions.						Population.	Death-ratio per 1,000.
VI.	...	...	...	...	...	19,390	17.2
V.	...	...	...	...	...	65,491	31.9
VIII.	...	...	...	...	...	41,482	33.9
III.	...	...	...	...	...	52,545	34.4
I.	...	...	...	...	...	65,121	36.6
IV.	...	...	...	...	...	9,791	37.6
II.	...	...	...	...	...	73,738	38.8
VII.	...	...	...	...	...	69,568	39.4

This abstract gives a better idea of the general sanitary state of Madras than does the death-ratio taken over the whole area, but as each division contains a number of villages, it is only by comparing the death-rates of villages with the general average death-rate that the real practical facts of the case become apparent. The village death-rates of course vary from year to year, but we shall take those for 1880 for our present purpose.

The average death-rate for Madras in this year was, as has been already stated, 36.7 per 1,000. Of village rates exceeding this proportion the following may be cited:—

Villages.						Population.	Death-ratio per 1,000.
Chintadripettah	...	...	...	...	...	15,120	38.3
Royapettah	...	...	...	...	...	5,255	39.5
Pursewalkum	...	...	...	...	...	19,006	39.1
Peddoo Naickpettah	...	...	...	...	...	65,639	43.4
Poodoopettah	...	...	...	...	...	3,774	45.5
Triplicane	...	...	...	...	...	33,258	45.7
Perambú	...	...	...	...	...	5,650	53.0
Meersaibpettah	...	...	...	...	...	2,050	57.5
Moothealpettah and Uttapaulum	...	...	...	...	...	40,957	56.3
Ráyapuram	...	...	...	...	...	11,089	60.7

The chief causes of these great losses of life in 1880 were endemic diseases, fevers, diarrhoeas, dysenteries, &c.

These village death-rates give in a few lines the Madras sanitary problem in a non-epidemic year, and, like similar village facts all over India, they point directly to foul undrained subsoil, imperfect cleansing, and bad water as their removable causes.

3. We shall next show what has been done in the course of past years to prevent these great losses of life, and what steps are now being taken in the same direction. In the first place, although the facts have been known for many years, and although two separate surveys, reports, and drainage schemes have been before the Municipal Commissioners, not a single step, so far as can be learned from the Report, has been taken either to drain the villages or to cleanse the subsoil. The Commissioners have simply pleaded poverty, and there the matter has ended.

4. The latest aspect which the drainage question has assumed is simply adjournment *sine die*, and the adoption of a system of surface concrete channels, intended not only for removing rainfall, which is their proper function, but to receive house and court sewage, and to leave the foul subsoil as it is.

In a report given in the present year's proceedings, Colonel Sankey, R.E., Public Works Department, makes the following remarks on this scheme:—"It is impossible to overlook or disguise the fact that there may be the most perfect system for removing all offensive matter from the point at which such is discharged into the street drains, while there may exist side by side with this complete system a state of house-drains that may be little less than poisonous. It is not of course proved that such is really the case in Madras, but if not (and there is nothing to the contrary in the Report), the Native houses and courtyards must be in a very different state from what they are in all other Native towns where, away from all view, sewage is allowed to sink into the ground of the little back-yards, and produces a rotten soil, the effects of which

cannot in any way be remedied by the most scrupulous cleanliness of the street drains outside. If a thoroughly healthy state of things is to be produced in Madras, and not merely a palliative, this fact must be looked fairly in the face." In these views we entirely concur. On the question of economy, Colonel Sankey says, "It is not to be supposed that a mere skin of cement one-fourth of an inch in thickness can for a long series of years resist, not only the corroding action of the sewage acids, but the endless sources of injury to which town drains are subjected," and he proposes to substitute V-shaped drains of stone.

5. The Report under review does not contain any Officer of Health's Report on the court-yards, but in our Memorandum on the Report of the Sanitary Commissioner for Madras we have quoted part of a Report by the Commissioner which reveals a condition of matters in these courtyards absolutely incredible. And Mr. Jones, the proposer of the surface drainage scheme, now tells us, that "the house drainage itself is one of the most important sanitary questions, but its improvement forms no part of my scheme," which is simply a tacit confession that, after this surface drainage work is completed, the sanitary state of Madras will remain precisely what it now is, as shown by the deplorable village death-rates we have given above.

Such being the case, we would strongly urge the inexpediency of wasting money upon the incomplete and unsatisfactory surface drainage plan now in process of execution, which does not fulfil any conditions of a proper drainage system, and we would recommend at the same time that a complete system of town and house drainage in combination with an improved and extended water-supply for removing house sewage, separately from the rainfall, be at once adopted.

6. *Water-supply.*—Little or no improvement appears to have been effected in this important element during the year. The population of Madras exceeds 400,000, while the Report estimates that only half this number uses the pipe water. The remainder must of necessity use the impure subsoil well water. The estimated amount of pipe water-supply is 14.2 gallons per head per diem for those who use it. The following approximate analysis shows the character of the Red Hill water after it arrives in Madras:—

										Grains per Gallon.
Total solids	...	...	...	...	...	...	...	...	...	14.70
Volatile solids	...	...	...	...	...	...	...	...	...	4.90
Sodium chloride	...	...	...	...	...	...	...	...	...	5.32
Total hardness	...	...	...	...	...	...	...	...	...	6.65
Free ammonia	...	...	...	...	...	...	...	...	...	0.025
Albumenoid ammonia	...	...	...	...	...	...	...	...	...	0.028
Nitric acid as ammonia	...	...	...	...	...	...	...	...	...	0.336

The water contains a large proportion of organic matter and numerous large infusoria and other evidences of organic impurity.

The pipes collect silt, which has to be washed out by a scour. During one of these operations it is stated that, "a piece of iron 16 inches in area was forced out of the pipe." Much impurity in the water appears to be derived from the open channel by which the Red Hill water is conveyed to the city, in reference to which the following remark occurs:—"Its bed is still in an uneven state, and this cannot be rectified without a very large expenditure of money, or without shutting off the supply from Madras for some considerable time."

Practically this conclusion amounts to a statement that, notwithstanding the present advanced state of practical engineering, and the real economy of a good water-supply, nothing can be done to remedy the present deplorable condition of the water-supply of Madras.

7. *Conservancy.*—The work done under this head is the most satisfactory of the year's proceedings, and the Report states that, "it is by no means complete, and a very great deal remains to be done." The present cleansing staff consists of 1,068 coolies and 504 carts, at a cost for 1880 of 21,761*l*. Part of the house sewage is removed separately and part is taken by rubbish carts, so that the costs of street and house cleansing cannot be separated. There can be little doubt that the great death-rates in some of the villages point to want of thorough removal of house sewage and growing impurity in the subsoil and subsoil well water in consequence. If the cleansing were better accomplished its cost would probably considerably exceed the whole present conservancy outlay, and it would be a moderate estimate to place this cost at 20,000*l*. a year, a sum which, if capitalized at 5 per cent., would enable a capital of 400,000*l*. to be spent on drainage and water-supply works.

8. Year after year we have called attention to the state of Madras, and up to the present time nothing effectual has been done to protect the people of this large Presidency capital from the enormous death-rates which prevail in it. Only palliatives, such as the present Black Town surface drainage scheme, have been tried. Under the circumstances we consider it to be quite useless to make any detailed recommendations, and we would rather conclude with a similar suggestion to the one already made by us in our Memorandum on the Report of the Madras Sanitary Commissioner, viz., that as it is apparently a hopeless matter to expect any improvement from the present Municipal administration, the whole subject should be taken in hand by the Govern-

ment of Madras Presidency, and the works required for the protection of the people from well-known local disease and death-causes should be carried out as speedily as possible.

18th April 1882.

No. 567.

Referred to the President, Madras Municipality, for his early remarks.

OOTACAMUND,
14th July 1882.

(Signed) G. S. FORBES,
Acting Under Secretary.

No. 201-A.

From A. T. ARUNDEL, Esq., President, Municipal Commission, to the Chief Secretary to Government, dated Madras, 4th August 1882, G. No. 566.

I have the honor, as requested, to submit my remarks on the memorandum of the Army Sanitary Commission on the Report of the Madras Municipality for 1880, a memorandum upon the perusal of which the Right Honorable the Secretary of State has requested a special report "on the sanitary conditions prevailing in the Presidency town to which there is apparently no prospect of a remedy being applied by any action of the Municipality."

2. I will first examine the memorandum of the Army Sanitary Commission, and then do myself the honor to explain the present conditions and future prospects of the Municipality in regard to sanitation, conservancy, and water-supply.

3. With regard to the first point, I have to premise that the Army Sanitary Commission have advanced certain statements which are not only incorrect, but also at variance with the facts detailed in the report that lay before them.

This I shall now proceed to prove.

4. In paragraph 3 of the memorandum, the Army Sanitary Commission state " * * In the first place, although the facts have been known for many years, and although two separate surveys, reports, and drainage schemes have been before the Municipal Commissioners, not a single step, so far as can be learned from the Report, has been taken either to drain the villages or to cleanse the subsoil. The Commissioners have simply pleaded poverty, and there the matter has ended." Apart from the question of cleansing the subsoil, of which more anon, I must demur to the statement of the Army Sanitary Commission, and assert on the contrary that the Report narrates the various steps that were taken towards the drainage of the most important of the villages of Madras, viz., those* that unitedly form what is known as Black Town.

* Peddunaikpettah.
Big Pareherry.
John Pereira's Gardens.
Moothealpettah.
Uttapauliam.

The Madras Municipal Report for 1880 (before the Army Sanitary Commission) stated, paragraph 7, "In the course of the year under report the Vice-President, Mr. Jones, successfully completed an experimental section to illustrate the method he will adopt in carrying out the drainage of Black Town * * *"

"The section of drainage thus completed was examined by His Grace the Duke of Buckingham and by His Excellency the late Mr. Adam, and the approval expressed by the Governors personally has been recorded by Government. The scheme for the drainage of the whole of Black Town has been prepared; and it may be noted that at the date of writing this Report, application has been made to the Government for a loan of one lakh to commence the work."

In another part of the Report (Appendix IV) the following remarks by Colonel Sankey, the Chief Engineer, Public Works Department, appear:—"In G.O. of 27th October 1879, No. 2698 W., it was observed that arrangements would be made to place at disposal an officer of this department for investigating Mr. Jones' scheme for the drainage of Black Town, Madras. Captain Awdry, the officer selected, has

reported the results of his examination in his letter * * and as the detailed report on the scheme itself has now been furnished by the President, Municipal Board, the matter is ripe for the decision of Government * *."

2. Owing to the inherent difficulties of the question itself * * * the details of this scheme have been subjected to more prolonged professional investigation and discussion than probably any other of a similar kind in India * * *"

4. In doing this and availing himself of the best points of the schemes of his predecessors, especially those of Major Tulloch, R.E.,* and the late Mr. Clarke, Mr. Jones has shown a wise discretion, and has produced a scheme which in its

general outlines solves to all appearances the question in the best possible way * *." So much in disproof of the statement of the Army Sanitary Commission that "not a single step so far as can be learned from the Report has been taken * to drain the villages * *."

5. In paragraph 4 the Army Sanitary Commission quote paragraphs 8, 9 and 10 of Colonel Sankey's remarks, as to the absolute necessity of a complete system of house-drains and backyard-drains in conjunction with the system of street-drains, paragraph 10 ending thus—

"If a thoroughly healthy state of things is to be produced in Madras and not merely a palliative, this fact must be looked fairly in the face." The Army Sanitary Commission remark, "In these views we entirely concur." They omit to quote or refer to paragraphs 7 and 12 of the same remarks which are as follow:—

"7. The house connections and disposal of the liquid portions of the house-refuse are dealt with in paragraphs 21 to 24 and 61 to 64 of Mr. Jones' Report, from which it will be seen that by the extremely small outlay of Rs. 2 per tenant he hopes to deal in a sufficiently satisfactory manner with this, which after all is probably by far the most important, as it is certainly the most difficult, portion of any scheme for draining a native town.

"8. }
"9. } Quoted by the Army Sanitary Commission.
"10. }
"11. } * * *

"12. From the nature of the case connected as it is more or less intimately with the private concerns of individuals, and not a little with caste prejudices, the question cannot be dealt with entirely as one of constructive devices (though of course these must be as perfect as the nature of the case admits), but must go very much further, and enlist the co-operation of all concerned; it is a matter which, though calling apparently for early and serious attention on the part of the President and Municipal Engineer in connection with this scheme, need not be further remarked on here."

It will be seen that a perusal of the passage now added from Colonel Sankey's note are essential in order to understand the drift of the whole.

6. In paragraph 5 of their memorandum, the Army Sanitary Commission have quoted a portion only of a sentence by the Municipal Engineer, Mr. Jones, omitting the remainder which contradicts their inference. They write, "And Mr. Jones, the proposer of the surface drainage scheme, now tells us that 'the house drainage itself is one of the most important of sanitary questions, but its improvement forms no part of my scheme,' which is simply a tacit confession that after this surface drainage work is completed, the sanitary state of Madras will remain precisely what it now is, as shown by the deplorable village death-rates we have given above." What Mr. Jones actually wrote was this:—"The house drainage itself is one of the most important of sanitary questions, but its improvement forms no part of my scheme,

as such expense under the Municipal Act falls on the owner and not on the general public,* and it is only when the house-drains become a public nuisance, which they do at the junctions with the street-

drains, that I have endeavoured to improve matters." Mr. Jones goes on in the next sentence to add, "The inspection and improvement of house-drainage is urgently

called for, and it was my intention to request that one or two Inspectors should be appointed, whose sole duty it would be to report as to each house-drain, and when defective to urge their reconstruction on the owners and undertake the work ourselves at their cost when they neglected to do so * * * It is needless to say more in contravention of the charge thus made by the Army Sanitary Commission against the Municipal Engineer.

7. The Army Sanitary Commission conclude paragraph 5 as follows :—

"Such being the case we would strongly urge the inexpediency of wasting money upon the incomplete and unsatisfactory surface drainage plan now in process of execution, which does not fulfil any conditions of a proper drainage system, and we would recommend at the same time that a complete system of town and house drainage in combination, with an improved and extended water-supply for removing house sewage, separately from the rainfall, be at once adopted."

On this I would remark that the system of drainage thus condemned by the Army Sanitary Commission has been approved not only by the professional Engineer who framed it, but also by Captain Awdry, R.E., and Colonel Sankey, R.E., the latter of whom states, as already quoted, that "the details of this scheme have been subjected to more prolonged professional investigation and discussion than probably any other of a similar kind in India," and that Mr. Jones has "exercised a wise discretion in availing himself of the best points of the schemes of his predecessors, especially of Major Tulloch, R.E., and the late Mr. Clarke." It has been approved also by the Municipal Commissioners guided by the professional advice above quoted. An experimental section has been completed and examined in person with approval by two different Governors of the Madras Presidency, and finally the scheme has received the formal sanction of the Madras Government itself.

8. It seems scarcely credible that the Army Sanitary Commission should have taken upon themselves to condemn without reservation a system of drainage thus endorsed by the highest professional and official authority in the Madras Presidency without procuring and perusing a copy of the drainage scheme report itself. Yet this, it would appear, must be the case, for had the Army Sanitary Commission examined the pages of the Drainage Scheme Report they would have found not merely the letter press account of the method proposed for the drainage of the internal courts and yards of houses (which they declare to be entirely overlooked), but also a large wood-cut giving a sectional view of the interior of a native house and of the way in which such a house would be drained.

9. In paragraph 6 of their memorandum the Army Sanitary Commission discuss the water-supply of Madras. I do not propose to do more than to state, first, that the sum of Rs. 2,50,000 is now being expended in extending the Red Hills water to those parts of Madras intended to be supplied, and, second, that the Commission seem to be under a most erroneous impression that all subsoil well water in Madras is impure. So far is this from being the case, that the best drinking water is always procured from wells—not of course in densely crowded localities—and not from the Red Hills pipes.

10. In paragraph 7 the Army Sanitary Commission discuss conservancy and conclude as follows :—

"If the cleansing were better accomplished its cost would probably considerably exceed the whole present conservancy outlay, and it would be a moderate estimate to place this cost at 20,000% a-year, a sum which if capitalized at 5 per cent. would enable a capital of 400,000% to be spent on drainage and water-supply works."

It is difficult to discuss gravely so singular a proposition. It means the abolition of the whole existing staff and means of street and house conservancy, comprising over 500 carts and 1,000 men, in order to raise capital to carry out a system of drainage which the Government of Madras no less than the Municipal Commissioners consider unadvisable. London itself, with all its excellent drainage, would be a sorry city if the proposal now made were tried there—every dust-bin and filth heap left untouched, and every dirt and mud cart abolished.

11. In the concluding paragraph of their memorandum the Army Sanitary Commission state, " * * that as it is apparently a hopeless matter to expect any improvement from the present Municipal Administration, the whole subject should be taken in hand by the Government of Madras Presidency, and the works required to protect the people from well-known local disease and death-causes should be carried out as speedily as possible." As I have already shown that every step taken by the Municipal Commissioners has been with express approval and countenance of the Madras Government, it is needless for me to do more than to leave this final accusation of the Army Sanitary Commission to be dealt with by Government, while for convenience of reference I note the following Proceedings of Government discussing and sanctioning the project :—

G.O., No. 1212,	dated	11th July	1878.
" "	1506,	"	6th August 1879.
" "	2698, W.,	"	27th October "
" "	3351, W.,	"	27th December "
" "	1344,	"	6th September 1880.
" "	2953,	"	28th December "
" "	744,	"	27th April 1881.
" "	1199,	"	27th June "
" "	1569,	"	27th August "
" "	1821,	"	28th September "
" "	2503,	"	23rd December "

12. I now beg leave to indicate the actual condition and future prospects of the City of Madras as regards sanitation, conservancy, and water-supply.

13. The drainage scheme for Black Town has been completed and the work is in progress. Black Town is the largest and most densely populated of the numerous towns and villages that form the aggregate called City of Madras. The City of Madras covers 27 square miles, with a population of 406,000. The area of Black Town is 1.65 miles and the population is 128,700. The scheme provides for carrying off all the liquid sewage from the houses and streets by surface drains wherever surface drains will answer the purpose, and by covered or under-ground drains elsewhere. The courts and yards of the houses will be connected with street drains under professional supervision, at the cost of the owners, by means of covered drains passing through or under the houses. The street drains will be flushed from the water pipes and will discharge their contents into three large underground sewers which will meet at a pumping station, whence the whole sewage will be forced first through a closed iron pipe over a mile in length, and then in an open channel to a large sewage farm north of the town, or into the sea, as may be desired.

14. It is not proposed by this system to drain the subsoil. No scheme yet proposed for Madras has provided for more than the most rudimentary and imperfect drainage of subsoil. Where the courts and yards are flagged the surface drain and the closed drain will each keep the yard dry, but the surface drain is preferred in this tropical climate. Where the yards are unpaved no subsoil drainage is complete unless sufficient to drain the whole area. No such scheme has ever been designed for Madras. Mr. Clarke's proposals in this respect were limited and scanty, while Major Tulloch made no provision for it at all. The subsoil is sandy almost every where in Black Town, and the ground is not water logged. Subsoil drainage cannot be effected without enormous expenditure which it is impossible for the Municipality to incur, and meanwhile the professional advisers of Government and of the Municipality consider it the immediate duty of the Commissioners to provide for the daily removal of all the liquid filth and sewage in the manner above described. The cost of the present scheme of drainage will be about Rs. 8,00,000, Rs. 1,00,000 is being spent this year, and about Rs. 3,00,000 more will, I hope, be spent in 1883.

15. There remain however other densely populated parts of Madras which are so imperfectly drained that completely new schemes must be formed and carried out for each of them. These with the approximate cost, &c., of each are as follows :—

	Area.	Population.	Cost.
	MILES.	NO.	RS.
Ráyapuram	0.84	52,000	1,40,000
Choolay and Vepery	1.0	33,000	1,20,000
Pursewakam	0.65	16,000	60,000
Triplicane and Chintadripettah	1.48	63,000	3,20,000
St. Thomé	.96	20,000	80,000
Add Black Town under construction ..	1.65	128,000	7,20,000
	6.58	312,000	8,07,500
			15,27,500

16. *Conservancy.*—The conservancy department now employ 532 carts of all kinds, besides four large canal barges, and 1,079 coolies for the daily removal of all solid refuse and filth throughout the town. The good done by this work cannot be over-estimated, but it is very far indeed from being complete. After the recent cholera epidemic in Madras, the Vice-President, Mr. Jones, drew up estimates of the additional staff that would be required to carry out, with thorough efficiency, the duties connected with street and house conservancy, and for the house to house cleansing of privies. For the former service above 100 more carts and 250 more men would be needed at a cost of over Rs. 40,000 per annum. For the latter the staff was estimated to cost about Rs. 60,000, about Rs. 1,00,000 per annum therefore would be required in addition to the present charges for thoroughness and efficiency in the very essentials of sanitation.

17. *Water-supply.*—The water-supply of Madras, so far as it is not obtained from wells, is derived from the Red Hills Lake, about 7 miles distant. The water is brought into Madras in a high level open channel, which is carefully protected by fence and hedge and by watchmen posted at regular intervals along its banks. Before being let from the channel into the delivery pipes the water passes through charcoal strainers. These however are insufficient to eliminate vegetable and animal products, and regular filtering beds are much required. The delivery channel runs at so high a level that the supply falls short while the lake has still a considerable depth of water available for use. A main in lieu of the channel would cost about Rs. 6,00,000, and the filtering beds would cost about Rs. 4,00,000 more.

18. The supply to Madras, though it has several times run low, has never failed except during the famine year 1877. The supply pipes are being extended throughout those portions of the whole area of Madras which it is intended to supply, but of course it is impossible to make a net work of pipes over the whole 27 square miles of town and country within the city limits. A sum of Rs. 2,50,000 is being expended during the present year in carrying out this extension of the water-supply. The water-supply loans now amount to Rs. 16,80,000.

19. *Causes of high Death-rate.*—Without going into any detailed remarks on this subject, I would note that increased efficiency in sanitation and in drainage must be looked to as a main factor in reducing the death-rate. I would call attention to the number of deaths, 869 in 1880, 1,654 in 1881 from small-pox which, under a compulsory system of vaccination would be almost entirely prevented. The Municipal Commissioners have expressed themselves in favor of such a system and await the action of Government to pass it into law.

The appointment of a Health Officer in Madras has again and again been postponed owing to lack of funds, but it may now be said to have become a necessity, and provision has been made for it in the new Municipal Bill submitted to Government.

20. *Ways and Means.*—The financial condition of the Municipality has long proved a bar to the sanitary progress that is so urgently needed. For several years the charges for Police thrown on the Municipality by Government arrested all

progress and even led to reductions of questionable wisdom. These impediments indeed are now happily removed, but no material change can take place until the income of the Municipality is largely increased. As shown above, at least Rs. 1,00,000 per annum will be required for conservancy and sanitation, while loans to the amount of 24 or 25 lakhs of rupees must be contemplated, involving further charges which may in the course of years amount to about Rs. 1,75,000 for interest and sinking funds.

The Municipal revenue requires therefore additional sources of income, capable of expansion so as eventually to bring from Rs. 2,00,000 to Rs. 3,00,000 in addition to the present income of Rs. 7,95,000.

21. This matter and my report No. 409, dated 26th May, on the impossibility of raising the needful funds except by a moderate octroi or by town duties on articles consumed within the city, are now before Government and await their decision as soon as the further information they have called for has been supplied.

No. 201-B.

From T. K. ROGERS, Esq., M.B.—F.R.C.S. & F.C.S., Lond., Chemical Examiner, to the Chief Secretary to Government, Financial Department, dated Madras, 22nd August 1882, No. 319.

In continuation of my letter No. 306, dated 10th August 1882, I have the honor to forward a copy of the results obtained from the examination of samples of soil taken from various localities in Madras.

2. On account of the pressure of Judicial work, and on account of other circumstances known to Government, the method of examination adopted was not that usually resorted to in Europe. The method used may be described briefly as follows: The soils were frequently washed with water, so that all matters soluble in water were almost completely dissolved out. The washings thus obtained were subsequently chemically examined.

3. I consider the results obtained to indicate a far greater immunity from filth contamination than could have been expected.

ENCLOSURE.

HYGIENIC Examination of Soils taken at a depth of four feet from different localities in Madras.

	Unnen Pagoda Street, Junction of Appoo Maistry Street at Xavier's Parichary.	Triplicane High Road, Junction of Wallajah Road.	Arconochella Naick Street, Junction of Kineappah Naick Street, Chintadripettah.	Mint Street, Junction of Annah Pillay Street.	Thambo Chetty Street, Junction of Oodacall Street.	Cox Street, Chintadripettah.	Arconochella Naick Street, Junction of Iyah Moodally Street, Chintadripettah.	Mint Street, Junction of China Bazaar Road.	Ramanya Street, Junction of Nullapa Vadyar Street.
Volume of Air contained .. per cent.	47	46	51	55	39	35	36	52	37
Moisture of Soil as received	12.382	12.42	13.92	15.45	0.621	2.005	1.100	16.600	0.052
Volatile matters	1.078	4.24	1.94	2.53	0.099	0.175	0.440	1.92	0.188
Inorganic Ammonia	0.00032	0.0006	0.0008	0.0004	0.0004	0.0005	0.00008	0.0002	0.00008
Organic do.	0.0008	0.0005	0.0007	0.0007	0.0006	0.0004	0.0004	0.0007	0.0003
Nitric Anhydride	0.02283	0.02473	0.0266	0.0305	0.0153	0.0191	0.0172	0.0305	0.0229
Chlorine as Chloride of Sodium	0.117	0.094	1.872	0.082	0.035	0.059	0.017	0.234	0.117

* Obtained by Aqueous extraction.

MADRAS,
22nd August 1882.

(Signed) T. K. ROGERS, M.B., F.R.C.S.,
Chemical Examiner.

No. 201-C.

From A. T. ARUNDEL, Esq., President, Municipal Commission, to the Chief Engineer, Public Works Department, dated Madras, 9th September 1882, No. 1181.

With reference to your letter No. 638 E., dated 25th August, I have the honor to enclose a letter from the Vice-President, Mr. Jones, giving so far as he can the information you desire.

2. As regards the question of the connection of the house-drains with the surface-drains of the streets, Mr. Jones estimates the cost at an average of Rs. 20 per house, or Rs. 2,65,000 for 13,255 houses in Black Town, and Rs. 8,00,000 for 40,000 houses throughout Madras.

The Municipal Act makes the house-owners responsible for all such house-drain connections, and as the recovery of the cost could be spread if necessary over a series of years I see no reason why the greater portion of the expenditure should not be recovered. I have consulted with the Revenue Vice-President, Mr. Ramasawmy Chettiar, on this matter, and should say that there would be no difficulty in recovering at least 50 per cent., and that in all probability the final burden on the Municipality would be very small. Mr. Jones' estimate need therefore to be corrected on this point, as he has debited the whole amount of Rs. 8,00,000 to the Municipality.

3. The map asked for in paragraph 8 of your letter is being prepared and will follow as soon as it is ready.

ENCLOSURE.

From J. A. JONES, Esq., M.Inst.C.E., Vice-President and Engineer, Municipal Commission, to the President, Municipal Commission, dated Madras, 7th September 1882.

The following memorandum contains, as far as I am able to give it, the information required by the Chief Engineer, Public Works Department, in his No. 638 E., dated 25th August 1882.

2. The amount actually expended up to the 1st April last was as follows:—

Drainage	Rs. 24,023
Water-supply extension*	12,788

* This is in addition to the Rs. 14,30,000 expended in 1869-74 on the water-supply.

3. The only estimate for drainage which has received sanction is that for the drainage of Black Town, amounting to Rs. 8,07,500, and this work is now in course of execution.

4. The estimates for the other portions of Madras are merely approximate and were determined with reference to area and population, and not with reference to actual levels or surveys. These estimates are—

	Rs.
Ráyapuram	1,40,000
Choolay and Vepery	1,20,000
Pursewakum	60,000
Triplicane and Chintadripet	3,20,000
St. Thomé	80,000
Total	7,20,000

5. Each of these, except a small portion of Ráyapuram which will be a portion of the Black Town area, will form an independent drainage area with its own outfall, and are shown on the accompanying* 6-inch map of Madras.

* To follow.
The sewage is in all cases proposed to be utilized on land and raised thereto by small engines or piccottahs.

6. The above total added to the estimate for Black Town amounts to Rs. 15,27,500, and there therefore remained at the 1st April last the sum of Rs. 15,93,477 which is roughly estimated to be required.

7. The above estimates provide only for the improvement of surface-drains to enable them to carry off sewage and storm-waters and for the necessary sewers to carry off sewage alone, the storm-waters passing on to their present outlets. The estimates do not include the improvement of the house drainage. They include a sum for altering house-drains which communicate with existing under-ground drains which from their low level must be altered so as to join the new open side drains. The existing house-drains are probably not in a satisfactory condition, but it is not necessary, under the present scheme, that all existing house drains should be taken up and replaced by closely jointed air tight pipes, as proposed in Mr. Clarke's scheme, at a cost of Rs. 50, nor is it necessary that these should be raised up inside the back-yards so high as to secure the exclusion of surface waters, in fact the pipe or drain must be kept below the level of the back-yard to carry off rainfall. Mr. Clarke's estimate was for pipes sufficient to carry off night-soil and other such matters which it is not now intended to carry off by house-drains, which need not therefore be of a very elaborate description. In fact if they are formed of country brick in chunam and well plastered with cement it will be sufficient. The length of these drains would probably not exceed 50 feet, and could be built, say, six inches square of new material and well plastered with cement for a sum of Rs. 28, but many of the existing drains would require little more than plastering. I have taken 50 feet, but this is probably an excessive length, as the drains end at the front of the house and not in centre of the street (as in Mr. Clarke's scheme), and I am inclined to think that if Rs. 20 per house were taken on an average it would cover all necessary expenditure under this head. This for Black Town, containing 13,255 houses, would amount to Rs. 2,65,100. Taking this amount for the whole of the portions of Madras proposed to be drained the amount would be for 40,000 houses Rs. 8,00,000.

8. *Flushing*.—The present water-supply would be sufficient to flush these drains where such supply exists, and where it does not do so they could be flushed by an ordinary pail-full of water. But in schemes where a close-jointed pipe from house to sewer form portion of the design a water-supply service to each house would be a *sine qua non* and the average cost per house may be taken at Rs. 61 as shown below:—

	Rs.	A.	P.
50 feet of 1½-inch piping at 6 annas	18	12	0
1½-inch stop cock and cover	18	0	0
1-inch discharge cock	8	0	0
Labour in cutting and jointing and masonry, &c.	11	0	0
Contingencies 10 per cent., say	5	4	0
Total	61	0	0

Cost for 13,255 houses in Black Town	8,08,000
Do. 40,000 " Madras	24,40,000

9. I find that the cost of extending the mains throughout each street in the district to be drained, to enable the above service to be laid on, would be Rs. 8,000 per mile, and that about 100 miles of new mains would be required, costing Rs. 8,00,000, in addition to the Rs. 24,40,000 required for house connections.

10. *Subsoil Drainage*.—The level of the subsoil water, or level of permanent saturation, stands about 1½ feet above mean sea level and slightly higher in the rainy season.

11. If the rainfall of Madras be taken as 50 inches per annum, which is about the average, and if half this amount be taken as the amount evaporated, we get 25 inches which must percolate through into the subsoil; this taken over an area of 7.48 square miles (the area to be drained) would yield a supply of 312,500 gallons per hour (Mr. Clarke proposed to carry off 248,000 per hour). In the rainy season the amount is of course much larger.

12. The major part of the sewers will have to be laid below the level of permanent saturation, and in the scheme now being carried out are at their lowest levels some 7½ feet below this line.

13. In pumping out all the waters from the pump well at Ráyapuram just constructed, which is sunk about 6½ feet below the above depth, or 15 feet below water level, I noticed that while the water in a well within 30 feet of this was not lowered a single inch, the water in the open excavation (the bottom of which was also below the level of saturation for sewer No. 4 which commences at this well, and was then excavated in length 210 feet and to a depth of about 12 inches below level of saturation and about 9 feet broad) only subsided from 3 inches to 4 inches. This well had to be pumped about every quarter of an hour at this depth and the water would rise to 5 feet (i.e., from 15 feet to 10 feet below saturation level) in about a quarter of an hour.

14. Considerable difficulty has also been experienced in putting in a pumping well at Napier Park, where the level of the bottom of foundation is only 8 feet below saturation level. The discharge at this place from an area of 700 square feet was about 250 gallons per minute.

15. From these facts it may, I think, be supposed that if wells were sunk 60 feet apart (double what the two wells were at Rayapuram) over the entire area to be drained and to 8 feet below saturation level we would probably get a constant supply of 250 gallons per minute, and on this basis we would get $\frac{250 \times 60 \times 5280^2 \times 7.48}{60 \times 60}$ or 871,200,000 gallons per hour from the 7.48

square miles. This result is almost 300 times in excess of that determined on the basis of rainfall alone, and being deduced from a limited area cannot be made applicable except with extreme caution to the whole area to be drained. There can, however, be little doubt that the less quantity is exceedingly under the mark, and that if that quantity were drawn off regularly the level of the subsoil water would not be affected a single inch.

16. The water in the wells, as before stated, stands usually to about 1 foot to 1½ feet above mean sea level, and I think it probable that the level of the subsoil water is somewhat dependent on the sea level. At present there is a hydraulic head against the sea and fresh water can be had from wells on the shore itself. What would occur were the subsoil water lowered to any considerable extent would merely, I presume, be the introduction of salt water where fresh now is.

17. I cannot of course positively assert that such would be the case, but I do not think any other conclusion can be arrived at from a careful consideration of what has already been stated.

18. The following shows depth, length, and diameter, &c., of the sewers (as at present being constructed) under the permanent level of saturation:—

				Length.	Depth below the level of Saturation.		Mean Depth.
					HIGH END.	LOW END.	
Sewer No. 1	...	18 inches diameter	...	2,155	1.0	2.5	1.75
		24 do. do.	...	3,732	2.5	5.0	3.75
		30 do. do.	...	1,263	5.0	6.60	5.85
Sewer No. 2	...	18 do. do.	...	3,326	0	2.25	1.12
		24 do. do.	...	4,593	2.25	5.25	3.75
Sewer No. 3	...	24 do. do.	...	2,498	0	7.66	3.83

19. The subsoil water could therefore be tapped to depths 6 feet 8 inches, 5 feet 3 inches and 7 feet 8 inches below permanent level of saturation, but it is not intended to allow subsoil water to pass into these sewers as their dimensions will not admit of this being done, and I believe were the subsoil water admitted there is no means by which the fine sand could be prevented entering; the means proposed by Mr. Clarke for this purpose would undoubtedly fail and the sewers would eventually be choked with sand.

20. Having regard, therefore, to all the points already noted, I am unable to give any idea of what would be the cost of subsoil drainage, nor can I see any feasible plan of carrying it out by which the level of the subsoil water would be affected in the very slightest degree.

Water Supply.

21. My report on the improvement of the Madras Water Supply, dated June 1877, gives in detail an estimate of the cost of the works necessary for pumping the water on to the summit of the hills about the Red Hills Lakes, there filtering the same and supplying Madras thence with a 27-inch main.

22. The total head which would be obtained by the scheme would be 60 feet above mean sea level, or about 30 feet above the highest ground in Madras and 40 to 50 feet above the mean level of the town. This would be sufficient pressure for all purposes, and would give an extremely good water-supply even in those distant portions of the town whither we are now extending our pipes. The additional head over our present head would be 30 feet. I would deprecate the adoption of any greater head than this, as with a very high pressure system the waste of water in Madras would be enormous and the sewers would become insufficient.

23. The extension of the distribution pipes at present being made, complete the water-supply as far as there is any present intention of doing so. It is not intended to bring any additional portion of the town within the limits of the water-supply area. There may be some cases, however, in which it would be advisable to afford a better supply within the present area and Rs 1,00,000 would certainly meet all cases of this kind. The estimate for pumps, fitters and main was Rs. 13,66,000, and copy of the report is herewith sent for information, though it is believed that several must be available in the Government Office.

24. The total cost of necessary improvements to our water-supply, supposing the scheme of surface drainage to be adhered to, may therefore be taken at Rs. 14,66,000.

25. The following estimate No. 1 will show, having regard to the foregoing remarks, the probable cost of the works for drainage and water supply if these were carried out in accordance with the views expressed by the Army Sanitary Commission:—

No. 1 Drainage.

	RS.
Main Sewers and Pipe Sewers in streets	45,00,000
House Drainage 40,000* at 50	20,00,000
House Service 40,000 at 61	24,40,000
Subsoil Drainage †	5,00,000
Total	94,40,000

Water Supply.

Extended Distribution to put main in streets to be drained so as to afford water-supply to each dwelling, 100 miles at 8,000	8,00,000
Improvement of water-supply to allow of extended service and to give increase head with proper fitting arrangement.	13,60,000
Total	21,60,000
Add Drainage	94,40,000
	1,16,00,000

Captain Tulloch's scheme would cost the same amount less the amount of subsoil drainage.

Mr. Clarke's Scheme.

	RS.
Main Sewers	25,00,000
House Drainage 38,000 at 50	19,00,000
House Service water-supply 38,000 at 61	23,18,000
	67,18,000
Extension of Mains	8,00,000
Improvement of water	13,60,000
Total	88,78,000

Present Scheme.

Street Drainage	15,27,500
Add for land for farms, lifts, &c.	3,00,000
	18,27,500
House Drainage (see para 7)	8,00,000
	26,27,500
Improved water-supply, increased head and contingent extra distribution (see para 24)	14,66,000
	40,93,500

26. The estimated cost of each of the four schemes would then be as follows including the necessary water-supply for each scheme as designed:—

	RS.
As advocated by Army Sanitary Commission	1,16,00,000
Major Tulloch	1,11,00,000
Mr. Clarke	88,00,000
Mr. Jones	41,00,000

* Captain Tulloch says 32,000, but he drains Rayapuram in addition to the number of houses proposed to be drained by Mr. Clarke which I make 38,000.

† I have entered the amount put down in Colonel Sankey's rough memorandum, but I doubt if anything could be done for that amount.

No. 201-D.

From A. T. ARUNDEL, Esq., President, Municipal Commission, Madras, to the Chief Engineer, Public Works Department, dated Madras, 29th September 1882, No. 1258.

I have the honor to forward a letter, No. 1256, dated 27th September, from the Vice-President Mr. Jones, giving the information asked for in your letter, No. 742 E., dated 14th instant.

From J. A. JONES, Esq., Vice-President, Municipal Commission, to the President, Municipal Commission, Madras, dated Madras, 27th September 1882, No. 1256.

I have the honor to make the following remarks and to forward the additional information required by Colonel Sankey in his letter to you, dated the 14th September 1882, No. 742 E.

The amount of Rs. 12,788 which set down as the amount spent on water-supply in addition to the original expenditure of Rs. 14,30,000 was the amount spent up to 1st April last for new works only. Such sum does not include any payment on account of interest and maintenance of the water-supply. Such expenditure is detailed in the following table:—

		RS. A. P.		
		RS.	A.	P.
From Current Revenue.	Outlay previous to 1873-74, advanced by	35,715	9	9
	Municipal Fund	46,340	11	1
	New works from 1873 to January 1882	1,40,630	3	5
	Maintenance from do. do.	6,00,229	10	6
	Interest from 1870 to July 1882	3,53,390	9	2
	Sinking Fund	11,76,306	11	11
	Red Hills water from 1873 to July 1882.	25,226	2	9
		12,01,532	14	8

	RS.	A.	P.
Loan of 1869-74	14,30,000	0	0
Loan of 1882	12,788	0	0
From Revenue	12,01,532	14	8
	26,41,320	14	8

The total up to 1st April including this amount is therefore Rs. 26,41,320-14-8.

With reference to paragraph 5 (1) of Colonel Sankey's letter, I fear I am not able to give an indisputable reply, but I will endeavour to give such facts as will enable Colonel Sankey

to see exactly how the matter stands. In the first place it will be noticed that I have merely made several strides beyond Mr. Clarke's scheme as he did beyond Major Tulloch's, when he recognized the principle of having more than one outfall over a large area, by the omission of St. Thomé from the general scheme, giving it an outfall of its own. I might contend that if the principle were right as regards St. Thomé, that is to say the principle of giving places widely separated their own independent drainage and independent outfalls, there can be no reason against the extension of such a principle, but it would be unfair not to point out that in case of St. Thomé Mr. Clarke intended to allow the sewage to flow by gravitation into the sea. What would be the effect of such a manner of disposal is not difficult to foresee.

Against the fact however that in St. Thomé no pumping would be required, I have to submit that where pumping is required, as it would be in most of the independent areas I propose, we have the income from the crops raised on the land irrigated, and taking three of our farms which respectively receive the sewage of (1) Choolay and Vepery; (2) Triplicane (north of Pycroft's Road); (3) Triplicane (south of Pycroft's Road), we have the following as the results of four years' working:—

Years.	D'MELLOWS.				TRIPLICANE.				KISHINAMPET.			
	Receipts.		Disbursements.		Receipts.		Disbursements.		Receipts.		Disbursements.	
	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.	RS.	A. P.
1878	1,362	2 4	1,378	4 11	1,125	10 3	965	8 6	2,641	1 7	1,843	6 5
1879	2,766	15 6	1,660	2 5	1,931	3 6	1,915	9 6	4,059	15 7	2,141	15 6
1880	1,762	13 1	1,716	1 8	1,676	12 3	2,791	10 5	3,086	8 9	2,606	10 4
1881	1,857	9 7	1,952	14 4	1,640	11 9	3,099	14 3	4,600	0 2	3,756	15 11
Total	7,749	8 6	6,707	7 4	6,374	5 9	8,802	10 8	14,387	10 1	10,349	0 2

This is a profit over the three farms of Rs. 2,650 in four years.

I do not imagine that when each of these portions of the town are properly drained that our present arrangements for raising the sewage by piccottahs will avail, but still whatever be the cost of such raising the net income will not be less than it is now and will most probably increase.

It may be urged that the sewage wherever raised and put on land, if suitable, will produce the same income, but any place where the sewage of the whole town has to be disposed of must necessarily be at some distance from the town itself, and the crops produced would either have to be carried into the town or sold at a reduced rate on the spot.

The saving due to each separate locality having its own outfall in a town having a somewhat uniform density of population would be little, but in a place such as Madras, where the populated portions are widely separated, forming almost independent towns, the saving is very considerable, while at the same time suitable areas are rendered available for sewage farming. The saving is due not alone to the actual length of sewer saved between these detached portions, but also to the decreased size of sewers throughout.

There is another saving in having detached areas, and that I think the most important one and one which goes I think far to decide the question as to whether the extra cost involved in several pumping stations would not, when capitalized, pay for the extra cost which would be incurred in constructing continuous sewers towards one well to the north of the town; for it has been decided by all who have considered the question that no other site is feasible as a single outfall for the drainage. The point to which I draw attention is this, that where there are very long sewers the lift at the pumping station, owing to the gradient necessary for the sewers, is very much greater than when the sewers are in comparatively short lengths, and this comes to be of considerable importance, as in addition to the extra length of sewer you have this increased height to which the sewage has to be raised, and the cost of this, it appears to me, would be as great as any extra cost which would result from any extra establishment required at the different stations of independent drainage areas.

To the second question in paragraph 5 I can speak positively and reply that there is available ground for sewage irrigation contiguous to the different drainage areas, and have further to add that of such ground the major part is already in the possession of, or available for, the Municipality. The different areas are colored on the map referred to in my letter of 7th September 1882, and the land which can be used in connection with these areas is colored of a darker shade of the same color as the area whose sewage it is proposed it should receive.

Paragraph (5) 3 opens up a question on which there must necessarily be many different opinions. Sewage farming in India is not however handicapped by many of the disadvantages to which such a process is subject in England. We have in India the aid of a powerful sun throughout the year, and our experience in Madras is that the complaints arising from sewage farming are very few and far between. The chief, and I may say the only, nuisance on a sewage farm is at the lift worked by piccottahs, but this is one which can be overcome by providing proper wells and means of raising the sewage, by which it would not be continually stirred up and the odours continually disseminated. When the Municipality asked some time ago to be allowed to utilize a portion of waste land belonging to the Madras Railway Company close to the Central Station as a sewage farm, the Agent Mr. Saunders and the Acting Chief Engineer Mr. West visited the farms at D'Mellows Road and elsewhere, and finding from their own observations that no nuisance was to be feared, immediately gave permission for the construction of the farm. No complaint whatever has been received from the Company as to this farm, although it has now been in existence over a year.

The following is from the Madras Manual of Hygiene compiled under the orders of Government by Dr. H. King, A.M., M.B., &c., page 226, paragraph 570:—

"Sewage irrigation yields on the whole more satisfactory results than any other of the wet methods and is more generally applicable. It requires a surface of about one acre for every 100 persons in the community, and 70 yards square will receive 2,000 gallons of sewage in 24 hours. Large crops of grasses, cereals, roots and culinary vegetables can be raised, year after year, from land thus irrigated. The sewage should be brought to the land as rapidly as possible, and putrefaction may be advantageously delayed or prevented by the addition of small quantities of carbolic acid. The liquid trickles down a prepared slope, over the ground to be irrigated, at the rate of 8 feet per hour, saturation of the soil being guarded against by deep draining unless where it is so sandy or otherwise permeable as to render the precaution unnecessary. The effluvia are rarely such as to constitute a nuisance, but it is desirable to choose ground distant from houses. Enteric fever, dysentery, and the prevalence of entozoa have been predicted as probable consequences of sewage irrigation, but there is no evidence of the occurrence of such results, nor need they be apprehended if reasonable care be used. In some places the practice has been pursued for years without any bad effect. The water is not freed from impurity by irrigation to the same extent as by filtration; but it loses its suspended matters and some of its dissolved organic impurities, if not allowed to run too quickly off the land. The financial results of this method are more satisfactory when rain and surface water are excluded from the sewage."

Coming to paragraphs 7 to 12 of Colonel Sankey's letter I must first state that Captain Tulloch has been drawn into some strange error in making the statement quoted by Colonel Sankey in regard to the house drainage. In no house I or the Sanitary Inspector have visited has the house drain ever been common to two adjoining houses or under the mean wall. Mr. Ramasawmy Chetty, the Revenue Vice-President, who has abundant opportunities for knowing, states that no house has its drain in common with an adjoining house, and that in the majority of houses there is always sufficient fall to run off the water quickly from the back portions of the house which are invariably higher there than towards the street. In the 600 houses in the experimental section of surface drainage executed no house drain was in such a position. In fact to begin with few houses have a mean wall at all, and in the majority of houses the drain is to the left hand side of the house. These remarks, I think, entirely dispose of Captain Tulloch's statement as to the position of the house drain.

In the experimental section of drainage executed as before stated about 600 houses were included. Of these I had to execute work in 14 houses, in order to alter the house drain to a proper level to allow of its flowing into the new street drain. The total length of house drains so altered was 257 feet and the total cost Rs. 76-10-7.

In order to determine the actual length of drain which would require to be altered if all the house drains had to be laid anew, I have had the house drains of all the houses in the three following streets measured with the result shown. Yedapollum Street is one of the streets already drained:—

	Number of houses.	Total length of house drain.	Average length.
		FEET.	FEET.
Yedapollum Street ...	83	2,442	30
Sevarama Sastry Street ...	26	1,395	54
Ummen Covil Street ...	38	2,431	63

Mean Average ... 49'

This is very nearly the length I gave in my former letter.
Now for 10 feet of a new 4" house drain the cost would be—

	RS.	A.	P.
Brickwork ...	2	8	0
Plastering ...	0	10	0
Excavation ...	0	2	0
Total ...	3	4	0
For 50 feet ...	16	4	0
Breaking walls and repairs ...	2	0	0
Outer nozzle to drain ...	2	0	0
Grating ...	1	0	0
Total ...	21	4	0

This is supposing that all drains have to be laid anew. It does not however allow for flooring back-yards, and this expense would be considerable, some houses having as many as three separate court-yards. Nor has such an expenditure been anticipated either by Captain Tulloch or the late Mr. Clarke, and therefore whatever is added to the one scheme on this account a similar amount must be added to each of the other two. Now it should be noted that all the Municipality had of necessity to expend to connect the house drains and the new surface drain in regard to 600 houses was Rs. 76-10-4. I do not claim that this amount covered all that ought to be done, for every house drain even where the level needs no alteration should be inspected and put into thorough repair, but it shows the extent to which the Municipality was actually liable. I do not see with these facts in view on what I can base a higher estimate than Rs. 20 per house for house drainage, seeing that Rs. 21 odd will on average give every house a new drain, which would in many, certainly 50 per cent., of the houses not be required. If flooring however is considered a necessity I would on that account add Rs. 10 per house, making in all Rs. 30 on the average for house drainage. There will be exceptional cases in which the whole flooring of the houses may have to be raised, but against this it may be said that such houses are of small size, and the length of drain would be considerably less than the average. The longest

house drain measured in any of the three streets mentioned was 135 feet, the shortest 8 feet. The longest length of drain altered in the experimental section of drainage was —

	RS.	A.	P.
82 feet, cost ...	21	13	5
The shortest 8 feet, cost ...	6	10	9
	28	8	2
Average per foot ...	0	5	0
For 50 feet ...	16	0	0

Paragraph 13 of Colonel Sankey's letter. My remark in paragraph 19 of my last letter had reference to Mr. Clarke's method of preventing sand entering sewers and not pipes and regarded the method of putting a drain pipe through the side of the sewer and packing broken brick at the end of it to prevent the entrance of sand.

I have made some experiments with the sand taken from the line of sewer now being excavated. I find that by mere oscillation in the water and without any head of water at all 100 per cent. of the sand passes through wire gauze of 256 meshes to the square inch and 80 per cent. of the sand passes through muslin of 1,600 meshes to the square inch. I do not see how it can be doubted that sand under the pressure of 6 to 14 feet head of water would be prevented entering any sewer by means of a lump of broken bricks. I must admit that Mr. Clarke's method of packing a pipe joint with well-tamped clay and covering it with concrete would prevent any sand entering.

In Calcutta the subsoil water is admitted to the sewers by no special contrivance, and the only subsoil water which is admitted is that which soaks through the brick-work, it being impossible to make sewers of country brick-work water-tight. I think therefore that it may be concluded that Mr. Clarke did not find the plan feasible, or he certainly would have adopted it in Calcutta.

It is no doubt a practice in Madras for persons building mud-huts, or huts of brick and mud, to obtain the mud clay or earth at as short a distance as possible from the building being erected. These cases however are usually confined to parcherries, and the pits are of small area. The borings carried out by Major Tulloch and the depths of soil marked "made soil" can however have no reference to such cases. It will be seen by referring to the sections that such soil is found from one end of Madras to the other up to depths of 7 to 9 feet, and in one case this soil is marked "unbottomed." In certain places it is shown above the surface, and it will be seen that it is found close to the sea and a distance of two miles north of the inhabited portions of the town. This can scarcely have connection with places which have been raised by rubbish, and it may be further noticed that where the line of the sewer crosses rubbish heaps near boring No. 8, these are distinctly marked as such, and neither in this place nor near to it is there any made ground at all. I do not understand what Captain Tulloch means by made ground, but I think it is obvious that he does not mean rubbish heaps.

The best way to deal with rubbish heaps is to cultivate crops from them, such as cholam and other coarser kinds of grain. This method more than anything else tends to remove anything that is unsanitary in the upper strata at any rate, and the more crops the deeper does the purification take place. No building would of course be allowed on such sites, and no house system of drainage would therefore be necessary.

I have replied so far as I have been able to Colonel Sankey's question, and though in reference to paragraph 5 (1) I have not been able to give a decided answer, I think I have said enough to enable a clear opinion to be formed on the matter.

No. 201-E.

Note by the Chief Engineer, Public Works Department.

The Secretary of State in despatch, No. 12, "Statistics and Commerce," dated 22nd June 1882, calls the serious attention of the Madras Government to the condition of matters prevailing in the Presidency Town as set forth in a memorandum by the Army Sanitary Commission, dated 18th April 1882.

2. The latter body, after reviewing the Report of the Madras Municipality for 1880, observe (paragraph 5) that they "would strongly urge the inexpediency of wasting money upon the incomplete and unsatisfactory surface drainage plan now in process of execution, which does not fulfil any conditions of a proper drainage system," and "recommend at the same time that a complete system of town and house drainage in combination with an improved and extended water-supply for removing house

sewage separately from the rainfall be at once adopted." They conclude their report by observing that the whole subject should be taken in hand by the Government of the Madras Presidency.

3. The delays in regard to the drainage of Madras, which have appeared incomprehensible and unreasonable to the Army Sanitary Commission, have arisen from inherent difficulties of a very serious character, which notwithstanding the reports of such well-known professional Engineers as Major Tulloch, R.E., and the late Mr. W. Clarke, M.I.C.E., and the strenuous efforts of a succession of Government officers and Presidents of the Municipal Commission, who one and all have certainly spared no pains in their endeavours, have hitherto proved to be insuperable.

4. To state the difficulties in detail is unnecessary, but the mention of a few of the leading facts may be useful. Madras has a population of 406,000 distributed in at least six different centres over an area of 27 square miles. No portion of the latter is raised more than 24 feet, and some places are only $2\frac{1}{2}$ feet above mean sea level; during cyclones, when the surface of the sea along the coast is abnormally raised, much of the place is even below mean sea level. In ordinary times the sea is practically tideless, as even during "springs" the difference between high and low water being not more than $3\frac{1}{2}$ feet. To add to the difficulty of collecting and discharging the sewage of the many large and scattered aggregations of population the north is separated from the south of Madras by a winding river, which for the most part is a backwater receiving the contents of natural drainage channels which are shallower and if anything more straggling than itself.

5. To any one acquainted with the difficulties which for the most part have proved insuperable, as regards the effective drainage of the cities and towns situated along the littoral of the Mediterranean, the bearing of the above facts will be sufficiently evident. Were Madras a flourishing commercial centre with a rapidly expanding trade, it is possible that the needful funds might be raised for dealing in some effective way with its drainage, but as the population is of the poorest, and trade not apparently increasing, it may at once be assumed that, without Government aid, the Municipality are quite unable to carry out the needful sanitary works on a large scale, and for want of means are compelled to confine themselves to palliatives. The Government on its side have been equally unable to come to the rescue, as from the manner in which the Imperial burdens have been distributed, this Presidency has hitherto not had its rateable share as compared with other provinces.

6. Major Tulloch's scheme of 1864-65, amounting to 39½ lakhs, provided for a perfectly closed system of drainage excluding rain and storm waters. A main sewer starting from St. Thomé was to be carried under the Cooum River to a well north of the town, from which the liquid sewage was to be pumped into a channel two miles in length, along the course of which it was to be employed in irrigation.

7. Mr. Clarke in 1875 followed Major Tulloch's scheme in the main, but by cutting off several of the outlying tracts, and particularly St. Thomé, which was to have a separate sewer discharging direct into the sea, he was enabled to reduce his estimated total outlay to 23½ lakhs.

8. Both Engineers however omitted from their schemes the expense of two items, one and other of which it is thought should be taken into account in estimating the total outlay required. The first of these is a supply of water under pressure all over the town. This would be quite essential in any system such as that apparently advocated by the Army Sanitary Commission and forming part of Major Tulloch's and Mr. Clarke's schemes, where the excreta of each house are carried off by a pipe of small dimensions (exclusive of all surface drainage) discharging into a system of closed town sewers. The second item is that of the cost of the house connections. The Municipal Act of Madras, like that of other towns where such institutions exist, confers the needful powers on the Commissioners to enforce the construction of all house connections at the cost of the proprietors; but to any one acquainted with the extreme poverty of the majority of the Madras population, it is quite clear that with a very large number it would be useless to attempt to put this provision of the Act in operation.

9. It will be observed from the correspondence which has lately taken place with the President of the Municipal Commission that both the above points have now received careful consideration, with the following results as regards probable outlay—See Mr. Jones' letter, No. 1, of 7th September 1882:—

(1) Water-supply extended so as to meet the requirements of a completely closed system—

	RS.
(a) Improved arrangements to give increased head of pressure throughout the town	13,60,000
(b) Extension of the street mains	8,00,000
(c) House service 24,40,000, half, say, recoverable from house-holders	12,20,000
Total, Water-supply ...	33,80,000
(2) House drainage Rs. 20,00,000, of which say half would be recoverable	10,00,000
Total ...	43,80,000

N.B.—Half of the cost under (c) and (2) has been taken as recoverable under the opinion expressed by Mr. Arundel, President, Municipal Commission.

Major Tulloch's scheme with the above additions, but excluding arrangements for dealing with the drainage of the subsoil (of which more presently), is the only one which would apparently fully meet the requirements of the Army Sanitary Commissioners; there can however be little doubt that his estimate if put in actual execution would not cost less than 45 lakhs. The total outlay which would thus have to be met from public funds is $45 + 43.8 = 88.8$ lakhs. Under Mr. Clarke's restricted scheme, amounting to 23½ lakhs, the extent of house drainage and water service would be less than in Major Tulloch's. If the cost of both the latter items be taken at 40 lakhs, the total under his proposed system of works would be $40 + 23.5 = 63.5$ lakhs.

10. The Army Sanitary Commission lay considerable stress on the foul condition of the subsoil and the necessity of dealing with this as part of a well-designed and comprehensive scheme; but as will be observed from the letter from the Chemical Examiner, No. 319, dated 22nd August 1882, that officer is of opinion from the analysis of soils taken at a depth of 4 feet from different localities in Madras that "the results obtained indicate a far greater immunity from filth and contamination than could have been expected."

11. Again that there are considerable difficulties in deciding both as to the measures to be taken, and the probable effect of such in regard to the drainage of the subsoil waters, will be seen from the observations contained in paragraphs 12 to 20 of Mr. Jones' letter, No. 1181, of the 9th September 1882. As remarked by him in paragraph 16 the water in the wells "stands usually to about 1 foot to $1\frac{1}{2}$ feet above mean sea level," and if the result of any considerable lowering of the subsoil water lead as he supposes to "the introduction of salt water where fresh is now," the general effect would, it is thought, be extremely injurious, as the admixture of salt with fresh water is understood to increase fourfold the effect in dissolving sewage matter held in suspension.

12. This is a matter to be decided by Chemical experts, but as a question of professional engineering there can be little doubt that to deal in any comprehensive way with the subsoil water, would need a very extensive net-work of underground drains which should have contrivances for admitting freely all such water and dissolved sewage matters, without at the same time allowing the fine particles of sand, of which the soil to a great extent consists, to be washed out.

13. Looking at the question in this light it would appear undesirable to attempt anything more than the arrangement contemplated in Mr. Clarke's scheme for placing small inlet pipes, well protected, at sufficiently short intervals along the lines of main sewers so as to get rid, as far as may be possible, of the dissolved sewage matters which

may have soaked into the soil in the immediate neighbourhood of each. Should there be any sensible washing out of the sand, it is needless to say that in process of time, as one of the evil results, the stability of buildings in the neighbourhood must necessarily become endangered. On the whole, therefore, in dealing with this part of the subject, it will be best not to contemplate any very extensive subsoil drainage works, and a sum of 5 lakhs may be assumed as the limit of necessary outlay.

14. The approximate cost of the several schemes would therefore stand as follows, taking into account the several adjustments as above:—

	RS.
(1) Major Tulloch's scheme with the cost of house water-supply service and drainage	88,80,000
Mr. Clarke's do. do. do. do. do. do.	63,50,000
Army Sanitary Commission's (being Major Tulloch's scheme with 5 lakhs added for dealing with subsoil water)	93,80,000

Each and all of these schemes, it must be remembered, leave out of account the following sums which would have to be borne directly by such of the house-holders as may be called on to bear the needful outlay for house connections, both water-supply and drainage, viz. :—

	RS.
Half of the house water-supply head (1) (c) para. 9 above ...	12,20,000
Half of the house drainage head (2) above	10,00,000
Total ...	22,20,000

15. With a population taxed it is believed very nearly to the utmost, it is needless to say that the expenditure of enormous sums of this character cannot be thought of. Even were Government in any way able (which it is not) to meet the outlay demanded by the scheme understood to be advocated by the Army Sanitary Commission, it is very questionable whether in justice to the many other pressing demands on account of other matters of the highest importance to the welfare of the Presidency, it could venture to do so, and again to compel even the well-to-do inhabitants to spend over 22 lakhs out of their own pockets, in addition to meeting the demands of increased taxation, is to say the least chimerical. On all accounts therefore it is necessary to consider whether there are not other means for bringing about as far as possible sound sanitation.

16. Mr. Jones' scheme is in this view the only one which has up to the present time been put forward as holding out reasonable prospects of success. As generally described, it, like both Major Tulloch's and Mr. Clarke's schemes, proposes to deal almost entirely with the removal of sewage matters, to the exclusion of the storm waters, but as with chiefly saucer-shaped open surface drains he has no need of water under pressure in each house, or of a closed system of house or street drains, excepting where for the requirements of slope the latter have to be converted into underground sewers, the cost is at once sensibly reduced.

17. Acting moreover on the principle that the sewage of each of the several centres of population, shall be employed in irrigating and raising crops on available land in the immediate vicinity, two very serious items of charge are minimised. In the *first* place there is no need for a very long sewer or sewers of large capacity, to convey the liquid sewage to any one point for the whole town, and in the *second* the sewage has ultimately to be lifted through a diminished height. These and other matters connected with Mr. Jones' scheme, including the very important facts tending to show that the plan of utilizing the sewage in irrigation has been proved by actual experiment to be rather remunerative than otherwise, and to be open to but small objection on the grounds of being offensive to the public, are very fully explained in his letter, No. 1256, dated 27th September, and the map which accompanies it.

18. The method of dealing with the separate house drainage is fully and apparently satisfactorily explained, and on the whole it would be fair to accept his estimate for the work as specified by him, viz.:—

	RS.
Street drainage	15,27,000
Land for sewage farms	3,00,000
House drains 8,00,000, half cost of	4,00,000
Improved water-supply	14,66,000
Total ...	36,93,000

To which may possibly be added—

To levelling and paving back-yards (See Mr. Jones' letter No. 1256)	2,00,000
Grand Total ...	38,93,000

This last item of two lakhs would, if admitted, have also to be added to all the other schemes if put in comparison. There can be no doubt that the drainage of the back-yards must be thoroughly dealt with if sound sanitation is to be secured, and this item must therefore apparently be included.

19. Mr. Jones is still apparently satisfied that his saucer drains will stand sufficiently well all wear and tear with a cement surface, but on this point there is room for doubt, and it would be advisable to keep in view that stone surfaced drains may as previously recommended have to be adopted, in which case not less than 2½ lakhs should be added to the probable cost of his scheme, bringing the total with the addition for floorings of the back-yards to Rs. 41,43,000. In addition to this householders, who can equitably be compelled under the Act to supply proper house drainage and connections, would have to incur the following items of expenditure from their private means, viz. :—

	RS.
1. For the supply of water to the drains	100
2. For the supply of water to the drains	100
3. For the supply of water to the drains	100
4. For the supply of water to the drains	100
5. For the supply of water to the drains	100
6. For the supply of water to the drains	100
7. For the supply of water to the drains	100
8. For the supply of water to the drains	100
9. For the supply of water to the drains	100
10. For the supply of water to the drains	100
11. For the supply of water to the drains	100
12. For the supply of water to the drains	100
13. For the supply of water to the drains	100
14. For the supply of water to the drains	100
15. For the supply of water to the drains	100
16. For the supply of water to the drains	100
17. For the supply of water to the drains	100
18. For the supply of water to the drains	100
19. For the supply of water to the drains	100
20. For the supply of water to the drains	100
21. For the supply of water to the drains	100
22. For the supply of water to the drains	100
23. For the supply of water to the drains	100
24. For the supply of water to the drains	100
25. For the supply of water to the drains	100
26. For the supply of water to the drains	100
27. For the supply of water to the drains	100
28. For the supply of water to the drains	100
29. For the supply of water to the drains	100
30. For the supply of water to the drains	100
31. For the supply of water to the drains	100
32. For the supply of water to the drains	100
33. For the supply of water to the drains	100
34. For the supply of water to the drains	100
35. For the supply of water to the drains	100
36. For the supply of water to the drains	100
37. For the supply of water to the drains	100
38. For the supply of water to the drains	100
39. For the supply of water to the drains	100
40. For the supply of water to the drains	100
41. For the supply of water to the drains	100
42. For the supply of water to the drains	100
43. For the supply of water to the drains	100
44. For the supply of water to the drains	100
45. For the supply of water to the drains	100
46. For the supply of water to the drains	100
47. For the supply of water to the drains	100
48. For the supply of water to the drains	100
49. For the supply of water to the drains	100
50. For the supply of water to the drains	100
51. For the supply of water to the drains	100
52. For the supply of water to the drains	100
53. For the supply of water to the drains	100
54. For the supply of water to the drains	100
55. For the supply of water to the drains	100
56. For the supply of water to the drains	100
57. For the supply of water to the drains	100
58. For the supply of water to the drains	100
59. For the supply of water to the drains	100
60. For the supply of water to the drains	100
61. For the supply of water to the drains	100
62. For the supply of water to the drains	100
63. For the supply of water to the drains	100
64. For the supply of water to the drains	100
65. For the supply of water to the drains	100
66. For the supply of water to the drains	100
67. For the supply of water to the drains	100
68. For the supply of water to the drains	100
69. For the supply of water to the drains	100
70. For the supply of water to the drains	100
71. For the supply of water to the drains	100
72. For the supply of water to the drains	100
73. For the supply of water to the drains	100
74. For the supply of water to the drains	100
75. For the supply of water to the drains	100
76. For the supply of water to the drains	100
77. For the supply of water to the drains	100
78. For the supply of water to the drains	100
79. For the supply of water to the drains	100
80. For the supply of water to the drains	100
81. For the supply of water to the drains	100
82. For the supply of water to the drains	100
83. For the supply of water to the drains	100
84. For the supply of water to the drains	100
85. For the supply of water to the drains	100
86. For the supply of water to the drains	100
87. For the supply of water to the drains	100
88. For the supply of water to the drains	100
89. For the supply of water to the drains	100
90. For the supply of water to the drains	100
91. For the supply of water to the drains	100
92. For the supply of water to the drains	100
93. For the supply of water to the drains	100
94. For the supply of water to the drains	100
95. For the supply of water to the drains	100
96. For the supply of water to the drains	100
97. For the supply of water to the drains	100
98. For the supply of water to the drains	100
99. For the supply of water to the drains	100
100. For the supply of water to the drains	100

	Rs.
To half cost of house drains 8 lakhs	4,00,000
Do. of levelling and paving the back-yards	2,00,000
Total	<u>6,00,000</u>

On the whole therefore it may be broadly stated that Mr. Jones' scheme would entail an outlay of not half that apparently contemplated by the Army Sanitary Commission so far as concerns the expenditure of public funds, but what is even of greater importance the compulsory outlay by private individuals would be reduced to 6 as against 22.2 lakhs. Even thus however reduced to a minimum the total charge is quite beyond the means at the disposal of the Municipality, who must consequently, unless aided by Government, content themselves with carrying out as they are now doing the Black Town portion of Mr. Jones' scheme, which is clearly the one of most pressing importance.

20. Great stress has been laid in the report by the Army Sanitary Commission on the preferability of a closed as compared with an open system of drains for Madras, but on this point there is reason to doubt whether the opinion is well founded.

21. In a hot climate the evolution of sewage gases must of necessity be much more rapid and therefore more likely to produce mischief than in a cold one, and considering the habits and the small means possessed by the natives anything approaching to a water closet system is not for a moment to be thought of.

22. (On the other hand house drains which can be easily got at for daily cleansing or for occasional repair, have much to recommend them both on the score of cleanliness and economy, while for the outer street drains the arguments in favor of these being kept, as far as possible, open to the action of the sun and air as also for ready scavenging appear to be unanswerable.

23. The sun which is an enemy to be dreaded with all closed pipes and drains is the reverse where organic matter is exposed, as all who have had sufficient acquaintance

• with India can attest. Here in fact the sun is the best of friends, and should, if properly turned to account, do more to keep Madras healthy than perhaps anything else save the benificent sea breeze, which no doubt holds the first place as a sanitary agent. The real difficulty is how to have sufficient lengths of drain kept open and exposed to the action of the sun, as the requirements of slope demand their being but too soon converted into underground sewers.

4th October 1882.

(Signed) R. H. SANKEY, Colonel, R.E.,
Chief Engineer, P.W.D.

No. 202.

ORDER—dated 30th October 1882, No. 2845 W., Public Works.

Ordered that the Secretary of State be addressed.

(True Extract.)

Colonel, R.E.,
Secretary to Govt., P.W.D.

To the President, Madras Municipal Commission,
„ Select Committee for the amendment of the Municipal Act, } with copy of despatch.
„ Financial Department,

BUILDINGS AND ROADS.
CIVIL WORKS.

Gobt. of (1882) Madras.
PUBLIC WORKS.

Dated October, 30th,

Recd.

Encl.

G.O., 30th Oct. 1882, No. 2845 W.

OCTOBER.
Nos. 201-202.

Sanitary condition of Madras.

Ordered that the Secretary of State be addressed on the subject of the — with reference to the remarks made by the Army Sanitary Commission on the Report of the Madras Municipality for 1880.

30TH OCTOBER 1882, No. ⁴⁵/₂₈₄₆ W., PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

LETTER—to

THE MOST HONORABLE THE SECRETARY OF STATE FOR INDIA,

MY LORD MARQUIS,

We have the honor to acknowledge the receipt of your Lordship's Despatch No. 12 (Statistics and Commerce), dated 22nd June 1882, forwarding copies of a Memorandum by the Army Sanitary Commission on the Report of the Madras Municipality for 1880, and directing the submission of a special report with reference to the remarks on the sanitary condition of the district over which it exercises jurisdiction.

2. In reply, we have the honor to forward for your Lordship's information copies of the accompanying papers from the Municipal officers and from our Chief Engineer, reviewing the report of the Sanitary Commission, and explaining the present condition and future prospects of the Municipality in regard to sanitation, conservancy, and water-supply. We would particularly invite attention to Colonel Sankey's Note, the last paper in the series, from which it will be apparent that the delay in grappling with the question of drainage and water-supply of Madras is due, apart from financial considerations, to the engineering difficulties presented by the generally low level of the ground on which Fort St. George and Black Town, with the surrounding far scattered group of villages, collectively known as Madras, are built, and by the tideless character of the sea into which the sewage, if not utilised for irrigation, has to be discharged. These difficulties have hitherto been found to be insuperable, at any thing like a reasonable outlay, notwithstanding the high professional talent which has been employed to surmount them; and looking to the financial condition of the Municipality, it seems utterly hopeless to expect that any really effective remedy of a sufficiently comprehensive character can be applied by that body. It remains therefore to consider whether the Government should come to the aid of the Municipality, and to what extent.

3. The lowest of the approximate estimates framed by the Municipal Engineer, and adopted by our Chief Engineer with slight modifications, is so large in amount that the resources of this Government are wholly inadequate to afford any material aid, having regard to the many pressing demands to be met from Provincial Funds throughout the Presidency.

4. We therefore see no prospect of any complete scheme of drainage and sanitation being carried out, unless the burdens now borne by Imperial and Provincial Funds respectively are readjusted to the advantage of the latter.

5. In the meantime, however, the most pressing and immediate needs of Madras will be met under the scheme which has been framed by the Municipal Engineer for the drainage of Black Town; but we are very far indeed from considering that, when that is finished, very much will not still require to be done, and done as soon as it is in any way possible to do it.

6. We are quite aware that the sanitation of Madras compares very unfavorably with that of most civilised capitals, and are most anxious to remedy a state of things in which we only acquiesce from our utter inability to meet the vast outlay without which it would be impracticable to deal successfully with it.

We have the honor to be,

My Lord Marquis,

Your Lordship's most obedient, humble servants,

(Signed)	M. E. GRANT DUFF.
(")	FRED. ROBERTS.
(")	DAVID F. CARMICHAEL.
(")	H. E. SULLIVAN.

OOTACAMUND,
30th October 1882.

GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

LETTER to the Most Honorable
the Secretary of State for
India.

No. ⁴⁵₂₈₄₆ W., dated 30th Oct. 1882.

FORWARDING with observations papers from the Municipal officers and from the Chief Engineer, Public Works Department, reviewing the Memorandum by the Army Sanitary Commission on the Report of the Madras Municipality for 1880.

30TH DECEMBER 1882, Nos. 1652, 1652-A, PUBLIC.

GOVERNMENT OF MADRAS.

PUBLIC DEPARTMENT.

READ—the following papers :—

Despatch from the Most Honorable the MARQUIS OF HARTINGTON, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 8th June 1882, No. 11 (Statistics and Commerce).

I forward 130* copies of a Memorandum by the Army Sanitary Commission on the report of your Sanitary Commissioner for 1880.

*Twelve by mail.
One hundred and eighteen through Stores Department.

2. It would appear that many towns and districts in this Presidency are, in sanitary matters, in a peculiarly unsatisfactory condition, which is a prolific cause of fever and other diseases. I request that the attention of your Sanitary Commissioner may be specially drawn to the important remarks in paragraph 22 of the Memorandum, in which I concur. The enormous death-rate in some of the jails also calls for continued consideration and action.

3. If it is the case, as surmised by the Army Sanitary Commission, that the registration of vital statistics has retrograded, your Excellency will doubtless see the importance of improving the organization for this purpose.

From A. H. T. MARTINDALE, Esq., Officiating Under Secretary to the Government of India, Home Department (Sanitary), to the Chief Secretary to Government, dated Simla, 19th July 1882, No. 226.

With reference to the despatch marginally noted, I am directed to state that the Governor-General in Council will be glad to be informed of any action taken, or proposed to be taken, by the Government of Madras upon the remarks and suggestions of the Army Sanitary Commission, with reference to the report of the Sanitary Commissioner for Madras for the year 1880.

ORDER—dated 30th December 1882, No. 1652, Public.

The main points to which the Army Sanitary Commission, in their review of Dr. Furnell's report for 1880, direct attention are—

- I.—Village Sanitation.
- II.—Registration of Vital Statistics.
- III.—Mortality in Jails.

2. I. VILLAGE SANITATION.—The statistics of many years show that the mortality from *Fevers* is more than double that from all other diseases put together. It is beyond question that the most active agents not only in nourishing epidemics, but in the generation of those endemic malarial fevers which thus carry off the bulk of the population, are to be found in filthy backyards and house premises, and, consequently, polluted water-supply.

3. The question, and it is one which has frequently engaged the attention of the Government, is how improvement can best be effected, both as regards the organization which conducts and enforces practical sanitary operations in the villages themselves, and as regards the skilled supervising agency that should indicate the matters to which the efforts of the executive organization should be directed.

4. At the outset it is proper to correct an error into which the Commission appears to have fallen. At paragraph 22 they write: "So long as there are persons on the spot who ought to discharge sanitary duties of this class" (i.e., attention to village cleansing and to water-supply) "and do not do them, it is clear that, unless such officials are to be abolished, they ought to be made to do their duty. Some steps might apparently be taken by the Government and its local officers to re-organize this local staff;" and again: "Madras reports have also shown that *village authorities and even cleansing officials exist*, whose services might be called into active operation if only suitable steps were taken." If this means, as there seems no doubt it does, that there is an existing staff in each village that may be compelled to engage in active sanitary operations, it is evident the Commissioners labor under serious misapprehension. It is no part of the duty incumbent upon the menial servants of the village communities to perform or to enforce active cleansing operations; even if it were, the legal or legislative sanction, without which their labors would be futile, is entirely wanting.

5. The duty of initiating sanitary work throughout the country outside the Municipal towns and of entertaining the establishments to carry it out devolves upon the Local Fund Boards. The Government can do little more than urge Circle Boards to make larger and more numerous grants, stimulate their interest in the matter, and insist that the sanctioned grants shall be fully utilized.

The Government indeed, as the law stands, may interfere and, in passing the annual budgets of the several circles, pass orders modifying the several allotments,—orders which are "binding and shall be carried out so far as the means at their disposal permit." But in the absence of detailed information as to local wants their interference is necessarily restricted to cases where the total grant proposed is manifestly inadequate. Increased attention has been paid within the last few years to the sanitary allotments which are now consequently much in excess of the amounts formerly assigned. The Board of Revenue, who are primarily responsible for the revision of the Circle Budgets, will be watchful to correct any neglect to provide satisfactorily for this very important purpose.

6. In 1880-81, the amount sanctioned out of Local Fund revenue for sanitary purposes (exclusive of vaccination) was Rs. 3,27,870; in 1881-82 it rose to Rs. 3,87,000; while in the current year it stands at Rs. 3,45,800. In the opinion of Government the total assignment might, with due regard to other claims, be very considerably supplemented. In 1881-82 the average sanitary grant over all the circles was 28·7 per cent. of the income available for sanitary objects. Of thirty-one circles, twenty fell below this average. Every circle should endeavour to make it a rule to allot not less than 25 per cent. for these purposes. Presidents will accordingly bring the matter under the special consideration of their respective Boards.

7. But besides the smallness of the assignments for sanitation, the neglect to utilize even the funds appropriated is a matter which claims serious notice. It is a grave reflexion on the administration of the funds, and the Government must insist on its being corrected. Taking the last available figures—those for the year 1881-82—it is observed that nearly one-half of the sanctioned outlay remained unexpended:—

Total sanitary allotment sanctioned	Rs.
Amount spent	3,86,863
	2,03,405

The expenditure under the different heads was as follows—

	Amount Sanctioned. RS.	Amount Spent. RS.
Conservancy	1,76,109	1,12,867
Improvement of village-sites	42,640	5,510
Water-supply improvement	1,09,499	52,467
Fairs and Festivals	9,809	6,403
Construction of Latrines, Drains, &c. . . .	48,906	26,158
Total	3,86,863	2,03,405

8. The assignments most fully utilized are those for conservancy establishments. This is to be expected as the establishments once organized are under better control, while the outlay is capable of more accurate estimation. The objects which have met with the least consideration are the improvement of village-sites and of village water-supply, the two most vitally important matters to which sanitary measures can be directed; the former having received only one-eighth of its proper due, and the latter less than one-half.

This is very unsatisfactory; and the Board of Revenue will exercise a more strict supervision than they appear to have hitherto done. The reasons for short outlay given in some of the annual circle reports are inadmissible or irrational; for instance, for an expenditure of only Rs. 8 out of a budget allotment of Rs. 1,500 in 1880-81 for village-site and water-supply improvement the Salem Board give the explanation that "there was no necessity for larger outlay during the year"; and Kurnool ascribes a similar deficiency, reaching nearly Rs. 4,000, "to the full amount not having been fully spent"! In many circles no explanation at all is furnished. The necessity of stricter financial control is plainly manifest.

9. In this connection, it is desirable to draw the notice of the Circle Boards to the expediency of allotting funds early in the year. There is a general tendency, the Government believe, to defer the distribution of the sanitation grant so late that insufficient time is left to complete the work before the close of the year.

10. The cause of this neglect to inaugurate works of the kind described is not far to seek. The assignment of funds is dependent upon the representation of local wants. The customs and ideas of the population in respect of sanitation remaining what they are, public and spontaneous applications for assistance are naturally of rare occurrence, and the Boards are obliged to rely mainly upon Tahsildars and Divisional officers. Rural sanitary reform is thus left largely dependent upon the personal interest which the Government officers take in discovering and representing the wants of the villages within their respective charges. In the midst of the multifarious duties which devolve upon these officials it is scarcely a matter of wonder that, in many circles, the projects submitted for approval are but few or are submitted in so crude a form that the allocation of funds is impossible. The Government desire to impress upon their district officers that, in present circumstances, the methodical investigation of the health requirements of the villages lying within their jurisdictions must be considered an imperative duty. The non-official members should be reminded that their appointments to the Circle Boards entail upon them equal and co-ordinate functions in this respect, and they should be encouraged to take a greater interest in these matters than hitherto, in some parts of the country, they have done: at the same time the Government are glad to recognise that there are very many honorable exceptions, and that the sanitary progress which has been made is greatly indebted to their unselfish labors.

11. Similar causes operate to postpone the prosecution of works which have already received budget sanction—want of local energy and local supervision. The responsible establishments are really inadequate for the supervision of all the minor works which should be in hand. The remedy seems to lie in some development of village agency. Wherever it can be done, village committees under the Head of the Village, similar to those that already exist in some circles, as in Salem and Dindigul,

should be organized; funds being placed at their disposal and the execution of all simple works entrusted to them under the general direction of the Boards' officers or of some official or non-official member.

12. In paragraph 20 of their Memorandum the Commission refer to the importance of taking measures to stimulate efforts on the part of the villagers themselves. It is observed that repeated instructions with this object have been issued both by the Board of Revenue and by the Government; and there is a standing rule permitting Circle Boards to supplement subscriptions raised for local improvements by a grant of equal amount.

13. With regard to the provision of a skilled agency for the supervision of sanitary work, or rather for indicating and devising measures on which the funds of the Boards can be expended to the best advantage, the Government observe that the scheme for the appointment of an Assistant Surgeon, subordinate to the Zillah Surgeon, which has so long been under consideration, will probably receive sanction at an early date; most of the difficulties, which were connected with the discharge of the Jail duties now devolving on Zillah Surgeons, being in a fair way to settlement. When this scheme is once in operation, the Boards will have at their disposal the services of a scientific officer whose duty it will be to advise on and investigate the sanitary requirements of each circle, and who will be able to supply much of that effective general supervision, the want of which has been commented upon in the preceding paragraphs.

14. The foregoing remarks have reference to the state of things as they exist in the present state of the law. Some extension of legal authority however seems required if conservancy is to be really efficient. The great mischief lies in the reeking backyards and filthy house premises, which are not only pestiferous in themselves, but spread disease by polluting the water-supply. As the Commission write (paragraph 10): "In the present state of the law regarding village sanitary improvements it unfortunately happens that the real evils in the case cannot be reached. The Sanitary officer has no authority inside house boundaries." The question of some simple Municipal law for villages and towns, not being Municipalities, has been more than once discussed—the latest resolution being only a year ago (G.O., 18th September 1881, No. 1695, Financial Department)—but hitherto it has been complicated with the introduction of provisions for raising special village cesses for sanitary purposes in addition to the funds raised under Act IV of 1871. A simpler measure might however prove of great advantage. The Board of Revenue will, after consulting Collectors and Presidents of Circle Boards, again report upon the expediency of an enactment sufficient to empower the Sanitary officers of the Boards to enter and inspect private premises, and to issue orders requiring the occupant to cleanse them, if unwholesome, to the officer's satisfaction; disobedience entailing a penalty, and giving the officer authority to enter and cleanse at occupant's cost. A measure on these lines, with the addition of such other provisions as may be considered expedient, would, it is believed, if judiciously worked, prove of immense benefit. It need be put in force only in towns of a certain size, or with the sanction of Government.

15. The freer extension of the Police Act, XXIV of 1859, is another measure which commends itself to Government. At present its operation is restricted generally to towns where there is a resident Magistrate, and as prosecutions under it are chiefly ordinary nuisance cases, this is not unreasonable. When the Act is put in force in other towns, as the Government desire it should be, prosecutions may be chiefly confined to offences under Clauses 1, 5 and the last paragraph of Clause 7 of Section 48. The last-mentioned provision should be of great use in protecting the water of wells and tanks which Local Fund Boards may have set apart for drinking purposes. In determining the towns to which the Police Act should be thus extended, District Magistrates should as a rule include every town in which a scavenging establishment is employed.

16. With regard to sanitary operations in *Municipalities*, it is only necessary to observe that conservancy establishments are generally adequate, and that the Municipal law is sufficient to enforce all the regulation that is required. Where conditions

inimical to health are allowed to continue, it is owing more often to failure in the vigorous execution of the law than to want of funds. As to the Presidency Town, its sanitary condition and the various questions connected therewith have been fully dealt with by Government in their Proceedings in the Public Works Department, No. 2845 W., dated 30th October 1882.

17. II. *Registration of Vital Statistics*.—Birth registration is regarded as "not unsatisfactory, and auguring well for greater accuracy in future years." With respect to the registration of deaths the same cannot be said. In the opinion of the Commission the rural registration is especially defective "showing apparently that the sufferings of the years of distress had somewhat loosened the registration machinery." This inference is probably correct to some extent. The mortality returns have always been less accurate than the birth registers, and are still very far from reliable. As frequently intimated, the Government are not prepared to recommend the introduction in the rural tracts of the compulsory Registration Act, which is in force in Municipalities. They must therefore again impress upon district officers the importance of the subject, and the necessity of frequent inspection and checking of the Curnams' registers. In Municipalities the supervision of the returns of vital statistics rests with the Civil Medical Officer. When, under the scheme referred to in paragraph 13 above, the Zillah Surgeon is set free to perform the duties of District Sanitary Officer, a similar supervision will, it is intended, be exercised by him with regard to the returns for the rural tracts. This, it is trusted, may result in considerable improvement.

At the instance of the Government of India,* the question of improving the vital statistics in the rural tracts is again under consideration, and reports have been called for from the various Sanitary and District authorities.

18. III. *Mortality in Jails*.—The Commission notice the high death-rates at some of the Central and District Jails. The attention of the Inspector-General will be called to their remarks. But the Government are glad to observe from last year's annual administration report that the mortality in the jails, specially mentioned, is now, in nearly every case, not in excess of normal rates.

(True Extract.)

C. G. MASTER,
Chief Secretary.

To the Sanitary Commissioner.
" Surgeon-General with the Government of Madras.
" Inspector-General of Jails.
" Revenue Department.
" Military Department.
" Public Works Department.
" Board of Revenue.
" Presidents of Municipal Commissions.
" Government Astronomer.
" Inspector-General of Police.

ENDORSEMENT—dated 30th December 1882, No. 1652-A, Public.

Copy to Government of India, Home Department, with reference to letter thence, No. 226, dated 19th July 1882.

C. G. MASTER,
Chief Secretary.

Exd. J. Wright.

Govt. of 1882 Madras.
PUBLIC.

30TH DECEMBER 1882, Nos. 1652, 1652-A, PUBLIC.

GOVERNMENT OF MADRAS.

PUBLIC DEPARTMENT.

READ—the following papers :—

Despatch from the Most Honorable the MARQUIS OF HARTINGTON, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 8th June 1882, No. 11 (Statistics and Commerce).

I forward 130* copies of a Memorandum by the Army Sanitary Commission on the report of your Sanitary Commissioner for 1880.

* Twelve by mail.

One hundred and eighteen through Stores Department.

2. It would appear that many towns and districts in this Presidency are, in sanitary matters, in a peculiarly unsatisfactory condition, which is a prolific cause of fever and other diseases. I request that the attention of your Sanitary Commissioner may be specially drawn to the important remarks in paragraph 22 of the Memorandum, in which I concur. The enormous death-rate in some of the jails also calls for continued consideration and action.

3. If it is the case, as surmised by the Army Sanitary Commission, that the registration of vital statistics has retrograded, your Excellency will doubtless see the importance of improving the organization for this purpose.

From A. H. T. MARTINDALE, Esq., Officiating Under Secretary to the Government of India, Home Department (Sanitary), to the Chief Secretary to Government, dated Simla, 19th July 1882, No. 226.

With reference to the despatch marginally noted, I am directed to state that the Governor-General in Council will be glad to be informed of any action taken, or proposed to be taken, by the Government of Madras upon the remarks and suggestions of the Army Sanitary Commission, with reference to the report of the Sanitary Commissioner for Madras for the year 1880.

ORDER—dated 30th December 1882, No. 1652, Public.

The main points to which the Army Sanitary Commission, in their review of Dr. Furnell's report for 1880, direct attention are—

- I.—Village Sanitation.
- II.—Registration of Vital Statistics.
- III.—Mortality in Jails.

Issued

Recd.

Encl.

G.O., &c., 30th December 1882,
Nos. 1652, 1652-A.

DECEMBER.

Sanitation.

Passing orders on despatch from Secretary of State, forwarding copies of a memorandum by the Army Sanitary Commission on the report of the Sanitary Commissioner, Madras, for 1880.

With order

no. 275 was 24 January 83

Communicated to

Suply. Engineers.

Saf. I. P.
u.s.

no 275 - 7 24 - 1 - 83

S. Eign.

2. I. VILLAGE SANITATION.—The statistics of many years show that the mortality from *Fevers* is more than double that from all other diseases put together. It is beyond question that the most active agents not only in nourishing epidemics, but in the generation of those endemic malarial fevers which thus carry off the bulk of the population, are to be found in filthy backyards and house premises, and, consequently, polluted water-supply.

3. The question, and it is one which has frequently engaged the attention of the Government, is how improvement can best be effected, both as regards the organization which conducts and enforces practical sanitary operations in the villages themselves, and as regards the skilled supervising agency that should indicate the matters to which the efforts of the executive organization should be directed.

4. At the outset it is proper to correct an error into which the Commission appears to have fallen. At paragraph 22 they write: "So long as there are persons on the spot who ought to discharge sanitary duties of this class" (i.e., attention to village cleansing and to water-supply) "and do not do them, it is clear that, unless such officials are to be abolished, they ought to be made to do their duty. Some steps might apparently be taken by the Government and its local officers to re-organize this local staff;" and again: "Madras reports have also shown that *village authorities and even cleansing officials exist*, whose services might be called into active operation if only suitable steps were taken." If this means, as there seems no doubt it does, that there is an existing staff in each village that may be compelled to engage in active sanitary operations, it is evident the Commissioners labor under serious misapprehension. It is no part of the duty incumbent upon the menial servants of the village communities to perform or to enforce active cleansing operations; even if it were, the legal or legislative sanction, without which their labors would be futile, is entirely wanting.

5. The duty of initiating sanitary work throughout the country outside the Municipal towns and of entertaining the establishments to carry it out devolves upon the Local Fund Boards. The Government can do little more than urge Circle Boards to make larger and more numerous grants, stimulate their interest in the matter, and insist that the sanctioned grants shall be fully utilized.

The Government indeed, as the law stands, may interfere and, in passing the annual budgets of the several circles, pass orders modifying the several allotments,—orders which are "binding and shall be carried out so far as the means at their disposal permit." But in the absence of detailed information as to local wants their interference is necessarily restricted to cases where the total grant proposed is manifestly inadequate. Increased attention has been paid within the last few years to the sanitary allotments which are now consequently much in excess of the amounts formerly assigned. The Board of Revenue, who are primarily responsible for the revision of the Circle Budgets, will be watchful to correct any neglect to provide satisfactorily for this very important purpose.

6. In 1880-81, the amount sanctioned out of Local Fund revenue for sanitary purposes (exclusive of vaccination) was Rs. 3,27,870; in 1881-82 it rose to Rs. 3,87,000; while in the current year it stands at Rs. 3,45,800. In the opinion of Government the total assignment might, with due regard to other claims, be very considerably supplemented. In 1881-82 the average sanitary grant over all the circles was 28.7 per cent. of the income available for sanitary objects. Of thirty-one circles, twenty fell below this average. Every circle should endeavour to make it a rule to allot not less than 25 per cent. for these purposes. Presidents will accordingly bring the matter under the special consideration of their respective Boards.

7. But besides the smallness of the assignments for sanitation, the neglect to utilize even the funds appropriated is a matter which claims serious notice. It is a grave reflexion on the administration of the funds, and the Government must insist on its being corrected. Taking the last available figures—those for the year 1881-82—it is observed that nearly one-half of the sanctioned outlay remained unexpended:—

Total sanitary allotment sanctioned	Rs.
Amount spent	3,86,863
	2,03,405

The expenditure under the different heads was as follows—

	Amount Sanctioned.	Amount Spent.
	RS.	RS.
Conservancy	1,76,109	1,12,867
Improvement of village-sites	42,640	5,510
Water-supply improvement	1,09,499	52,467
Fairs and Festivals	9,809	6,403
Construction of Latrines, Drains, &c.	48,906	26,158
Total	3,86,863	2,03,405

8. The assignments most fully utilized are those for conservancy establishments. This is to be expected as the establishments once organized are under better control, while the outlay is capable of more accurate estimation. The objects which have met with the least consideration are the improvement of village-sites and of village water-supply, the two most vitally important matters to which sanitary measures can be directed; the former having received only one-eighth of its proper due, and the latter less than one-half.

This is very unsatisfactory; and the Board of Revenue will exercise a more strict supervision than they appear to have hitherto done. The reasons for short outlay given in some of the annual circle reports are inadmissible or irrational; for instance, for an expenditure of only Rs. 8 out of a budget allotment of Rs. 1,500 in 1880-81 for village-site and water-supply improvement the Salem Board give the explanation that "there was no necessity for larger outlay during the year"; and Kurnool ascribes a similar deficiency, reaching nearly Rs. 4,000, "to the full amount not having been fully spent"! In many circles no explanation at all is furnished. The necessity of stricter financial control is plainly manifest.

9. In this connection, it is desirable to draw the notice of the Circle Boards to the expediency of allotting funds early in the year. There is a general tendency, the Government believe, to defer the distribution of the sanitation grant so late that insufficient time is left to complete the work before the close of the year.

10. The cause of this neglect to inaugurate works of the kind described is not far to seek. The assignment of funds is dependent upon the representation of local wants. The customs and ideas of the population in respect of sanitation remaining what they are, public and spontaneous applications for assistance are naturally of rare occurrence, and the Boards are obliged to rely mainly upon Tahsildars and Divisional officers. Rural sanitary reform is thus left largely dependent upon the personal interest which the Government officers take in discovering and representing the wants of the villages within their respective charges. In the midst of the multifarious duties which devolve upon these officials it is scarcely a matter of wonder that, in many circles, the projects submitted for approval are but few or are submitted in so crude a form that the allocation of funds is impossible. The Government desire to impress upon their district officers that, in present circumstances, the methodical investigation of the health requirements of the villages lying within their jurisdictions must be considered an imperative duty. The non-official members should be reminded that their appointments to the Circle Boards entail upon them equal and co-ordinate functions in this respect, and they should be encouraged to take a greater interest in these matters than hitherto, in some parts of the country, they have done: at the same time the Government are glad to recognise that there are very many honorable exceptions, and that the sanitary progress which has been made is greatly indebted to their unselfish labors.

11. Similar causes operate to postpone the prosecution of works which have already received budget sanction—want of local energy and local supervision. The responsible establishments are really inadequate for the supervision of all the minor works which should be in hand. The remedy seems to lie in some development of village agency. Wherever it can be done, village committees under the Head of the Village, similar to those that already exist in some circles, as in Salem and Dindigul,

should be organized; funds being placed at their disposal and the execution of all simple works entrusted to them under the general direction of the Boards' officers or of some official or non-official member.

12. In paragraph 20 of their Memorandum the Commission refer to the importance of taking measures to stimulate efforts on the part of the villagers themselves. It is observed that repeated instructions with this object have been issued both by the Board of Revenue and by the Government; and there is a standing rule permitting Circle Boards to supplement subscriptions raised for local improvements by a grant of equal amount.

13. With regard to the provision of a skilled agency for the supervision of sanitary work, or rather for indicating and devising measures on which the funds of the Boards can be expended to the best advantage, the Government observe that the scheme for the appointment of an Assistant Surgeon, subordinate to the Zillah Surgeon, which has so long been under consideration, will probably receive sanction at an early date; most of the difficulties, which were connected with the discharge of the Jail duties now devolving on Zillah Surgeons, being in a fair way to settlement. When this scheme is once in operation, the Boards will have at their disposal the services of a scientific officer whose duty it will be to advise on and investigate the sanitary requirements of each circle, and who will be able to supply much of that effective general supervision, the want of which has been commented upon in the preceding paragraphs.

14. The foregoing remarks have reference to the state of things as they exist in the present state of the law. Some extension of legal authority however seems required if conservancy is to be really efficient. The great mischief lies in the reeking backyards and filthy house premises, which are not only pestiferous in themselves, but spread disease by polluting the water-supply. As the Commission write (paragraph 10): "In the present state of the law regarding village sanitary improvements it unfortunately happens that the real evils in the case cannot be reached. The Sanitary officer has no authority inside house boundaries." The question of some simple Municipal law for villages and towns, not being Municipalities, has been more than once discussed—the latest resolution being only a year ago (G.O., 18th September 1881, No. 1695, Financial Department)—but hitherto it has been complicated with the introduction of provisions for raising special village cesses for sanitary purposes in addition to the funds raised under Act IV. of 1871. A simpler measure might however prove of great advantage. The Board of Revenue will, after consulting Collectors and Presidents of Circle Boards, again report upon the expediency of an enactment sufficient to empower the Sanitary officers of the Boards to enter and inspect private premises, and to issue orders requiring the occupant to cleanse them, if unwholesome, to the officer's satisfaction; disobedience entailing a penalty, and giving the officer authority to enter and cleanse at occupant's cost. A measure on these lines, with the addition of such other provisions as may be considered expedient, would, it is believed, if judiciously worked, prove of immense benefit. It need be put in force only in towns of a certain size, or with the sanction of Government.

15. The freer extension of the Police Act, XXIV of 1859, is another measure which commends itself to Government. At present its operation is restricted generally to towns where there is a resident Magistrate, and as prosecutions under it are chiefly ordinary nuisance cases, this is not unreasonable. When the Act is put in force in other towns, as the Government desire it should be, prosecutions may be chiefly confined to offences under Clauses 1, 5 and the last paragraph of Clause 7 of Section 48. The last-mentioned provision should be of great use in protecting the water of wells and tanks which Local Fund Boards may have set apart for drinking purposes. In determining the towns to which the Police Act should be thus extended, District Magistrates should as a rule include every town in which a scavenging establishment is employed.

16. With regard to sanitary operations in *Municipalities*, it is only necessary to observe that conservancy establishments are generally adequate, and that the Municipal law is sufficient to enforce all the regulation that is required. Where conditions

inimical to health are allowed to continue, it is owing more often to failure in the vigorous execution of the law than to want of funds. As to the Presidency Town, its sanitary condition and the various questions connected therewith have been fully dealt with by Government in their Proceedings in the Public Works Department, No. 2845 W., dated 30th October 1882.

17. II. *Registration of Vital Statistics*.—Birth registration is regarded as "not unsatisfactory, and auguring well for greater accuracy in future years." With respect to the registration of deaths the same cannot be said. In the opinion of the Commission the rural registration is especially defective "showing apparently that the sufferings of the years of distress had somewhat loosened the registration machinery." This inference is probably correct to some extent. The mortality returns have always been less accurate than the birth registers, and are still very far from reliable. As frequently intimated, the Government are not prepared to recommend the introduction in the rural tracts of the compulsory Registration Act, which is in force in Municipalities. They must therefore again impress upon district officers the importance of the subject, and the necessity of frequent inspection and checking of the Curnams' registers. In Municipalities the supervision of the returns of vital statistics rests with the Civil Medical Officer. When, under the scheme referred to in paragraph 13 above, the Zillah Surgeon is set free to perform the duties of District Sanitary Officer, a similar supervision will, it is intended, be exercised by him with regard to the returns for the rural tracts. This, it is trusted, may result in considerable improvement.

At the instance of the Government of India,* the question of improving the vital statistics in the rural tracts is again under consideration, and reports have been called for from the various Sanitary and District authorities.

18. III. *Mortality in Jails*.—The Commission notice the high death-rates at some of the Central and District Jails. The attention of the Inspector-General will be called to their remarks. But the Government are glad to observe from last year's annual administration report that the mortality in the jails, specially mentioned, is now, in nearly every case, not in excess of normal rates.

(True Extract.)

C. G. Master
Chief Secretary.

To the Sanitary Commissioner.
" Surgeon-General with the Government of Madras.
" Inspector-General of Jails.
" Revenue Department.
" Military Department.
" Public Works Department.
" Board of Revenue.
" Presidents of Municipal Commissions.
" Government Astronomer.
" Inspector-General of Police.

ENDORSEMENT—dated 30th December 1882, No. 1652-A, Public.

Copy to Government of India, Home Department, with reference to letter thence, No. 226, dated 19th July 1882.

C. G. MASTER,
Chief Secretary.

Exd. J. Wright.