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Local & Munl. (1895) Department.

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G.O., No. 866 M

DATED 20th May 1895

[Despatch Abstract.]

Inspection Notes.

Passing orders on the resolutions of the Cocanada Munici -pal Council in connection with the Sanitary Commissioner's---- on the municipality.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

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G.O., DATED 27.5.95
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Inspection note.

Passing order on the resolutions of the Canada Inland Council in connection with the Sanitary Commissioners for the Country

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

20 May 1866 Proof 264

TH APRIL 1895, No. M., LOCAL AND MUNICIPAL.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper :—

From M.R.Ry. I. E. SESHACHALAPATI GAR, B.A., Chairman, Municipal Council, Cocanada, to the Chief Secretary to Government (through the Deputy Collector, Head Quarters Division, Cocanada), dated 19th March 1895, No. 1703.

I have the honour to submit herewith inspection notes of the Sanitary Commissioner for Madras on this municipality together with the council's resolutions thereon.

ENCLOSURES.

INSPECTION Notes of the Sanitary Commissioner for Madras.

GODAVARI DISTRICT.

COCANADA MUNICIPALITY.

Inspected 27th to 30th October 1894.

		Males.	Females.	Total.
Population as per census of	1881 ..	14,874	13,982	28,856
	1891 ..	20,328	20,225	40,553

Inspection Notes.	Copies of Resolutions.
The *Town site* is upon alluvial deposit, which is for the greater part of the year water-logged.	
2. *Dwellings.*—(*a*) The "pucca" built dwellings are usually very damp. Under section 180, the municipality should use their best influence to persuade the inhabitants when building new houses to raise the basements and have impervious floorings of concrete, cement-plastered, or stone upon concrete, cement-pointed. "Damp-proof courses" in the walls should be universally adopted in new buildings. The extra cost of this procedure would be very slight, and would well repay the builder both as to better health of the inhabitants and therefore better value of property, as well as by the longer life of the house. Details as to "damp-proof courses" would doubtless be given on application by the Sanitary Board.	Section 180 of the Act should be enforced strictly with reference to the construction of pucca buildings, *i.e.*, houses having brick or stone walls.
(*b*) *Turpoo Pettah.*—This is a conglomeration of the poorest type of huts much crowded upon the soil, arranged without reference to perflation, drainage or conservancy. The necessity for improvement here and in other similar localities has been strongly urged by Surgeon-Captain Vickers, whose vigilance in sanitary matters ought to prove of much assistance to the municipality.	Postponed till the next meeting. The two new proposed sites should also be inspected in the meantime and reported on—2nd March 1895. Postponed till 16th instant for taking the levels of the site between the Prince of Wales' choultry and Kondagapalem. The Chairman will see this done in the meantime—6th March 1895. *Note by Chairman.*—The levels are

(*c*) *Balpregada Ramaluchwama Pettah* —is another of the hut lands that requires urgent attention. The sewage from this area is received into a pool about 100 yards square. It should be possible to run a pipe from this part and drain it into the neighbouring canal.

(*d*) It is essential that these insanitary places should be carefully surveyed, and be rearranged upon plans allowing for perflation, correct disposal of sewage, and properly-made roads. Most of the huts are built upon private lands.

(*e*) In future, the municipality should take care not to permit of the building of huts in close proximity to the better class of houses, and when this permission is given it should be seen that no manner of doubt occurs as to the owner's liability to erect latrines and make arrangements for drainage and roads.

(*f*) A list of hut lands should be placed before the municipality together with a complete report by the Civil Surgeon of their sanitary condition and the arrangements made for each. The council should then determine the order in which each improvement should be taken and enforced.

(*g*) At the end of Nalam Padmanabham street, an arrack shop obstructs the natural drainage towards the canal. The owner is one Redlum A. Ram Iyer. If this house were cut down, it would do much towards improving the natural perflation of the site, and towards improving the drainage of an important street.

3. *Roads.*—These are in fairly good order. No metal nearer than Dowlaishweram is obtainable. Several roads have been macadamized by utilizing the ballast of ships arriving in the port.

4. *Drainage.*—(*a*) The state of the Coringa road requires early attention. A large ditch without a correct outlet receives the sewage and surface-washings from the neighbourhood. During the hot season, it is stated the stench from this source is a cause of much complaint by the Eurasians residing in the locality. It is undesirable this mass of filth water should be added to the already over-

being taken. The matter will very likely be disposed of at the meeting of the 16th instant. The council is anxious to provide separate accommodation to these Kurpoo people as soon as possible.

The Chairman should get an estimate prepared for putting in pipes to remove the drainage.

Note by Chairman.—The owner of the pettah has not left out streets and lanes as suggested by the Chairman in consultation with the Civil Surgeon. Permission has therefore been declined for repairing or reconstructing houses in this block.

The Civil Surgeon will be requested to favour the council with his views about the existing hut lands.

The Chairman should make an estimate for acquiring the site for making a road from Nalam Padmanabham street to the Salt creek; and also another for making a drain only.

Recorded.

Chairman to see if there is any cheap way of doing this.

burdened soil of the neighbourhood. Arrangements should be made under local engineering advice to provide for the grading of this trench or for its drainage by pipes.

(*b*) Beyond a pucca-built drain leading from the market to the canal, which is possessed of very bad gradients, there is really no systematic attempt to remove the sewage from the town site. Indeed, it is a common sight to see sewage-water in unlined drains side by side with the pervious masonry channels conveying drinking-water. The councillors should remember, in this connection, that common masonry such as these channels are formed of cannot be trusted to prevent entrance of impurities from the soil surrounding them. Every effort should therefore be made to divert drainage from their neighbourhood.

(*c*) *The Kurnam Mannur Channel* leads surface drainage from the town to the swamp. The flow is imperfect. It should be carefully re-sectioned throughout and be made broader with reference to securing a greater discharge in a shorter time.

(*d*) *Factory Street, Jaganaickapur.*—This is one of the chief outlets for sewage from Jaganaickapur. One side of the road possesses masonry drains and the other not. Much nuisance results. A correct, egg-shaped, cement-lined drain should be laid down.

5. *Water-supply.*—(*a*) The Samalkot canal supplies a large portion of the town by means of masonry conduits obviously not impervious. Open cisterns exist at intervals. Many of these are in bad repair and surrounded with spilt water, for which no drainage has been arranged. There are only five wells from which water can be procured. The Nadrapettah sewage channel and that from the main channel flows side by side with the conduit. At the Cutcherry road, the ground in the neighbourhood of the conduit is waterlogged, and probably sewage, ground soil water, and the drinking-water intercommunicate through the conduit wall. At the point where the water is taken off for the town from the canal (at Simpson lock), necessarily boats have to wait to pass. On this account, this was an unfavourable spot for selection. Fœcal contamination must be frequent.

To lie over until a water-supply scheme can be sanctioned.

Chairman will attend to this point. The channel should be improved.

This will be attended to as funds permit.

Nothing can be done at present.

Inspection Notes.

Copies of Resolutions.

The channel supplies the Balajee tank and the Rajah tank. Into these the people step to obtain their water, thus defiling it.

(*b*) Floating platforms with impervious surfaces sloping towards a cistern on the bank should be employed in this and other tanks, *e.g.*, the Church and Rajah tank, used for drinking purposes.

Cheap floating platforms will be put up if possible.

(*c*) *Soorianpett Rajah Tank.*—Drainage from the road enters this tank. The banks should be repaired so as to prevent this.

The necessary repairs will be made.

(*d*) At Jaganaickapur, the water-supply is obtained by a conduit from an irrigation channel led from the Gódávari. At a point where several boats were moored I found the banks lined with fœces. One man was performing his ablutions in the channel water. The watchman placed here for protection of the water was himself discovered in the act of easement.

Recorded.

(*e*) *Jaganaickapur Tank.*—This is used by dhobies. The water is simply the sewage and surface washings from the surrounding area. It would be advisable to fill in this tank permanently.

Recorded.

(*f*) Such water, therefore, as is obtainable in Cocanada is derived from sources that are open to contamination and is distributed by modes to which this also applies. The water found on the site by shallow well sinking is practically always brackish. Under these circumstances, the desirability for a new water-supply scheme is self-evident. It seems to me that the Engineer officers of the East Coast Railway have, in all probability, solved the difficulty. At Samalkot, under Messrs. Bell and Howard, the first successful artesian wells in this Presidency have been sunk. The character of the country between Samalkot and Cocanada, and the extension of its surface below the sea, justify the hope that it will be possible to secure water by artesian wells in Cocanada. I would strongly advise that experiments be made at an early date. From what I understand of the plant placed at disposal of the Sanitary Engineer at Cochin, I am disposed to think it far too incomplete to work out the problem of artesian wells either here or in any other part of the Presidency, and I should think it most desirable that that department be provided

The council prefers to wait and see what becomes of the experiment at Cocanada port station.

Inspection Notes.

Copies of Resolutions.

with a set of a more recent type and capable of sinking greater depths. As it happens, in the case of Cocanada, however, the chances are that comparatively small depths may have to be sunk. Still, in sinking a well, the Engineer should be prepared for depths far beyond the 300 odd feet for which the present apparatus is designed. I enclose a description of the artesian wells at Samalkot, as kindly furnished me by the Engineer officers referred to. The achievement although on a small scale is, I consider, of a most important character, in consideration of the want of success that has attended efforts elsewhere than in Pondicherry in the South of India.

6. *Conservancy.*—(*a*) There are a few corrugated-iron dust-bins in the town but they are but little used by the people, except that the rubbish is cast in the vicinity. I would advise the municipality in localities of the town inhabited by the better classes to introduce the "separate receptacle system;" that is, require each householder under sections 219 and 220 to place at an hour to be determined by the council the rubbish of 24 hours in a receptacle, the pattern of which should be approved by the municipality. The rubbish could then be collected by passing rubbish carts.

It is too soon to introduce the system here.

(*b*) Three cinerators are provided at a site within 75 yards of houses. These are of the old pattern and not in use now. I would advise the use of the Silchar incinerator, a description of which with full particulars will be found at page 108 of the Proceedings of the Sanitary Commissioner for the first quarter of 1894. A site more distant from houses should be selected.

The best specimen of a cinerator will be purchased on hearing from the Sanitary Commissioner in reply to the Chairman's letter to him.

(*c*) Wheel-barrows are used for rubbish collection. These are in charge of the sweepers and meet the rubbish carts at appointed spots. The system is decidedly suitable and must be economical of labour. I think, however, more might be carried by each wheel-barrow, considering the weight in regard to bulk of most rubbish, if there were a light iron wire fence added to each.

The capacity of the wheel-barrows will be increased in the cheapest manner compatible with efficiency.

(*d*) Much more care is requisite as to insisting upon rubbish removal from house compounds. Very little care seems to be taken in this direction.

Chairman to see to this.

(*e*) The two new latrines at Jaganaickapur require correctly formed

approaches. It is undesirable that men and women should be required to wade through water to get to them. The foot-path should be well raised.

There is a road already. The condition observed by the Sanitary Commissioner was due to exceptional floods.

(*f*) One of the Sanitary Engineer's standard-pattern latrines has been lately erected. The holes for the seats have, however, been turned the wrong way by the workmen. This should be remedied. There being much room for misplacing the buckets, it would be advisable to add small iron guides, so that the buckets should be placed directly below the seat and thus not leave room for "matter" being placed "in the wrong place."

This will be remedied as soon as possible.

(*g*) There is urgent necessity for more latrines. For the whole town there are only seven temporary latrines, two iron and two masonry built. One of the latter is situated near the hospital. It is at present out of repair, and it would be advisable, instead of putting it into order, to remove it entirely, as the site is not suitable. I would advise the use of the patterns of iron latrines designed by Mr. Donaldson, Calcutta (Presidency Jail). They are cheap and meet desired ends well. These latrines should not, as in the present sample, be placed in localities far removed from habitations. If correctly looked after and they be covered as in the case of the design advised, there is no reason why they should form a source of nuisance; the municipality, however, should be prepared to see that side by side with each latrine a hut is placed for a toty and that he be always upon duty. This is the only way to keep latrines upon the separate removal system, in a condition that they can be used with decency.

A sum of Rs. 1,000 has been provided in the budget for 1895–96. Enquiry will be made about the latrines (Donaldson's) recommended. The council approves of the proposal to have huts for toties near the public latrines. The present dimensions of the night-soil trenches are 18″ deep and 24″ wide. The width will also be reduced to 18″.

Night-soil Depôt.—The night-soil is disposed of in trenches two feet deep and four feet wide. Such a breadth permits of too great an accumulation without the advantage of earth contact, which is necessary with regard to nitrification by micro-organisms. To secure the correct character of decomposition, eighteen inches deep and eighteen inches broad is the full size they should be made.

Rubbish and Night-soil disposal.—No sale-proceeds are secured under this head by the municipality. They give away the rubbish and receive in return the right to bury their fœcal matter in a

A site will be soon acquired for night-soil depôt. The old night-soil depôt, which is municipal property, has already been given over for cultivation at a favourable rate of rent for 1895–96.

field. They should arrange that the right of cultivating this ground be also made over to them. They should then proceed to cultivate at their own risk, and endeavour by the use of night-soil and rubbish in the soil to secure object lessons for the ryots of the neighbourhood. The system of poudrette-making followed in Poona (of which description is enclosed) should be that chosen.

7. *Cocanada Market.*—(*a*) This is upon the site of a filled-in tank. The municipality and temple authorities share the rights and the proceeds. The so-called market consists of a mere collection of shanties. The butchers' stalls have the usual accompaniments of dirty ropes and filthy boxes. It is high time that so large a town attempted to obtain a market where food could be retailed in a cleanly manner. The eagerness with which certain masonry-built stalls have been taken up by the grain merchants for retail and for store godowns seems to point to the probability of the market being a good investment.

There is nothing special to be said about this.

(*b*) Indeed, I cannot well see why the municipality should give up "pucca" built stalls for use as godowns, whilst they still permit meat to be retailed under the unsatisfactory conditions mentioned. At but small expense the stalls could be made suitable for butchers. If the difficulty has been in regard to compelling butchers to resort to markets, the matter should receive attention as soon as the amended Act No. IV of 1884 renders this course legal.

Jaganaickapur Market.—This is much better than the building attempted in this direction at Cocanada. There seems, however, to be confusion as to the respective requirements of market sanitation. Although there is in one portion a good cement floor with a drain, the fish vendors were found squatted outside selling their fish either on the bare ground or on old bamboo baskets, whilst the rice-sellers were on the cement floor. A cistern should be provided for the drain here. The well is in a filthy condition and should be baled out and be subsequently kept covered.

The Chairman will get an estimate prepared for a cleanly meat market with cemented floor and a thatched roofing.

8. *Slaughter-house.*—This is a substantially-built structure. The cistern should not be open and thus permit of dipping of chatties. The water should be raised by a pump from the well (which should be

The proposed improvements cannot be executed now.

closed) and should be taken from the cistern by means of taps. Under Mr. Norton, a former Chairman, a flourishing garden seems to have existed round the slaughter-house from which the municipality reaped a certain amount of profit. For this purpose, the sullage water from the slaughter-house was utilized. It seems to me a very great pity that this good work should have been allowed to come to naught, as a result of apathy on the part of the council. Such a scheme is sanitarily and economically sound, and I would strongly advise the council to again endeavour to revive the former condition of affairs.

The old garden site has been leased out for cultivation along with the old night-soil depôt.

9. *Burial Grounds.*—(*a*) The Hindu burial ground beyond Hanamah's (?) tank is in very bad order, being overgrown with prickly-pear. This should be reduced to a decent state.

Prickly-pear has been removed now.

(*b*) All burial grounds are now beyond municipal limits. A Muhammadan burial ground undesirably near a drinking-water tank has been duly closed by the municipality. Unfortunately, the ground given to Muhammadans in lieu of that closed is fast being built round with houses. This should be stopped at once. The Muhammadans should be advised to bury their dead in regular order, otherwise the ground will soon be exhausted.

Chairman to see that the new burial-ground has not been built on.

10. *Vaccination.*—The depôt which is situated within the hospital is unfit for its purpose. Correctly-formed floors and well-ventilated buildings must be provided for the successful cultivation of fresh lymph. There has hitherto been much reason to complain of the dilatoriness of the municipality in respect to vaccination. Surgeon-Captain Vickers, however, agitated the matter freely, and it was ultimately found that not the Chairman but the Sub-Magistrate was chiefly to blame. Acting under stringent orders from the District Magistrate, matters have now improved.

Recorded.

Of 85 cases examined haphazard, 56 were protected by vaccination and 29 were unprotected. Of the latter, 13 had been attacked by small-pox. It is to be hoped that the greater energy now being displayed by the municipality may be continued—there being evidently much room for it.

Total births between 1st July and 31st December 1893.	Number vaccinated		Number vaccinated a second time, because first operation proved unsuccessful.		Postponed under medical certificate at the end of six months.	Died.	Left the town.	Unaccounted for.	Ratio of successful vaccinations to total births per cent.
	Successfully.	Unsuccessfully for the first time.	Successful.	Unsuccessful.					
592	53	..	..	..	..	92	59	2	8·97

11. *Registration.*—The following shows the result of registration during 1890–94:—

—	1890.	1891.	1892.	1893.	1894 up to end of November.
Deaths from—					
Cholera	..	50	297	11	7
Small-pox	306	25	36	2	2
Fevers	85	60	225	102	134
Dysentery and diarrhœa	78	77	232	88	93
All other causes	373	320	663	588	644
Total ..	842	532	1,453	791	890
Death rate per mille ..	27·7	17·4	35·8	19·5	23·9
Births	675	584	1,220	1,029	1,031
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These statistics bespeak inefficient registration.

FORT ST. GEORGE,
30*th January* 1895.

(Signed) W. G. KING, Surgn.-Lieut.-Col.,
Ag. Sanitary Commissioner.

NOTE.—This report has been delayed by waiting for statistical information from the Chairman. This was asked for on the 30th October last, but has not been received up to date.—W.G.K.

———

G.O., dated 23*rd December* 1893, *No.* 1765 *M., Local and Municipal.*

* * * * *

2. In future the following procedure should be adopted:—

The Sanitary Commissioner will send his notes written on half-margin to the Chairmen, who will enter what they have to say on the other margin of the page to face the notes; the notes and the Chairmen's comments and replies will then be forwarded in original to Government. Chairmen will be expected to obtain the remarks of the council and to forward the notes to Government within six weeks.

———

POUDRETTE—MANUFACTURE OF—IN POONA.

From the Secretary, City Municipality, Poona, to the Sanitary Commissioner for Madras, dated Poona, 5th April 1894, No. 710.

With reference to your letter, No. 660–S, dated the 15th ultimo, I have the honour to enclose a memorandum of information required by you.

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Memorandum.

1. *Method of Poudrette manufacture.*—Night-soil collected by the bhangies is carted away to a depôt about four miles to the south of the city. Here the filth is treated in open pans, 17 feet long, 12 feet broad and 1 foot in depth. These pans are constructed in rows of 11 pans each, there being 21 such rows. The pans are numbered in regular rotation, and 14 of them are used daily. On the first day, Nos. 1 to 14 are used, the next day Nos. 15 to 28, and so on. In this way the work is carried on systematically. Briefly described, the process of manufacture is as follows:—

The contents of four night-soil carts and three cart-loads of ashes are put into each pan. First, a layer of ashes is put down, the filth run over it and more ashes spread on the top. The mass is stirred daily by bhangies and more ashes mixed in until the poudrette is dry. The number of days taken up by this process varies according to the state of the weather. In fair weather the whole process is complete in from eight to ten days; during the monsoon it takes from fifteen to twenty days. The poudrette is then taken out of the pit and heaped on one side for sale. One "heap" of this manure is made up of the contents of five pans.

From the above description it will be seen that the poudrette is manufactured by the "sun-drying process". During the monsoon the pans are covered with grass chappars to prevent any water getting into their contents. During this season of the year also all the night-soil is not treated in the pans, but half of it is buried into trenches and mixed with ordinary kutchra. These trenches are emptied after about six months, and the manurial properties and consequently the money value of the poudrette obtained from them are inferior to that obtained from the pans. The ashes that are used for mixing with the filth are obtained by burning kutchra. They act as a good deodorant and during the monsoon the amount used is greater than that used in fair weather. Instead of three cart-loads of ashes we have to use five or six cart-loads of them for each pan during the rainy season.

2. The average time taken up by the contents of the pans to be fit for issue and be fairly odourless is eight days during fair weather. To be completely odourless the poudrette takes about a fortnight, and to be unrecognizable as a compost it takes nearly a month.

3. In the year 1892–93 the cost of the establishment at the depôt was Rs. 14,097–5–5, and the amount realized by the sale of the poudrette in the same year was Rs. 46,103–8–0.

4. No objections were made by the ryots to use the manure at any time.

5. The price of the poudrette varies considerably with the demand. When the demand is great, each heap is sold for Rs. 50 or Rs. 60 on an average. If there is no demand, the heap goes for Rs. 25 or Rs. 30 at the most. A heap is equal to 20 cart-loads, so the price of one cart-load of poudrette varies from one to three rupees.

6. The demand has arisen mainly for "wet crops." Sugar-cane thrives best under the use of this manure. Bajree rice, wheat also, thrive well under the application of this manure.

7. It is said that mangoes, plantains, oranges and other fruits do not thrive under its use.

ARTESIAN WELL AT SAMALKOT, GODAVARI DISTRICT.

The following papers furnish an account of the experimental boring of an artesian well at Samalkot, the methods pursued in connection therewith, and the results of the experiment:—

From E. A. S. BELL, Esq., to the Sanitary Commissioner for Madras, dated 8 Granville Road, Finchley N., England, 26th July 1894.

In reply to your No. 943-S., and subsequent reminder, No. 1056-S. just received, I have much pleasure in giving you a short account of what took place.

At the time of starting operations, no idea of an artesian supply was anticipated.

When I took charge of the works of the Cocanada Sub-division, East Coast Railway, in December 1892, an excavation for a well had been made at Samalkot junction. This being the point whence the branch line to Cocanada takes off, ample water-supply for the engines was of the highest importance. This excavation was then about 20 feet in diameter and some 25 feet deep. As, however, we had only come upon surface water, mainly percolating through from the Gódávari Eastern Canal, which is about 100 yards distant, it was resolved to put down a boring to ascertain if a permanent supply of good sub-soil water could be obtained. As nothing of an unusually interesting nature was expected, I regret to say no record was kept of the nature of the soil passed through, the dates, nor the rate of progress in any particular stratum.

Speaking from memory, the tube was started in hard moorum which continued for about 20 feet, equivalent to 45 feet from the surface; after which stiff yellow clay was met with for about another 20 feet. We then came upon sandy clay for about 15 feet, making about 80 feet from the surface. Beneath this was sand rather coarse, and immediately the tube entered this water came up and flowed out at the top. The force of the flow was not great, and in hopes of coming upon some gravel which would form a small pocket round the foot of the tube and thus improve the flow, boring was continued for another 10 feet when, having come upon gravel, operations were suspended.

The top level of the tube was about 35·00; hence the water-bearing stratum was approximately 45 feet below M.S.L. A small extra length was added to the tube to ascertain how high the water would rise, but we found it only reached about two feet above the original tube, the level of which was approximately the level of the surrounding country.

As mentioned before, this tube was not sunk with any idea of its remaining as the source of the permanent supply of water for the station, but with a view to find out whether an ordinary well should be sunk at this spot or some other site chosen for it.

Consequently, only a small diameter tube (4-inch) was used, and no inlets were made to assist the flow, all the water having to find its way through the aperture at the bottom. However, on discovering the artesian supply, this pipe was allowed to remain and a new 6-inch diameter was put down about 100 feet to one side. This pipe had holes about one inch diameter bored at frequent intervals in the side of the lowest 10 feet length to assist the inflow. The supply from this, of course, is considerably greater than from the other, but I hear that the level to which the water rises is substantially the same. I may mention that I was transferred from that sub-division before the 6-inch pipe was sunk, and so can give no details of that work. I am sorry that such details as I have been able to give of the former are of such a meagre description, but it is all necessarily from memory. If you require further information on the subject, Mr. W. H. K. Howard, who took over charge from me and who resides at Tuni, would, I am sure, give you all the information in his power.

From W. H. K. HOWARD, Esq., Assistant Engineer, No. II, Sub-Division, Tuni, to the Acting Sanitary Commissioner for Madras, dated Tuni, 26th November 1894, No. 1725.

[Your letter No. 1645-S, dated 31st August 1894.]

I regret the delay in answering your above-quoted letter; but as I was not in charge at the time that these tube wells were actually sunk, but took over just as they were completed, I know nothing about them personally, and I have therefore had to collect my information by degrees from the subordinates, &c., concerned, to whom I sent a string of questions on the subject to be answered, as I thought you would like to have the fullest information possible on the subject that I could collect together. With regard to the 4-inch tube I am unable to supplement Mr. Bell's details, as the subordinate who was in immediate charge of the work is not here now. I send details of the

6-inch tube completed by Mr. Anderson, Supervisor, who was in personal charge of the sinking operations of this tube, being answers to a table of questions compiled by me. I may also state that the Railway Engineers succeeded in getting an artesian supply at Rajahmundry, details of which I give so far as I have been able to collect them; I also give details of an attempt made by me to obtain artesian water at Cocanada, but which failed owing to an accident with the boring plant. The likelihood of obtaining such a supply here and the importance of success in so doing are, however, I consider, so great that I have got sanction to make another attempt to a depth of 200 feet and I shall be happy to communicate the result of the trial to you. At Rajahmundry, as at Samalkot, there was no initial idea of obtaining an artesian supply and it was not till after the station well had been sunk 50 feet that a trial tube was put down to test how much further it would be necessary to sink the well before a supply was obtained; and it was during this trial that, after sinking the tube 70 feet below the bottom of the well, an artesian supply was met with and the water rose to about 50 feet in the well, *i.e.*, to about ground surface, showing that it must meet with considerable friction somewhere in its underground channels and in the tube. The water level does not rise and fall with the Gódávari river (which is only half a mile distant) to any very appreciable extent and is not therefore connected with it, but comes, I think, from the hills at the back of Rajahmundry about three miles off. No record of the strata has been kept in the office, and the subordinate in immediate charge at the time is not now here. I give below what information I can gather:—

Discharge of pipe, 3·35 cubic feet per minute.
Bore of pipe, 6 inches.
Reduced level of ground in neighbourhood, 52·66.
Maximum water level in well, 49·07.
Reduced level of bottom of pucca well in which tube is sunk, 0·32.
Bottom of tube, 70 feet below bottom of well.
Diameter of well, 16 feet.

The delay in submitting this report has been greatly owing to pressure of work.

N.B.—The flow from all these tubes has continued uninterrupted for over a year now.

From Mr. A. J. ANDERSON, Supervisor, to the Assistant Engineer, Tuni, dated 20th September 1894.

The following is about all the information I can give on the artesian wells at Samalkot. The 6-inch pipe well was started on the 16th September 1893. A hole 10 feet deep was first dug, and the first length of 15 feet of pipe was put in this and sunk to a depth of 5 feet below ground, when the next length was joined. The soil passed through was red clay with a mixture of fine brown sand. The sinking went on without much trouble in the above soil to a depth of 25 feet, when hard moorum was met with, which had to be cut with the chisel, the soil coming up being of a yellowish colour and the quality being very much like as if soft sandstone of thick grains was being cut through; this continued to a depth of 40 feet below ground surface, and then we came on fine yellow clay with now and then a mixture of kunkar; this continued with but slight changes of colour and consistency to a depth of 70 feet below ground, the lower 15 feet being mixed with kunkar and sand in greater quantities the lower we went down. Then from 70 to 80 feet below ground level a stiff reddish brown clay was passed through being slightly mixed with coarse brown sand. At the depth of 80 feet we struck the water-bearing strata, and the water began to flow over top of pipe; but as the flow was very feeble, another 4 feet was sunk through fine reddish sand and the water flowed with considerable force from the top of the pipe. An extra 6-inch pipe was then fixed to the top to see how far the water would rise, and this was found to be 3 feet, making in all 9 feet to which the water rose above ground level. This extra pipe was then taken off, and a reducing piece 6-inch to $2\frac{1}{2}$-inch and 2 feet in length with a right angle bend of $1' \times 2\frac{1}{2}''$ and pipes of $2\frac{1}{2}$-inch and 193

feet in length were fixed on to connect well with storage cistern. It was then found that the flow into storage cistern was very feeble on account of the height to which it had to rise (8 feet) before being turned into storage cistern.

It was then decided to lower the tube 3 feet; this we tried to do for 3 days, but owing to the bottom 10 feet of the lower tube having been pierced with $\frac{1}{2}$-inch to 1-inch holes at intervals of $1\frac{1}{2}$ inch apart, it was found that the fine sand in water strata had filled it to this depth and that the sand would fill in again as fast as it was taken out with the plunger. It was then decided, that as the tube could not be sunk any lower, to cut 3 feet off the top; this was done, and when pipes were fixed into storage cistern as formerly, it was found that the flow had greatly increased. The tube began to deliver water on January 30, 1894, and since then the flow has neither increased nor diminished, but it is found that at times, if the flow is watched for five or ten minutes, it comes out in slight jets.

Progress.—The first 25 feet was done in near 23 days, the next 15 in hard moorum was done in 45 days, the next 44 feet in 56 days. The cost of sinking was Rs. 743-5-0.

Labour.—The R.L. of top of flow is of both pipes 39·50, the ground level being 34·50. The R.L. of bottom of 6-inch tube is *minus* 50·50. That of the 4-inch tube is about the same. The R.L. of hills behind S.L.O. and about 2 miles off is about 105. This I approximated by taking the rise in 1,000 feet near S.L.O. The strata of hills at surface is stony. Ballast is got from them. The R.L. 39·50 of top of flow of both pipes is just above tubes; the delivery ends are a foot higher. The distance apart of the pipes is 293 feet. The water has been sent up for analysis and pronounced to be very pure.

About the 4-inch tube, as this was finished before I had charge of S.L.O. station, I cannot give progress or any information as to strata, &c. It began to discharge in June 1893, and was then plugged up until a small cistern $8' \times 8'$ was made; this was done in August 1893 and connected with a concrete drain and leather hose to the tube. The flow from this tube was at the beginning rather feeble, but after cleaning it out once or twice with the plunger, it increased and did do so till January 1894. Since then the flow has been very uniform. The discharge * from both pipes is 856 gallons per hour, and the discharge from each is about equal; in fact, I am inclined to believe that the flow from the 4-inch tube is greater than that from the 6-inch and this I attribute to the ten feet at bottom pierced with holes being choked with sand, the pipe being only four feet in the water bearing stratum.

Cocanada Port Artesian Well.—This is of 4-inch bore and was sunk to a depth of 165 feet below ground. The strata passed through was first 40 feet sandy with slight black silt mixed, second 60 feet pure black silt, third 50 feet quicksand with slight black silt, fourth 7 feet of kunkar, gravel and clay mixed with sand, † fifth 8 feet stiff yellow brown clay with slight admixture of coarse brown sand.

P.L. of ground near tube of C.O.P. is 4·00 above M.S.L.

Dis. No. 959.

Submitted to the Collector.

(Signed) S. VENKATARAM DAS,
Deputy Collector.

21*st March* 1895.

Cur. No. 457-Eng.

Forwarded.

(Signed) V. A. BRODIE,
Collector.

28*th March* 1895.

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* The discharge has since been gauged in October last and is now for 6-inch tube 373, for 4-inch tube 561 = Total 934 gallons per hour.

† Very like the clay met with at Samalkot and therefore holds out hope of success at our present trial to 200 feet deep.

(Signed) W. H. K. HOWARD.

C.No. 1198m

Sanitary Commissioner's Inspection Notes. Cocanada Municipality

[G. / 24.]
600—8-3-95.

DEPARTMENT.

Papers to be read in proceedings:—

Again G.O., dated 189 , No.

Again G.O., dated 189 , No.

Current No. of 189 , dated from

Current No. 1198 M of 1895, dated 19-3-95 from the Chairman M. C. Cocanada.

ORDER. dt 20-5-95 No 866m.

The Council's resolutions on the S. C's inspection notes do not in the majority of instances afford a by any means satisfactory disposal of the questions raised by that officer and in the following instances do not deal with them at all viz: paras 2(e), 5(d), 5(e), 7(a) and 10. The Chairman will now report in detail what action the Council propose to take in respect of the suggestions made in these paragraphs. He will also state whether Council contemplate moving in respect of the suggestions in para 7(b) in regard to the improvement of the Jaggannaickpur market and in para 9(b) in regard to the regulation of burials in the Mahomedan cemeteries, which appear to have escaped their notice.

2. With regard to the question of water-supply they are reminded that the scheme prepared by the Sanitary Engineer has been abandoned as being beyond the means of

the Council and that therefore the suggestions made in paras 4(b), 5(a) and 5(f) ~~deserve~~ call for their earnest and early attention. The Govt. must express its surprise that the Council should have recorded without remark the statement contained in (d) para 6 of the note touching the watchman appointed to guard the water supply. The Chairman will report what action was taken regarding the watchman who ought certainly to be dismissed.

3. The figures in para 11 show that the registration of vital statistics ~~does not~~ ~~also~~ is not what it should be and that the staff requires more supervision than it at present has.

4. ~~With reference to the Sanitary Commissioner's remarks~~ The observations of the S.C. as to the insufficiency of the plant now in use for artesian well sinking operations will be referred to the Sanitary Engineer ~~will be consulted~~ for remarks.

[initials] 15/5/95

Cgt

n.v.

Sanitary Commissioner's Inspection Notes Cocanada Municipality –

[initials]

C.S.

D.S.

(for orders)

To

The Chairman M. C. Cocanada ✓

" Collector of Godavari ✓

" Sanitary Commissioner ✓

" " Engineer ✓

Editor's Table – Desp 6/6

Note

Orders are solicited as to whether it is necessary to include the enclosures of the S.C.'s report in the printed G.O. The extract from G.O. no $\frac{1765 M}{23\text{-}12\text{-}93}$ certainly seems unnecessary and the others are of little general use.

Cgt

n.v.

20th May 1895, No. 866 M., Local and Municipal.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

Read—the following paper :—

From M.R.Ry. I. E. SESHACHALAPATI GAR, B.A., Chairman, Municipal Council, Cocanada, to the Chief Secretary to Government (through the Deputy Collector, Head Quarters Division, Cocanada), dated 19th March 1895, No. 1703.

I have the honour to submit herewith inspection notes of the Sanitary Commissioner for Madras on this municipality together with the council's resolutions thereon.

Enclosures.

Inspection Notes of the Sanitary Commissioner for Madras.

GODAVARI DISTRICT.

Cocanada Municipality.

Inspected 27th to 30th October 1894.

		Males.	Females.	Total.
Population as per census of	1881 ..	14,874	13,982	28,856
	1891 ..	20,328	20,225	40,553

Inspection Notes.	Copies of Resolutions.
The Town site is upon alluvial deposit, which is for the greater part of the year water-logged.	
2. *Dwellings.*—(*a*) The "pucca" built dwellings are usually very damp. Under section 180, the municipality should use their best influence to persuade the inhabitants when building new houses to raise the basements and have impervious floorings of concrete, cement-plastered, or stone upon concrete, cement-pointed. "Damp-proof courses" in the walls should be universally adopted in new buildings. The extra cost of this procedure would be very slight, and would well repay the builder both as to better health of the inhabitants and therefore better value of property, as well as by the longer life of the house. Details as to "damp-proof courses" would doubtless be given on application by the Sanitary Board.	Section 180 of the Act should be enforced strictly with reference to the construction of pucca buildings, *i.e.*, houses having brick or stone walls.
(*b*) *Turpoo Pettah.*—This is a conglomeration of the poorest type of huts much crowded upon the soil, arranged without reference to perflation, drainage or conservancy. The necessity for improvement here and in other similar localities has been strongly urged by Surgeon-Captain Vickers, whose vigilance in sanitary matters ought to prove of much assistance to the municipality.	Postponed till the next meeting. The two new proposed sites should also be inspected in the meantime and reported on—2nd March 1895. Postponed till 16th instant for taking the levels of the site between the Prince of Wales' choultry and Kondagapalem. The Chairman will see this done in the meantime—6th March 1895. *Note by Chairman.*—The levels are

Inspection Notes.

(*c*) *Balpregada Ramaluchwama Pettah* —is another of the hut lands that requires urgent attention. The sewage from this area is received into a pool about 100 yards square. It should be possible to run a pipe from this part and drain it into the neighbouring canal.

(*d*) It is essential that these insanitary places should be carefully surveyed, and be rearranged upon plans allowing for perflation, correct disposal of sewage, and properly-made roads. Most of the huts are built upon private lands.

(*e*) In future, the municipality should take care not to permit of the building of huts in close proximity to the better class of houses, and when this permission is given it should be seen that no manner of doubt occurs as to the owner's liability to erect latrines and make arrangements for drainage and roads.

(*f*) A list of hut lands should be placed before the municipality together with a complete report by the Civil Surgeon of their sanitary condition and the arrangements made for each. The council should then determine the order in which each improvement should be taken and enforced.

(*g*) At the end of Nalam Padmanabham street, an arrack shop obstructs the natural drainage towards the canal. The owner is one Redlum A. Ram Iyer. If this house were cut down, it would do much towards improving the natural perflation of the site, and towards improving the drainage of an important street.

3. *Roads.*—These are in fairly good order. No metal nearer than Dowlaishweram is obtainable. Several roads have been macadamized by utilizing the ballast of ships arriving in the port.

4. *Drainage.*—(*a*) The state of the Coringa road requires early attention. A large ditch without a correct outlet receives the sewage and surface-washings from the neighbourhood. During the hot season, it is stated the stench from this source is a cause of much complaint by the Eurasians residing in the locality. It is undesirable this mass of filth water should be added to the already over-

Copies of Resolutions.

being taken. The matter will very likely be disposed of at the meeting of the 16th instant. The council is anxious to provide separate accommodation to these Turpoo people as soon as possible.

The Chairman should get an estimate prepared for putting in pipes to remove the drainage.

Note by Chairman.—The owner of the pettah has not left out streets and lanes as suggested by the Chairman in consultation with the Civil Surgeon. Permission has therefore been declined for repairing or reconstructing houses in this block.

The Civil Surgeon will be requested to favour the council with his views about the existing hut lands.

The Chairman should make an estimate for acquiring the site for making a road from Nalam Padmanabham street to the Salt creek; and also another for making a drain only.

Recorded.

Chairman to see if there is any cheap way of doing this.

Inspection Notes.

burdened soil of the neighbourhood. Arrangements should be made under local engineering advice to provide for the grading of this trench or for its drainage by pipes.

(*b*) Beyond a pucca-built drain leading from the market to the canal, which is possessed of very bad gradients, there is really no systematic attempt to remove the sewage from the town site. Indeed, it is a common sight to see sewage-water in unlined drains side by side with the pervious masonry channels conveying drinking-water. The councillors should remember, in this connection, that common masonry such as these channels are formed of cannot be trusted to prevent entrance of impurities from the soil surrounding them. Every effort should therefore be made to divert drainage from their neighbourhood.

(*c*) *The Kurnam Mannur Channel* leads surface drainage from the town to the swamp. The flow is imperfect. It should be carefully re-sectioned throughout and be made broader with reference to securing a greater discharge in a shorter time.

(*d*) *Factory Street, Jaganaickapur.*—This is one of the chief outlets for sewage from Jaganaickapur. One side of the road possesses masonry drains and the other not. Much nuisance results. A correct, egg-shaped, cement-lined drain should be laid down.

5. *Water-supply.*—(*a*) The Samalkot canal supplies a large portion of the town by means of masonry conduits obviously not impervious. Open cisterns exist at intervals. Many of these are in bad repair and surrounded with spilt water, for which no drainage has been arranged. There are only five wells from which water can be procured. The Nadrapettah sewage channel and that from the main channel flows side by side with the conduit. At the Cutcherry road, the ground in the neighbourhood of the conduit is waterlogged, and probably sewage, ground soil water, and the drinking-water intercommunicate through the conduit wall. At the point where the water is taken off for the town from the canal (at Simpson lock), necessarily boats have to wait to pass. On this account, this was an unfavourable spot for selection. Fœcal contamination must be frequent.

Copies of Resolutions.

To lie over until a water-supply scheme can be sanctioned.

Chairman will attend to this point. The channel should be improved.

This will be attended to as funds permit.

Nothing can be done at present.

Inspection Notes.	Copies of Resolutions.
The channel supplies the Balajee tank and the Rajah tank. Into these the people step to obtain their water, thus defiling it.	
(*b*) Floating platforms with impervious surfaces sloping towards a cistern on the bank should be employed in this and other tanks, *e.g.*, the Church and Rajah tank, used for drinking purposes.	Cheap floating platforms will be put up if possible.
(*c*) *Soorianpett Rajah Tank.*—Drainage from the road enters this tank. The banks should be repaired so as to prevent this.	The necessary repairs will be made.
(*d*) At Jaganaickapur, the water-supply is obtained by a conduit from an irrigation channel led from the Gódávari. At a point where several boats were moored I found the banks lined with fœces. One man was performing his ablutions in the channel water. The watchman placed here for protection of the water was himself discovered in the act of easement.	Recorded.
(*e*) *Jaganaickapur Tank.*—This is used by dhobies. The water is simply the sewage and surface washings from the surrounding area. It would be advisable to fill in this tank permanently.	Recorded.
(*f*) Such water, therefore, as is obtainable in Cocanada is derived from sources that are open to contamination and is distributed by modes to which this also applies. The water found on the site by shallow well sinking is practically always brackish. Under these circumstances, the desirability for a new water-supply scheme is self-evident. It seems to me that the Engineer officers of the East Coast Railway have, in all probability, solved the difficulty. At Samalkot, under Messrs. Bell and Howard, the first successful artesian wells in this Presidency have been sunk. The character of the country between Samalkot and Cocanada, and the extension of its surface below the sea, justify the hope that it will be possible to secure water by artesian wells in Cocanada. I would strongly advise that experiments be made at an early date. From what I understand of the plant placed at disposal of the Sanitary Engineer at Cochin, I am disposed to think it far too incomplete to work out the problem of artesian wells either here or in any other part of the Presidency, and I should think it most desirable that that department be provided	The council prefers to wait and see what becomes of the experiment at Cocanada port station.

Inspection Notes.	Copies of Resolutions.
with a set of a more recent type and capable of sinking greater depths. As it happens, in the case of Cocanada, however, the chances are that comparatively small depths may have to be sunk. Still, in sinking a well, the Engineer should be prepared for depths far beyond the 300 odd feet for which the present apparatus is designed. I enclose a description of the artesian wells at Samalkot, as kindly furnished me by the Engineer officers referred to. The achievement although on a small scale is, I consider, of a most important character, in consideration of the want of success that has attended efforts elsewhere than in Pondicherry in the South of India.	
6. *Conservancy.*—(*a*) There are a few corrugated-iron dust-bins in the town but they are but little used by the people, except that the rubbish is cast in the vicinity. I would advise the municipality in localities of the town inhabited by the better classes to introduce the "separate receptacle system;" that is, require each householder under sections 219 and 220 to place at an hour to be determined by the council the rubbish of 24 hours in a receptacle, the pattern of which should be approved by the municipality. The rubbish could then be collected by passing rubbish carts.	It is too soon to introduce the system here.
(*b*) Three cinerators are provided at a site within 75 yards of houses. These are of the old pattern and not in use now. I would advise the use of the Silchar incinerator, a description of which with full particulars will be found at page 108 of the Proceedings of the Sanitary Commissioner for the first quarter of 1894. A site more distant from houses should be selected.	The best specimen of a cinerator will be purchased on hearing from the Sanitary Commissioner in reply to the Chairman's letter to him.
(*c*) Wheel-barrows are used for rubbish collection. These are in charge of the sweepers and meet the rubbish carts at appointed spots. The system is decidedly suitable and must be economical of labour. I think, however, more might be carried by each wheel-barrow, considering the weight in regard to bulk of most rubbish, if there were a light iron wire fence added to each.	The capacity of the wheel-barrows will be increased in the cheapest manner compatible with efficiency.
(*d*) Much more care is requisite as to insisting upon rubbish removal from house compounds. Very little care seems to be taken in this direction.	Chairman to see to this.
(*e*) The two new latrines at Jaganaickapur require correctly formed	

Inspection Notes.

approaches. It is undesirable that men and women should be required to wade through water to get to them. The foot-path should be well raised.

(*f*) One of the Sanitary Engineer's standard-pattern latrines has been lately erected. The holes for the seats have, however, been turned the wrong way by the workmen. This should be remedied. There being much room for misplacing the buckets, it would be advisable to add small iron guides, so that the buckets should be placed directly below the seat and thus not leave room for "matter" being placed "in the wrong place."

(*g*) There is urgent necessity for more latrines. For the whole town there are only seven temporary latrines, two iron and two masonry built. One of the latter is situated near the hospital. It is at present out of repair, and it would be advisable, instead of putting it into order, to remove it entirely, as the site is not suitable. I would advise the use of the patterns of iron latrines designed by Mr. Donaldson, Calcutta (Presidency Jail). They are cheap and meet desired ends well. These latrines should not, as in the present sample, be placed in localities far removed from habitations. If correctly looked after and they be covered as in the case of the design advised, there is no reason why they should form a source of nuisance; the municipality, however, should be prepared to see that side by side with each latrine a hut is placed for a toty and that he be always upon duty. This is the only way to keep latrines upon the separate removal system in a condition that they can be used with decency.

Night-soil Depôt.—The night-soil is disposed of in trenches two feet deep and four feet wide. Such a breadth permits of too great an accumulation without the advantage of earth contact, which is necessary with regard to nitrification by micro-organisms. To secure the correct character of decomposition, eighteen inches deep and eighteen inches broad is the full size they should be made.

Rubbish and Night-soil disposal. — No sale-proceeds are secured under this head by the municipality. They give away the rubbish and receive in return the right to bury their fœcal matter in a

Copies of Resolutions.

There is a road already. The condition observed by the Sanitary Commissioner was due to exceptional floods.

This will be remedied as soon as possible.

A sum of Rs. 1,000 has been provided in the budget for 1895–96. Enquiry will be made about the latrines (Donaldson's) recommended. The council approves of the proposal to have huts for toties near the public latrines.

The present dimensions of the night-soil trenches are 18″ deep and 24″ wide. The width will also be reduced to 18″.

A site will be soon acquired for night-soil depôt. The old night-soil depôt, which is municipal property, has already been given over for cultivation at a favourable rate of rent for 1895–96.

Inspection Notes.

field. They should arrange that the right of cultivating this ground be also made over to them. They should then proceed to cultivate at their own risk, and endeavour by the use of night-soil and rubbish in the soil to secure object lessons for the ryots of the neighbourhood. The system of poudrette-making followed in Poona (of which description is enclosed) should be that chosen.

7. *Cocanada Market.*—(*a*) This is upon the site of a filled-in tank. The municipality and temple authorities share the rights and the proceeds. The so-called market consists of a mere collection of shanties. The butchers' stalls have the usual accompaniments of dirty ropes and filthy boxes. It is high time that so large a town attempted to obtain a market where food could be retailed in a cleanly manner. The eagerness with which certain masonry-built stalls have been taken up by the grain merchants for retail and for store godowns seems to point to the probability of the market being a good investment.

(*b*) Indeed, I cannot well see why the municipality should give up "pucca" built stalls for use as godowns, whilst they still permit meat to be retailed under the unsatisfactory conditions mentioned. At but small expense the stalls could be made suitable for butchers. If the difficulty has been in regard to compelling butchers to resort to markets, the matter should receive attention as soon as the amended Act No. IV of 1884 renders this course legal.

Jaganaickapur Market.—This is much better than the building attempted in this direction at Cocanada. There seems, however, to be confusion as to the respective requirements of market sanitation. Although there is in one portion a good cement floor with a drain, the fish vendors were found squatted outside selling their fish either on the bare ground or on old bamboo baskets, whilst the rice-sellers were on the cement floor. A cistern should be provided for the drain here. The well is in a filthy condition and should be baled out and be subsequently kept covered.

8. *Slaughter-house.*— This is a substantially-built structure. The cistern should not be open and thus permit of dipping of chatties. The water should be raised by a pump from the well (which should be

Copies of Resolutions.

There is nothing special to be said about this.

The Chairman will get an estimate prepared for a cleanly meat market with cemented floor and a thatched roofing.

The proposed improvements cannot be executed now.

Inspection Notes.

closed) and should be taken from the cistern by means of taps. Under Mr. Norton, a former Chairman, a flourishing garden seems to have existed round the slaughter-house from which the municipality reaped a certain amount of profit. For this purpose, the sullage water from the slaughter-house was utilized. It seems to me a very great pity that this good work should have been allowed to come to naught, as a result of apathy on the part of the council. Such a scheme is sanitarily and economically sound, and I would strongly advise the council to again endeavour to revive the former condition of affairs.

9. *Burial Grounds.*—(*a*) The Hindu burial ground beyond Hanamah's (?) tank is in very bad order, being overgrown with prickly-pear. This should be reduced to a decent state.

(*b*) All burial grounds are now beyond municipal limits. A Muhammadan burial ground undesirably near a drinking-water tank has been duly closed by the municipality. Unfortunately, the ground given to Muhammadans in lieu of that closed is fast being built round with houses. This should be stopped at once. The Muhammadans should be advised to bury their dead in regular order, otherwise the ground will soon be exhausted.

10. *Vaccination.*—The depôt which is situated within the hospital is unfit for its purpose. Correctly-formed floors and well-ventilated buildings must be provided for the successful cultivation of fresh lymph. There has hitherto been much reason to complain of the dilatoriness of the municipality in respect to vaccination. Surgeon-Captain Vickers, however, agitated the matter freely, and it was ultimately found that not the Chairman but the Sub-Magistrate was chiefly to blame. Acting under stringent orders from the District Magistrate, matters have now improved.

Of 85 cases examined haphazard, 56 were protected by vaccination and 29 were unprotected. Of the latter, 13 had been attacked by small-pox. It is to be hoped that the greater energy now being displayed by the municipality may be continued—there being evidently much room for it.

Copies of Resolutions.

The old garden site has been leased out for cultivation along with the old night-soil depôt.

Prickly-pear has been removed now.

Chairman to see that the new burial-ground has not been built on.

Recorded.

Inspection Notes.

Copies of Resolutions.

Total births between 1st July and 31st December 1893.	Number vaccinated		Number vaccinated a second time, because first operation proved unsuccessful.		Postponed under medical certificate at the end of six months.	Died.	Left the town.	Unaccounted for.	Ratio of successful vaccinations to total births per cent.
	Successfully.	Unsuccessfully for the first time.	Successful.	Unsuccessful.					
592	53	..	..	..	..	92	59	2	8·97

11. *Registration.*—The following shows the result of registration during 1890–94:—

—	1890.	1891.	1892.	1893.	1894 up to end of November.
Deaths from—					
Cholera	..	50	297	11	7
Small-pox	306	25	36	2	2
Fevers	85	60	225	102	134
Dysentery and diarrhœa	78	77	232	88	93
All other causes	373	320	663	588	644
Total ..	842	532	1,453	791	890
Death rate per mille ..	27·7	17·4	35·8	19·5	23·9
Births	675	584	1,220	1,029	1,031
Birth rate per mille ..	22·2	19·1	30·1	25·4	27·7

These statistics bespeak inefficient registration.

FORT ST. GEORGE,
30*th January* 1895.

(Signed) W. G. KING, Surgn.-Lieut.-Col.,
Ag. Sanitary Commissioner.

NOTE.—This report has been delayed by waiting for statistical information from the Chairman. This was asked for on the 30th October last, but has not been received up to date.—W.G.K.

G.O., dated 23rd December 1893, No. 1765 M., Local and Municipal.

* * * * *

2. In future the following procedure should be adopted :—

The Sanitary Commissioner will send his notes written on half-margin to the Chairmen, who will enter what they have to say on the other margin of the page to face the notes; the notes and the Chairmen's comments and replies will then be forwarded in original to Government. Chairmen will be expected to obtain the remarks of the council and to forward the notes to Government within six weeks.

POUDRETTE—MANUFACTURE OF—IN POONA.

From the Secretary, City Municipality, Poona, to the Sanitary Commissioner for Madras, dated Poona, 5th April 1894, No. 710.

With reference to your letter, No. 660–S, dated the 15th ultimo, I have the honour to enclose a memorandum of information required by you.

Memorandum.

1. *Method of Poudrette manufacture.*—Night-soil collected by the bhangies is carted away to a depôt about four miles to the south of the city. Here the filth is treated in open pans, 17 feet long, 12 feet broad and 1 foot in depth. These pans are constructed in rows of 11 pans each, there being 21 such rows. The pans are numbered in regular rotation, and 14 of them are used daily. On the first day, Nos. 1 to 14 are used, the next day Nos. 15 to 28, and so on. In this way the work is carried on systematically. Briefly described, the process of manufacture is as follows:—

The contents of four night-soil carts and three cart-loads of ashes are put into each pan. First, a layer of ashes is put down, the filth run over it and more ashes spread on the top. The mass is stirred daily by bhangies and more ashes mixed in until the poudrette is dry. The number of days taken up by this process varies according to the state of the weather. In fair weather the whole process is complete in from eight to ten days; during the monsoon it takes from fifteen to twenty days. The poudrette is then taken out of the pit and heaped on one side for sale. One "heap" of this manure is made up of the contents of five pans.

From the above description it will be seen that the poudrette is manufactured by the "sun-drying process". During the monsoon the pans are covered with grass chappars to prevent any water getting into their contents. During this season of the year also all the night-soil is not treated in the pans, but half of it is buried into trenches and mixed with ordinary kutchra. These trenches are emptied after about six months, and the manurial properties and consequently the money value of the poudrette obtained from them are inferior to that obtained from the pans. The ashes that are used for mixing with the filth are obtained by burning kutchra. They act as a good deodorant and during the monsoon the amount used is greater than that used in fair weather. Instead of three cart-loads of ashes we have to use five or six cart-loads of them for each pan during the rainy season.

2. The average time taken up by the contents of the pans to be fit for issue and be fairly odourless is eight days during fair weather. To be completely odourless the poudrette takes about a fortnight, and to be unrecognizable as a compost it takes nearly a month.

3. In the year 1892–93 the cost of the establishment at the depôt was Rs. 14,097–5–5, and the amount realized by the sale of the poudrette in the same year was Rs. 46,103–8–0.

4. No objections were made by the ryots to use the manure at any time.

5. The price of the poudrette varies considerably with the demand. When the demand is great, each heap is sold for Rs. 50 or Rs. 60 on an average. If there is no demand, the heap goes for Rs. 25 or Rs. 30 at the most. A heap is equal to 20 cart-loads, so the price of one cart-load of poudrette varies from one to three rupees.

6. The demand has arisen mainly for "wet crops." Sugar-cane thrives best under the use of this manure. Bajree rice, wheat also, thrive well under the application of this manure.

7. It is said that mangoes, plantains, oranges and other fruits do not thrive under its use.

ARTESIAN WELL AT SAMALKOT, GODAVARI DISTRICT.

The following papers furnish an account of the experimental boring of an artesian well at Samalkot, the methods pursued in connection therewith, and the results of the experiment:—

From E. A. S. BELL, Esq., to the Sanitary Commissioner for Madras, dated 8 Granville Road, Finchley N., England, 26th July 1894.

In reply to your No. 943-S., and subsequent reminder, No. 1056-S. just received, I have much pleasure in giving you a short account of what took place.

At the time of starting operations, no idea of an artesian supply was anticipated.

When I took charge of the works of the Cocanada Sub-division, East Coast Railway, in December 1892, an excavation for a well had been made at Samalkot junction. This being the point whence the branch line to Cocanada takes off, ample water-supply for the engines was of the highest importance. This excavation was then about 20 feet in diameter and some 25 feet deep. As, however, we had only come upon surface water, mainly percolating through from the Gódávari Eastern Canal, which is about 100 yards distant, it was resolved to put down a boring to ascertain if a permanent supply of good sub-soil water could be obtained. As nothing of an unusually interesting nature was expected, I regret to say no record was kept of the nature of the soil passed through, the dates, nor the rate of progress in any particular stratum.

Speaking from memory, the tube was started in hard moorum which continued for about 20 feet, equivalent to 45 feet from the surface; after which stiff yellow clay was met with for about another 20 feet. We then came upon sandy clay for about 15 feet, making about 80 feet from the surface. Beneath this was sand rather coarse, and immediately the tube entered this water came up and flowed out at the top. The force of the flow was not great, and in hopes of coming upon some gravel which would form a small pocket round the foot of the tube and thus improve the flow, boring was continued for another 10 feet when, having come upon gravel, operations were suspended.

The top level of the tube was about 35·00; hence the water-bearing stratum was approximately 45 feet below M.S.L. A small extra length was added to the tube to ascertain how high the water would rise, but we found it only reached about two feet above the original tube, the level of which was approximately the level of the surrounding country.

As mentioned before, this tube was not sunk with any idea of its remaining as the source of the permanent supply of water for the station. but with a view to find out whether an ordinary well should be sunk at this spot or some other site chosen for it.

Consequently, only a small diameter tube (4-inch) was used, and no inlets were made to assist the flow, all the water having to find its way through the aperture at the bottom. However, on discovering the artesian supply, this pipe was allowed to remain and a new 6-inch diameter was put down about 100 feet to one side. This pipe had holes about one inch diameter bored at frequent intervals in the side of the lowest 10 feet length to assist the inflow. The supply from this, of course, is considerably greater than from the other, but I hear that the level to which the water rises is substantially the same. I may mention that I was transferred from that sub-division before the 6-inch pipe was sunk, and so can give no details of that work. I am sorry that such details as I have been able to give of the former are of such a meagre description, but it is all necessarily from memory. If you require further information on the subject, Mr. W. H. K. Howard, who took over charge from me and who resides at Tuni, would, I am sure, give you all the information in his power.

From W. H. K. HOWARD, Esq., Assistant Engineer, No. II, Sub-Division, Tuni, to the Acting Sanitary Commissioner for Madras, dated Tuni, 26th November 1894, No. 1725.

[Your letter No. 1645-S, dated 31st August 1894.]

I regret the delay in answering your above-quoted letter; but as I was not in charge at the time that these tube wells were actually sunk, but took over just as they were completed, I know nothing about them personally, and I have therefore had to collect my information by degrees from the subordinates, &c., concerned, to whom I sent a string of questions on the subject to be answered, as I thought you would like to have the fullest information possible on the subject that I could collect together. With regard to the 4-inch tube I am unable to supplement Mr. Bell's details, as the subordinate who was in immediate charge of the work is not here now. I send details of the

but not for monthly volume.

6-inch tube completed by Mr. Anderson, Supervisor, who was in personal charge of the sinking operations of this tube, being answers to a table of questions compiled by me. I may also state that the Railway Engineers succeeded in getting an artesian supply at Rajahmundry, details of which I give so far as I have been able to collect them; I also give details of an attempt made by me to obtain artesian water at Cocanada, but which failed owing to an accident with the boring plant. The likelihood of obtaining such a supply here and the importance of success in so doing are, however, I consider, so great that I have got sanction to make another attempt to a depth of 200 feet and I shall be happy to communicate the result of the trial to you. At Rajahmundry, as at Samalkot, there was no initial idea of obtaining an artesian supply and it was not till after the station well had been sunk 50 feet that a trial tube was put down to test how much further it would be necessary to sink the well before a supply was obtained; and it was during this trial that, after sinking the tube 70 feet below the bottom of the well, an artesian supply was met with and the water rose to about 50 feet in the well, *i.e.*, to about ground surface, showing that it must meet with considerable friction somewhere in its underground channels and in the tube. The water level does not rise and fall with the Gódávari river (which is only half a mile distant) to any very appreciable extent and is not therefore connected with it, but comes, I think, from the hills at the back of Rajahmundry about three miles off. No record of the strata has been kept in the office, and the subordinate in immediate charge at the time is not now here. I give below what information I can gather:—

Discharge of pipe, 3·35 cubic feet per minute.
Bore of pipe, 6 inches.
Reduced level of ground in neighbourhood, 52·66.
Maximum water level in well, 49·07.
Reduced level of bottom of pucca well in which tube is sunk, 0·32.
Bottom of tube, 70 feet below bottom of well.
Diameter of well, 16 feet.

The delay in submitting this report has been greatly owing to pressure of work.

N.B.—The flow from all these tubes has continued uninterrupted for over a year now.

From Mr. A. J. ANDERSON, Supervisor, to the Assistant Engineer, Tuni, dated 20th September 1894.

The following is about all the information I can give on the artesian wells at Samalkot. The 6-inch pipe well was started on the 16th September 1893. A hole 10 feet deep was first dug, and the first length of 15 feet of pipe was put in this and sunk to a depth of 5 feet below ground, when the next length was joined. The soil passed through was red clay with a mixture of fine brown sand. The sinking went on without much trouble in the above soil to a depth of 25 feet, when hard moorum was met with, which had to be cut with the chisel, the soil coming up being of a yellowish colour and the quality being very much like as if soft sandstone of thick grains was being cut through; this continued to a depth of 40 feet below ground surface, and then we came on fine yellow clay with now and then a mixture of kunkar; this continued with but slight changes of colour and consistency to a depth of 70 feet below ground, the lower 15 feet being mixed with kunkar and sand in greater quantities the lower we went down. Then from 70 to 80 feet below ground level a stiff reddish brown clay was passed through being slightly mixed with coarse brown sand. At the depth of 80 feet we struck the water-bearing strata, and the water began to flow over top of pipe; but as the flow was very feeble, another 4 feet was sunk through fine reddish sand and the water flowed with considerable force from the top of the pipe. An extra 6-inch pipe was then fixed to the top to see how far the water would rise, and this was found to be 3 feet, making in all 9 feet to which the water rose above ground level. This extra pipe was then taken off, and a reducing piece 6-inch to $2\frac{1}{2}$-inch and 2 feet in length with a right angle bend of $1' \times 2\frac{1}{2}''$ and pipes of $2\frac{1}{2}$-inch and 193 feet in length were fixed on to connect well with storage cistern. It was then found that the flow into storage cistern was very feeble on account of the height to which it had to rise (8 feet) before being turned into storage cistern.

It was then decided to lower the tube 3 feet; this we tried to do for 3 days, but owing to the bottom 10 feet of the lower tube having been pierced with $\frac{1}{2}$-inch to 1-inch holes at intervals of $1\frac{1}{2}$ inch apart, it was found that the fine sand in water strata had filled it to this depth and that the sand would fill in again as fast as it was taken out with the plunger. It was then decided, that as the tube could not be sunk any lower, to cut 3 feet off the top; this was done, and when pipes were fixed into storage cistern as formerly, it was found that the flow had greatly increased. The tube began to deliver water on January 30, 1894, and since then the flow has neither increased nor diminished, but it is found that at times, if the flow is watched for five or ten minutes, it comes out in slight jets.

Progress.—The first 25 feet was done in near 23 days, the next 15 in hard moorum was done in 45 days, the next 44 feet in 56 days. The cost of sinking was Rs. 743-5-0.

Labour.—The R.L. of top of flow is of both pipes 39·50, the ground level being 31·50. The R.L. of bottom of 6-inch tube is *minus* 50·50. That of the 4-inch tube is about the same. The R.L. of hills behind S.L.O. and about 2 miles off is about 105. This I approximated by taking the rise in 1,000 feet near S.L.O. The strata of hills at surface is stony. Ballast is got from them. The R.L. 39·50 of top of flow of both pipes is just above tubes; the delivery ends are a foot higher. The distance apart of the pipes is 293 feet. The water has been sent up for analysis and pronounced to be very pure.

About the 4-inch tube, as this was finished before I had charge of S.L.O. station, I cannot give progress or any information as to strata, &c. It began to discharge in June 1893, and was then plugged up until a small cistern $8' \times 8'$ was made; this was done in August 1893 and connected with a concrete drain and leather hose to the tube. The flow from this tube was at the beginning rather feeble, but after cleaning it out once or twice with the plunger, it increased and did do so till January 1894. Since then the flow has been very uniform. The discharge * from both pipes is 856 gallons per hour, and the discharge from each is about equal; in fact, I am inclined to believe that the flow from the 4-inch tube is greater than that from the 6-inch and this I attribute to the ten feet at bottom pierced with holes being choked with sand, the pipe being only four feet in the water bearing stratum.

Cocanada Port Artesian Well.—This is of 4-inch bore and was sunk to a depth of 165 feet below ground. The strata passed through was first 40 feet sandy with slight black silt mixed, second 60 feet pure black silt, third 50 feet quicksand with slight black silt, fourth 7 feet of kunkar, gravel and clay mixed with sand, † fifth 8 feet stiff yellow brown clay with slight admixture of coarse brown sand.

P.L. of ground near tube of C.O.P. is 4·00 above M.S.L.

Dis. No. 959.
Submitted to the Collector.
(Signed) S. VENKATARAM DAS,
Deputy Collector.
21*st March* 1895.

Cur. No. 457-Eng.
Forwarded.
(Signed) V. A. BRODIE,
Collector.
28*th March* 1895.

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* The discharge has since been gauged in October last and is now for 6-inch tube 373, for 4-inch tube 561 = Total 934 gallons per hour.

† Very like the clay met with at Samalkot and therefore holds out hope of success at our present trial to 200 feet deep.

(Signed) W. H. K. HOWARD.

...t. of {1895} Madras.

...OCAL AND MUNICIPAL.

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Recd. *Encl.*

G.O., 20th May 1895, No. 866 M.

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