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*Proceedings of the Madras Government, Public Works Department,
for the month of March 1860.*

No. 105 Read the following letter from Colonel J. H. BELL, Chief Engineer, to the
Secretary to Government, dated 28th February 1860, No. 10,742:—

Having circulated to all District Engineers and Special Executive Engineers the Order of
Government noted in the margin, on the subject of the daily
No. 2,163, 9th September 1859. removal of Soil and Urine from the Privies of European Barracks
and Jails, requesting them at the same time to report what means they considered best adapted
to effect that object, I have now the honor to submit for the information of Government, the
Replies of the Officers to my Circular, together with a summary of them for facility of reference,
accompanied by a summary of the Reports addressed by Officers Commanding Divisions and
Forces to the Quarter Master General of the Army on the same subject. These were prepared in
communication with the Local Officers of the Department Public Works, and I have given them
full consideration in my own Report, which I have now the honor to make.

2. The general question of the removal of Sewerage resolves itself, on enquiry, into two
cases: 1st, The primitive method, at present to some extent in use, of daily removing the Soil and
Urine to such a distance as it is supposed will render it innocuous; and 2ndly, The modern and
very efficacious plan of adopting glazed earthenware Pipes and afterwards masonry Drains and
Sewers, with a good supply of water.

3. Before proceeding to notice the relative advantages of these two systems, I would draw
attention to the practice which prevails in some places, and for the correction of which it seems
important that immediate measures should be adopted. Thus, while it is admitted by every
one how very objectionable is the use of Cesspools, Sinks, and Pits, in connection with thickly
inhabited buildings, and while they have much fallen into disuse, they still exist in some cases.
The Privy attached to the Barracks at Vellore is a pit which is only occasionally cleaned out;
and in the Jails at Masulipatam and Guntoor the still more objectionable system prevails of
removing the Soil from the Privies and depositing it in large open pits in the Jail compounds.
At Itchapore the places of resort for the Convicts are portions of the compound partitioned off.

4. In ordering the adoption of one general system, it will be obvious that some arrange-
ments must be made by Government to meet the expense for Jails as well as Barracks. It does
not appear that to any Jail (except for the Hospital) are there Sweepers attached; and hence
ensue, in some cases, much of the nuisance and many of the bad consequences which might be
avoided. In localities where there are usually Prisoners of the Sweeper caste in the Jails, there
is no direct expense incurred; but where none of these men are found among the Convicts, some
means should be taken for doing the work. At Cuddapah it is stated there are always 30 or 40
Sweepers among the Convicts; so that no expense is there incurred. At Chicacole it is said the
work is done by the Prisoners themselves, while at Itchapore Jail, the compound is, when it
becomes very offensive, cleaned by Sweepers who are actually paid by the Prisoners—from
which I infer there are none of the Sweeper caste among them.

5. In the replies of the several Officers regarding the first method of disposing of Sewage,
there are various suggestions for the arrangement in the Privies, the mode of removing the
Sewage, and the ultimate disposal of it, each of which points I will now notice separately
under the following heads:—

- I. The arrangement and nature of construction of the Privies.
- II. The mode of removing Soil and Urine.
- III. The best mode of disposing of the same ultimately.

I. For the arrangements in the Privies (the disuse of Sinks or Cesspools being assumed)—
to be used, wooden tubs without seats, the handles of which being iron rings, two coolies, by
running a bamboo through them, could carry away six at a time. Sheet-iron troughs, six feet long
and two feet wide, to fit under the seats of the Privies by being pushed in through holes in the
end wall; iron vessels (to fit into the Privies), just large enough for two men to lift by the hands,
having closely-fitting covers to prevent the escape of effluvia: wooden seats with pans
under them in lieu of existing low chunam walls; covered cisterns for the reception of Soil and
Urine to be carried away every night; cut stone floors dressed smooth, sloping towards the drain-
age openings in the rear walls, these openings terminating outside in masonry tanks holding
metal vessels with handles and covers.

2nd. In connection with the arrangement of Privies it is also suggested that there should
be ridge ventilators throughout the length of the buildings; openings in the roof at intervals with
wire cages filled with charcoal under each; ground ventilators in the front walls; that the buildings

should be large and lofty, the seats for privacy partitioned off with canvas or other screen, the construction of flues in the rear walls at (under) each seat, with a bell mouth for the entrance of effluvium, and terminating in the top of the wall with another bell mouth holding a wire basket of charcoal, through which the offensive air would pass before it escapes into the atmosphere.

II. In regard to removing the Soil and Urine daily, the suggestions are—the conveyance of tubs and in some cases chatties by Sweepers to what is considered a safe distance from the Barrack or Jail, the removal of the same on ordinary carts, and in some cases on carts specially constructed for the purpose, with or without the iron troughs or vessels referred to above; and the removal in large casks or barrels, or carts designed for the purpose.

III. As to the best mode of disposing of the Soil there is an equal variety of opinion. For stations on the Sea coast, the plan in use in some cases, and recommended, is the removal of the Soil at night when it is thrown into the Sea, and the conveyance of the Urine, and water from wash-houses, by drains into the Sea. In Inland stations the most prevalent system is to bury the Soil in pits at a distance varying from 400 yards to two miles from the Jail or Barrack, while the Urine is, in some instances, disposed of in the same way, and in others it is conveyed away by drains. From the Nellore Jail the Urine and surface drainage of the premises, are conveyed by brick and chunam channels into an irrigation channel. From the Madura Jail all the Soil and Urine is washed into channels, and conveyed eventually by a main drain of the Town into an irrigation channel. At Kurnool it is disposed of to the benefit of the Jail by removal to a distant spot, which, however, being near the river, is more or less injurious to some other community. At Chittore the Soil and Urine are very properly removed by the Prisoners to a distance of a mile, but there they are buried in the bed of the river. At Rānīpet the Sweepers remove the Soil to the fields and sell it for manure, and this is the course recommended in several cases.

6. I now proceed to note the course which I would recommend for general adoption in the event of Government ruling that the Soil and Urine shall be daily removed to a distance both from Barracks and Jails, &c. in accordance with the letter from the Government of India, No. 5,149, 30th July 1859.

I. That, assuming all new Privies are to be built according to the standard plan from Bengal, to all existing Privies ridge ventilators and flues for the escape of effluvium with wire cages or baskets for charcoal shall be introduced; that the floors and troughs, in fact all parts liable to come in contact with Soil or Urine, shall be made of cut stone; that the trough shall have a fall to one end discharging through an opening in the end wall into an iron cistern having a close fitting cover; that cast iron-seats and lids be substituted for wooden ones in the Barrack Privies, while those attached to Jails should have simply the open stone trough, which in both cases will be constantly washed out and flushed—in the case of Barracks by water from the wash-houses, in the case of Jails by water drawn for the purpose by the Prisoners.

II. That carts with large casks, on the plan proposed by the Officer Commanding Hyderabad Subsidiary Force, shall be provided for the removal of the Soil and all other Sewerage matter, including refuse of cook-rooms and water from wash-houses, the latter having been first used in washing out the Urinals and Privies; that baskets of charcoal be also hung from the roof of the building, and that to purify the charcoal it shall be made *red hot* each morning. The flues now proposed, I have, at the request of the Commander-in-Chief, ordered to be introduced at once; the suggestion having emanated with the Inspector General of Hospitals.

III. In regard to the ultimate disposal of the Sewerage in general, it should at places on the Coast be conveyed into the Sea as far as can conveniently be done beyond low-water mark, and in other places it should be conveyed in that direction, which, for the greater portion of the year, is to leeward, and as the experience of Trichinopoly has proved (vide Report of the Officer Commanding Southern Division), that even at a distance of a mile and a half, it was so offensive on being spread out on the surface of the ground as to require pits to be dug for its reception, it would appear that that course should be adopted in every case; and I must say that unless Sewerage is to be utilized, I see no other satisfactory mode of disposing of it. There will be, however, a difference in the present arrangement from that which formerly existed at Trichinopoly. It is now intended that Urine shall be removed as well as the Soil, and I conclude as a natural consequence, that the Sewerage of cook-rooms and the water from wash-houses must be got rid of also. The Sewerage will then all be in a very liquid state and will be less offensive than has hitherto been experienced. It will be in such a state, that covering in the pits daily will be unnecessary, and so far the system of depositing it in pits will be unobjectionable; but there are other reasons against this plan even at a distance of two miles from the Cantonment, or Civil Stations where the Jail is, for these pits may affect the wells from which the community obtain water for domestic purposes; and I, therefore, incline to the suggestion that the experiment should be made of using this Sewerage as manure. Its fertilizing properties are generally well known elsewhere than in India. In China there is no loss allowed of so valuable a manure for the cultivation of Rice. In the neighbourhood of Edinburgh the Sewerage after leaving the precincts of the city is conveyed in open drains (and being in a very

fluid condition is comparatively inodorous), and on being distributed over meadows raises the value of land from £3 or £4 to £20 and upwards an acre. The sale by the Sweepers at Arcot, of the Soil from the Privies there, shows that its value is beginning to be known in this country; and as an experiment, I would recommend that at any Cantonment or Civil Station where Government decide on removing the Sewerage, it should be to a distance of about two miles, to be deposited on arable land conveniently situated. If requisite, it would be desirable even to offer a reward for using it the first year; the second year it should be given to the same party free of all expense; and afterwards put up to annual auction, where there can be little doubt that as the value of it became known, the amount realized would be of value to meet the expenses incurred in the conveyance of the manure.

7. The general adoption, however, of the above system will lead to a large monthly expenditure, and before sanctioning such a course, it is a matter for serious enquiry whether it is not preferable to construct at once a perfect system of Pipe Sewerage (by glazed earthenware Pipes), in connection with every Barrack, Jail, and other Public Building containing many inhabitants. I very much doubt if the expense incurred by the removal of Soil, &c. is met by any corresponding advantage, when it is remembered that the expenditure is for the removal of the Sewerage belonging to a Barrack occupied by more or less than 1,000 men, while no sanitary precautions are taken in regard to the Sewerage of Native Lines or Bazaars containing 5,000 or 6,000 inhabitants on each side of the Barracks. At Bangalore, it is reported that the refuse water from the wash-houses used to be carried away, but the practice was abandoned on account of the expense, and it is now conveyed by covered drains to a distance. Now, why should not all Sewerage matter be so disposed of? There must be water for wash-houses in European Barracks, and it will suffice for keeping clean the Urinals and flushing the Privies and Drains. The construction of covered Drains at Bangalore to carry off the water of the wash-houses was adopted in preference to carting the water, on the score of economy; and so in regard to Sewerage in general, the most economical plan in the end would be to have proper Pipe draining, which should be carried as far as the boundary of the Cantonment or Civil Station, to be continued by open masonry Drains, and the Sewerage should be finally disposed of for manure.

8. Any system of this kind should, however, be arranged with the view to its combination eventually with one general system of Drainage and Sewerage for the whole of the Station. Under any circumstances, the discharge of Drains, Pipes, or Sewers, or the conveyance of any Soil or Urine into tidal Rivers, Back-waters, flowing Streams or Rivers, River-beds or Irrigation Channels, if the water is used for domestic purposes by even a small community, should be positively forbidden, and a severe penalty attached to a breach of the Regulation.

CIRCULAR No. CXII, 29TH SEPTEMBER 1859.

ORDER OF GOVERNMENT, No. 2,168, DATED 9TH SEPTEMBER 1859.

Abstract of Replies from District Engineers to the enquiry as to what means are best adapted for the daily removal of Urine and solid filth from Barracks and Jails.

GANJAM.—All filth and Urine should be regularly removed from Privies attached to Barracks and Jails by Sweepers employed for that special purpose, and made to do it daily by responsible Superintendents. There are no Sweepers paid by Government for the Chicacole Jail, the work is done by the Prisoners, but there is one Sweeper for the Jail Hospital. There is no Sweeper for the Itchapore Jail, and the whole system is offensive and pernicious, the places of resort for the Prisoners are portions of the Jail compound partitioned off; when the compound becomes very offensive the Prisoners pay for its being cleaned. Jails should have properly built Privies, with portable Barrack vessels constantly cleaned and removed by paid Sweepers to any available open piece of ground, to be deposited or buried in pits. There are no European Barracks in the District.

VIZAGAPATAM.—Urine from the Veteran Barracks is daily removed and thrown into the Sea, the Privies being unprovided with Drains; a like system prevails in the Jail, while for other purposes of nature the Prisoners are marched out under a Guard to the same place; the only refuse which passes into the Drains at the Jail are from the eating and cooking shed which discharges into the Back-water; the fall is ample, and the Drain is constantly flushed with water from a well. Would recommend the adoption of the same plan in regard to Urine if Barracks for a Regiment are built. Situated as Vizagapatam is, without a command of water for flushing, conveying the filth and Urine to the Sea is preferable to burying it in pits.

GODAVERY.—Would prefer, where practicable, closed Sewers flushed into perennially-flowing streams, but where that is not feasible, would have sheet-iron troughs, six feet by two feet by one, under the seats to receive the Soil, one for every two seats, each travelling on low iron wheels and fastened one to another end to end by iron hooks to allow of as many as may be requisite

being placed and removed through a hole in the side wall of the building: these troughs should be removed daily (all Urine having been first emptied into them), and drawn by a horse to a distance of not less than a mile from the Barracks in that direction, which for the greater part of the year is to leeward: there should be a double set of troughs to each Privy, and after being emptied, they should be scoured out with gravel or sand and water; deposit to be left for the natural brute Scavengers of India, or the ground trenched and filled in as requisite.

KRISHNA.—The practice in the Masulipatam and Guntoor Jails is to remove the filth from the Privies and deposit it in large open pits in the Jail compound; nothing is done towards disinfecting the Urine and ordure; this appears to have been the practice for many years, probably since the establishment of the Jails; thus the Soil of the compound must in a great measure be impregnated with organic matter in a state of putrefaction, and it cannot be a matter of much surprise that the inmates of the Jails suffer from cholera and other diseases severely. Would recommend an attempt being made to utilize the Soil and Urine as manure. In the Jail compounds would recommend erection of reservoirs built on the ground, lined with tin for the temporary reception of the Soil and Urine; the Soil and Urine in separate reservoirs, where they should be deodorized; metallic basins should be substituted for the chatties in Privies.

NELLORE.—No European Barracks; the arrangements in the Jails are—for carrying off the Urine there are brick and chunam channels, which serve also to drain the space within the Jail walls. These channels communicate with a catch Drain, which empties into Irrigation channels. The Jail Drains are daily flushed with water from wells. Privies are attached to the Jail wards, and the ordure of each night is deposited in wooden buckets or tubs; removed in the morning to waste ground 400 or 600 yards distant; in some cases pits have been excavated and the Soil thrown into them, but no means are taken to cover them in. For the purposes of nature in the day-time, the Prisoners are marched out to an open ground 300 yards from the Jail.

CUDDAPAH.—No Barracks in the District; there is a large Jail in the town of Cuddapah, and the measures taken for the daily removal of the Soil and Urine, though susceptible of improvement, are very judicious—the night Soil and large tubs containing Urine are every morning conveyed in carts by the Jail Sweepers to an open plain two miles outside the town. As an improvement, would suggest large pits being excavated to be gradually filled up, and, if necessary, lime thrown in once a week; no expense is incurred, as there are always 30 or 40 Sweepers among the Prisoners who do the work.

BELLARY.—Has twice reported to the Officer Commanding the Division in communication with the Officer Commanding 74th Highlanders and Officer Commanding Artillery.

KURNOOL.—There are no Privies attached to the Kurnool Jail; Urine and Soil are removed by Sweepers morning and evening to a spot not far from the bank of the river, which is objectionable; there are Urinal chatties in a corner of the Jail; the night wards are provided with a masonry sink which discharges into a Urinal chatty without; the sink is cleaned each morning with lime and water.

CHINGLEPUT.—Considers the filth and Urine should be collected during the day in covered cisterns, and removed during the night by carts to at least half a mile from any buildings. The practice of letting Urine run into drains, as at the Mount, should be stopped and that it should be removed as the Soil now is. The cisterns should be iron enamelled and the standard Urinal for European Troops should be adopted in Jails.

NORTH ARCOT.—The practice in the Jail at Chittoor is satisfactory; the Prisoners are employed daily in carrying away the filth and Urine in tubs to the bed of a River a mile off, where pits are dug and afterwards covered up.

At Vellore the Medical Officer complains that at the Barracks and Jail there are no means of removing the Urine, though the Soil is removed daily in tubs from the Jail. The Privy attached to the Barracks is a pit which is occasionally cleaned out. The Doctor recommends a proper Privy and Urinary for the Garrison Hospital. At Raniyet there are small stalls in the Privy at the upper Barracks, which are cleaned out every night by Sweepers, and removed to the fields, where they sell it for manure. Urine tubs are in use, which are emptied into a covered Cesspool, and cleaned out at night also.

SOUTH ARCOT.—The only building of the kind referred to in this District is the Jail at Cuddalore. The Privy is floored with granite, and a cistern has been built, from which the Drain is flushed several times a day; this answers well, and no complaints have been made. The Drain falls into a tidal back-water, but it is at a place not far from the outlet to the Sea; recommends that the ashes from cooking places should be thrown into the receptacles for the Soil.

TANJORE.—Is of opinion that the Soil from the Barrack should be removed by Sweepers at night, and from Jails by Sweepers during the day, as the Prisoners are employed out of doors in the day-time and then answer the calls of nature in the field near their work.

TRICHINOPOLY.—Has never observed anything disagreeable in the neighbourhood of the out buildings attached to the European Barracks in Trichinopoly, and concludes that the means used by the Commissariat Department are efficacious, viz., the removal of all Soil and Urine in large casks on carts to a distance of two miles from the Cantonment.

MADURA.—The plan in use at the Jail here is a good one as far as the Jail is concerned—the Soil is washed into a main Drain of the Town which falls into an Irrigation channel, but this Drain in common with all others requires water for flushing it. At Paumbem, there are no Privies in the Jail; the Convicts are marched out twice a day to the Sea beach. An open Drain to carry off Urine from the Jail is offensive; this should be covered and flushed twice a day with water raised by the Prisoners.

TINNEVELLY.—In the Jail the Prisoners are marched out twice a day to a distance to attend the calls of nature; Urine is removed in chatties carried away by the Prisoners themselves. In the Military Jail there are Sweepers paid by Government.

COIMBATORE.—In reference to paragraph 4 of Mr. Fraser's observations, it would be requisite that the charcoal should be made *red hot*, simply heating will not answer. The general question divides itself into two cases: first, where water is scarce; secondly, where the supply of water is not limited. The advantages of a constant supply of water are so great that if obtainable no other mode of removal should be adopted. If water cannot be had daily, removal must be resorted to; would recommend as follows: Iron vessels to fit into the Privies just large enough for two men to lift by their handles when filled; there should be two sets for each Privy with one set of closely fitting covers; these vessels to be removed once or twice in 24 hours on low carts made for the purpose with high wheels and bent axles. Vessels from the Urinaries could be removed in the same manner; it should be deodorized and sold as manure; the whole of it might be used for Soldiers' gardens; and on Hill Stations would sell at a profit for Coffee Estates; when it cannot be deodorized, but a small quantity of water is available, it should be kept submerged in the pits from 5 to 10 feet, which would prevent any unpleasant smell being perceived. If pits are used care should be used in selecting the site; the strata should dip away from the wells, and the South-West and North-East directions should be avoided.

NORTH CANARA.—There are no Privies to Barracks in North Canara; and concerning those to the Jails and Hospital, the District Engineer is anxious to consult the Zillah Surgeon before he reports.

MALABAR.—All the European Barracks in this District being situated on the Sea coast, the contents from the Privies and Urinals can be easily and rapidly carried into the Sea. In Cannanore Barracks the ordure is conveyed away in pans during the night, and from the Urinals there are Drains to the Sea. The Hospital and other Military Buildings are arranged in the same way; the Jail at Calicut has not got Drains from the Urinals to the Sea, but vessels are placed in the wards as in the Privies. In situations on the coast Urinals should be connected with wash-houses that the surplus water may flush the Drains: Cesspools and Drains discharging into tidal Rivers and Back-waters are objectionable.

CIVIL ARCHITECT.—At Perambore Barracks there are small Privies which are daily cleaned, and the Soil removed to a dry ditch near the public Privies. The Report continues in regard to other Native Lines which do not form subject of this Report. In Her Majesty's Jail the Soil is removed in baskets by Scavengers to the ditch, near the Leper Hospital. The washings of the Privies run into Drains, which convey it to the Black Town Main Sewer. From the Penitentiary, the Soil is removed by Scavengers in baskets to the banks of the Kdam River and buried in pits dug for the purpose; would recommend that air-tight box carts be employed to convey the Soil during the nights to the plains of Vyesurpadi, where it should be buried in deep pits dug for the purpose.

EXECUTIVE ENGINEER, BANGALORE.—Recommends that all filth should be carried away from the Privies daily. Cesspools always affect any wells near them. For the daily removal of Soil recommends tubs with rings on each side through which when turned up a bamboo can be passed to carry them—two Sweepers might carry six tubs. Seats to Privies should be abolished, as these tubs would not be uncomfortable to sit on and are much cleaner; seats often get infested with bugs. Recommends a flue being constructed in the rear walls of Privies to carry off the effluvia, and proposes that the top of it should be bell-mouthed, carrying a wire basket filled with charcoal for the foul air to pass through; a Pipe communicates with the rear just below the flue to assist the draught and cause a flow of fresh air; considers that there should not be any windows in the back walls of Privies, but ridge ventilators to the roof and openings in the front walls. Regarding Urinals, the standard plans of wash-houses are good and effective, the Urinals being at the back of the wash-houses, and all the water from the latter flowing through them. At Bangalore, Urinals are lined with granite slabs, are easily kept clean and last for ever; the refuse water from wash-houses used to be carted away, but being very expensive, covered Drains were built, and now it all flows away to a considerable distance from the Barrack, and will eventually be discharged into the Sewerage Drain of the proposed system of drainage.

OFFICER COMMANDING MYSORE DIVISION.—Reports that every attention is paid to the daily removal of all offensive matter from Privies, &c., and that the Privies and Urinals are of the standard plan. States that lime and chloride of lime are used for purification in all cases.

SUPERINTENDING SURGEON AND SANITARY OFFICER, HYDERABAD SUBSIDIARY FORCE.—Deprecates a multiplication of Cesspools. Considers open Drains leading from all the buildings and terminating in a single large covered Sewer, to be desirable. Suggests that this Sewer should debouch at as great a distance from the Barracks as possible. Is of opinion that the places of deposit of the contents of the Scavenger's cart from the Barracks and Hospital should not be in the lines of natural drainage, and that trenches of considerable depth should be dug in appropriate places, as far removed as possible, for the reception of filth, into which at times, especially when epidemics prevail, deodorizing and disinfecting substances may be thrown and earth added until the trenches are filled, when fresh ones might be dug on the same spots.

OFFICER COMMANDING SOUTHERN DIVISION.—At Trichinopoly, until a few months ago, the ordure from the European Barracks was conveyed in carts and spread over the ground about a mile and half from the Barracks, but the effluvium was so offensive that pits were dug. This system was only partly carried out as no regular Establishment existed for the purpose. This, with certain subsidiary arrangements, is the system which now prevails.

The proposed system is as follows: The daily burial of all refuse matter from the Barracks should be insisted on, and a spot selected in conjunction with the Civil Authorities not nearer than two miles from Cantonments and one and a half miles from any high road, where pits should be periodically dug. These pits should be long trenches of a sufficient depth, and a portion of earth thrown over the day's deposit of ordure. The Commissariat Officer should be authorized to submit Contingent Bills for the expense of digging the pits. Does not think that the construction of Privies is adapted to the use of charcoal in the manner set forth by Government.

At Jackatalla the same system prevails as at Trichinopoly, with a slight difference; and the suggestions above detailed are stated to be applicable to this as well as all Stations in the Division where European Troops are quartered.

OFFICER COMMANDING CEDED DISTRICTS.—Reports that there are no Cesspools for Privies to the European Barracks in the Division, and that in the Artillery Barracks there are no separate Urinaries; considers this latter arrangement objectionable. Night Soil and Urine are conveyed to a distance each morning. Is of opinion that in Privies and Urinaries charcoal enclosed in a wire cage should be hung to the roof of each, and that in Barracks the use of charcoal must depend on the character of the building, for if it be spacious and roomy, nothing could more tend to keep it free from impure air than having the upper ventilators open at night.

Is of opinion that the present system of removing the deposits from Privies to a distance answers admirably. Condemns Cesspools. Believes that there is no better deodorizer than quicklime. States that the present arrangement is to place two or more of the ordinary necessary tubs into which the filth and Urine have been emptied, on carts, and to convey them to the place selected for the deposit. Adds that these tubs when filled are exceedingly weighty, and become injured from being put on the carts. Considers the carts, too, quite inefficient for the purpose. Proposes a cart of the description shown in sketch accompanying. Describes it to be a large cask or barrel placed between a framework of wood on two pins fitting into either side of the frame-discharged. Has ordered the substitution of wooden seats with pans under them for the existing low chunam walls, with a Drain through which the Urine passes into the street outside.

OFFICER COMMANDING CENTRE DIVISION.—Recommends the following arrangements: The prohibition of Cesspools. The provision of covered cisterns for the reception both of ordure and Urine to be carried away every night and buried at a distance, and the making of one or more apertures in the roof of every Privy with an iron cage of charcoal suspended under each. For the sake of privacy recommends the putting up of a canvas screen or a wooden frame about four feet high from the ground between each seat. Points out defective arrangements at Puna-mall, Mount and Arcot.

OFFICER COMMANDING NAGPORE FORCE.—Suggests that all Privies and Urinaries should be spacious and lofty; that there should never be two rooms in the breadth of these buildings; that there should be ventilating openings at intervals close to the floor and high up in the walls, and ridge ventilators the whole length of the roof. The floor to be of cut stone dressed smooth with a good fall towards the drainage openings, which should be terminated outside in masonry tanks holding metal vessels with handles capable of being lifted by two men, and with covers. The water in the metal vessels to be poured into the filth carts. Describes the form in which the vessels are to be made. Pits to be dug on the outskirts of Cantonments for the reception of every description of filth. Condemns Cesspools or Pits in the vicinity of Barracks. Considers that Drains for carrying away water from wash-houses and cook-rooms should always be open and carried to points removed as far as possible from the Barracks, and flushed with clear water

daily. Is of opinion that the best mode of using charcoal would be to reduce it to small irregular lumps of the size of marbles and to hang it in wire-net trays or baskets. Concludes with stating how the foregoing suggestions may be made applicable to the European Barracks and Hospital at Kampsee.

(Signed) J. H. BELL, Colonel,
Chief Engineer.

Central Office of P. W., Sépakkam,
28th February 1860.

ORDER THEREON, 29th March 1860, No. 650.

No. 106.

On 30th July 1859 the Government of India communicated* a Circular on the subject of the arrangements advisable in Privies, Urinaries, and Wash-houses; this, with the plans, &c., accompanying it, was forwarded to the Chief Engineer with the Order of this Government noted in the margin.

* No. 5,149.
9th Sept. 1859, No. 2,168.

2. The Chief Engineer in consequence circulated to all his Subordinates the above Order, and desired that they would report what measures they considered best adapted to effect the daily removal of Soil and Urine from the Privies of European Barracks and Jails. With his letter above recorded, Colonel Bell forwards a Summary of Replies received as well from the District Engineers as from Officers Commanding Divisions, the latter having been forwarded through the Quarter Master General of the Army. The Chief Engineer's Report and the Summary noticed above having been printed in extenso, it is not necessary to make any lengthened remarks. Colonel Bell in paragraph 2 of his Report briefly states the question.—Shall the present primitive method of daily removal be employed, or the modern and efficacious plan of adopting glazed earthenware Pipes and afterwards masonry Drains and Sewers with a good supply of water?

3. After noticing (paragraph 5) the various suggestions which had been made for—

- (1.) The arrangement and nature of construction of the Privies;
- (2.) The mode of removing Soil and Urine;
- (3.) The best mode of disposing of the same ultimately;

Colonel Bell proceeds (paragraph 6) to detail the course which he would recommend if the instructions of the Government of India are to be properly carried out. As regards the first part of the question Government have no remarks to offer. Colonel Bell's plan appears unexceptionable; as regards the third, they agree with the Chief Engineer that, whenever practicable, the Sewage should be used as manure; and with reference to the second they are fully of opinion that the plan proposed in paragraph 7 of the Report now before them is by far the best that can be carried into effect.

4. The system of Sewage by Pipe Drains flushed by any available water, is the one now generally adopted in England. The Government, therefore, approve of the plan now proposed by Colonel Bell. Though no immediate action can generally be taken in the matter, it will be the duty of the Chief Engineer to give effect to the system in particular cases, so far as it may be practicable, with the modifications which local circumstances require. The Governor in Council will leave it to him, in communication with Local Officers, to bring forward from time to time cases where its application may appear likely to be beneficial. Brick Drains perhaps may be necessary where the pressure upon Pipes would be too great.

5. The Report and its enclosure will be circulated to all Officers concerned, for their guidance. The Inspector General of Jails has not, it appears, been communicated with on the subject; the papers will be also sent to him, and his attention will be drawn to the objectionable practices prevailing in certain Jails,* as set forth in the letters of some of the District Engineers and he will forthwith take measures to correct the same.

* Masulipatam Itchapore.
Guntour. Kurnool.
Chicacole. Vellore.

(Signed) J. D. BOURDILLON,
Secretary to Government.

Circular N^o CXL 29th Sept 1859

Order of Government N^o 2168 dates 9th September 1859.
Abstract of replies from District Engineers to the
enquiry as to what means are best adapted
for the daily removal of Urine and solid filth
from Barracks and Sails.

Guzam

All filth and Urine should be regu-
larly removed from Privies attached to
Barracks and Sails by sweepers employed
for that special purpose and made to
do it daily by responsible superintendents.
There are no sweepers paid by Government
for the Chicacole Sail the work is done
by the Prisoners but there is one sweeper
for the Sail Hospital there is no sweeper
to the Ichapore Sail and the whole
system is offensive and pernicious. The
places of resort for the Prisoners are portions
of the Sail compound partitioned off when
the compound becomes very offensive the
Prisoners pay for its being cleaned. Sails
should have properly built Privies,

with

with portable barrack refuse constantly removed and cleaned by paid sweepers, to any available open piece of ground to be deposited, or buried in pits. There are no European Barracks in the District.

Urine from the Veteran Barracks is daily removed and thrown into the sea; the Prison being unprovided with drains, a like system prevails in the Jail, while for other purposes of nature the Prisoners are marched out under a Guard to the same places; the only refuse which passes into the drains at the Jail are from the eating and cooking shed which discharges into the backwater. The fall is ample and the drain is low. I strongly flushed with water from a well would recommend the adoption of the same plan in regard to urine of Barracks for a Regiment are built at Pozzani is without a communal of water for flushing and conveying the filth and urine to the sea is preferable to burying it in pits.

Under paper where provisions are stored

closed sewers flushed into Perennially flowing streams but where that is not feasible would have sheet iron troughs 6 feet by 2 feet by 1 under the seats to receive the soil one for every two seats each travelling on low iron wheels and fastened one to another end to end by iron hooks to allow of as many as may be requisite being placed and removed through a hole in the side wall of the building. These troughs should be removed daily, all urine having been first emptied into them and drawn by a horse to a distance of not less than a mile from the Barracks in that direction which for the greater part of the year is to leeward. There should be a double set of troughs to each Prison and after being emptied they should be scoured out with gravel or sand and water deposit to be left for the natural brute scavengers of India or the ground trenched and filled in as requisite.

Prison

The practice in the Madras Jail is to remove the filth

filth from the Privies and deposit it in large open pits in the jail compound, nothing is done to disinfecting the urine and ordure. This appears to have been the practice for many years probably since the establishment of the jails thus the soil of the compound must in a great measure be impregnated with organic matter in a state of putrefaction, and it cannot be a matter of much surprise that the inmates of the Jails suffer from Cholera and other diseases severely. would recommend an attempt being made to utilize the soil and Urine as manure. In the Jail compounds would recommend erection of reservoirs built on the ground lined with tin for the temporary reception of the soil and Urine. the soil and Urine in separate reservoirs where they should be deodorized, metallic basins should be substituted for the Chalties in Privies.

No European Barracks, the Nellore arrangements in the jail are; for carrying off the Urine there are brick

and

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and Chican channels which serve the Jail walls. These channels communicate with the space within, a catch also to drain the space within, a catch drain which empties into irrigation channels. The Jail drains are daily flushed with water from wells. Privies are attached to the Jail wards and the ordure of each night is deposited in wooden buckets or Tubs; removed in the morning to waste ground 4 or 600 yards distant in some cases pits have been excavated and the soil thrown into them but no means are taken to cover them in. For the purposes of nature in the day time the Prisoners are marched out to an open ground 300 yards from the Jail.

Kadapa

No Barracks in the District. There is a large Jail in the Town of Kadapa and the measures taken for the daily removal of the soil and Urine, though susceptible of improvement, very judicious the night soil and large tubs containing Urine are every morning conveyed in carts by the Jail sweepers to an open plain two miles outside the Town. As an improvement would

suggest

or

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Suggest large pits being excavated to be gradually filled up, and if necessary lime thrown in once a week. no expense is incurred as there are always 30 or 40 Sweepers among the Prisoners who do the work.

Has twice reported to the Officer Com. Bellary manding the Division in Communication with Officer Commanding 7th Highlanders and Officer Commanding Artillery.

There are no Privies attached to the Karnail Karnail Jail. Urine and Soil is removed by Sweepers morning and evening to a spot suit far from the bank of the river which is objectionable there are urinal Chalties in a corner of the Jail the night wards are provided with a masonry sink which discharges into a urinal Chatty without the sink is cleaned each morning with Lime and water.

Considers the filth and urine should be collected during the day in covered Cisterns and removed during the night by Carts to at least half a mile from any Buildings. The practice of letting urine run into drains

as

North Arcot

as at the Mount should be stopped and that it should be removed as the soil now is. The Cisterns should be now enamelled and the standard urinal for European Troops should be adopted in Sails.

The practice in the Jail at Chittoor is satisfactory the Prisoners are employed daily in carrying away the filth and urine in tubs to the bed of a River a mile off where pits are dug and afterwards covered up.

At Vellore the medical Officer complains that at the Barracks and Jail there are no means of removing the urine though the soil is removed daily in tubs from the jail. The Privy attached to the Barracks is a pit which is occasionally cleaned out the D^r recommends a proper Privy and urinary for the Garrison Hospital. at Ranepet there are small stalls in the Privy at the upper Barracks which are cleaned out every night by Sweepers and removed to the Fields where they sell it for manure. Urine tubs are in use which are emptied into

as

is covered. Cops go and cleaned out at night also.

The only building of the British Academy kind referred to in this District is the jail at Suddalore. The Privy is of stone with granite and a cistern has been built from which the drain is flushed several times a day. This answers well and no complaints have been made. The drain falls into a tidal backwater but it is at a place not far from the outlet to the sea recommends that the ashes from cooking places should be thrown into the receptacle for the soil.

Is of opinion that the soil from Barrack should be removed by sweepers at night and from jails by sweepers during the day as the Prisoners are employed out of doors in the day time and then answer the calls of nature in the field near their work.

Has never observed any thing disagreeable in the neighbourhood of the out buildings attached to the European Barracks.

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Barracks in Trichinopoly and concludes that the means used by the Commissariat Department are efficacious viz the removal of all soil and urine in large carts on carts to a distance of 2 miles from the Cantonment.

Madura.

The plan in use at the jail here is a good one as far as the jail is concerned the soil is washed into a main drain of the Town which falls into an irrigation channel but this drain in common with all others requires water for flushing it. At Paumbem there are no Privies in the jail, the convicts are marched out twice a day to the sea beach. An open drain to carry off urine from the jail is offensive this should be covered and flushed twice a day with water raised by the Prisoners.

Tinnevely.

In the jail the Prisoners are marched out twice a day to a distance to attend the calls of nature; urine is removed in Chatties carried away by the Prisoners themselves. In the Military jail there are sweepers paid by Government.

Koyumputtur.

In reference to para 4 of Captain Fraser.

Fraser's observations. It would be requisite that the Charcoal should be made Red hot simply heating will not answer, the general question divides itself into 2 cases. 1st where water is scarce, 2nd where the supply of water is not limited. The advantages of a constant supply of water are so great that if obtainable no other mode of removal should be adopted. If water cannot be had daily removal must be resorted to, would recommend as follows Iron Vessels to fit into the Privies just large enough for two men to lift by their handles when filled there should be two sets for each Privy with one set of closely fitting covers, these Vessels to be removed once or twice in 24 Hours on low carts made for the purpose with high wheels and bent axles.

Vessels from the Urinaries could be removed in the same manner one set of Pans for the Vessels would be enough. To bury the ordure will be very expensive, it should be deodorized and sold as manure the whole of it might be used for Soldier's Gardens; and on Hill Stations would sell at a profit for Coffee Estates; when it cannot be deodorized but a small quantity of water is available it should be kept submerged in the Pit from 5 to 10 feet which

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which would prevent any unpleasant smell being perceived. If Pits are used care should be used in selecting the site the strata should dip away from the wells and the South West and North East directions should be avoided.

North Canara.

There are no Privies to Barracks in North Canara and concerning those to the Jails and Hospital the District Engineer is anxious to consult the Zillah Surgeon before he reports.

Malabar.

All the European Barracks in this District being situated on the sea coast the contents from the Privies and Urinals can be easily and rapidly carried into the sea. In Cannanore Barracks the ordure is conveyed away in pans during the night and from the Urinals there are drains to the sea. The Hospital and other Military buildings are arranged in the same way. the jail at Calicut has not got drains from the urinals to the sea but Vessels are placed in the wards as in the Privies. In situations on the Coast urinals should be connected with wash house that the surplus

surplus water may flush the drains. Cess-pools and drains discharging into tidal Rivers and Backwaters are objectionable.

At Serampore Barracks there are Civil Architect small privies which are daily cleaned, and the soil removed to a dry ditch near the Public Privies. The Report continues in regard to other Native Lines which do not form subject of this report. In Her Majesty's jail the soil is removed in baskets by scavengers to the ditch, near the Leper Hospital. The washings of the Privies run into drains which convey it to the Black Town main sewer. From the Penitentiary the soil is removed by scavengers in baskets to the banks of the Hoiam River and buried in pits dug for the purpose would recommend that air tight box carts be employed to convey the soil during the night to the plains of Tyesurpadi where it should be buried in deep pits dug for the purpose.

Recommends that all filth should be carried away from the Privies daily

Executive
Engineers
Bangalore.

daily. Cesspools always affect any wells near them. For the daily removal of soil recommends tubs with Rings on each side through which when turned up a bamboo can be passed to carry them 2 Sweepers might carry six tubs. Seats to Privies should be abolished as these tubs would not be uncomfortable to sit on and are much cleaner. Seats often get infested with Bugs, recommends a flue being constructed in the rear walls of Privies to carry off the effluvia and proposes that the top of it should be bell mouthed carrying a wire basket filled with charcoal for the foul air to pass through. A pipe communicates with the rear just below the flue to assist the draught and cause a flow of fresh air; considers that there should not be any windows in the back walls of Privies but Ridge Ventilators to the Roof and openings in the front walls. Regarding Urinals the standard plans of wash houses are good and effective the urinals being at the back of the wash houses and all the water from the latter flowing through

through them, at Bangalore urinals are lined with granite slabs, are easily kept clean and last for ever, the refuse water from wash houses used to be carted away but being very expensive covered drains were built and now it all flows away to a considerable distance from the barracks and will eventually be discharged into the sewage drain of the proposed system of drainage.

Officer Commanding
Mysore Division.

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Officer Commanding
Mysore Division

Reports that every attention is paid to the daily removal of all offensive matter from Privies &c. and that the Privies and Urinals are of the Standard Plan. States that Lime and Chloride of Lime are used for purification in all cases.

Superintending
Surgeon and
Sanitary Officer
M. A. S.

Represents a multiplication of Appurals. Considers open drains leading from all the buildings and terminating in a single large covered sewer, to be desirable. Suggests that the sewer should debouch at as great a distance from the Barracks as possible. Is of opinion that the places of deposit of the contents of the Scavenger's Cart from the Barracks and Hospital should not be in the lines of natural drainage and that trenches of considerable depth should be dug in appropriate places as far removed as possible for the reception of filth into which at times, especially when

when epidemics prevail, deodorizing and disinfecting substances may be thrown and earth added, until the trenches are filled when fresh ones might be dug in the same spots.

At Tschinopol, until a few months ago, the ordure from the S. Barracks was conveyed in carts and spread over the ground about a mile and half from the Barracks, but the effluvia was so offensive that pits were dug. This system was only partly carried out as no regular Establishment existed for the purpose. This with certain subsidiary arrangements is the system which now prevails.

The proposed system is as follows. The daily burial of all refuse matter from the Barracks should be insisted on and a spot selected in conjunction with the Civil authorities not nearer than

Officer Commanding
the Tschinopol Barracks

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2 miles from Cantonments and 1 1/2 mile from any high road where pits should be periodically dug. These pits should be long trenches of a sufficient depth and a portion of earth thrown over the day's deposit of ordure. The Commissary Officer should be authorized to submit Contingent Bills for the expense of digging the pits. Does not think that the construction of privies is adapted to the use of Charcoal in the manner set forth by Government.

At Jachabulla the same system prevails as at Tschinopol with a slight difference and the suggestions above detailed are stated to be applicable to this as well as all Stations in the Division where European Troops are quartered.

Officer Commanding

the Ceded Districts

Reports that there are no cesspools for privies to the S. Barracks in the Division and that in the existing Barracks there are no separate privies. Considers this latter arrangement objectionable. Night soil and urine are

are conveyed to a distance each morning
Is of opinion that in Privies and
Urinals Charcoal enclosed in a wire
Cage should be hung to the roof of
each, and that in Barracks the
use of Charcoal must depend
on the character of the Building
for it be spacious and Roomy nothing
could more tend to keep it free from
impure air than having the Upper
Ventilators open at night.

Is of opinion that the present
system of removing the deposits from
Privies to a distance answers admirably
Condensed Effluvia. Believes that there
is no better disposer than quick lime
States that the present arrangement
is to place two or more of the
ordinary necessary tubs into which
the filth and urine have been emptied
on Carts and to convey them to the
place selected for the deposit. Also
that these Tubs when filled are
exceedingly weighty and become
injured from being put on the Carts

Enclosed

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Considers the Cart to be quite inefficient
for the purpose. Proposes a Cart of
the description shown in sketch
accompanying. Describes it to be a
large Cask or barrel placed between
a frame work of wood on two wheels
putting into either side of the frame
work so that the barrel can be
turned over bottom upwards till the
contents are completely discharged
Has ordered the substitution of
wooden seats with pans under them
for the existing low Chunam walls
with a drain thro' which the urine
passes into the street outside.

Officer Commanding
the Cantonment

Recommends the following
arrangements. The prohibition of Ef-
fluvia. The provision of Covered Cisterns
for the reception both of ordure and urine
to be carried away every night and
buried at a distance and the making
of one or more apertures in the roof of
every privy with an Iron Cage of
Charcoal suspended under each for
the sake of privacy recommends the
putting

putting up of a Canvas screen or
a wooden frame about 4 feet high
from the ground between each lat.
Pits with defective arrangements at
Punwall, Mount and Creek.

Suggests that all privies and
urinals should be spacious and
lofty. That there should never be two
rooms on the breadth of these buildings
that there should be ventilating openings
at intervals close to the floor and high
up in the walls and ridge ventilators
the whole length of the roof. The
floor to be of Cut stone dressed smooth
with a good fall towards the
drainage openings which should be
terminated outside in masonry
benches holding metal vessels
with handles. Capable of being
lifted by two men and with covers.
The water in the metal vessels
to be poured into the pits in
casks. Describes the form in
which the vessels are to be made
Pits to be dug on the outside of
Cantonments.

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Cantonments for the reception of
every description of filth. Con-
siders Appools or pits in the
vicinity of Barracks. Considers
that drains for carrying away
water from wash houses and Cook
Houses should always be open
and carried to points removed
as far as possible from the Barracks
and flushed with clear water daily.
Is of opinion that the best mode
of using Charcoal would be to
reduce it to small irregular
lumps of the size of Marbles and
to hang it in wire net trays or
baskets. Concludes with stating
how the foregoing suggestions may
be made applicable to the
European Barracks and Hospital
at Hampton.

Contract Officer
Department
28th Feb 1860

H. Bell Colonel
Chief Engineer

Alfred

Central Office of P.W.
S. Pakham
28 February 1860

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N^o 10/42

From The Chief Engineer

To The Secretary
to Government P.W.

Sir,

Public

Having circulated to all District Engineers
and Special Executive Engineers the Order of Government

dated 22/68. 4th Sept 1859 noted in the margin on the subject of the daily removal of
soil and urine from the Privies of European Barracks and

Encls 20
23 Orig letters with
3 do do &
2 Plans.
1 Summary of
replies.

Jails, requesting them at the same time to report what
means they considered best adapted to effect that object,

I have now the honor to submit for the information of
Government the replies of the Officers to my Circular,
together with a Summary of them for facility of
reference, accompanied by a Summary of the reports
addressed by Officers Commanding Divisions and
Forces to the Quarter Master General of the Army
on the same subject. These were prepared in communication

with

Enclosure in a letter
from the Chief Engineer
to the Secretary to Govt
dated 1/28 Feb 1860 N^o 10/42.

00556/60

Also attached, which is from
the Chief Engineer to the
Secretary to Govt, dated 1/28
Feb 1860, adapted for the
daily removal of urine
and soil from
European Barracks and Jails.

with the local Officers of the D.P.H., and I have given them full consideration in my own report, which I have now the honor to make. -

2. The general question of the removal of sewage resolves itself, on enquiry, into two cases 1st the primitive method, at present to some extent in use, of daily removing the soil and urine to such a distance as it is supposed will render it innocuous: and 2nd the modern, and very efficacious plan of adopting glazed earthen ware pipes and afterwards masonry drains and sewers with a good supply of water. -

3. Before proceeding to notice the relative advantages of these two systems, I would draw attention to the practice which prevails in some places, and for the execution of which it seems important that immediate measures should be adopted: Thus, while it is admitted by every one how very objectionable is the use of cesspools, sinks, and pits, in connection with thickly inhabited buildings, while they have much fallen into disuse; they

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they still exist in some cases: The Privy attached to the Banacks at Villor is a pit which is only occasionally cleaned out; and in the jails at Allahabad and Pootun the still more objectionable system prevails of removing the soil from the Privies and depositing it in large open pits in the jail compounds. At Itchapore the places of resort for the Convicts are portions of the compounds partitioned off. -

4. In ordering the adoption of one general system it will be obvious that some arrangements must be made by Government to meet the expense for jails

as

as well as Banacks. It does not appear
that to any Jail (except for the Hospital)
are there sweepers attached; and hence ensue,
in some cases, much of the nuisance and many
of the bad consequences which might be
avoided. - In localities where
there are usually Prisoners of the Sweep
Caste in the Jails there is no direct
expense incurred; but where none of these
men are found among the Convicts,
some means should be taken for
doing the work. At Kadiapa
it is stated there are always 30 or 40
sweepers among the Convicts; so that no expense

is there incurred. At Chittrachit³⁵⁷ it is
said the work is done by the Prisoners
themselves, while at Ichapore Jail, the
Compound is, when it becomes very offen-
sive, cleaned by sweepers who are
actually paid by the Prisoners, from
which I infer there are none of the
Sweep Caste among them -

In the replies of the
several Officers regarding the 1st me-
thod of disposing of sewage there are
various suggestions both for the arrange-
ment in the Privies, the mode of re-
moving the sewage, and the ultimate
disposal of it, each of which points
I will now notice separately under
the following heads -

I The arrangement and nature
of construction of the Privies -

II The mode of removing soil
and Urine -

III The best mode of disposing
of the same ultimately -

For the arrangements in the
Privies

Privies (the design of sink or Cess Pools
is being assumed) to be used wooden
tubs without seats, the handles of which
being Iron Rings, two Coolies, by run-
ning a bamboo thro' them, could carry
away six at a time. Short Iron troughs
6 feet long and 2 feet wide to fit
under the seat of the Privies by being
pushed in through holes in the end wall.
Iron Vessels (to fit into the Privies) just
large enough for two men to lift by the
handles having closely fitting covers to
prevent the escape of effluvia. Wooden
seats with pans under them in lieu
of existing low Churnam walls; covered
Bistons for the reception of soil and
urine to be carried away every
night. Cut stone floors dressed smooth,
sloping towards the drainage &
openings in the rear walls, these
openings terminating outside in
Masonry tanks holding metal
vessels.

vessels with handles and ³⁷²covers -
In connection with the
arrangement of Privies it is also
suggested that there should be Ridges
Ventilators throughout the length
of the buildings; openings in the
Roofs at intervals with wire Cages
of charcoal under each; Ground
Ventilators in the front walls;
that the buildings should be
large and lofty, the seats for privacy
partitioned off with canvas or other
screen, the construction of flues
in the rear walls at /under/ each
seat, with a bell mouth, for
the entrance of effluvia and
terminating in the top of the
wall with another Bell Mouth
holding a wire basket of charcoal

through

through which the offensive air would pass before it escapes into the atmosphere -

II In regard to removing the soil and Urine daily, the suggestions are, the conveyance of tubs and in some cases Chalties by sweepers to what is considered a safe distance from the Barrack or Jail, the removal of the same on ordinary Carts and in some cases on Carts specially constructed for the purpose, with or without the Iron troughs or Vessels referred to above, and the removal in large Casks or Barrels, on Carts designed for the purpose -

III As to the best mode of disposing of the soil there is

an

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an equal variety of opinion. For Stations on the sea coast the plan in use in some cases, and recommended, is the removal of the soil at night when it is thrown into the sea, and the conveyance of the urine, and water from wash houses, by drains into the sea. In Inland Stations the most prevalent system is to bury the soil in pits at a distance varying from 400 yards to 2 miles from the Jail or Barrack, while the urine is, in some instances, disposed of in the same way, and in others it is conveyed away by drains. From the Nellore Jail the Urine and surface drainage of the premises, is conveyed by brick and Chunam Channels into an Irrigation Channel. From the Madura Jail all the soil and Urine is washed into Channels and conveyed eventually by a Main drain of the Town into an Irrigation Channel. At Burmool it is disposed of

of to the benefit of the Jail by removal
to a distant spot, which, however, being
near the River is more or less injurious
to some other community. At Canthar And

the soil and urine are very properly
removed by the Prisoners to a distance
of a mile, but there they are buried in
the bed of the River. At Francispett Philip
the Sweepers remove the soil to the Fields
and sell it for manure, and this is
the course recommended in several cases.

b. I now proceed to note the
course which I would recommend for
general adoption in the event of a
Government ruling that the soil and
urine shall be daily removed to a
distance both from Barracks and Jails

1. In accordance with the letter from
the Government of India No 5149
30th July, 1859.

T. That, assuming all new Privies

are

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are to be built according to the Stand-
ard Plan from Bengal to all exist-
ing Privies, Bridge Ventilators and
fines for the escape of effluvia with
wire cages or baskets for Charcoal -
shall be introduced, that the floors, and
Troughs, in fact all parts liable to
come in contact with soil or urine -
shall be made of cut stone, that the
Trough shall have a fall to one end
discharging through an opening in the
end wall into an Iron Cistern having
a close-fitting cover, that cast iron
seats and lids be substituted for
wooden ones in the Barracks Privies, while
those attached to Jails should have
simply the open stone Trough which,
in both cases will be constantly
washed out and flushed in the case
of Barracks by water from the wash
houses, in the case of Jails by water

drawn

drawn for the purpose by the Prisoners.
That Carts with large Casks on
the plan proposed by the Officer
Commanding Hyderabad S. H.
shall be provided for the removal
of the soil and all other sewerage
matter, including refuse of Cook
Rooms and water from wash houses,
the latter having been first used in
washing out the Urinals and Privies,
that Baskets of Charcoal be
also hung from the Roof of the
building, and that to purify the
Charcoal it shall be made red
hot each morning. The flues
now proposed, I have, at the
request of the Commander-in-
Chief, ordered to be introduced
at once, the suggestion having
emanated

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emanated with the Inspector General
of Hospitals.
In regard to the ultimate
disposal of the Sewage in general,
it should at places on the coast be
conveyed into the Sea as far as can
conveniently be done beyond low water
mark, and in other places it should be
conveyed in that direction, which, for the
greater portion of the year, is to land,
and as the experience of Trichinopoly has
proved, vide report of the Officer Commanding
Southern Division, that even at a distance
of a mile and a half it was so offensive
on being spread out on the surface of
the ground as to require pits to be
dug for its reception, it would appear
that that course should be adopted
in every case; and I must say
that unless sewerage is to be utilized
I see no other satisfactory mode of
disposing of it. There will be
however

however a difference in the present
arrangement from that which
formerly existed at Trichinopoly. It
is now intended that urine shall
be removed as well as the soil,
and I conclude as a natural consequence
that the sewerage of Cook Rooms
and the water from wash houses
must be got rid of also. The sewerage
will then all be in a very liquid
state and will be less offensive than
has hitherto been experienced. It will
be in such a state, that covering in
the pits daily will be unnecessary
and so far the system of depositing
it in pits will be unobjectionable,
but there are other reasons against
this plan, even at a distance of 2
miles from the Cantonment, or civil
stations where the soil is, for these
pits may affect the wells from
which

450
which the community obtain water for
domestic purposes, and therefore in line
to the objections that the experiment
should be made of using the sewerage
as manure. Its fertilizing properties are
generally well known elsewhere than in
India. In China there is no soil allowed
if so valuable a manure for the
cultivation of Rice. In the neighbourhood
of Edinburgh the sewerage after
leaving the precincts of the City is
conveyed in open drains / and being
in a very fluid condition is comparatively
inodorous / and on being distributed
over meadows raises the value of
land from £3 or £4 to £20 and upwards
an acre. The sale by the sweepers at

Arcoth

Proct of the soil from the pines there,
shows that its value is beginning to be
known in this country, and as an experiment
I would recommend that at any
Cantonment or Civil Station where
Government decide on removing the sewerage
it should be to a distance of about two miles
to be deposited on the Arable land
conveniently situated. If requisite it
would be desirable even to offer a reward
for using it the first year, the 2^d
year it should be given to the same
party free of all expenses; and
afterwards put up to annual
auction, where there can be
little doubt that as the value
of it became known the

Amount

amount realized would be of value to
meet the expenses incurred in the conveyance
of the manure.

The general adoption however
of the above system will lead to a large
sanitary expenditure and before sanctioning such
a course it is a matter for serious enquiry
whether it is not preferable to construct at
once a perfect system of Pipe Sewerage (by
 glazed earthen ware pipes) in connection with
every Barrack, Jail, and other Public building
containing many inhabitants. Every much doubt
if the expense incurred by the removal of
solid ~~fec~~ is not by any corresponding advantage
when it is remembered that the expenditure
is for the removal of the sewerage belonging
to a Barrack occupied by more or less than
1000 men while no sanitary precautions are taken
in regard to the sewerage of native Lines
or Bazaars containing 5 or 6000 Inhabitants
on each side of the Barracks. At Bangalore
it is reported that the refuse water from
the wash houses used to be carried away
but the practice was abandoned on account
of

of the expense and it is now conveyed by covered drains to a distance. Now why should not all sewerage matter be so disposed of? There must be water for wash houses in European Barracks and it will suffice for keeping clean the Urinaries and flushing the Crinies and Drains: the construction of covered drains at Bangalore to carry off the water of the wash houses was adopted in preference to carting the water on the score of economy; and so in regard to sewerage in general the most economical plan in the end would be to have proper pipe draining which should be carried as far as the boundary of the Cantonment or Civil Station to be continued by open masonry drain and the sewerage should be finally disposed of for manure.

8. Any system of this kind should however be arranged with the view to its combination eventually with one general system of drainage and sewerage for the whole of the station. Under any circumstances the discharge of drains, pipes, sewers

sewers, or the conveyance of any soil or urine into tidal Rivers, Back waters, flowing streams, or Rivers; River beds, or Irrigation Channels if the water is used for domestic purposes by even a small community, should be positively forbidden; and a severe penalty attached to a breach of the Regulations.

Sepahikain
28 February 1865

I have the honor to be,
Sir,
Your Most Obedt Servant

H Bell Colonel
Chief Engineer

The Secretary to Government
Public Works Department

B. May

7 Sept 59 N 2168.

No margin.

The

P.W.D.
No 650.

Proceedings of the Madras Government.
Under date the 29^e March 1860.

Read the following
letter from the Chief
Engineer.

On the subject of
privies in European bar. (Here enter 28th February 1860
N^o 70742/
-racks and Jauls &c.)

* N^o 5749.

On 30 July 1859
the Government of India
communicated a circu-
lar on the subject of the
arrangements to be made
in privies, urinals, and
wash houses, this, with
the plans you accompa-
nying it, was forwarded
to the Chief Engineer
with the order of this
Government to be
the Margin.

9th Sept 59 N^o 2168.

The

2. The Chief Engineer
in consequence circulated
to all his Subordinates
the above order, and do-
sured that they would
report what measures
they considered best
adopted to effect the
daily removal of soil
and urine from the
privies of European-
barracks and Sails.
With his letter above
replied Colonel Bell
forwards a summary
of replies received as
well from the District
Engineers as from Of-
ficers Commanding
Divisions, the latter
having been forwarded
through the Quarter
Master General of

Engineers report and the
summary noticed above
having been printed
in extenso, it is not
necessary to make any
lengthened remarks.
Colonel Bell in para
2 of his report briefly
states the question, viz
shall the present pri-
vative method of daily
removal be employed
or the modern and
efficacious plan of
adopting glazed earthen
ware pipes and ap-
pendages masonry
drains and sewers with
a good supply of water?

3. After noticing
(Para 5) the various sug-
gestions which had been
made for

(1) The arrangement and
nature of construction

of the Privies,

(2) The mode of removing
soil and urine,

(3) The best mode of dis-
posing of the same ultimately,
Colonel Bell proceeds (Para 6)
to detail the course which
he would recommend
if the instructions of the
Govt of India are to be
properly carried out. As
regards the first part of
the question Govt. have
no remarks to offer. Col.
Bell's plan appears un-
exceptionable as regards
the third, they agree
with the Chief Engineer
that, whenever practicable,
the sewage should be
used as manure, and
with reference to the second
they are fully of opinion
that the plan proposed
in the report

now before them is by far
the best that can be carried
into effect.

4. The system of sewage
by Pipe Drains flushed
by any available water,
is the one now generally
adopted in England. The
Govt. therefore approve of
the plan now proposed
by Colonel Bell. -
Though no immediate
action can be ^{generally} taken, in
the matter, it will be the duty of the
Chief Engineer to give
effect to the system in par-
ticular cases, so far as it may
be practicable, with
the modifications which
local circumstances re-
quire. The Governor in
Council will leave it
to him, in connec-
tion with local officers,
to bring forward from
time to time cases where
application

application may appear likely to be beneficial. Buck drains perhaps may be necessary where the pressure upon Pipes would be too great.

5. The report and its inclosures will be circulated to all officers concerned for their guidance. The Inspector of Prisons has not, it appears, been communicated with on this subject. The papers will be also sent to him, and his attention will be drawn to the objectionable practices prevailing in certain jails, as set forth in the letters of some of the District Engineers and he will forthwith take

* Masulipatam.
Guntur.
Chicacole.
Tchapore.
Karnul
Pellore.

measures to correct the same.

AM
March 20.

AM

31 Copies to the Chief Engineer - C. J. P. - 10 with 28 Rel.
4 " Inspector General of
21 " Military Dep. of
21 " Indian Dep. of

Mr. No. 9th Sept/59.
103-104

Public Works 1860 Dept.
Pro. of Govt 31st March.

10650

Pro. of the Madras Govt.
29th March 1860

From the Chief Engr. to
24th March 1860. C. M. 75th P.
14th April 1860.

Approving the Plan
proposed by Col. Bell for
removing the Soil and Urine
from the Privies of European
Barracks and Quarters, and
directing the Inspector Genl.
of Quarters to take measures
to correct certain objections
the practices prevailing
in certain Quarters.

10105 & 106.