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GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following papers :—

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Chief Secretary to Government, dated Fort St. George, 8th February 1892, No. 269.

With reference to G.O., dated 16th February 1891, No. 189 M., Local and Municipal, I have the honour to forward a report, plans and estimates for the drainage of Negapatam.

2. This scheme has taken considerable time and labour to prepare. The adoption of an underground system was necessary, and I was desirous that the design should be fairly complete in its details, as, if approved, it might form a standard design with reference to which other similar projects for towns in this Presidency might hereafter be prepared.

3. I have endeavoured in the design to carry out those principles which I advocated in my note (appendix I) to the report of the Committee on the Water-supply and Drainage of Madras.

4. What are to be considered the correct principles on which to carry out the drainage of Madras have not yet been decided, and when these are promulgated in due course it may perhaps be found that they are at variance with my proposals; again, principles suited to Madras may be found unsuited to an up-country station, though I know of no reason why general principles once accepted need not be so applied.

5. There is again the question to consider whether open drains are in any case to be adopted. In certain cases circumstances will prevent their adoption and while in all cases closed drains can be used, but whether always advantageously or not depends on local conditions.

6. For my own part I must add that while to the general public who have not closely studied the question underground drainage may seem to be generally preferable, I have very grave doubts whether, looking to the professional aid available to up-country local and municipal bodies, any underground system of sewage would receive fair treatment and be attended to as it ought to be, and where such a result may be expected there can be little difference of opinion as to which method should be placed in the hands of a Municipal Council to aid them in preserving the health of the people.

7. But in some cases, such as Negapatam, circumstances have not permitted of proposals for open drainage being made, and in Negapatam there are many persons acquainted with European systems of drainage to which in some respects the plan proposed is analogous but very much more simple.

8. Government will see therefore that if it accepts the proposals for Negapatam it will be placing its approval on a system which will be more or less applicable to the whole presidency and the scheme is one therefore which demands more than ordinary consideration.

ENCLOSURE.

Report to accompany plans and estimates for the drainage of Negapatam.

The town of Negapatam in the Tanjore district is situated at the junction of Devanadi river with the sea. The sea is on the east of the town; the river passes along the west and south of the town and then joins a backwater which lies between part of the town and the sea. The town is one of importance; it is one of the termini of the South Indian Railway which here has its Locomotive Workshops and where most of its stores are landed.

2. The municipal limits include what are practically three separate towns, viz., Negapatam proper, Vellapollim and Nagore, which lie along the Bay of Bengal between the Devanadi on the south and the Vettar river on the north. The areas and population are as follows:—

	Square mile.		Population.	Density per square mile.
	Inhabited.	Uninhabited.		
Negapatam proper	0.55	0.21	31,320	52,000
Vellapollim	0.61	1.08	10,575	6,480
Nagore	0.56	0.84	16,853	10,200
Total	3.45	1.93	58,848	..

3. This report refers to a scheme of drainage for the most densely populated portion, viz., Negapatam proper, in which, as above noted, 31,320 persons or over 50 per cent. of the population reside in 4,929 houses on an area of about 0.98 of a square mile.

4. This portion of Negapatam is elevated above mean sea level from 3.6 to 18 feet. The lowest portion is only 0.6 ft. above spring tide level.

5. A ridge runs through the centre of the town from north to south; two other ridges proceeding east and west from this ridge divide the town unequally, the major portion of the town lying to the north of these latter ridges; there are thus four separate natural drainage areas.

6. The plan on which it is proposed to drain the town is that which was advocated in a note (appendix No. 1) appended to the report of the Committee on Water-supply and Drainage of Madras. This plan has been adopted after full consideration of the circumstances of the town, viz., the small gradients and irregular grading of the streets, their comparatively small width, their small average elevation above sea level and the difficulty of obtaining an outlet even if the drains were of a surface nature, not forgetting, however, to take account of the disadvantages which appertain to closed pipe sewers when there is not a proper water-supply.

7. The plan * accompanying shows, as far as possible, the positions and levels of the sewers proposed. It will be seen from this that every street within the area noted, except a small village on the sea shore, has been provided with

* Plan No. 1.

sewers; these are mostly 6" in diameter, and these sewers, as well as the intercepting sewers, will in no case run more than half full when carrying off 15 gallons, half delivered in six hours, per head of population. Smaller pipes might be used, but 4" diameter pipes are used for the house drains and it is not considered advisable to use a less diameter than 6" for the street sewers.

8. These street sewers deliver what they collect into intercepting sewers which entirely surround the town and pass finally into the pump well near the bridge under the Tanjore road over the Devanadi river. The pump well is located in this position because it is proposed to deliver all the sewage on to what is known as Hathaway's Park which is a municipal garden where rubbish is shot and on portion of which some trees, &c., are now cultivated. This plan has been selected in preference to having two pump wells—one collecting the sewage from the east and the other from the west of the town; the economy to be obtained under such latter plan would have been little more than that of less excavation for the intercepting sewers while possibly, unless very expensive works were undertaken, the pumping of sewage from the easterly portion of the town into the backwater would cause it to become offensive. The two intercepting sewers are of unequal length—one being as hereafter detailed only 2,190 feet long while the other has a length of 10,100 feet; this is the most economical design having regard to the levels of the streets along the sewer routes.

9. The following table shows the length of the sewers in each of the four natural drainage divisions already described and marked on the accompanying plans:—

Blocks.						Diameter of sewers.					Total.
						6"	9"	12"	15"	18"	
Branch sewers.											
A	..	..	..	..	..	22,490	..	..	..	..	..
B	..	..	..	..	..	16,000	..	..	..	..	..
C	..	..	..	..	..	24,150	..	..	..	..	..
D	..	..	..	..	..	25,518	1,370	120	..	..	..
Total ..						88,158	1,370	120	..	..	89,648
Intercepting sewers.											
No. 1	..	..	..	..	..	860	1,330	..	..	..	2,190
" 2	..	..	..	..	..	990	1,580	1,350	2,780	3,400	10,100
Total ..						1,850	2,910	1,350	2,780	3,400	1,01,938

This equals 19.29 miles and in addition to this there are 115,000 feet or 21.78 miles of house drains to be hereafter described.

10. The minimum gradients which have been adopted for the sewers are generally such as will give a velocity of flow equal to 2 feet per second when the sewers are flowing half full. In a very few cases, however, the gradient of the 6" sewer has been reduced to 1 in 300 which gives a velocity of only 1.9 feet per second. The maximum (half flowing in 6 hours) and minimum velocities (half flowing off in 18 hours) are as follows:—

Gradient.		Maximum velocity per second.	Minimum velocity per second.
6"	1 in 200	2.313	1.67
6"	1 in 300	1.90	1.337
9"	1 in 430	2	1.39
12"	1 in 585	2	1.38
15"	1 in 730	2	1.38
18"	1 in 875	2	1.38

There are only 11,740 feet of 6" sewers below 1 in 200 and possibly during execution by re-grading the streets the gradients of these may be increased.

11. Permanent flushing arrangements have been provided which will command 15,890 feet of the sewers, the remainder must be flushed from barrel carts or otherwise; where the comparative level of the tributary sewers and sewer No. 2 allow it, self-flushing tanks are introduced on the former above their junctions with the latter; there are five such tanks each having a capacity of 6,250 gallons and one a capacity of 5,000 gallons. The former discharge themselves in full in 1.46 minutes and the latter in 5.84 minutes and will be filled and will flush as follows:—

Self-flushing sewers.	Length of 6" sewer filling chamber.	Supply from the sewer in gallons per hour.		Capacity of chamber in gallons.	Time for each filling of the chamber.		Time to empty chamber.	Maximum possible discharge in 1" from chamber into sewer.	Diameter of sewer pipe flushed.	Length flushed or distance between two chambers.
		Maximum during 6 hours of the day.	Minimum during 18 hours of the day.		During 6 hours of maximum supply.	During 18 hours of minimum supply.				
No. 1	1,480	740	247	1,250	1.70	5.10	1.46	857	15"	400
" 2	1,250	625	208	1,250	2	6	1.46	857	15"	530
" 3	19,690	9,845	3,282	5,000	1.53	5.84	1.46	857	18"	700
" 4	2,250	1,125	392	1,250	1.53	4.66	1.46	857	18"	1,650
" 5	2,350	1,175	392	1,250	1.53	4.66	1.46	857	18"	280
" 6	2,300	1,150	383	1,250	1.53	4.66	1.46	857	18"	530

12. One of the chief features of this scheme is the mode of collecting the house sewage. One of the greatest obstacles to the introduction of proper drainage into this country is the difficulty of dealing with the house arrangements—a difficulty due not only to the habits of the people but to the costliness of the apparatus necessary if drainage on European plans is adopted. In the plan proposed in this scheme there is (beyond the fixing of a proper outlet to the house to ensure

the discharge of sewage into a trap) no interference whatever with the internal arrangements of the house. At the same time if any person is rich enough to provide proper apparatus or improve the internal sanitary arrangements in any way, it is open to him to do so and the plan proposed will suit anything done in that direction. Indeed, it is to be hoped that the Municipal Council, should this scheme be adopted, will at once take measures to see that all sewage finds its way from the houses and that none is allowed to soak into the backyards of the houses; this is a matter, however, which must be undertaken cautiously and carefully and piecemeal, following up the introduction of the street drainage as quickly as possible. On sheet No. 6 of the drawings is exhibited the plan proposed; it consists in connecting a nozzle or pipe to the existing house drains which will discharge the sewage over a trapped gully and the majority of the storm water beyond it. These gullies, which will be of stoneware, are connected with the street sewer in the usual manner, and, taking the breadth of an average house as 30 feet, at every 300 feet or 10th gully there will be a ventilating pipe rising above the roofs of the houses; these ventilators ventilate the main sewer, the house drain, be it noted, not being in direct connection with the sewer at all but discharging over a grating on the top of the stoneware gully. The inlets for air to the sewers will be over the manholes and in the manhole covers, one of which is provided for every 300 feet of sewer. The designs of these manholes are shown in sheet No. 4. The plan proposed above will ensure that no gas enters the houses and at the same time thorough ventilation of the sewers is secured.

13. The sewers themselves will be constructed entirely of glazed pipes pointed with Portland cement; the levels and gradients of the intercepting sewers are shown on sheets Nos. 2 and 3; it will be seen that sewer No. 2 lies mostly below water-level, but provision has been made for pumping during construction. As the sewers will be laid in sand, provision for laying the sewers on concrete has been made only when the depth at which the sewer is to be laid is below mean sea level.

14. The sewers, as has been already stated, all concentrate into one well. No. 1 sewer is 8 feet below ground at this point and No. 2 sewer 17 feet. The design of the well is shown on sheet No. 8. It will be entirely apart from the pumping station. The design is explanatory of itself and it will be seen that screening of the sewage, the lowering by pumping below pipe level and the ventilation have been amply provided for, while there will be every facility for the easy removal of garbage and other floating matter before the pumps are reached.

15. The engine house will adjoin, but not closely, the well above described. The maximum discharge will be (except in storms when an excess flow may enter the sewers, but this is partially provided for by the inclusion in the scheme of six overflows) from No. 1 sewer 647 and No. 2, 113 gallons per minute, in all 760 gallons. The maximum lift necessary is from the bottom of the lowest pipe to a point at which sufficient head will be obtained to pass the sewage through the delivery pipe on to the sewage farm already referred to. The lift in this case is $45.18 - 19.52 = 25.66$ feet. (The datum in the plan and section is assumed at 30 feet below mean sea level). The actual H.P. required is—

$$\frac{760 \times 10 \times 25.66}{33,000} = 6 \text{ H.P.}$$

$$\text{Add 80 per cent.} = \text{say, 5 H.P.}$$

$$11 \text{ H.P., say 12 H.P.}$$

It is proposed to have three engines of 6 H.P. each; meantime until there is a more sufficient water-supply, two 6 H.P. engines will be sufficient, and provision has been made in the estimates for that number only.

16. From the pumps the sewage will be delivered through a 14" diameter main into a distributing cistern at the sewage farm (see sheets Nos. 3 and 9). The ground at the farm will have to be slightly graded as shown on the latter sheet of drawings. A sum of Rs. 1,000 has been entered in the estimate for this purpose.

17. The following is an abstract of the cost of the proposed works:—

	RS.	A.	P.
Street sewers and connections	2,63,680	14	0
Intercepting sewers	66,495	0	0
Sewage well and pumping house	9,845	0	0
Engines and boilers	9,000	0	0
Pumping main	8,535	0	0
Sewage farm and distributing cistern	1,626	0	0
Contingencies	53,818	2	0
Total	4,13,069	0	0

18. The working charges will amount to about Rs. 7,000 for pumping, Rs. 1,000 for cleaning sewers and pump well; the farm itself should more than pay.

19. The cost of the scheme without taking pumping charges into account comes to Rs. 13 per head. The estimates have been prepared as far as possible on rates available and with reference to works executed and pipes received.

20. It is, however, possible that for a work of this kind a contractor might be found who would do the work for much less than the estimates, as if large orders are given for pipes, &c., their cost would no doubt be reduced materially below quoted prices; the only way to ascertain this is to advertise for tenders.

21. Presuming that the Municipality will be unable to start the scheme without aid from Government and that Government will contribute 50 per cent., the annual cost to the Municipality will be as follows:—

	RS.
Interest and sinking fund for 30 years at 5.96 per cent. on half cost of the scheme, i.e., Rs. 2,06,500	12,307
Working charges	8,000
Total	20,307

22. This report is accompanied by the following plans, drawings and estimates:—

- (1) General plan showing lines of sewers, pumping station, sewage farm, &c.
- (2) Sections of intercepting sewer, sewer No. 2.
- (3) Sections of intercepting sewer, No. 1 pumping main and sewage farm.
- (4) Plan showing the details of manholes on pipe sewers of various depths.
- (5) Plan of flushing gallery and self-flushing sewer by sewage.
- (6) Plan showing the details of house connections and ventilating traps.
- (7) Plan of engine and boiler house.
- (8) Plan of pumping well.
- (9) Plan of distributing cistern for sewage farm.
- 4 Estimates for street sewers and connections.
- 2 do. intercepting sewers.
- 1 Estimate for sewage well.
- 1 do. engine and boiler house.
- 1 do. engines and boilers.
- 1 do. pumping main.
- 1 do. sewage distributing cistern.
- 1 General abstract.

No. 172.

Referred to the Chief Engineer, Public Works Department, for remarks.

FORT ST. GEORGE,
29th February 1892.

(Signed) N. S. BRODIE,
Ag. Under Secretary.

To the Chief Engineer, Public Works Department, with plans and estimates.

No. 112-D.

MEMORANDUM.

Forwarded to the Local and Municipal Department with the suggestion that Mr. Jones' remarks thereon may be obtained, especially as regards the sufficiency of the water-supply for flushing and the omissions noted regarding the size of the pipes and the gradients of the same.

OOTACAMUND,
8th May 1893.

(Signed) J. HANNAN,
Ag. Joint Secy. to Govt., P.W.D.,
General, Buildings and Roads Branch.

To the Local and Municipal Department,
with original papers.

ENCLOSURE.

Note by the Deputy Chief Engineer, Public Works Department.

The Sanitary Engineer desires that special consideration be given to his proposals for the drainage of Negapatam, as, if approved, they will be more or less applicable to the whole Presidency.

2. He further says that he has prepared the scheme in such complete detail that, if approved, it may be taken as a standard design.

3. The scheme provides for a system of underground drainage, and the special feature is that the house drains are not connected with the main sewer but discharge over a trap connected with the main sewer.

4. Under this system solid excrementitious matter must of necessity be excluded from the main and be disposed of as heretofore.

5. Where underground sewers are a necessity, I think that this principle might be approved, first, on account of the cost of the appliances that would be necessary if all sewage were to be water-borne, and, secondly, on account of the probable defective workmanship in making connections which would result in the sewer gas escaping into the houses.

6. The physical features of Negapatam render it possible to deal with the drainage in four distinct blocks, but the sewage from these blocks is to be carried by intercepting sewers to one common well from which it is proposed to pump it on to some municipal waste land.

7. The details, as given in the report and shown on the drawings, are hardly so complete as to establish their claims to be considered a standard design.

8. The dimensions of the sewers and their gradients have been determined with reference to a water-supply of 15 gallons per head of population per diem.

9. Rain water is to be as far as possible excluded from the system, though overflows have been provided in case storm water should enter the sewers.

10. The maximum discharge that will reach the outfall from the intercepting sewers is stated to be 760 gallons per minute. This will take place during the six hours in which it is assumed that one half of the sewage of the day will be discharged, and is equal to a sewage rate of a little over 17 gallons per diem for a population of 32,000.

11. What the water-supply of the town at present is is not stated, but, unless it is at least 15 gallons per head, the proposed sewer would not work properly.

12. The general plan is on somewhat too small a scale, and the gradients against each of the street sewers have not been shown. The sewers are proposed to be graded, so that when running half full the velocity shall generally be 2' per second, though in some cases a velocity of only 1.90' per second will be obtained.

13. The sewers are not to run more than half full.

14. A velocity of 2' per second is the very least that should be allowed.

15. Baldwin Latham lays down a velocity of not under 3' per second for 6" and 9" circular pipes, but the gradients obtainable in Negapatam probably will not admit of this. For the upper portions of the town where the sewage admissions are small, the gradients should be steeper than 1 in 200 to admit of the sewer pipes running half full. The Sanitary Engineer has probably arranged for this. The gradients should, however, have been shown on the plan and also the size of the pipes.

16. The connection with the house drain and the trap into which or upon which it discharges, is satisfactorily designed. The end of the connection or nozzle has a flap door to pass excess storm water that may fall in the backyards, &c., clear of the trap and into the street side drain.

17. The arrangements for ventilating the sewers are satisfactory; one ventilating pipe to every 300' has been allowed. Manholes and lampholes have been properly provided, the former at points of deviation. The outlets from manholes are shown

on sheet of drawings at same level as inlets. They are generally placed at a little lower level to compensate for the check the velocity of the sewage receives on entering manhole.

18. Fifteen thousand eight hundred and ninety feet out of the total of 101,938 feet of sewer are said to be commanded by permanent flushing arrangements. These arrangements consist in six of the ordinary self-flushing annular syphons, the sewage itself being used for the flush. They are used for flushing the intercepting sewers only.

19. The other arrangements consist in three automatic flushing syphons and tanks to be filled with clear water.

20. They are situated in the vicinity of the Poopaly tank, Kothankolam tank and Theevtheertham tank, and a hand power pump is provided at each of these stations. These pumps will also be useful for filling the barrels by which the rest of the flushing will be done through 176 lampholes.

21. The arrangement is satisfactory provided sufficient water is obtainable.

22. It might be advisable to make some arrangements to admit a portion of storm water and ensure a general and complete flush when the opportunity occurs. It can enter by the traps when the water is sufficiently high in the street side drains.

23. Intercepting sewer No. 2 lies below water level. Under these circumstances, iron pipes are generally used and I think there will be considerable difficulty both in laying and afterwards maintaining this section. The stoneware pipes are sure to deteriorate.

24. The well is suitably designed and the arrangement for the distribution of the sewage is satisfactory.

25. Rs. 1,000 per annum for cleaning pipes and well seems hardly a sufficient sum to allow, especially when much of the flushing is to be done by hand power.

26. The town is a difficult one to sewer properly and the scheme seems to provide for all that can be done.

27. It would have been better if no pipes under 9" had been used, but gradients do not allow of this size and a proper discharge.

28. There will be probably many stoppages with the 6" pipes.

29. Of the 6" pipes only about one-eighth of the total length of this size is graded below 1 in 200. It would be as well if this grade was made the minimum, as it only gives a maximum velocity of 2.3' per second.

30. On the whole I think that the scheme may be approved if the supply of water that is necessary to work it is available.

(Signed) O. V. BODDY, Major, R.E.,
Dy. Chief Engineer, P.W.D.

3rd May 1893.

No. 300.

Referred to the Sanitary Engineer for remarks.

FORT ST. GEORGE,
19th May 1893.

(Signed) J. F. PRICE,
Chief Secretary.

To the Sanitary Engineer.

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, to the Chief Secretary to Government, dated Fort St. George, 26th May 1893, No. 1068.

In reply to your reference No. 300, dated 19th May 1893, enclosing a memorandum of the Public Works Department and a note by the Deputy Chief Engineer, I have the honour to enclose a memorandum thereon.

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ENCLOSURE.

MEMORANDUM on note by the Deputy Chief Engineer, Public Works Department, dated 3rd May 1893, on the Sanitary Engineer's scheme for the drainage of Negapatam.

Para. 15.—“For the upper portions of the town where the sewage admissions are small, the gradients should be steeper than 1 in 200 to admit of the sewer pipes running half full.” The effect of giving steeper gradients to the sewers will not be an increase but a decrease in the depth of sewage running consequent upon an increased velocity. To admit of the sewers in the higher sections running half full, the size of the sewers should be reduced, but the pipes cannot (owing to the house drainage pipes being 4" diameter) be made less than 6" in diameter. There is no advantage in a pipe running half full and the reason why the scheme is designed so that the pipes shall not at periods of maximum flow more than half full is to allow for the discharge of storm water, which will get into the sewers at times in spite of the best arrangements to exclude it.

The sewers nearer the ridge, as a matter of fact, have generally greater gradients than those lower down and these are all marked on a large scale plan in this office which it was thought unnecessary to send to Government.

Para. 17.—“The outlets from manholes are shown on sheets of drawings at same level as inlets. They are generally placed at a little lower level to compensate for the check the velocity of the sewage receives on entering manhole.” All the lateral sewers enter the intercepting sewers at a higher level. It is only the inlets and outlets of the intercepting sewer itself that is shown on the drawings as being on the same level. It will be observed that the check the velocity of the sewage receives on entering a manhole has been duly considered and the bottom of the manhole has been so designed as to avoid such check. There is no break in the continuity of the sewer at the manhole. On the line of the sewer in the bottom of the manhole a channel is formed corresponding with the half section of no sewer, so that the sewer is practically continuous and there is no interruption to the flow of sewage at the manhole.

Para. 21.—Sufficient water is always obtainable at Negapatam (if not from the tanks referred to in paragraph 20) from the adjacent rivers and the sea.

Para. 22.—In drainage schemes which are not on the gravitation principle and which depend upon pumping machinery for lifting the sewage before its final disposal, storm water should be, as far as practicable, excluded from the sewers. In India nine months in a year are dry and the extra pumping power that would be required to deal with storm waters, however small in quantity, would be idle for greater part of the year, and as the occurrence of rain is most uncertain it usually happens that the machinery is not ready to work just when rain commences. The consequence is that the sewers are flooded and surcharged so that the admission of storm water secures no flush, and the surcharged state of the sewers causes a deposit in the sewer of silt, &c., usually found in storm water. Flushing to be efficient should be regular and the amount of water used a fixed quantity so as to be under the proper control of the pumping machinery.

Para. 23.—Iron pipes have been and are being used in sewage works in place of stoneware pipes but not because the latter are liable to deteriorate. In bad soil the use of iron pipes has obvious advantages. The simple fact of the sewers being below water level should not prevent the use of stoneware pipes. It may be that iron pipes will be required to be substituted if found cheaper to lay (through there being a large amount of water in the excavation), but that is no reason for anticipating their use.

Para. 27.—The reasoning in this paragraph is not understood.

Para. 28.—There is no reason why there should be many stoppages with the 6" pipe. The house connections are all 4" and any matter that passes a 4" drain will readily pass a 6" drain. Again there is more likelihood of a stoppage in a 9" pipe than a 6" where the quantity of water flowing is the same. The recognised principle is that as small a pipe should be used as will carry the estimated flow because a greater velocity is secured and therefore there is a less probability of stoppage.

Para. 29.—The lines of 6" sewers with gradients of 1 in 300 are usually short independent lengths adjacent to the main sewers, but to alter these gradients to secure an additional (2.3 feet per second — 1.9) = 0.4 ft. per second would require the deepening of 9,100 feet of sewer No. 2 to an extent of 1½ feet, and this would add very greatly to the cost of the scheme and be out of all proportion to any extra cost of flushing required.

It is not possible to estimate the quantity of water now being used in Negapatam—it is not probable however that it amounts to 15 gallons per head—but the scheme cannot on that account be designed for a less quantity because a proper water-supply must come sooner or later. Every endeavour was made in the design to secure as much flushing as possible and nothing more in that direction can be done without very large additional expense for pumping machinery, &c.

FORT ST. GEORGE,
26th May 1893.

(Signed) J. A. JONES,
Sanitary Engineer to Govt.

No. 354.

Transferred to the Public Works Department.

FORT ST. GEORGE,
9th June 1893.

(Signed) A. T. PRINGLE,
Assistant Secretary.

To the Public Works Department, with plans and estimates.

No. 448-D.

MEMORANDUM.

Retransferred to the Local and Municipal Department with remark that the Sanitary Engineer having reported that sufficient water is always available at Negapatam for flushing purposes, the drainage scheme may be approved.

OOTACAMUND,
21st June 1893.

(Signed) J. HANNAN,
Ag. Joint Secy. to Govt., P.W.D.,
General, Buildings and Roads Branch.

To the Local and Municipal Department, with papers returned.

ORDER—dated 8th July 1893, No. 888 M., Local and Municipal.

The scheme submitted by the Sanitary Engineer and approved by the Public Works Department will now be sanctioned. The Municipal Council should report what action it proposes to take in the matter.

(True Extract.)

Wickham
Under Secretary, P.W.D.,
for Chief Secretary.

To the Chairman, Municipal Council, Negapatam,
through the Collector of Tanjore.
" Sanitary Engineer, with plans and estimates.
" Public Works Department.
Editors' Table.

Exd. C. A. Munisawmy.

P. W. CURRENT No. 6497

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Govt. of {1893} Madras.
LOCAL AND MUNICIPAL.

No 1982 W of 31st July 1893

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G.O., 8th July 1893, No. 883 M.

JULY.

DESPATCHED
AUG 93

Drainage Scheme.

Sanctioning the — for Negapatam submitted by the Sanitary Engineer, and directing the Municipal Council to report what action it proposes to take in the matter.

Copy to the S.E. V
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179 247 248