[L. & M.
8,000-8-[illegible]]

Local & Munl. (1896) Department.

MISCELLANEOUS.

G.O., No. 1578 M

DATED 16-9-96

[Despatch Abstract.]

Water Supply Forwarding to the Vizagapatam Munl Council for remarks, the plans and estimates for the — of the Municipality, requesting the Council to submit proposals for financing the scheme and directing the Sanitary Board to explain the delay in forwarding the Sanitary [illegible]gineers report of 25th January 1895.

BACK PAPERS.

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

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
Cco 2716 L/96							

78 Mmis d/ 16-9-96

&estimates will be
the Muni. Council, Vizagapatam
ith the request that it will submit
financing the Scheme
ted on the assumption
make a grant of
a loan of
& ~~lend~~ the other half
at 4¼ %, repayable
rs.
will be requested to explain
y that has occurred in
the San. Engr's report of
y 1895.

(for orders) 14/9/96

12/9

P&C

Chairman Mc. Vizagapatam
(with plans and estimates ~~a copy~~ to be returned)
Cco 1224 M. of enclosures
Sanitary Board.

P&C

Despd 19/9/96

FOR ORDERS.

H. E. THE GOVERNOR.

THE HON'BLE MR. H. W. BLISS, C.I.E.

THE HON'BLE MR. J. GROSE, C.I.E.

Plans & estimates despatched with
SO 22 ... 28/1/97

[G./25 A.]
1,000—21-3-96.

DEPARTMENT

C. No.

FOR ORDERS.

clear, as further levels may be necessary before commencing work on the present scheme. In either case the Council may be asked to make the requisite allotment, if it approves of the ~~scheme.~~ proposed project. It is hardly necessary to ask the Council to submit proposals for financing the scheme, as it has been shown above how it can be done.

WWD
28-8-96

I submit that the Council should not only have its say as to the project itself but also as to the question of financing it. It will have to find the ways and means and is entitled to be heard on the subject. I consider that the calculation in the ~~Off~~ Office note leaves too small a margin to be safe or anything like it. I do not see where the estimates can be cut down.

5/9/96.

415

C. 8/9 R 10/9

LOCAL AND MUNICIPAL DEPARTMENT.

Current No. 2147.M.

From

Lsp 1528 m
10/9/96

x A

The M.C. must of course have its say.

I don't understand why there has been so much delay in sending the scheme on.

x From my part (though this is a matter which need not be considered now), I do not see why so large and expensive a reservoir is needed. In his para 7 Mr. Ellis says that the dry weather flow of the Vanka in 1888 — a very dry year — was about 420 gals per minute. From his para 6 it appears that the requirement is only 417 gals per minute — why therefore the need of a reservoir to hold 8 months' supply? However, the town will no doubt increase and water be wanted hereafter.

para. 2

The usual half grant may be promised.

9/9/96

FOR ORDERS.

x Please see the notes and orders in G.O.No.912.M. dated 15"June 1891.

2. With the letter read above the Sanitary Engineer now forwards plans and estimates for the supply of water to the town of Vizagapatam together with the Sanitary Boards resolution thereon. From the Acting Sanitary Engineer's report, it appears that after a careful investigation of the various schemes, Mr. Jones concluded in favour of the one approved by Mr Wals in which it is proposed to form the reservoir near the village called Moodarsalowa. For the purpose of this scheme the population of Vizagapatam is assumed at 40000 against 34487 according to the last census- and provision is made for a supply of 15 gallons per head per diem. The distribution system covers Vizagapatam proper and the suburb of Alipur, but as

as Waltair possesses a good local supply from wells, the Sanitary Engineer considers that there is no urgent necessity for including it in this scheme. The Sanitary Board is, however, of opinion that the scheme should be extended so as to include Waltair, that this portion of the town must be supplied by pumping and that its present omission does not affect the scheme for Vizagapatam as approved by it. The original estimate of the scheme was put down at 4 lacs, but the Sanitary Board has raised this to 4.21 lacs, excluding the charges for establishment amounting to Rs 30000. Assuming that Govern~~ern~~ment will as usual bear half the cost and lend the other half on the usual terms, the Council will have to provide for an annual charge of Rs 17,045 on account of this scheme. The only source of revenue which appears to be capable of improvement is the tax on carts which is at present levied at Rs 2 per ~~cent~~ cart per annum, and this will bring in an additional revenue of Rs 400; but when the amended Municipal Act is passed into law the tax on buildings and lands can be levied at the maximum rate of 8½ per cent, in which case the ditional receipts from the tax may be expected to be Rs 2390. If water and drainage tax is levied at 6½ per cent it will bring in a sum of Rs 15,560. The total additional income will thus amount to Rs 18,350 as shown below.

Tax on carts at Rs 4 per ~~cent~~ cart	400. ✓
Additional receipts from the tax on buildings and lands at 8½ per cent	2390. (1)
Water and drainage tax at 6½ per cent	15,560 (2)
Total	18,350

This

3./

Interest and sinking fund at 5.96% on 421000/2		12,545
Establishment and repairs (including labour)	Head works	2000
	Town	2500
Total		17,045.

(1) $\frac{17950 \times 2}{15} = 2393$ or 2390 in round fig

(2) $\frac{2393 \times 13}{2} = 15{,}555$ or 15,5 in round figures

This amount will be sufficient to enable the Council to provide for the repayment of the loan and to maintain the works.

P.R.
26/8/96

The figs given above are not quite what they should be, if water tax is only levied at 6½ o/o, it is proposed to levy house & land tax at 10 o/o. This would raise the land & house by Rs 6020
Water tax would bring in Rs 15560
Total increase in taxation Rs 21580

The same result would be obtained by levying at 8½ & 8 o/o respectively, as is now proposed to be introduced in amending the act. It thus appears that there will be ample funds to finance the scheme. If Waltair is not served, it would be rather unfair to levy full water tax on houses there. The reduction that would be caused ~~thereby~~ by remitting such tax can only be ascertained by reference to the Chairman. It is ~~hardly~~ very unlikely that the loss resulting would be more than Rs 4,500, or ~~over 1/4~~ about 30 o/o of the whole income from water tax, as the number of houses in Waltair is small compared with Vizagapatam proper, although they are mostly European houses, & as such liable to heavy taxation. If the loss is not more than Rs 4500, the Council wd. still have Rs 17080 to finance the scheme which is just sufficient. But

9 ?. the extra Rs 2500 to be realized under tax on carts has not been taken into consideration as being unnecessary. This shows that the scheme can easily be financed by the Council, if it is willing to take advantage of the powers it will have under the amended Act.

Until the supply of Vizag^m. has been carried out it is hardly worth while considering the extension to Waltair, as apparently it can be carried out at any time. If it is found after or towards the completion of the proposed works that the Council will be able to finance the Waltair extension, it may be undertaken. In the meanwhile the San. Bd. may be asked to submit an estimate for it, so that it may be ready when wanted.

~~If the San. Bd's~~ The Council has not yet been consulted, & before asking it to allot Rs 1000 for levels &c. it is submitted that the San. Bd's resolution may be sent to it for remarks, ~~with the request that if approved, a sum of Rs 1000 may be allotted for the necessary levels.~~ These levels are apparently required for preparing an estimate for the Waltair extension, as the levels for the rest of the scheme are given in the San. Engr's report. It is not however quite

2290

FOR ORDERS.

10

S.B./1 29-6-96—200.

No. 2290

GOVERNMENT OF MADRAS.

OFFICE OF SANITARY BOARD,

Fort St. George, 23 July 1896.

Local & Municipal De

CURRENT No. 2147/M

From

J. A. JONES, ESQ., MEM. INST. C.E., F.R.S.E.,
SECRETARY, SANITARY BOARD (ENGINEERING BRANCH),

To

The Chief Secretary to Government,
Local & Municipal, Department.

SIR,

I have the honor to forward plans & estimates for the supply of water to Vizagapatam with the resolution of the Sanitary Board thereon.

2. The revision by the Sanitary Board would have raised the Sanitary Engineer's estimate of Rs400,000 to Rs 451,000 had not there been since omitted, under terms of G.O., No. 847 M., dated 15th. May 1896, the charges for establishment (30,000).

3. The figures inthe last para of the report (signed by Mr. Ellis in January 1895) will now stand as follow:-

		Rs
Interest & sinking fund at 5.96% on $\frac{4,21,000}{2}$		12,545 ✓
Establishment & repairs (including labor)	Head works	2,000 *
	Town	2,500 θ
Total		17,045

I think the figure Rs 2580 for establishment & repairs including labor as entered by Mr. Ellis is much too low.

I have the honor to be,
Sir,
Your most obedient servant ,

Secretary,
Sanitary Board (Engineering Branch).

Head Works *

Filter Beds & Tank

Establishment

1 Superintendent	Rs 60
6 Coolies at Rs7 each	" 42
2 Watchmen at Rs7 each	" 14
Per month	116
For 12 months 116 X 12	1392
Cleaning filters &c	608
	Rs 2000

Town ⊖

Establishment

1 Overseer	Rs 60
2 Fitters at Rs15 each	" 30
4 Turncocks at Rs7 each	28
4 Fountain cleansers at Rs6 each	24
2 Watchmen at Rs6 each	12
Per month	154
For 12 months 154 X 12	1848

Repairs including labor

40 Fountains at Rs16/3 each	652
	Rs 2,500

No. C/29 V

Appendix I

From

G. J. Walch Esqr.,
Superintending Engineer, 1st Circle.

To

H. G. Turner Esqr.,
Collector of Vizagapatam District.

Camp. Vizianagaram. 5th February 1888

Sir,

At your request I have the honor to forward the enclosed remarks with reference to the proposals for supplying the town of Vizagapatam with water; I do not include the civil Station + village of Waltair in my remarks because their provision with water other than from their present means of supply is a comparatively unimportant matter and it seems evident to me the cost would be greater than the advantages gained would warrant.

2. I must presume that the opinions and remarks which I offer are formed simply on a cursory inspection of the sites + ground dealt with + on the somewhat scanty information on the subject generally which has been placed

before

fore me, I have no means of checking correctness of that information.

3. It has been quite impossible in the absence of information on the subject for me to deal with the probable absolute cost of the various schemes; but I may say that I consider that neither of them would be very expensive as compared with similar water supply works of other towns -

4. The following papers some received from you & some from Mr Ussher are herewith returned.

(1) Memo on Moodoosellovah reservoir by L. F. Supr d/ 10-1-88 on white paper
(2) —— do —— do —— no date (on blue paper)
(3) Letter from Mr Gauge to you d/ 9-12-87 + enclosure.
(4) —— do —— do —— d/ 10-12-87
(5) Memo by Col Frazer R. E d/ 10-11-87

I have &c

(Sd) G. T. Walch

Superintending Engineer

1st circle

Remarks on the scheme for supply of the town of Vizagapatam with water -

To accompany letter to the Collector of Vizagapatam No $\frac{C}{29V}$ d/ 5th February 1888 -

Population to be taken as 35,000
allowance of water per head = 20 gallons per diem
∴ total quantity of water
required per diem —— = 700,000 gallons ✓
or per annum . . . . - . = 255,500,000 ✓
or per minute . . . . = 486 ✓

Scheme No I "Col: Frazer's"

(1) Supply to be drawn from the Hanumanthavaka stream at the Gorge, constructing a small weir and also sinking a large well at the place to pump from, and then raising the water by pumps to a reservoir on the side of the hill at such a height as to command by gravitation all the town of Vizagapatam below M. S. L + 60 below which level it is believed that all the true town lies.

(2) The scheme is perfectly feasible if a sufficiency of water is obtainable at all

times

ones of the year from the natural flow of the stream; I do not believe that any appreciable addition would be obtained by the proposed well - That flow can easily be gauged by means of a small weir during the months of the year when there is least in the stream and should be found that the daily discharge ever falls below the required quantity then the scheme may be at once abandoned -

3) That quantity is given above as 700,000 gallons a day but it would be no very serious matter if for a short time in each year only half that quantity or at the rate of 10 gallons per head were given to the town.

It would be better if [illegible] were always limited to 10 galls as if accustomed to an extra [illegible] they [illegible] [illegible]

(4) The level of the bed of the stream at the gorge is stated to be +36 and allowing 26 feet roughly for the slope+ which would have to be given to a 12" diameter pipe, and for loss* of head at a filter bed, the height to which the water would have to be lifted would be 50 ft and for this steam pumps would be necessary; but as neither the height to be lifted to nor the quantity to be lifted is very great the pumps & engines would not be costly; a double set of each would be necessary so that there might be no fear of stoppage for more than a day or whatever might be the time for which the service reservoir would hold a supply in cases of break down.

+ 16 feet

* 10 feet

(5) The advantages of the scheme are

(a) Its small cost for impounding works

(b) its much shorter length of piping than in any other scheme; only $2\frac{7}{8}$ miles as against $5\frac{1}{4}$ in scheme No. 3 & $8\frac{1}{4}$ in scheme No. 2; and the cost of iron piping 12" diameter laid is stated to be about Rs 17,000 a mile.

(c) The quickness with which it might be set going -

(d) the freedom from anxiety & risk that there would be in connection with the safety of the impounding embankments of other schemes.

(e) The absence of the trouble which in the other schemes will someday or other be inevitable from silting up the storage reservoir.

(6) The disadvantages of the scheme are

(a) The cost of the pumps, engines, engine house and attendant's quarters, which however would not bring the cost of the head works to nearly as much as that of the reservoir and its appurtenances of Scheme No. 2

(b)

b) The cost of working the pumps, establishment fuel &c. It is believed that Mr Gauge has made an estimate of what this would be but I have not the information before me - whatever it may be, capitalized at the rate at which the Municipality could borrow, would form an important item in the consideration of the cost of the scheme.

(c) the difficulty of getting the pumping machinery repaired when it went wrong, there being positively no workshops where such repairs could be carried out nearer than Dowlaswaram.

Probably cd be done at the E.C. Ry workshop at Waltair

7. This last is undoubtedly by far the greatest of the disadvantages and is so serious that in my mind it turns the scale against this scheme. If however before any of the proposals should be carried out there appeared a tolerable certainty of railway workshops coming into existence at Vizagapatam then I should prefer this scheme to the others, always, of course, supposing the observations as to the flow of water in the stream show it to be sufficient.

Scheme No 2

Scheme No 2

(1) Reservoir to be formed by restoring old tank at Simhachellam and supply taken therefrom by pipes to a "Service" reservoir or tank near the jail from which the distribution to the town would be led off.

(2) There would be absolutely no constructional difficulties about this and the cost of restoration of the old bund and necessary appurtenances would probably not be more than one quarter that of the reservoir in scheme No 3.

(3) as regards the levels, the bed of the tank is said to be M. S. L + 129 and supposing the off-take to be at 10 ft above this and the slope required for the piping ($8\frac{1}{2}$ ms) to the "service" reservoir to be about 46 feet, and the loss of head at a filter bed 10 ft, the water could be delivered at the "service" reservoir at about + 83; this would be some 23 feet above what is contemplated under scheme No 1.

(4) The catchment basin is said to be upwards of 4 square miles which is more than sufficient+ to give the required supply.

+ see consideration of catchment basin scheme no 3

) what would be the storage capacity of the reservoir there is nothing to show. Mr Zange indeed in his letter× 9th December 1887 says it would contain 2 or 3 years supply but he is I am confident, much mistaken unless indeed he contemplated not merely restoring the old bank but raising it and impounding water to a much higher level than was ever the case in the old tank. Supposing however it would contain× a 5 months supply, which I consider is the least that such a reservoir should contain, then the advantages and disadvantages of this scheme may be thus summarised.

× returned herewith

× above + 139

(6) advantages.

(a) Cheapness of construction of the impounding works.

(b) The fact that into its basin flows the water from the beautiful Simhachellam springs which give a very appreciable supply of the present water during a considerable ortion of the year and never entirely cease flow; though, from a report by L. Vertue made in July 1858, it appears that in the hot weather their discharge falls to only 2 c.ft per minute.

(7)

(7) Disadvantages

(a) The distance of the reservoir from the point common to all the schemes (viz, the "Service" reservoir near the jail); this is stated to be 8½ Ms against the 2 7/8 Ms of scheme No 1 & 5¼ miles of scheme No 3 and the extra cost of iron piping for this greater distance would amount to more than the difference between the cost of the impounding works in this scheme & No 3.

(b) The greater cost of compensation for land for the reservoir – what this would be – I have nothing to show me but as the greater part of the proposed water spread of the reservoir is under wet cultivation, it would certainly be considerably more than the compensation which would have to be paid for the reservoir of scheme No 3; whilst for scheme No 1 there would of course not be any such expenditure necessary.

(c) The impossibility of keeping the gathering ground of the reservoir free from extensive pollution during the great annual Simhachellam feast when many thousands of devotees and their followers assemble there.

(8) This last disadvantage is so serious that in my mind it turns the scale against this scheme, though from the ease with which

the

he reservoir might be formed & the beauty of ts situation it is at first sight the most attractive of all the proposals.

Scheme No. 3.

Reservoir to be formed by throwing an embankment across the valley of the Hanumanthavaka stream at a place called "Moodoosellovah".

(2) according to the memorandum on the subject drawn up by the Local Fund Supervisor Vencata Rungam Pillai, the catchment basin would be 4 square miles, but some one has entered in the margin that it would be only 3 3/8 sq miles. The rainfall in the valley is said to be 40" per annum and taking only 1/3 of this or say 13" to run off the supply from 3 3/8 sq miles would be 636,649,728 gallons per annum or considerably more than double the quantity required.

Sq. ft in one sq mile
27,878,400 × 3.4 approximate
= 94,786,560 × 1 1/12 ft
= 102 685 440 × 6.2
= 636,649,728 gallons

(3) The capacity of the reservoir given by the Supervisor (& here I have no means of checking in any way the accuracy of his calculations) with water at level M.S.L + 163 would be 23,372,118 c.ft = 144,907,131 gallons and allowing 1/3rd (a very large proportion) for soakage & evaporation during the whole time that it might be without supply, he takes the storage available for distribution supposing the reservoir to start full and not to receive during the time any fresh supply, as 15,581,412 c.ft = 96,604,754 gallons or about 138 days supply.

With the water level of the reservoir raised to M.S.L + 169, he gives its capacity as 31,643,073 c.ft and the final figures treated in the same way become 130,793,439 gallons or about 187 days supply. As the take off from the Reservoir will of course not be from the lowest part of its bed and probably from not below ten feet above that, and as occasionally the reservoir may be 5 months without receiving any supply it would be advisable if this scheme be adopted to take the higher of the two levels above noted as that to which water should be impounded & then, with care in drawing off, the capacity of the reservoir would be ample.

(4) As this higher level for the reservoir surface would, it appears, not require a

bank

bank with more than 27 feet of water against it in its deepest part there would be no serious constructional difficulties.

(5) As regards the levels, the lowest part of the bed of the proposed reservoir is stated to be M.S.L + 142 and the off take would be at, say, about + 152. The distance from the "Service" Reservoir near the jail is said to be 5¼ miles the slope required for the piping in this distance would be about 29 feet and allowing 10 feet for loss of head in filtering the water could be delivered at the "Service" reservoir at about M.S.L + 113 which would command some houses that neither of the other schemes would serve and would deliver through the town distribution pipes with a pressure that might be made useful in cases of fire.

(6) Advantages

(a) Delivery at the "Service" reservoir at a considerably higher level than under either of the other schemes.

(b) The saving in cost for compensation for land, as compared with scheme 2.

(c) The freedom of its gathering ground

from

from liability to pollution.

(d) The less distance of the storage reservoir than in scheme 2 from the "Service" reservoir & consequent saving in piping.

(7) Disadvantages

(a) The much greater initial cost of construction of the impounding works than under either schemes No 1 or No 2 this advantage is as compared with scheme No 2 more than counterbalanced by advantage (d).

(8). In this scheme the comparative advantages more than counterbalance the disadvantages, and rejecting the other schemes for the reasons given, I consider this one (No 3) the best. There would be no serious Engineering difficulties in carrying it out and as to the cost it would be moderate as compared with that of most town water supply works.

(Sd) G. J. Walch
Superintending Engineer
1st Circle.

True copy

Ag: Sanitary Engineer to Govt.
Jan 95.

P.W. Enq 668/95

Report

Vizagapatam Water Supply.

No. 184

The Hanumantha Vanka ha long been considered the best source o a water supply for the town of Vizagapatam. In 1888 Mr. C. T. Walch, late Chief Engineer P.W.D., made a preliminary investigation into several schemes for the water supp of the town all having the Hanumanth Vanka as the source of supply, but differing in respect of the point on the stream at which it was propose to bund it for forming a reservoi The scheme he considered best wa the one in which it was proposed to form the reservoir near the villag called Moodarsalowa (vide Mr. Walch's Report, Appendix I).

2. The question of the water supply of Vizagapatam has engage the attention of this Department since 1891. After a careful investigation of the various schemes propose

Mr.

r. J. A. Jones, the Sanitary Engineer, oncluded in favor of the scheme approved of by Mr. Walch. The details of the scheme were to a considerable extent settled by Mr. Jones before he went on leave, and the scheme as now forwarded is practically on the lines indicated by him.

3. The Hanumantha Vanka flows through a deep valley formed by two parallel ranges of hills. The valley measures from the Gorge to its head about 5 miles in length, with an average breadth of 2 miles. It is proposed to bund up this valley near the village of Moodar-salowa or about 2½ miles above the Gorge.

4. Appendix II gives the results of the analysis of the water made at various times. Column 5 gives the limit of impurity in a water that may be classed as 'usable' - vide Dr. MacNally's Handbook of Sanitation for India, page 80. The Chemical

Examiner

Examiner considers the water suspic apparently because of the high quantity o chlorine in it. An inspection of the bed and banks of the Hanumantha Vanka & its tributary streams shows that som 3 or 4 feet of the top soil consists of a porou red soil, and below this lies a deep bed of hard limey clay. Three trial pits along the line of the proposed bund showe similar results. The whole catchment area of the Hanumantha Vanka appears to be covered with this layer of limey clay, to which the presence of a large quantity of chlorine in the wate must be attributed, and not to anima contamination. The popular opinion about the water is that it is good. Provision is made in the estimate for removing the villages of Moodarsalowa & Gollapoliem, which lie within the catchment area of the proposed tank, and the water will be filtered before delivering into the town. With these precautions no reasonable

objection

r. J. A. Jones, the Sanitary Engineer,

ection could be urged against the water.

The catchment area of the stream above the point at which it is proposed to form the reservoir is 6 square miles. From the statement (Appendix III) of rainfall at Vizagapatam for the past 20 years it will be seen that the lowest fall was in 1891 when it was 16.93 inches. The next lowest amount reached was 26.45 in 1875. During 1891 the monsoon fall i,e, from May to October amounted to 14.68 inches. The gathering ground is steep and otherwise favorable for a large percentage of run off. At 33 per cent run off or say 5 inches may be safely assumed. The run off in a year like 1891 would be

4.

$$\frac{27,878,400 \times 6 \times 5}{12} = 69,696,000 \text{ c. ft.}$$

6. The population of Vizagapatam was according to the census of 1881, 30,291 and according to the last census 34,487. For the purpose of this scheme the population is assumed at 40,000. Provision is made for a supply of 15 gallons per head per diem, which is equal to 417 gallons per minute, or 36 million cubic feet in a year.

4120
25020
100080
6
600,480 gals per day

7. The Hanumantha Vanka flows perennially. The dry weather flow was gauged in 1888 — a year the rainfall of which stands the third lowest — within the past twenty years — and was found to be about 420 gallons per minute.

8. It is considered sufficient if the tank be made large enough to hold 8 months' supply or say 24 million cubic feet.

9. The reservoir as designed will hold 24,720,086* cubic feet above the outlet level. The loss by evaporation and absorption will be counterbalanced by the daily inflow into the tank.

*Appendix IV.

10. The reservoir will have a water spread of 2,895,433 square feet at F. T. L. The reduced level of the full tank will be 166.00 above M. S. L.

The

the level of the outlet will be 146·60. The tank will then be 20·50 feet deep from the F. T. L. to the level of the outlet.

11. The bund will be 2,700 feet long, with a top width of 12 feet. The inner slope will be 1½ to 1 from the toe of the bank to full tank level, and above this level the slope will be 1½ to 1. The inner face of the bund will have a stone revetment 2 feet thick on a backing of gravel 1 foot thick. The top of the revetment will be finished off with a row of curb stones 1½ feet above the top of the bund. The outer slope will be 2 to 1

12. Puddling has not been provided in the bund because it is not considered necessary, and it would be difficult & costly to obtain the necessary clay. The soil available for the formation of the bund is a mixture of yellow clay & kunker which when well consolidated forms a very compact & impermeable mass.

13.

13. A surplus weir, to be built in the solid ground at the northern extremity of the bank, is provided. It will be 130 feet long, and with a depth of 3 feet of water flowing over it, will discharge the maximum flow from the drainage area. The discharge from the drainage area of 6 square miles calculated by the formula $D = CM^{\frac{2}{3}}$ (Major Ryves formula), assuming C as 675, equals 2,227 cubic feet per second. To discharge this quantity with a depth of 3 feet of water flowing over it the length of the calingulah should be 130 feet (Vide Appendix V).

132.

14. The water will be drawn by a vertical pipe 18" in diameter – having 3 inlet arms 5 feet, 10 feet & 15 feet below full tank level. Each arm will be controlled by a sluice valve. The vertical pipes & the valves will be enclosed in a masonry tower. The outlet from the tank consists of an iron pipe 10" in diameter placed in a masonry conduit. The conduit

pass 10 days
20.5'

w

he level

will be constructed in excavation cut in the solid ground – thus the necessity of laying the outlet pipes in made bank, which sometimes endangers the bund, is obviated, and the pipe could be inspected whenever required under the arrangement adopted.

15. There will be two filter beds each 72 feet square. Each bed will filter about 300,000 gallons per 24 hours. When the population reaches 40,000 and the consumption attains the maximum of 15 gallons per head, a third bed will have to be constructed as a stand-bye, for repairs, cleaning &c.

16. The water will leave the filter bed at the level of 142.00. The service reservoir is located near the Jail which is a distance of 29,000 feet from the filters. The filters & service reservoir will be connected with a 10" iron main. The maximum water level in the service reservoir will be 84.00. The 10" pipe will have

39 Sluice valve from 2½" to 15".

2 fire valves.

20 Hydrants for fire service.

10 Two tap pillar fountains.

30 Wall tap fountains, single & double.

19. The scheme is estimated to cost as below –

	Rs
Collecting reservoir	69,760
Surplus weir	2,320
Surplus channel	7,880
Water tower & Sluice	18,910
Filters	14,830
Delivery main from Filters	98,140
Laying & jointing Delivery main	8,320
Service Reservoir	18,460
Pipes, sluice valves, fountains and hydrants &c	1,01,340
Laying & jointing pipes	14,960
Tools & plant	8,600
Establishment	18,500
Contingencies	18,080
Total –	4,00,000

20. On the assumption that Government will pay a moiety of

the

a hydraulic fall of 2 feet in 1,000 feet which is sufficient for the delivery of [illegible] 17 gallons per minute.

17. The distribution system will cover Vizagapatam proper and the suburbs of Alipore. Waltair is at too high a level to be supplied from the reservoir. If necessary, arrangement can be made to pump up water to Waltair from the service reservoir. But Waltair possesses a good local supply from wells, and there is no urgent necessity for including it in this scheme.

18. The following is a statement of pipes & appendages in the distributing system.

7,030 feet 15" Cast Iron pipes.
1,940 — " — 14" — " —
1,650 — " — 8" — " —
1,760 — " — 7" — " —
1,910 — " — 6" — " —
2,930 — " — 5" — " —
4,590 — " — 4" — " —

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the cost the annual outlay will be

	Rs
Interest & sinking fund at 5.96 per cent	= 4,00,000/2 × 5.96 = 11,920
Establishment & repairs	2,580
Total	14,500

Office of Sanitary Engr. to Govt.
Fort St. George, 25th January 1895

R. E. Ellis
Ag. Sany. Engr. to Govt.

Enclosure to letter No. 185 of 1895

1895

From

The Ag: Sanitary Engineer
to Government.

P.W. Estt 668/95

Dated 25 January 1895

Vizagapatam Water Supply Scheme

Report on the ——.

1/2447 no of 96

3-5-94—500.

Local & Municipal Dept.

CURRENT No. 2147 M

1896.

From

The ~~Sanitary Engineer~~ Secretary
~~to Government,~~ Sanitary Board
Engineering Branch

To

The Chief Secretary
to Government
Local & Municipal Dept.

No. 2290

Dated 23 }
Despd. 24 } July 1896
Recd. 24 JUL 96 }

Enc. 3 + plan

Subject.

Forwarding plans and estimates for the supply of water to Vizagapatam with the Resolution of the Sanitary Board.

Vizagapatam Water

For orders

H.M.

For Refce
Vide [illegible]

L & M. / 28, E. / 23 — 26 -96.
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Depe.

GOVERNMENT OF MADRAS.

SANITARY BOARD OFFICE.

SANITARY ENGINEERING BRANCH.

Proceedings of the Sanitary Board, No. 2289 dated 23rd July 1896.

Present

The Hon'ble Col. D. McNiel Campbell, R.E., President.
Surgn. Lieut. Col. W. G. King M.B., C.M., D.P.H.,
Sanitary Commissioner for Madras.
J.A. Jones Esqr. Mem. Inst. C.E., F.R.S.E.,
Sanitary Engineer to Government.

Read the following :—

Report No. 184 dated 25th. January 1895, from the Ag. Sanitary Engineer to Government on Vizagapatam Water Supply together with plans & estimates amounting to Rs 400,000.

Resolution

The plans & estimates (Rs4,21,000) as amended by the Sanitary Board are approved.

The Board considers that the scheme should be extended so as to include Waltair. This portion of the town must be supplied by pumping & its present omission does not affect the scheme for Vizagapatam as above approved. The Municipal Council should be requested to allot the sum of Rs 1000 for the necessary levels as soon as possible.

(True Extract)

J.Yule
Secretary
Sanitary Board (Engineering Branch)

To

The Chief Secretary to Government,
Local and Municipal Department.

2290 6

1896

From

The Secretary
Sanitary Board
Engineering Branch

To

The Chief Secretary
to Government
Local & Municipal Dept.

No. 2289
Dated 23rd July 1896

Enc - 1
Subject

Proceedings of the
…nitary Board relative
… the Supply of water
… Vizagapatam

From

To

Dated 2…
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Recd. 24 …

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[L & M. / 28]
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1884,