(1) பக்கங்களின் எண்ணிக்கை 10

(2) புதுக்கித் திருப்பிய நாள் 12/9L

(3) ஆதாரங் குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

P. W. துறை

அரசாணை எண். மு. கோப்புத் தாள். எண். 2427(W)	அச்சகம் பலவகை

நாள் : 21.9.1893 199

மடிக்கவோ கூர்படப் கையாளவோ கூடாது.

ஆவண. கா. 1—18,006—6-9-90.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

Read—again the following paper:—

G.O., dated 11th April 1893, Mis. No. 496 M., Local and Municipal.

Read—the following paper:—

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, 6th December 1892, No. 2774.

I have the honour to send, as per annexed list, plans and estimates for the improvement of the water-supply of the town of Kurnool.

2. In my report, dated 10th April 1891, No. 272, it will be noticed that of the two schemes under consideration I preferred the scheme which had for its source the Hindri river as opposed to the canal supply and this was practically the source which had the very strong support of Dr. W. G. King, who had long been District Medical and Sanitary Officer of Kurnool.

3. He had indeed fair grounds for considering that the source of supply was a pure one, for the most favored water used in Kurnool is that drawn from the cutcherry well on the south bank of the Hindri, which was supposed to be perfectly pure water.

4. When experiments were made to test the available supply in the Hindri during the dry season, water was taken from it as well as from the well to which I have referred and it is regretted that the results were anything but favorable, as is shown by the following analysis:—

—	A. Water from experimental well in the bed of Hindri after allowing the water to stand still for 20 hours.	B. Water from experimental well in the bed of Hindri while a pump was working.	Water from pump well in Collector's cutcherry.
Total solids, grms. per litre	0·330	0·320	0.440
Volatile solids do. do.	0·100	0·090	0 120
Chlorine do. do.	0·024	0·021	0·032
Total hardness, Clark's scale	8°·750	8°·750	11°·550
Permanent hardness do. do.	1°·750	1°·750	0°·700
Free ammonia, milgrms. per litre	0·280	0·240	Trace.
Albumenoid ammonia do. do.	0·120	0·080	0·080
Nitric acid do. do. (as ammonia) ..	0·450	0·450	2·250
Apparent quality of water as inferred from the results obtained on examination.	Suspicious.	Suspicious.	Suspicious.

The samples A and B are condemned as suspicious on account of the high amount of ammonia; in some respects the water from the cutcherry well is worse, but this water is used by a great many people. The people of Kurnool have also, I find, a strong prejudice against using water drawn from the bed of the Hindri, and I am informed

that cholera travels when it gets into the Kurnool district and adjacent to the Hindri very rapidly down that river. For these reasons and also in view of the fact that the cost of the scheme would have been much greater than I anticipated, I was compelled to abandon the proposal to make the Hindri the source of supply.

5. The figures on which I based the cost of that scheme, viz., those in an estimate for Rs. 81,094, were, I find, for only a portion of the work. The original estimate for the work was Rs. 1,14,225 (see paragraph 18 following) and this without engines, pumps, &c., which are absolutely necessary for the supply of the town.

6. The scheme now submitted has for its source of supply the Kurnool canal and there are two reasons why the first large item—indeed the largest item in the scheme except pipes—is a settling tank; on the capacity of this tank depends its cost. I accepted in my first estimate the Public Works Department figures and placed the cost at Rs. 8,000. But from enquiries made and after consultation with the Executive Engineer, Kurnool, I am of opinion that for one reason, viz., to allow for the closure of the canal, the tank should contain at least a fortnight's supply. There is at present great inconvenience to the canal during closure and water has to be stored for the benefit of the municipality by erecting bunds across the canal and thus forming reservoir to keep up the supply.

7. Were this the only reason for the tank, it might have been possible to let matters go on as now, but the water of the Kurnool canal, which is supplied by the Tungabhadra, carries in it such a very large proportion of silt (about 30·38 grains per pint during the monsoon and slightly less ordinarily) that a settling tank is a positive necessity. It is impossible to admit water in such a state as the water in the canal is into the distribution pipes, and, further, though I have not included the cost of filter-beds in the estimate, I fear that they will eventually be found necessary, and this is also the opinion of the Chemical Examiner: *vide* the following analysis:—

—	Kurnool Cuddapah canal water obtained from the canal on the 29th October 1890.
Total solids, grms. per litre	0·330
Volatile solids do. do.	0·100
Chlorine do. do.	0·021
Total hardness, Clark's scale	4°·550
Permanent hardness do. do.	0°·700
Free ammonia, mlgrms. per litre ..	0·040
Albumenoid ammonia do. do. ..	0·120
Nitric acid do. do. (as ammonia).	0·300
Apparent quality of the water as inferred from the results obtained on examination.	Usable after filtration, as large amount of fine clay being in suspension.

8. The settling tank included in the estimate will contain a fortnight's * supply and this is none too large either for the convenience of the canal officers or the necessity for settling the water before admission to the pumps. The settling tank is divided into halves and each portion will contain a week's supply.

9. The depth of the proposed settling tank is nine feet below inlet level and therefore if the deposit took place with a rate of fall of only 12″ per day, the water ought to be perfectly clear in a week after delivery; as a matter of fact the deposit

* The Municipal Council before the first estimate was prepared asked for a six weeks' storage

1427/2

will take place much quicker than this. The inlet level to the settling tank is placed three feet below ordinary canal level so that the water may be drawn from the canal almost up to the last minute before closure.

10. Before describing the further portions of the scheme I may say that the arrangements made are such that a very slight lowering of the pump well will allow of the introduction of filters if found necessary.

11. The water from the settling tank will be drawn off by means of floating pipes which will draw off the top water first; these pipes are connected outside the settling tank to a main 12″ in diameter which will carry the water to the pump well.

12. From the hydraulic gradients it will be seen that it is impossible, if water is to be delivered to the town of Kurnool above ground level (and I cannot recommend dip wells or pumps if they can be precluded) to avoid the use of pumping machinery, and hence the reason for its provision. The machinery will be of a simple character; two direct acting centrifugal pumps are proposed which will raise the water to the necessary level 12·52 feet above ground at the pump house site.

13. The pump house will contain the engines, pumps and boilers and the water will be raised into a tank which is under the same roof. This tank is merely to regulate the pressure and not for storage in any respect.

14. The population of Kurnool at the last census was 24,523 and the scheme has been designed for the supply of 15 gallons per head to 30,000 people, which is not a very great allowance in view of increased population. The daily supply will therefore be 450,000 gallons per 24 hours, of which 225,000 gallons will be delivered in six hours or at the rate of 630 gallons per minute. The water has to be lifted at the pumping station after being drawn off from the settling tank from a level of 920·00 to a level of 946·50 or 26·5 feet, and with this level at the pumping station there will be only in some parts of Kurnool a pressure of ten feet during periods of maximum draught and supply.

15. The following will be the pump horse power required:—

$$\frac{630 \times 26{\cdot}5 \times 10}{33{,}000} = 5 \text{ P.H.P.}$$

16. The distribution it is proposed to effect through about 6 miles of pipes varying in size from 12″ in diameter (3,720 feet) to 3″ in diameter (16,539); there will be 30 fountains, or one to each thousand of the population, with 15 hydrants, valves, air valves, &c. To keep the expenditure as low as possible the ends of certain of the branch mains have not been connected to each other, but instead thereof and to facilitate the exit of silt from the pipes scour-valves have been allowed for at the end of each such branch; scour-valves have also been provided on the other mains. It would have been advisable to have had more mains in certain localities, but the estimate being larger than anticipated every means consistent with suitable arrangements have been adopted to lessen the cost.

17. The cost of the scheme is, however, very considerably more than my approximate estimate for the Hindri scheme, but it is, as will be seen, very much about the same amount (if contingencies are omitted) as the estimate prepared by the Public Works Department (Mr. Carless and Colonel Smalley) in 1887.

18. The following statement shows all the estimates already referred to. The items which call particularly for attention are the cost of the settling tank and that of the pipes; the former cannot be reduced and very low estimate rates have been used in calculating its cost. What the pipes will cost can only be seen when they are actually tendered for, but their cost is based on the assumption that they will be delivered in Madras at about present rate, Rs. 105 per ton, and taken to Kurnool *via* rail to Kistnapuram and thence by canal:—

—	Estimate prepared by Colonel Smalley, Public Works Department, in 1887.	Estimate prepared by Mr. Carless, Public Works Department, in 1889.	Estimate for the Hindri scheme as in my report, No. 272, dated 10th April 1891.	Detailed estimate for the Hindri scheme as now revised.	Detailed estimate for scheme now proposed.
	Rs.	Rs.	Rs.	Rs.	Rs.
Offtake at channel	..	..	..	..	1,040
Settling reservoir or silting bed	13,402	7,472	..	..	33,150
Engine and boiler house	..	..	4,000	5,922	5,100
Fencing, levelling the site, forming road and compensation for land	..	..	..	1,600	1,600
Engines, pumps and boilers including erection	..	..	10,800	22,000	12,000
Pipes, valves, fountains, hydrants, &c.	50,000	73,094	50,000	82,881	57,850
Laying and jointing pipes	..	..	..	14,700	11,900
Filter beds	29,147	..	..	..	..
Repairing present conduits and cisterns.	15,206	..	..	..	..
Storage reservoir	6,470	..	..	..	..
Infiltration gallery	..	..	8,000	10,700	..
Contingencies including cost of establishment	1,14,225	80,566	72,800	1,37,803	1,22,640
	..	528	9,100	20,687	18,360
Total ..	1,14,225	81,094	81,900	1,58,490	1,41,000
			Annual cost of pumping ..	6,200	2,500

19. The figures show how unsafe it is to make approximate estimates (even though the present scheme is different from that originally proposed), but it may now be taken as a fact that Kurnool is not likely to get a water-supply for less than Rs. 1,41,000 and this may be called cheap, for it amounts to only Rs. 4·7 per head.

20. If Government will still carry out its promise (based, no doubt, on an incorrect anticipation of the cost) to contribute 75 per cent. of the amount, the balance to be met by the municipality will be Rs. 35,250. Government has directed the entry of Rs. 61,000 as a grant for 1893–94 and a loan of Rs. 20,000, and this will be sufficient to allow the works to start.

21. The annual charges to the municipality will be—

	Rs.
Interest and sinking fund on Rs. 35,250 at 5·96 per cent.	2,100
Pumping charges	2,500
Maintenance of pipes, &c.	1,000
Total ..	5,600

But the municipality at present pays Rs. 3,500 per annum for water; this will, however, be reduced to a payment for daily 450,000 gallons × 365 at Re. 1 per 1,000 cubic yards or 2·66 thousands of cubic yards daily. This will cost Rs. 2·66 per diem or Rs. 970 per annum, and I doubt if at present so much water will be used, but if it be so a saving of Rs. 3,500 — 970 = 2,530 will be effected, so that the extra charges to the municipality will be Rs. 3,070 per annum or only about 2 annas per head per annum. The tax on buildings is levied at only 6 per cent. and yielded in 1891–92 Rs. 5,580, so that a water-tax of a little above 3 per cent. will be all that is required, and even then Kurnool will remain one of the most lightly-taxed towns of the Presidency.

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No. 1055.

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

Fort St. George, (By order.)
12th December 1892.

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

2427/3

No. 1338-C.

Memorandum.

With reference to endorsement, No. 1055, of 12th December 1892, from the Local and Municipal Department, on the scheme of the Sanitary Engineer for the supply of the town of Kurnool with water, the undersigned has the honour to say that, as a whole, that scheme as far as it goes seems a judicious one, but he is convinced that the "settling tank" should be capable of holding a supply for six weeks instead of only for two weeks (see paragraph 7 of Mr. Jones' report). Copy of a letter, No. 677, dated 27th February 1893, from the Executive Engineer, Kurnool division, bearing on this portion of the subject, is sent herewith. It will also be advisable to use Portland cement plaster instead of surki plaster in these tanks.

2. There can be no doubt that, as noticed in paragraph 7 of the Sanitary Engineer's report, filter-beds will have to be provided.

(Signed) G. T. WALCH,
Ag. Chief Engineer, P.W.D.

Madras,
21*st March* 1893.

To the Local and Municipal Department.

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Enclosure.

From the Executive Engineer, Kurnool Division, to the Superintending Engineer, III Circle, Bellary, dated 27th February 1893, No. 677.

In reply to your endorsement, No. 3077, dated 13th February 1893, on memorandum from the Chief Engineer, dated 9th February 1893, No. 587-C., asking for a report as to whether a storage reservoir containing a fortnight's supply would be sufficient for the Kurnool water-supply, I have the honour to state that keeping the town supplied during the closure has always proved a troublesome matter.

2. The practice has been to throw a dam above the regulator at Kurnool and to form a reservoir containing about a week's supply.

This reservoir contained about three to four millions cubic feet and supplied the town as well* as the gardens in Kurnool and had to be replenished once a week. This, of course, interferes greatly with the clearance of silt below the head sluice. The year before last I had a second dam erected in the 12th mile and from this replenished the lower one (last year we had no closure at all). We found this arrangement fairly convenient, as there is generally but little silt to be removed in the miles occupied by the reservoirs; still the time thus allowed is not sufficient for proper check measurement of silt clearances and if we could be allowed a full 6 weeks it would be more satisfactory. If then the permanent storage reservoir could have a supply for 3 or 4 weeks, we could store a further supply for 2 weeks or so in the canal itself, and then there need be no great danger of hurriedly taken measurements and check measurements.

* 3 miles and 80 feet and ⅔ feet average depth.

It must be borne in mind that the canal reservoirs will hold water, not only for the town reservoir, but also for sugar-cane and other gardens. In other words that the town cannot claim all the water held up in the canal reservoirs.

3. The flow of water through the head sluices during the dry weather is very small as a rule, it does not actually cease but it takes 2 or 3 days to refill a reservoir.

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No. 3184.

Copy forwarded to the Chief Engineer, Public Works Department, with reference to memorandum, No. 587-C., dated 9th February 1893.

(Signed) A. T. FRASER, Col., R.E.,
Superintending Engineer, III Circle.

6*th March* 1893.

Order—dated 11th April 1893, Mis. No. 496 M., Local and Municipal.

The Sanitary Engineer should revise the estimates with reference to the Chief Engineer's remarks.

(True Extract.)

(Signed) C. A. GALTON,
Ag. Chief Secretary.

To the Sanitary Engineer.

READ—also 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, 6th June 1893, No. 1146.

With reference to G.O., dated 11th April 1893, No. 496 M., Mis., Local and Municipal, I have the honour to forward two revised estimates, the latter of which shows the cost of carrying out the proposals of the Chief Engineer, Public Works Department. This, it will be observed, raises the estimate from Rs. 1,41,000 to Rs. 2,65,420, and, as far as my judgment goes, would render the scheme impossible to the municipality.

2. I would draw the attention of Government to its request (*vide* G.O., dated 13th November 1890, No. 1682 M., Mis., Local and Municipal) desiring me to draw up schemes with a due regard to the financial circumstances of each municipality, and had I not had this very necessary point in view, I should have proposed more extensive settling tanks than I did and should also have entered the cost of the filter-beds in the estimate. I had had a great deal of correspondence with the Executive Engineer of Kurnool on the matter and it seemed impossible to suggest works which would do away with all inconvenience to the canal. I suggested, therefore, as much as the municipality was likely to be able to afford even taking account of the promised large proportion to be paid by Government.

3. Judging from the Executive Engineer's letter, it would, however, appear that very great advantage will ensue in having even 2 weeks' supply arranged for, and indeed he suggests only 3 or 4 weeks' supply.

4. It may be possible at some future time to increase the area of the storage or settling tanks, and apparently the Chief Engineer considers that filter-beds will be found necessary. Keeping these points in view I think that, even supposing the tanks are made sufficient only at present to store two weeks' supply, it will be advisable to construct the works so that these additions can at any time be made.

5. In such case the excavation must be deposited so as not to interfere with the future extension, and I have therefore made estimates of the extra cost which will be thus entailed. I find at the same time that my original rate even for depositing close to the site of the settling tank is rather low, and I have altered the rate and amount in red figures so that the excavation will cost Rs. 19,994 instead of Rs. 16,431. There has also to be added Rs. 2,403, the difference between the cost of plastering with coment and surki, as recommended by the Chief Engineer, and the total of the estimate will now be, including 15 per cent. for contingencies, Rs. 1,47,900 instead of Rs. 1,41,000.

6. If the original size of tank be adhered to but the earth deposited so as to be out of the way of future extension, the excavation will cost Rs. 24,144 instead of Rs. 19,994 and compensation for land Rs. 650 instead of Rs. 600, and the total of the estimate will be (including contingencies) Rs. 1,53,550 instead of Rs. 1,47,900. This, I think, in view of the Chief Engineer's suggestion, should be the plan to be adopted.

7. If the Chief Engineer's suggestions for the extension of the settling tank are now carried out, the total of the estimate including the enlarged settling tanks—which require, not only the deposit of the earth on land at a greater distance, but the purchase of extra land, the diversion of road, &c.—will be raised to the sum of Rs. 2,65,420. Detailed estimate is submitted.

8. If the works be carried out as per original design but with figures altered as in paragraph 5, the annual cost will be (supposing Government to contribute 75 per cent. as promised)—

	RS.
Interest and sinking fund on Rs. 36,975 at 5·96 per cent.	2,204
Pumping charges	2,500
Maintenance of pipes	1,000
	5,704
Deduct saving in municipality's present payment for water as in paragraph 21 of Sanitary Engineer's letter, No. 2774, dated 6th December 1892	2,530
Extra charge ..	3,174

9. If as proposed in paragraph 6, as follows:—

	RS.
Interest and sinking fund on Rs. 38,388 at 5·96 per cent.	2,288
Pumping charges	2,500
Maintenance of pipes	1,000
	5,788
Deduct saving in municipality's present payment for water as in paragraph 21 of Sanitary Engineer's letter, No. 2774, dated 6th December 1892	2,530
Extra cost ..	3,258

and if as proposed by the Chief Engineer (cost as given in paragraph 7), as follows:—

	RS.
Interest and sinking fund on Rs. 66,355 at 5·96 per cent.	3,954
Pumping charges	2,500
Maintenance of pipes	1,000
	7,454
Deduct saving in municipality's present payment as in paragraph 21 of Sanitary Engineer's letter, No. 2774, dated 6th December 1892	2,530
Annual extra cost ..	4,924

No. 368.

Referred to the Public Works Department for remarks.

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

FORT ST. GEORGE,
14th June 1893.

Note by the Acting Chief Engineer, dated 12th July 1893.

The revised estimate, amounting to Rs. 2,65,420, submitted by the Sanitary Engineer, provides for increasing the storage capacity of the reservoirs from that originally proposed, viz., about 13,35,000 c. ft. to 52,23,000 c. ft. or 3,26,40,000 gallons. Allowing that 2 feet in depth of the water in the reservoir is absorbed by evaporation and silt deposit, the quantity remaining will, at 4,50,000 gallons per day, still be sufficient for 8 weeks' consumption at least. The dimensions proposed for the reservoirs seem, therefore, to be unnecessarily large.

No provision is made for filtration of the water.

In paragraph 7 of his letter, No. 2774, dated 6th December 1892, to the Chief Secretary to Government, Mr. Jones clearly showed that such filtration was necessary

and it was for that reason that the Chief Engineer in paragraph 2 of his No. 1338, dated 21st March 1893, drew attention to the necessity for providing for this important work. This is, however, more a question for the Sanitary Board to decide.

The Sanitary Engineer also submits an alternative estimate amounting to Rs. 1,53,550. In this estimate the capacity of the reservoirs as originally designed is adhered to, namely, to retain sufficient water for a fortnight's consumption. Provision is, however, made for acquiring sufficient land and for so disposing of the soil that, if hereafter found necessary, the required extension of the reservoirs can be made. As, apparently, the cost of carrying out the larger work is beyond the means of the municipality, the Chief Engineer recommends the estimate for Rs. 1,53,550 for sanction, leaving the question of providing filtering arrangements to be decided by the Sanitary Engineer.

(Signed) J. HANNAN,
Ag. Chief Engineer, P.W.D.

No. 564-D.

Transferred to the Local and Municipal Department, with reference to endorsement in that department, No. 368, dated 14th June 1893.

OOTACAMUND,
15th July 1893.

(Signed) J. HANNAN,
Ag. Joint Secy. to Govt., P.W.D.

No. 502.

Referred to the Sanitary Engineer for further remarks.

(By order.)

FORT ST. GEORGE,
2nd August 1893.

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

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, 4th August 1893, No. 1596.

With reference to endorsement, No. 502, dated 2nd August 1893, I have the honour to state that I still think that eventually filtration will be necessary at Kurnool, but that it is doubtful whether the town can afford it at present, and, as they use the water now without any settling at all, the new supply without filtration will be superior to that at present in use and will be delivered with pressure.

2. The addition of filter-beds and a service reservoir, which will also be necessary, will not necessitate any alteration to works now proposed except that small additional pumping machinery will be required to raise the water from the settling tank to the filter-beds—they cannot in this case be constructed, as usual, with the level of the top of sand at level of bottom of settling tank; the bottom of this tank is already ten feet below ground. The cost of filters having an area of 1,110 square yards (4 filters, 1 out of use) would be Rs. 26,640, and of a service reservoir to contain two-thirds of a day's supply (50,000 c. ft.), would be Rs. 25,000, or in all, say, Rs. 52,000. The pumping charges would (because of double pumping) be increased in the proportion of 26 feet to 39 feet or by 50 per cent., that is, from Rs. 2,500 to Rs. 3,750 per annum.

3. As the Chief Engineer now suggests that the smaller scheme, viz., that costing Rs. 1,53,550, be carried out, the total cost with the above works included would be Rs. 2,05,550.

2427/5

4. A comparison of the cost of the two schemes will be as follows:—

Scheme without filters or service reservoir—

	Rs.
Interest and sinking fund on 25 per cent. of 1,53,550 at 5·96 per cent.	2,288
Pumping charges	2,500
Maintenance of pipes	1,000
	5,788
Deduct savings on present municipal payments	2,530
	3,258

Scheme including filters and service reservoir—

	Rs.
Interest and sinking fund on 25 per cent. of 2,05,550 at 5·96 per cent.	3,062
Pumping charges	3,750
Maintenance of pipes	1,000
	7,812
Deduct savings on present municipal payments	2,530
	5,282

5. These statements are based on the payment of 75 per cent. in each case by Government. It is a question on the one hand for Government to say whether it will increase its grant to 75 per cent. of Rs. 2,05,550, and on the other whether the municipality can afford to pay Rs. 5,282; the latter figure, it will be observed, is larger than the figure given in paragraph 8 of my No. 1146, of 6th June 1893, as the cost with the enlarged settling tanks which I considered too expensive a scheme for the municipality to undertake.

ORDER—dated 24th August 1893, No. 1114 M., Local and Municipal.

The papers will be referred to the Municipal Council, Kurnool, for early report as to which of the schemes they are prepared to undertake, and how they would propose to meet the annual charges in the event of Government contributing three-fourths of the cost and advancing the remainder at 4¼ per cent. interest repayable in 30 years.

(True Extract.)

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

To the Chairman, Municipal Council, Kurnool,
through the Collector.
" Sanitary Engineer (with plans and estimates).
" Public Works Department.

Exd. A. Blatt.

P. W. C[illegible]ENT No. 7815

Govt. of {1893} Madras.

LOCAL AND MUNICIPAL.

Issued 8 S.C

Recd. 12.9.93 Encl.

G.O., 24th August 1893, No. 1114 M.

AUGUST.

Water-supply Scheme.

Referring to the Municipal Council, Kurnool, papers regarding the — of the town, and requesting them to report at an early date as to which of the schemes they are prepared to undertake, and how they would propose to meet the annual charges in the event of Government contributing three-fourths of the cost and advancing the remainder at 4½ per cent. interest repayable in 30 years.

No 2427 Wap 21 September 1893

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