

- (1) பக்கங்களின் எண்ணிக்கை 10
 (2) புதுக்கித் திருப்பிய நாள் புதும் 1981
 (3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம் [Signature]

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

[Signature] துறை

அரசாணை எண். 2570.14. அச்சகம்
 மு. கோப்புத் தாள் எண். பலவகை

நாள் : 11. 10. 1893 198

[Signature]
மடிக்கவோ கண்டபடி கையாளவோ கூடாது

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, Madras, to the Chief Secretary to Government, dated Fort St. George, 23rd June 1893, No. 1333.

[Trichinopoly Water-works.]

I have the honour to forward to Government revised plans and estimates for the head works or rather such portion of them as relate to the collection of water.

2. My reason for proposing this revision is the experience of the difficulties and expense which has been and will have to be encountered if the original design is adhered to. No doubt the past season has been exceptional and the quantity of water in the Cauvery much more than in ordinary seasons, but all our endeavours to lay the connecting pipe between the pump well and the screening chamber by ordinary methods of piling and sinking temporary wells to clear the excavations have been futile, chiefly because the pumps get continually blocked by the inflow of sand, and if the wells are made any more watertight they would be of no use to pump from, because we could not then lower the water. That pipe is at a level higher than the proposed filtration gallery, and while this pipe is in the banks of the river, the gallery is in the bed. The amount of water to be dealt with is very considerable in both cases. I am now beginning to lay the pipes (so as to carry me clear of the engine-house and allow its construction to be proceeded with) in caissons as shown on plan No. 1. I find that this plan had to be ultimately adopted for laying pipes at Lahore where the pipes were intended to be laid 22 feet below the river-bed, but even with caissons only 20 feet was eventually obtained. Our pipe near pumping station is proposed to be 26 feet below ground and 17 feet below ordinary water level. The proposed filtration gallery excavation would have to be carried to a depth 17 feet below river-bed. From our experience during the last season I feel sure that the works as originally designed could neither be carried out within a reasonable time nor without very much greater expense than anticipated even if we managed to overcome the difficulties we have with sand choking the pumps. Again a very large quantity of pumping machinery would have to be purchased, probably Rs. 30,000 worth, as I have not been able to borrow more than one engine and pump for Trichinopoly.

3. The river is now in flood, and if existing plans are to be proceeded with, it will not be until the latter part of the year or the beginning of next that work could be begun again. While under the proposed plans moderate floods would not delay us much.

4. I have therefore to lay before Government new proposals for the collecting works in the river and these will be seen in plans Nos. 1 to 2.

5. Plan No. 1 shows the engine-house site—the screening chamber well, the line of pipe between it and the pump well, and the filtration gallery; the designs of these works are shown on sheets marked A and B. As originally designed, the lower portion of the screening chamber at the point X has been sunk; some of the excavation between pump well and chamber and for a portion of the gallery has been taken out, but no portion of the pipe could be laid and the floods have no doubt filled in the excavation.

6. The great difficulty is the laying of the pipe and founding the filtration gallery so far below water level and I propose to avoid this.

7. The following are my revised proposals for the works.

8. The screening chamber to be moved as near the pump well as possible (about 33 feet as shown on drawings between well and well). The pipe between chamber and pump well to be laid in caissons at the level of 325.75. The original level was 325.75 at chamber (and this level because of the machinery cannot be altered) and at pump well 323.75. It will now enter the pump well practically 2 feet higher and so even for this short length 2 feet in depth of excavation will be saved; this will be the only piece of low level pipe except the pipe connecting the two chambers which will be sunk with the double well. The use of the second adjoining chamber or well will be afterwards described.

9. To obviate having any deep excavation and to keep the amount and cost of pumping as low as possible, I propose to sink three wells, each 15 feet diameter and 300 feet apart, in the bed of the river (only one of these wells is shown on plan No. 1).

10. The lowest water level in the river is about 337.00; since this project was begun, the lowest level recorded has been 338.00.

11. It is proposed to sink each of these wells far enough to allow of its floor being at a level of 322.0 or 15 feet below the lowest water level.

12. But to lay the pipe from the bottom of one well to the bottom of another would lead us back to the same difficulties and expenditure it is desirable to avoid.

13. It is proposed to lay the pipe $3\frac{1}{2}$ feet below the lowest water level.

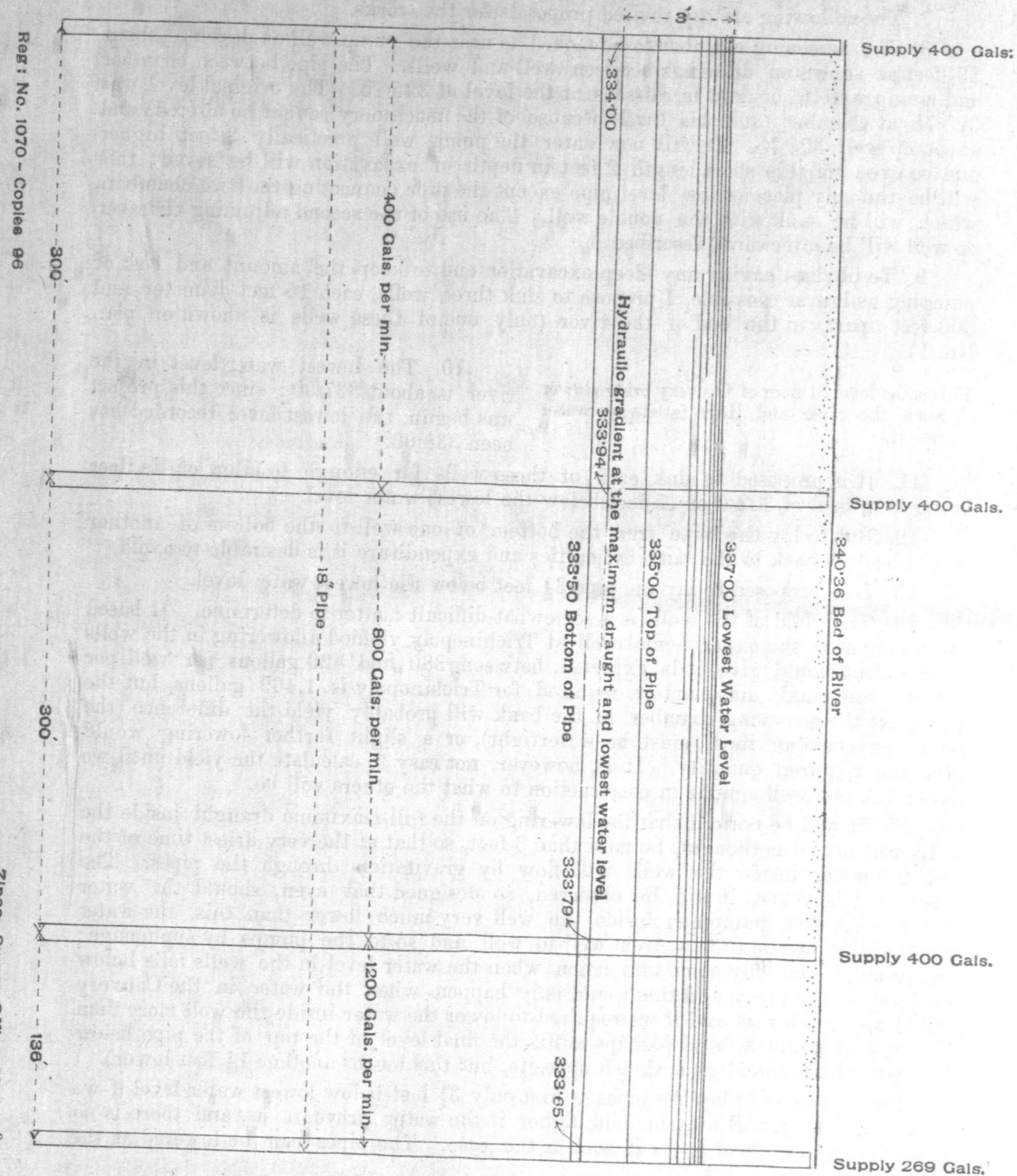
14. The yield of the wells is a somewhat difficult matter to determine. If based on the quantity the experimental well at Trichinopoly yielded a lowering in the wells of three feet would give, it is expected, between 380 and 420 gallons per well per minute; the maximum quantity required for Trichinopoly is 1,469 gallons, but the well next the screening chamber in the bank will probably yield the difference (the screening chamber itself must be watertight), or a slight further lowering would give the required quantity. It is, however, not easy to calculate the yield until we have sunk one well similar in construction to what the others will be.

15. It will be noticed that the lowering on the full maximum draught inside the wells will not, it is thought, be more than 3 feet, so that at the very driest time of the year the water inside the wells will flow by gravitation through the pipes. The pipes are, however, it will be observed, so designed that even, should the water fall (by excessive pumping) inside the well very much lower than this, the water would still continue to flow from well to well and so to the pumps by syphonage; this principle can only come into action when the water level in the wells falls below the level of the pipes and this would only happen when the water in the Cauvery was at its very lowest and if we required to lower the water inside the well more than $3\frac{1}{2}$ feet. It might be well perhaps to fix the final level of the top of the pipe below the hydraulic gradient (vide sketch opposite, but this means another $1\frac{1}{2}$ feet lower).

16. I propose to lay the pipes at first only $3\frac{1}{2}$ feet below lowest water level if we can do so. They will only be laid higher if the water prevents us, and there is no reason for laying them lower if such is the case. The pipes can be lowered as the water falls.

17. At Lahore the expenditure was exceedingly great through laying the pipes at 20 feet below bed-level as the whole piping between the wells had to be laid in caissons, and they might as well have been laid only 3 feet to 4 feet below because the usual draught on the wells there has not lowered the water more than that distance.

18. The pipes which will pass outside the wells will be the 18-inch cast-iron pipes on hand which were to be laid from the pump well to the filtration gallery; these are not included in estimate as they were originally included in the estimate for pipes. These are turned and bored pipes and it is thought that by ordinary sheet piling they



can be laid during the next dry season when the water is at its lowest. At any rate they can at any time be lowered, for they will only require to be so when the water falls so low as to be nearly uncovering them. The drop pipes inside the wells will be light wrought-iron pipes. The supply pipes will be continued to the well next the screening chamber, and as the pipe into this chamber will be at a level of 525.75 (the original level), the water can be drawn down in the wells to nearly this level or almost 7.75 feet lower than it is thought will be necessary when the river water is at its very lowest.

19. Even by these proposals the amount of the estimate will be Rs. 37,140 against a sanctioned amount of Rs. 35,000. There has been an expenditure chiefly on screening chamber (proposed to be abandoned) of Rs. 4,500 so that the total excess will be Rs. 6,640; this I propose to meet from savings in other items. I feel sure, however, that the works according to the existing design could not be carried out for less than Rs. 60,000 or Rs. 70,000, so that economy as well as rapidity of execution will be secured by the acceptance of my proposals which, I trust, will meet with the approval of Government.

No. 417.

Referred to the Public Works Department for remarks.

Fort St. George,
3rd July 1893.

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

To the Public Works Department.

No. 2304-C.

Note by the Acting Chief Engineer, Public Works Department, dated 1st August 1893.

In paragraph 14 of letter, No. 251, dated 8th April 1891, to the Chief Secretary to Government, the Sanitary Engineer reported that, after due consideration, he advocated the substitution of a filtration gallery in lieu of wells in the river-bed as likely to be less expensive, more easy in construction and less liable to destruction by floods than a line of wells connected by pipes. The Sanitary Engineer's expectations have not been realised, and in view of the engineering difficulties he has encountered in endeavouring to carry out the works as designed and the large extra cost that their successful construction would entail, he now submits revised estimates for the head works, substituting for the infiltration gallery a line of wells connected by pipes as the most feasible method of collecting water from the river.

2. The Sanitary Engineer proposes to sink three wells of 15 feet diameter in the bed of the river and also a subsidiary well 14 feet in diameter adjoining the screening well. The yield from the river wells may be as little as 1,140 gallons per minute, in which case the subsidiary well would have to yield 329 gallons per minute in order to complete the maximum requirements of the town, viz., 1,469 gallons per minute. As pointed out by the Sanitary Engineer it will be possible to obtain an increased supply by lowering the water in the wells by more than 3 feet, but it must be borne in mind that probably the rate of infiltration into the wells will decrease in time, as vegetable and animal growth may clog the openings. The water-collecting power of the wells appears to be about the minimum for the requirements of the town, and may hereafter have to be supplemented by the addition of other wells.

3. In sheet No. 1 the position of only one well in the river-bed is shown; the location of the remaining two wells is not shown, but apparently it is contemplated to carry the pipes at about right angles with the river bank, and the farthest well will be more than 200 yards from the bank and towards the middle of the river. The connecting pipes are to be laid with their upper sides 2 feet below lowest water level and some 5 feet below the bed of the river. Irrespective of the great desirability that the pipes should be wholly below the hydraulic gradient as drawn for the

assumed lowest water level, their position as shown renders them liable to damage from floods. It is possible to estimate to what distance below the ordinary bed of the river the scouring action of high floods will reach, but the pipes will not, it is considered, be out of danger if laid only 5 feet below the bed of the river. They should be laid as deep as possible, and there can be no great engineering difficulties in so laying them that their upper sides should be at level 333.5. This will also probably obviate the drawing of any water from the wells by the action of syphonage. It may be remarked that, as at present designed, when once the pipes run full bore, the syphons will come into action as soon as the level of the water falls to 335, and not as implied in paragraph 15 of the Sanitary Engineer's letter when it falls below 334.

4. There will probably be considerable scour round the wells during high floods. The best position for the wells and line of pipes would therefore appear to be somewhat parallel to the axis of river. The pipes would not then be subject to any transverse strain, and the wells would also be more secure from scour than if sunk towards the midstream.

5. The principle of obtaining the water supply from wells instead of from one gallery may be adopted, but the connecting pipes should be laid as deep as possible and the position of the wells in the river-bed should receive consideration.

MADRAS,
5th August 1893.

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

Transferred to the Local and Municipal Department with reference to endorsement of that department, No. 417, dated 3rd July 1893.

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

To the Local and Municipal Department,
with papers in original returned.

No. 545.

Referred to the Sanitary Engineer for remarks.

(By Order.)

FORT ST. GEORGE,
16th August 1893.

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

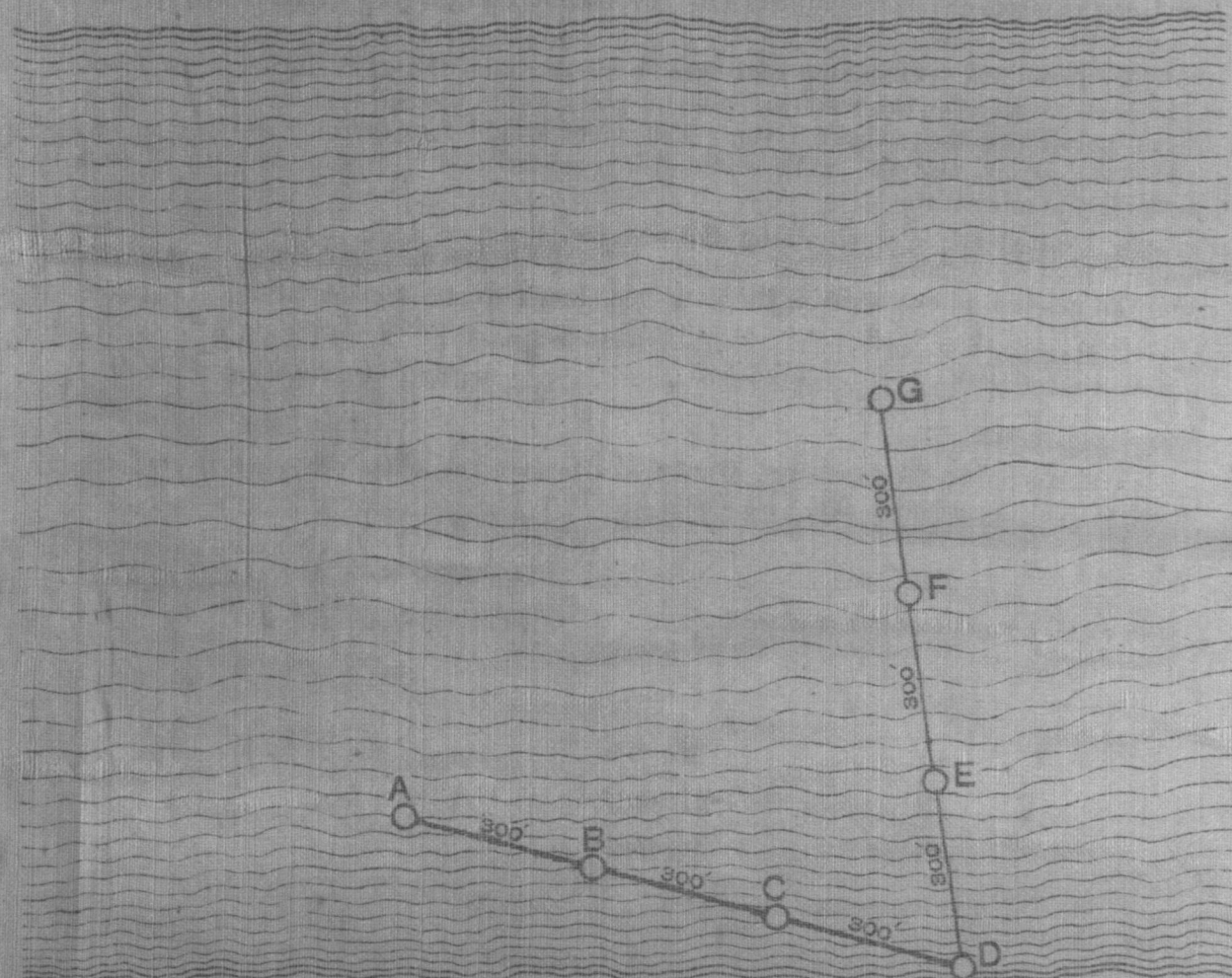
To the Sanitary Engineer.

From J. A. JONES, Esq., MEM. INST. C.E., F.R.S.E., Sanitary Engineer to Government, Madras, to the Chief Secretary to Government, dated Fort St. George, 23rd August 1893, No. 1741.

In regard to reference No. 545 of 16th August 1893, I have the honour to state that, during the execution of the works, every endeavour will be made to lay the pipes at the level suggested by the Chief Engineer in his note. I beg to point out, however, that, in my No. 1333 of 23rd June 1893, I stated that it was even doubtful whether we would be able to lay the pipes at the level of $3\frac{1}{2}$ feet below lowest water level because it all depends on what level the water is during the coming dry weather; the pipes can be lowered whenever the level is such that syphonage would take place. It will require, I believe, a large amount of pumping machinery to secure even the level I originally proposed.

2. As to the position of the wells, I beg to point out that, if the wells are situated parallel or in a position approaching a line parallel to the axis of the river, the amount of water each well would yield would be much diminished because the action

of wells is limited to a certain distance on either side of them; thus, if the wells were placed as per following sketch and if the distance between the wells were in each case 300 feet, the four wells A, B, C, D would probably not yield as much as D and E alone if these were placed as shown somewhat at right angles to the course of the river. If the wells A, B and C were placed further apart so that A was in line with G, the cost of the connecting pipe would be enormously increased.



3. It is admitted that there may be strains on the pipes; but, laid as these will be in 7 feet of sand, there is not much to be feared in that respect. The wells must of course be deep enough to withstand scour, and it is believed that their present depth affords every security.

4. The laying of the pipe to a greater depth of $1\frac{1}{2}$ feet will increase the cost to some extent; but, as all the elements of the estimate are so liable to variation owing to their dependence on the level of the water in the Cauvery at the time of the execution of the work, I do not propose to send any further revised estimate than that now attached.

5. I have marked this letter urgent as two months have passed since I submitted proposals and because I must make preparation and be in a position to begin work when the river falls. Early sanction is therefore requested.

No. 581.

Referred to the Public Works Department for further remarks.

FORT ST. GEORGE,
25th August 1893.

(Signed)

A. T. PRINGLE,
Assistant Secretary.

To the Public Works Department.

No. 2995-C.

Returned to the Local and Municipal Department with the remark that, in the opinion of the Acting Chief Engineer, the arrangements proposed by the Sanitary Engineer will probably answer and may be approved.

(Signed)

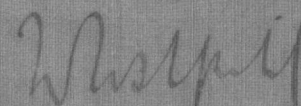
J. HANNAN,
Ag. Joint Secy. to Govt., P.W.D.

1st September 1893.

ORDER—dated 11th September 1893, No. 1213 M., Local and Municipal.

The proposals of the Sanitary Engineer are approved.

(True Extract.)



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

To the Sanitary Engineer (with plans and estimates).

- " Chairman, Municipal Council, Trichinopoly.
- " Collector of Trichinopoly (abstract).
- " Public Works Department. ✓

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

G.O., 11th Sept. 1893, No. 1213 M.

SEPTEMBER.

Water-supply.

Approving the proposals of the Sanitary Engineer in connection with the Trichinopoly — scheme.

no 140928 19-6.91
- 30188 8/17.12.91
- 6248 8/9-3.92
- 16534 8/31.5.92
- 1868w 8/27.6.92
- 3432w 8/15.12.92
- 66w 8/14.1.93
- 28040 8/5.8.93
- 29950 8/1-7.93

№ 2540 Waf 11 - October 1893.

Recorded.
Recorded

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 8.1043

DESPATCHED
12 OCT. 93

SE. 11 Cuts. 17/10
S.S. VI Cuts
For information
from Council

88. 329 27/10 J² 12/10.