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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Revenue DEPARTMENT

G.O. No.
B.P. No.

1723

Press
Mis.

Dated

21 - 7 - 1876 197

not to be folded or roughly handled

No. 482. Read the following Proceedings of the Madras Government in the Revenue Department, dated 23rd May 1876, No. 671:—

Read the following Proceedings of the Board of Revenue, dated 15th May 1876, No. 1,262.

Read the following letter from J. J. L. RATTON, Esq., M.D., on Special Salt Duty, to E. GIBSON, Esq., Acting Sub-Secretary to the Board of Revenue, dated Porto Novo, 13th April 1876, No. 105.

I HAVE the honor to inform you that I received lately a copy of Board's Proceedings dated 22nd February 1876.

2. The 4 Rupees a-garce estimate of the cost of salt manufacture therein alluded to is taken from paragraph 43 of my last report on the best method of working salt-pans. It includes the annual charge for repairing and working the salt-pans, excepting the charge for working steam-pumps omitted by mistake. It does not include the interest on capital, charge for establishment or guards, as Government has always borne these charges in addition to paying contractors from Rupees 9 to Rupees 17-8-0 a-garce to make the salt. This payment I have looked upon as the price of its manufacture as distinguished from its net cost. Inclusive of steam charges, I think it would cost Rupees 5 a-garce to make the salt.

3. As this estimate is based on the supposition that the salt-scraping season will last for four months only, and that the yield of salt will be at the rate of three garce only per acre of salt works per month, it may be found, in practice, to err on the side of excess.

4. At the above rate, however, the Harigoshti pans, which are estimated to cost about a lakh of Rupees, would yield 3,000 garce annually; this at 5 per cent. interest on capital would give Rupees 1-10-8 a-garce as the capital charge on the salt in addition to the 5 Rupees a-garce cost of manufacture. This strikes me as being a heavy first charge. The estimate includes Rupees 25,000 for buying the land, Rupees 5,000 for building bridges from the Railway Station, and Rs. 25,000 for steam machinery. Of these, the first two charges are, I think, exceptional in the sense that they will not require to be incurred at most other sites, last charge is very high.

5. I understand that two engines with pumps, &c., each capable of doing the whole work required, are estimated for. I am not an expert in this matter, but I cannot recall to mind having seen anywhere the whole steam machinery required in

a manufactory provided in duplicate. I know that it is considered a very costly thing to have steam machinery lying idle, and, as machinery at Harigoshti replaces labor and directly affects the cost of salt manufacture for which I am held responsible, I would suggest having engines of less power. Considering that our estimate of the amount of brine required, 14,955 gallons per cawny per diem, is a very outside one based on the half-inch a-day rate of evaporation, which exists perhaps for one month of the salt season in South Arcot, I think that two engines, each capable of delivering half that quantity per diem, would amply suffice for our wants. If one were disabled, the other would keep the pans going well enough whilst repairs were being effected.

6. M. deClosets, C.E., of the Napier Iron Foundry, and Mr. Cammiade have been lately making experiments with wind-mill pumps at Madras, and the former now informs me that he can supply wind-pumps capable of raising 700 gallons of brine a minute for Rupees 1,200 laid down at Porto Novo. I have written to the Collector of South Arcot, Mr. Garstin, asking him to sanction my ordering one of these pumps for the 16-cawny plot of salt-pans at Porto Novo, where we are now employing twenty-four coolies at Rupees 6 a-month each to do the work of one such wind-pump, and are suffering great inconvenience from these coolies sometimes absenting themselves. I look upon this as a very important experiment—if experiment it can be called—for, at the most, fifteen such pumps would do the irrigation work of the proposed Harigoshti salt-pans, for which 25,000 Rupees' worth of steam machinery is set apart in the estimate, besides saving fuel and the wear and tear of complex and expensive steam-gear. I would be very glad to have permission to order and test one of these wind-pumps at once, so as to be able to report upon it at the end of the season.

7. Since writing the above, I have received Proceedings of the Madras Government, Revenue Department, dated 5th April 1876, Nos. 46 and 47, in which I am called upon to furnish information as to the difference in density of the water at A (District Engineer's plan) from that of sea water. I tested the water at A about a dozen times at different tides in January and February and found it to vary in density between 2° and 3° Beaumé. I have tested it again two or three times lately at high tide and found it to be 3° Beaumé. But, whilst I was suffering from dysentery, Mr. Garstin had the water tested by the Salt Superintendent ten times a-day from the 15th February to the 14th March for the purpose of comparing it with that at B in the District Engineer's plan. The Collector sent the series of observations to me for information in reference to the question I raised as to the best pumping station for supplying the Harigoshti salt-pans. These observations exhibit the water at A as having been much below the density of sea water during the greater part of the period covered. Even at high tide on two days only was the water 3° Beaumé, or of the same density as sea water. As the matter is very important, I subjoin a statement showing the highest reading and the lowest reading each day and the mean of the ten observations taken daily, but I must add that, these observations having been entirely in the hands of natives, I am not disposed to place absolute confidence in their accuracy:—

or 25½ yards; and, as the whole length of the channel all round the 16-cawny plot is about a mile, the channel will take up about 8 of the 16 cawnies. The remaining 8 in the midst of such a brine-supply might then be worked on the most approved principles with permanent crystallizing beds really impervious to percolation, which I consider a essential to the production of a really pure salt.

6. I have communicated a copy of paragraph of the District Engineer's letter to the Chief Engineer of the South Indian Railway and to the Divisional Engineer at Porto Novo with a request that a sufficient opening, as suggested by Major Mead, be left in the line.

7. I had experiments set on foot for the systematic testing of the brine at Manambadi for a distance of about a mile up the river above A on the plan. The water was tested hourly every day from 8 A.M. to 5 P.M. at seven spots including Beaumé between half flow and half ebb tide, and I have sent the registers to Dr. Ratton for his scrutiny. The density of the water at A was nearly always 2° Beaumé's hydrometers, however, are by no means delicate instruments, and it is rare to find three persons read them exactly alike, so that I consider the only general result to be deduced from these observations is that in an exceptionally dry season there is always between half flow and half ebb a fairly strong brine available at A, but not always so strong at B. On only occasion only I think, during the flood tides at full moon, the water was registered as 3° Beaumé opposite the Manambadi pans.

ENCLOSURE

From Major H. R. MEAD, R.E., District Engineer, South Arcot, to J. H. GARSTIN, Esq., Collector of South Arcot, dated Lalpett, 2nd March 1876, No. 328.

WITH reference to G.O., No. 569, dated 3rd March 1876, and your letter, No. 55, dated 10th March, forwarding Proceedings of the Board of Revenue, I have the honor to forward a supplemental memorandum on the proposed salt-works at Harigoshti.

2. I regret to have to bring to notice that Dr. Ratton in his letter, No. 16, of 28th January, forgets that the plan proposed in the former memorandum was based on his own proposition, and as he has done on the Harigoshti scheme, he I must say I consider, before reporting as favorable should have satisfied himself that at the place where it was proposed to take the water good salt water was always available.

3. I would further remark that there is no reason to delay handing over the land north of the Vellaur to the Railway if they should be requested to arrange for an opening, say fifteen feet span, to cross a channel carrying water, the surface of which will be slightly above the ground level and the bed about four feet below it. The water in the channel will have but a slight fall and velocity.

(True Copy)

(Signed) J. H. GARSTIN,
Collector.

ENCLOSURE No. 2.—Supplemental Memorandum drawn up by District Engineer.

THE Government Order read above will be communicated to the Collector of South Arcot, who will observe that Government are disposed to sanction the lesser of the two schemes (BK) referred to in his letter embodied in the Board's Proceedings of 22nd February 1876, No 520.

2. Referring to paragraph 7 of the Collector's letter of the 28th March, the Board observe that the information regarding the relative density of the brine at the several points where it has

been gauged is not sufficiently full to enable the Board to furnish the statement called for by Government. Before proceeding further, the Board will await Dr. Ratton's report.

(True Copy and Extract.)

(Signed) E. GIBSON,
Acting Sub-Secretary.

Separate Revenue, No. 8.

Salt.

RECORDED.

2. The Government await the report from Dr. Ratton.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

Read the following Proceedings of Madras Government in the Revenue Department, dated 5th April 1876, No. 481:—

Read the following Proceedings of the Board of Revenue, dated 22nd February 1876, No. 520.

Read again Board's Proceedings dated 22nd December 1875, No. 3,417.

Read also the following letters:—

From J. H. GARSTIN, Esq., Collector of Salt, Arcot, to H. E. STOKES, Esq., Acting Secretary to the Board of Revenue, dated Cuddalore, 22nd January 1876, No. 30.

I HAVE at length the honor to submit to you the survey plan and estimates for laying out in salt-pans the land proposed to be taken up at Harigoshti, in the vicinity of Porto Novo, for that purpose. These papers would have been submitted some months ago had it not been that in consequence of the Board's recommendation, Government to send Dr. Ratton to Harigoshti to carry out, on a large scale, experiments as to the feasibility of introducing the French system of salt manufacture into the Presidency, and in the sequence of the visit of that officer to Cuddalore in September last when he explained to me the results of the experiments as proposed to the District Engineer what he proposed to do at Harigoshti, it was determined to anticipate the decision of Government and to estimate for the Dr. Ratton.

2. The original scheme comprised three lots of land AH, BK, and DG; the two former situated within the limits of the village of Harigoshti, and the latter within those of the village of Ambadi, and the latter within those of the village of Harigoshti. It was proposed to cut a channel from A to D, and to carry it all round DG and across the two blocks into which it is divided by the Porto Novo-Virdachellam road, and to make large central platforms for storing the salt which was to be made according to the system called after Dr. Ratton.

3. It is now proposed to take advantage of Dr. Ratton's presence at Porto Novo to lay out all these blocks on the French system.

4. The Board are aware that the plot of land AH, which is reported by Mr. Freer to be about 16

* About 22 acres.

cawnies in area, has been already nearly entirely enclosed by an embankment and a channel, that on two cawnies of it salt was made during 1875, and that the conversion of the remainder into pans is now in progress. Dr. Ratton, when here a few days ago en route to Porto Novo, was kind enough to say he would show Mr. Freer how to lay out these pans on the French system, so that we have now only to consider the two remaining plots comprised in the scheme, viz., BK having an area according to the District Engineer's calculation of about eighty acres and DG one of 240 according to the estimate of the same officer, but of 271 acres according to the Revenue Survey accounts.

5. Dr. Ratton's proposals for converting DG into a salt-pan on the French system entail the lifting the brine-supply to the highest point of the area to be converted, whence it is to be allowed to flow by gravitation over the said area, which is to be divided by small "Varappus," or embankments into three terraces, and from the lower of these the highly-condensed brine will flow into the crystallizing beds. As there is, as I understand, to be no attempt at symmetrical arrangement of these terraces, they will probably be extremely irregular in shape, but, as the general slope of the ground at Harigoshti is from west to east, it follows, as a matter of course, that the crystallizing beds will be in a long row from north to south, and, as a necessity on this arrangement, that the platforms must adjoin the crystallizing beds on the east, because, as the railway station will be close to the salt pans on the east, the platforms must be between the railway and the crystallizing beds. This arrangement, I have reason to believe, in accordance with Dr. Ratton's views. That officer will no doubt submit his propositions in full detail if called on, but it seems to me that the position of the g platform, perhaps the whole length of such as to leave no alternative but throwing up a long line of the storing of a single line of salt the crystallizing beds, and of a width sufficient to admit of the storing of a single line of salt heaps, each containing, say, 100 garce, with a line of salt will thus have to be carried a very short distance to be readily accessible for loading railway trucks at which will serve as the embankment to the pans. explained by the District Engineer in his memorandum at C, the western extremity of the channel enclosing line of railway and carry water to E, F, and G, where The Railway Company will have to bridge the channel at R.

6. The works at BK will be as follows:—A channel dug down to about 2½ feet below low-tide level will be carried completely round it as shown by the red dotted line on the plan. From B to C the bottom width will be 9 feet, on the other side only 8 feet, and, as the slopes will be 2 to 1, there will be at full channel level a depth of 27 feet from B to C, and of 26 feet on all the other sides. This water is to be admitted through a head sluice capable of admitting in four hours all the water required to be pumped during a single day to the Harigoshti plot. With the earth from the channel, a large embankment is to be thrown up all round it and enclosing it. The slope of this piece of ground being from south to north, the crystallizing beds will be in a row all along the north channel, and I propose to have ten or twelve boats built to work in the channel and to carry the salt from the crystallizing beds to the platform which I propose to place at S where there is some waste land available close to the high road and to the canal; and, as large cargo boats can ascend the latter as far as the proposed site for the platform, it will be easy to export salt by sea from this platform if required.

7. The cost of carrying out all these works will be large. For BK the District Engineer estimates as follows:—

	RS.
Head sluice	4,000
Earthwork	5,500
Laying out in pans, including crystallizing beds and platform at	8,000
100 Rupees an acre	17,500
To which must be added compensation for land	1,000
Cost of twelve boats	1,800
	20,300

8. The cost of the works at Harig	he estimates as follows:—	RS.
Earthwork ...	...	5,000
Laying out, including platform	d crystallizing beds (but exclusive	
of embankment, railway,) a	0 Rupees an acre ...	24,000
Steam engines, &c. ...	...	25,000
Aqueduct over drainage chann	D... ..	3,000
Two culverts in road ...	...	1,600
Five surplus sluices for draini	It-pans	1,500
Two bridges from railway stati	to embankment	5,000
		65,100
To which has to be added the c	of buying the land, which at, say,	
100 Rupees an acre for 250 a	held on putta out of the 271 to	25,000
be taken up	...	90,100

9. The cost of Police lines and a S have to be incurred at once in connection with the Manambadi pans now being worked, but a separate set of Police lines will probably be required for Harigoshti; and if the pans have, when completed, to be divided into two separate charges under two Superintendents, there will have to be another office built, so that the total cost of the works, &c., at Harigoshti will be about 97,500 Rupees, or, in round numbers, a lakh of Rupees.

10. Estimating the outturn at 20 garces manufactured annually at Harigoshti alone, per acre of salt-pans, there should be 5,000 garces which, at 4 Rupees* a-garce, will cost Rupees 20,000. Adding to this the interest on a lakh of Rupees at 5 per cent., or Rupees 5,000, the total cost would be 25,000 Rupees, leaving 235 Rupees a-garce on 5,000 garces, or 47 Rupees a-garce, making at those pans alone.

11. From BK the outturn will be probably 1,600 garces worth 3,84,000 Rupees, and the cost thereof, at 4 Rupees a-garce, 6,40,000 Rupees, plus the interest, at 5 per cent., on 20,000 Rupees = 1,000, or 7,40,000 Rupees in all, making over three lakhs as profit annually.

12. I request that the Board will oblige by sanctioning the estimate for the works at the plot proposed at Harigoshti, for whether Dr. Ratton's proposals for the latter place are accepted or not does not affect the general plan of the Harigoshti proposals are rejected for the present, but I trust that the proposals put forward will meet with the Board's hearty support in their entirety, as I consider they promise to result in a great success.

13. Dr. Ratton is now at Porto Novo, unable to do anything, except advise Mr. Freer how to lay out the little plot at AH, till his estimates now submitted are sanctioned; and, as there will be probable savings in the current year's budget amounting to about 10,000 Rupees, there are ample funds for commencing works both at Harigoshti (GD) and at west Manambadi (BK).

ENCLOSURE No. 1.—Plan.

ENCLOSURE No. 2.—Estimate.

ENCLOSURE No. 3.—District Engineer's Memorandum on proposed works.

From J. H. GARSTIN, Esq., Collector of South Arcot, to C. A. GALTON, Esq., Acting Secretary to the Board of Revenue, dated Porto Novo, 3rd February 1876, No. 55.

In continuation of my letter of the 2nd ultimo, No. 30, forwarding a plan and estimate for the proposed salt works at Harigoshti, I have the honor to send a copy of a letter from Dr. Ratton, who thinks that it is advisable to transfer the head sluice and source of brine-supply

for the large plot BK and the Harigoshti works.

* Vide Survey Plan.

a mile, there is a great difference in the strength of quantity of fresh water discharged into the river Khan Sahib's Voikal. If such a change was made, high level channel from C on the plan to the south pumping station would then be. The coast canal c

2. The District Engineer, to whom I wrote d objections, on the score of expense, to the modification cannot really be so much difference between the wa but, as Dr. Ratton has tested the water several ti considerable difference in the saltness of the water points.

3. I am inclined to agree with Dr. Ratton as of the head sluice, and, though the carrying of the some additional expense, it will be compensated for BK, which will not need to be nearly of the size from the high level channel by means of sluices, a direct from the sea for three hours out of every tid

4. The District Engineer himself thinks th the supply should be taken much lower down, that

5. The cost of cutting a channel from A to only other extra work entailed by the shifting of th of the high level channel and the bridging of the c ment of the channel existing all round AH. This

6. Dr. Ratton has just sent me the result of east and west ends of the plot AH. At the east Under these circumstances I do not hesitate to R Ratton, subject of course, to the official criticism o

7. Under any circumstances it is very impo plan of the Harigoshti works should be settled as soon as possible, as the Railway Company's Engineer will want to know how the channel will affect the level of the line and the northern abutment of the Vellaur bridge; how he will be a ble to work across it; and how he will need to bridge it. I have purposely delayed giving him of Government deciding how they will take the cl over this strip of land on the river bank to admit fine dry season for work the better. The question of whether the pumping station shall be at C, or in the south-west corner of AH, does not affect the question of the works west of C at all, and it is very probable that the District Engineer w ill, on testing the water, see the necessity of securing the brine-supply from where Dr. Ratton and I propose.

from B to A.* The water at A is nearly as of the density of sea water, but, though distance between A and B is less than half the water at the two places, owing to the from the coast canal and at times from the would necessitate the prolongation of the western corner of the plot AH, where the ld be crossed by a wooden aqueduct.

Officially on the subject, thinks there are n proposed by Dr. Ratton, and that there re at two points only about 660 yards apart; es at the two spots and has always found a fancy there cannot be much doubt on the ve

to the advisability of changing the position gh level channel from C to B may entail y the saving in the size of the channel round at present proposed, as BK will be supplied l the supply for Harigoshti will be drawn

if there is so much difference in the water, in the vicinity of the Custom-house.

the Custom-house would be trifling, and the pumping station, besides the prolongation al with an aqueduct, would be the enlarge- would not be expensive.

his testing the river water at high tide at the end it is 3° Beaumé, but at the west end 2°. I recommend the modification proposed by Dr. of the District Engineer.

important, in the interests of the railway, that the soon as possible, as the Railway Company's affect the level of the line and the northern able to work across it; and how he will need to over this strip of land on the river bank to admit channel, and the sooner work is begun in such a of whether the pumping station shall be at C, the question of the works west of C at all, and ill, on testing the water, see the necessity of and I propose.

ENCLOSURE No. 1.

From J. J. L. RATTON, Esq., M.D., Special Salt Duty, to J. H. GARSTIN, Esq., Collector of South Arcot, dated Porto Novo, 28th January 1876, No. 16.

With reference to the brine supply of the projected Harigoshti salt works sanctioned by Government, I have the honor to inform you th at I have good reason to fear that, in the plan proposed by the District Engineer, brine for salt n manufacture is taken from the river at a point where strong sea brine is but seldom to be obtaine d.

2. I think, to make certain of the supply of brine should be obtained from as near the source as possible, especially as the river we have to deal with is known to be in great fresh, or nearly so, almost throughout the year.

3. I would suggest the transferring of the supply sluice gate and pumping machinery to the east end of what is known as the 16-cawny plot. At this spot, as far as can be judged at present, sea brine is procurable at, and for every working day for a period of two hours more. Here, then, during this period the pumps will be able to abstract brine direct from the sea itself, and afterwards, the sluice gates being closed, they will still have the brine in the plot. I believe that in this way brine enough to supply the Harigoshthi works, the 50-cawny work, and the 16-cawny work, will be procurable. At all events the canal is enlarged, and it will bear widening considerably.

4. The only additional expenses involved in this proposal are the enlarging of the before-mentioned canal, if that be thought necessary, and an iron aqueduct to bridge over the stream which intersects the line of brine-supply. As a set-off against this expenditure considerable retrenchments can be made in the canal works for the reservoir for the Harigoshthi pans. I need not mention manufacture to secure a continuous service of long brine.

(True Copy.)

(Signed) J. H. GARSTIN,

Collector.

With his letter of the 22nd January the

Board's Proceedings, dated 10th April 1874, No. 808.

Harigoshthi, and estimates of the cost of acquiring the directions on scientific principles.

2. The scheme comprises three distinct parts. The first of these, which measures only 16 cawnies, manufacture has commenced, the operations under Dr. Ratton's supervision. The Collector

Board's Proceedings, dated 1st February 1876, No. 303.
Board's Proceedings, dated 10th December 1875, No. 3,331.
recorded in Government Order, 15th February 1876, No. 219, R.D.

budget for the Harigoshthi project, and requested the Revenue Department of Rupees 10,000 Budget. A further sum of nearly Rupees 7,400

3. The second and third plots measure Ratton's proposals for laying them out on the length of channel and the lifting of the brine- cost of the works at Manambadi (BK) amount to lakh of Rupees in round numbers. The Collector per garce as the cost of manufacture and 5 per of Rupees in the former case and 11½ lakhs in out the pans at the plot BK, leaving plot 1 proposals in regard to it are not accepted.

of the important salt undertaking at Harigoshthi, (its source) as possible, especially as the river we have to deal with is known to be in great fresh, or nearly so, almost throughout the year.

3. I would suggest the transferring of the supply sluice gate and pumping machinery to the east end of what is known as the 16-cawny plot. At this spot, as far as can be judged at present, sea brine is procurable at, and for every working day for a period of two hours more. Here, then, during this period the pumps will be able to abstract brine direct from the sea itself, and afterwards, the sluice gates being closed, they will still have the brine in the plot. I believe that in this way brine enough to supply the Harigoshthi works, the 50-cawny work, and the 16-cawny work, will be procurable. At all events the canal is enlarged, and it will bear widening considerably.

4. The only additional expenses involved in this proposal are the enlarging of the before-mentioned canal, if that be thought necessary, and an iron aqueduct to bridge over the stream which intersects the line of brine-supply. As a set-off against this expenditure considerable retrenchments can be made in the canal works for the reservoir for the Harigoshthi pans. I need not mention manufacture to secure a continuous service of long brine.

(True Copy.)

(Signed) J. H. GARSTIN,

Collector.

The Collector submits a survey plan of the site selected for extension of salt manufacture in the South Arcot District in the neighborhood of Harigoshthi, and laying out the pans under Dr. Ratton's

marked AH, BK, and DG on the plan. The scheme, has already been taken up and salt manufacture has commenced, the operations under Dr. Ratton's supervision. The Collector recently reported that the expenditure on this plot amounted to Rupees 8,336, and the Board sanctioned the outlay which had been incurred in connection with it from the provision of Rupees 12,800 made in the current year's budget. The sanction of Government for the retransfer to the Department of Public Works is apparently required to complete the works.

about 80 and 250 acres respectively, and Dr. Ratton's proposals for laying them out on the length of channel and the lifting of the brine- cost of the works at Manambadi (BK) amount to lakh of Rupees in round numbers. The Collector per garce as the cost of manufacture and 5 per of Rupees in the former case and 11½ lakhs in out the pans at the plot BK, leaving plot 1 proposals in regard to it are not accepted.

4. The estimated cost of manufacture is very low, and does not, it is presumed, include charges for establishments, guarding &c. It is a little more than two francs a-ton, the cost at which Dr. Ratton calculated that salt equal to the French might be produced in India. The items of charge were not specified in his report, but probably labor only is referred to. The Board have every confidence, however, that the financial results will be satisfactory if Dr. Ratton superintends the operations from first to last.

5. From the second letter above recorded, it appears that the Collector has been in communication with the District Engineer on the advisability of altering the site of the head sluice, lengthening the high-level channel and transferring the position of the pumping station to the south-west corner of AH with a view to securing a brine supply. Dr. Ratton strongly recommends the alterations proposed, as he has ascertained by testing that the brine at A is stronger than that procurable at B, the site at first proposed for the head sluice. The Collector supports the recommendation, but the District Engineer has raised objections on the score of the additional expense which he anticipates will result from the modification proposed.

The Collector will ascertain definitely what will be the cost of the change of plan; meanwhile the Board will not defer laying the proposals submitted before Government, as it is of importance that early orders should be passed, if a advantage is to be taken of Dr. Ratton's presence on the spot whilst the season serves, and also with a view to a settlement of the level of the line and the northern abutment of the Vellaur bridge.

6. Considering the extensive nature of the scheme, and as the Board have limited expenditure at Mercantile Board's Proceedings, dated 17th February 1875, No. 385. prospect works at Harigoshthi, they strongly recommend the their entirety, or at any rate that sanction be accorded at BK and commencing operations there at once.

7. The Collector states that ample funds are available, as he anticipates a saving of Rupees 10,000 in the current year's budget, and the Budget for the ensuing year contains a provision of Rupees 60,000 for the Harigoshthi project.

(True Copies and Extract.)

(Signed) C. A. GALTON,

Acting Secretary.

SEPARATE REVENUE, No. 3.

Salt.

obtained, they desire to know what is the difference of sea water. Dr. Ratton will be requested to furnish the information, and the report called for in paragraph 5 of the Board's Proceedings as to the Dr. Ratton will be awaited.

(True Extract.)

(Signed) D. F. CARMICHAEL,

Secretary to Government.

Memorandum on proposed Salt Works at Harigoshthi.

It is proposed to make salt on a large scale on Dr. Ratton's system; this may be briefly described as follows.

2. The salt water is to be lifted and flow into large pans; these pans may be brine gets stronger, it is to be passed in the salt is to be made; these last Dr.

3. The ground at Harigoshti is of high road is a parallelogram of about 100 feet from south to north and 1,900 from east to west; the ground on the west side is about 100 feet, that on the east 1½ feet above high water; the small and the drainage of it in the hot weather easy; the area 240 acres, or three-eighths of a mile, is also believed to be sufficient.

4. With regard to bringing the water has to be carried a considerable distance and also lifted about 6½ feet.

5. The land is on the north side of the Vellaur river, which is tidal, but, of course, for salt work it is important that the water should be taken from as near the sea as possible, and therefore the pans should be placed at B, a distance of nearly 3,000 yards below the south-west corner of the ground, and the water has to be carried this distance before it is begun to be used in the pans.

6. It is, however, proposed to take a portion of ground situated just west of the proposed site of the head sluice; this is of land 4,200 feet in length with a breadth of 800 feet, the area being about 80 acres, the level of it alongside of the river averages 2½ feet above high water.

7. I propose, as there is a large quantity of water to be lifted, that it should be raised by steam-power.

8. The following is a sketch of the works proposed. The total area of land to be used for salt manufactory is 320 acres; to supply surface with water half an inch in depth 6·5 cubic feet per second is required; as, however, supply should be passed into the channels only at and above half tide; the head sluice and channels should be large enough to pass this water through in four hours or be capable of supplying water at the rate of, to allow for contingencies, say 50 feet per second, as it is important to have the channel round the east pans should be cut on as high a level as possible. I propose that the channel round the east pans should be cut all of water, the level never being allowed below 14·5 feet above the datum line of the levels or never down to 11 above datum or about 2½ feet above high water.

9. For the supply of the west pans 10 acres, 4·7 cubic feet per one inch is required every 24 hours; this water is to be lifted by steam-power, and we ought to be able to supply it by working four hours per day, or at the consideration, say 30 cubic feet per 1" of 23·2 cubic feet per 1" taking contingencies into account.

10. This water to command the level of this channel to be cut down to 17 above datum or about 5½ feet above high water, the bed of the channel being cut down to 11 above datum or about 2½ feet above high water.

11. With regard to banks, I propose the river bank throughout should be 2 yards wide at the top, which is to be 24 feet above datum or about 8½ feet above high water; this height will be safe from floods; the cross banks to be 2 feet above datum.

12. The banks of the high level should be 24 feet above datum; the bank of the river side to be 2 yards wide; the others on the river wide at top. All banks to have slopes of 1½ to 1, and the drainage of the banks and channels are shown in the plan by a thick red dotted line. The banks to be a circular channel round the east pans with a bottom width of 9 feet; it also has to carry 50 cubic feet per 1". I propose for the south channel and 8 feet for the north; this will give enough earth to form banks and so give a total section of 108½ square feet of water-way. With water at 14·5 above datum, this should be ample.

13. The proposed direction and plan by a thick red dotted line. The banks to be a circular channel round the east pans with a bottom width of 9 feet; it also has to carry 50 cubic feet per 1". I propose for the south channel and 8 feet for the north; this will give enough earth to form banks and so give a total section of 108½ square feet of water-way. With water at 14·5 above datum, this should be ample.

14. The head sluice at B must be large enough to pass the water required without much loss of land. I propose 4 vents of 5 feet, the depth of waterway 70 square feet.

15. At first I would propose that only the eastern ones being supplied by the water for the western pans should be raised by piccottahs or other means; hereafter, should it be thought advisable, water might be pumped up for these pans and passed over the supply-channel by a small aqueduct; the fall of the ground for this is favorable.

16. For the supply of the western pans we must raise water at the rate of 30 cubic feet per 1" for 4 hours from minimum height of 21 feet above D. L. or 6½ feet in height of 21 feet above D. L. or 6½ feet in height of nearly 22-horse power. As a rule the engine would be required to have sufficient power and also capacity in four hours.

17. The cost of raising this water will be heavy, both as regards the capital charge of the cost of engines and pumps and also their wear and tear, cost of fuel, &c.; it will, however be cheaper to do the work by steam-power at one pumping station than by doing the same work by manual labor.

18. I would propose that 2 steam engines, each of 15 horse power with separate pumps (Groyne's or Appold's) should be used; it is necessary, in order to ensure the supply of brine to the pans, to have duplicate engines. I believe that it is generally considered that the friction of the pumps is nearly compensated by the excess of interest over nominal power, and therefore a 15-horse power engine should do the work required in less than 8 hours, and if at any time it be wished to do the work quicker—for example, at the commencement of the season,—the two engines and pumps might be worked together.

19. West of the pumping station the water is to be carried by the high-level channel to D, where it is to cross the stream by an aqueduct and then to E, the south-west corner of the ground; from E it is to go north to G, crossing the stream by a culvert. This channel is to carry water in the surface 21 feet above D. L. the banks to be 24 feet above water-surface, 1 yard wide at top with slopes 1½ to 1, bed of channel 17 above D. L., the channel to have a section of at least 88 square feet, bottom width not less than 14 feet, so that we may be able to store water in it. Also, that practically no head may be lost from the pumping station to the north-west corner of the ground; as to form the banks of a necessary section a large quantity of earth is required, no extra cost is incurred in making it of a large section.

20. From this channel, E to G, the salt water is to be taken to the pans. The pans are to be embanked all round.

21. In the estimate I have allowed a lump sum for laying out this ground according to Dr. Ratton's plan of large irregular pans, and also for making up platforms for the storage of the salt; this last will be a very heavy item.

22. For the drainage of the ground 5 small surplus sluices are allowed, for a channel will be formed along the east side of the ground in excavating for the bank; this will be the main drain.

23. The railway station is on the east side of the ground and the drainage. East of the ground and eventually rails should be laid from it to the platforms, so that the salt may be loaded at once from the storage heaps on the trucks. I have allowed nothing for this, but have entered approximate amount for two bridges across the drainage.

24. I enclose a detailed estimate for the work of the main channels and banks, and the following is the approximate estimate for the project exclusive of cost of the land:—

	RS.
Earthwork of main channel for east portion	5,500
Do. for west do.	5,000
Head sluice, 4 vents of 5 feet, founded on wells, complete ...	4,000
Two 15-horse steam engines with separate boilers, pumps, &c., including store, engine-house and quarters for engine driver, &c.	25,000
Aqueduct waterway for canal above 8' x 4' that of drainage below 20 feet span	3,000
Two culverts in road, 10 feet each, at Rupees 800	1,600
Five surplus sluices, each 3 feet square, at Rupees 300	1,500
Two bridges across drainage, 10 feet span each, for the salt to be carried to Railway at Rupees 2,500	5,000
Laying out the eastern portion, including condensers, salt-pans, and platforms, at Rupees 100 an acre	8,000
Laying out the western portion, 40 acres, at Rupees 100 an acre ...	24,000
Police Lines	5,000
Salt Office	2,400
Grand total exclusive cost of land	90,000

CAMP TRIVANELLORE,
19th January 1876.

(Signed) H. R. MEAD, Major, R.E.,
District Engineer, South Arcot.

SUPPLEMENTAL MEMORANDUM on a revised scheme for the proposed Salt Works at Harigoshti.

In the former scheme it was proposed to take the salt water from the Vellaur by a head sluice placed at B close to the mouth of the east coast canal. This place was considered eligible by Dr. Ratton, who I certainly thought had thoroughly gone into the question; it however appears that he had not done so, and now he considers the point A as more eligible.

2. Moving the head sluice from B to A entails a heavy extra cost, but in an undertaking of this magnitude the extra cost may be considered but small, and considering how much money would be saved yearly should the water at A be even slightly stronger in brine, I have no hesitation in recommending its adoption should it be found, after careful inquiry, to be the case.

3. I must bring to notice, however, that as yet we have only a few isolated observations to go on, and these taken at only one time of the year; the Collector, however, at my request, having a series of observations carried out, and these I hope will settle the matter definitely; from what I saw when with him on the 14th February I have but little doubt but that it will be found advisable to move the sluice to A.

4. The reason of the difference of the strength of the brine-water at B and A is that the eastern coast canal acts as a spring channel. The water in it was in February certainly but very slightly brackish, and at that time no land water except springs found its way into it.

5. In determining the best line for the channel and the site for the pumping station, the first point to be considered is the crossing of the east coast canal, and as Government have directed that the Railway Company shall cross it by a bridge, giving ample roadway so that the canal may be at any future time improved and made use of, it is necessary for the contingency of the canal being required for use to be borne in mind. This necessitates the use of a very heavy and expensive work, namely, a large under-tunnel sunk to a depth, so that there may be always at least 3 feet of water over it for the passage of boats; the area of the passages for the salt water must be large, so that but little head may be lost.

6. We require about 6½ cubic feet per second per day, but we should be able, as before explained, to pass the quantity required in a day in four hours, or, say, be able to pass 50 cubic feet

for the large plot BK and the Harigoshti works from B to A.* The water at A is nearly always of the density of sea water, but, though the distance between A and B is less than half a mile, there is a great difference in the strength of the water at the two places, owing to the quantity of fresh water discharged into the river from the coast canal and at times from the Khan Sahib's Voikal. If such a change was made, it would necessitate the prolongation of the high level channel from C on the plan to the south-western corner of the plot AH, where the pumping station would then be. The coast canal could be crossed by a wooden aqueduct.

* Vide Survey Plan.

2. The District Engineer, to whom I wrote demi-officially on the subject, thinks there are objections, on the score of expense, to the modification proposed by Dr. Ratton, and that there cannot really be so much difference between the water at two points only about 660 yards apart; but, as Dr. Ratton has tested the water several times at the two spots and has always found a considerable difference in the saltiness of the water, I fancy there cannot be much doubt on the points.

3. I am inclined to agree with Dr. Ratton as to the advisability of changing the position of the head sluice, and, though the carrying of the high level channel from C to B may entail some additional expense, it will be compensated for by the saving in the size of the channel round BK, which will not need to be nearly of the size at present proposed, as BK will be supplied from the high level channel by means of sluices, and the supply for Harigoshti will be drawn direct from the sea for three hours out of every tide.

4. The District Engineer himself thinks that, if there is so much difference in the water, the supply should be taken much lower down, that is, in the vicinity of the Custom-house.

5. The cost of cutting a channel from A to the Custom-house would be trifling, and the only other extra work entailed by the shifting of the pumping station, besides the prolongation of the high level channel and the bridging of the canal with an aqueduct, would be the enlargement of the channel existing all round AH. This would not be expensive.

6. Dr. Ratton has just sent me the result of his testing the river water at high tide at the east and west ends of the plot AH. At the east end it is 3° Beaumé, but at the west end 2°. Under these circumstances I do not hesitate to recommend the modification proposed by Dr. Ratton, subject of course, to the official criticism of the District Engineer.

7. Under any circumstances it is very important, in the interests of the railway, that the plan of the Harigoshti works should be settled as soon as possible, as the Railway Company's Engineer will want to know how the channel will affect the level of the line and the northern abutment of the Vellaur bridge; how he will be able to work across it; and how he will need to bridge it. I have purposely delayed giving him over this strip of land on the river bank to admit of Government deciding how they will take the channel, and the sooner work is begun in such a fine dry season for work the better. The question of whether the pumping station shall be at C, or in the south-west corner of AH, does not affect the question of the works west of C at all, and it is very probable that the District Engineer will, on testing the water, see the necessity of securing the brine-supply from where Dr. Ratton and I propose.

ENCLOSURE No. 1.

From J. J. L. RATTON, Esq., M.D., Special Salt Duty, to J. H. GARSTIN, Esq., Collector of South Arcot, dated Porto Novo, 18th January 1876, No. 16.

With reference to the brine supply of the projected Harigoshti salt works sanctioned by Government, I have the honor to inform you that I have good reason to fear that, in the plan proposed by the District Engineer, brine for salt manufacture is taken from the river at a point where strong sea brine is but seldom to be obtained.

2. I think, to make certain of the success of the important salt undertaking at Harigoshti, brine should be obtained from as near the sea (its source) as possible, especially as the river we have to deal with is known to be in great part fresh, or nearly so, almost throughout the year.

3. I would suggest the transferring of the supply sluice gate and pumping machinery to the east end of what is known as the 16-cawny site. At this spot, as far as can be judged at present, sea brine is procurable at, and for some time before and after, tide, that is, at least once every working day for a period of two hours or more. Here, then, during this period the pumps will be able to abstract brine direct from the sea itself, and afterwards, the sluice gates being closed, they will still have the brine in the 16-cawny plot canal to fall back upon. I believe that in this way brine enough to supply the Harigoshti works, the 50-cawny work, and the 16-cawny work, will be procurable. At all events there will be no fear of scarcity if the 16-cawny plot canal is enlarged, and it will bear widening considerably.

4. The only additional expenses involved in this proposal are the enlarging of the before-mentioned canal, if that be thought necessary, an additional 2,000 yards of aqueduct running on top of the river-side embankment and an iron or wooden aqueduct to bridge over the stream which intersects the line of brine-supply. As a set-off against this expenditure considerable retrenchments can be made in the canal works for the 50-cawny plot, which are now designed to act as a reservoir for the Harigoshti pans. I need not add that it is a matter of vital importance in salt manufacture to secure a continuous service of strong brine.

(True Copy.)

(Signed) J. H. GARSTIN,
Collector.

With his letter of the 22nd January the Collector submits a survey plan of the site selected for extension of salt manufacture in the South Arcot District in the neighborhood of Harigoshti, and estimates of the cost of acquiring the land and laying out the pans under Dr. Ratton's directions on scientific principles.

2. The scheme comprises three distinct plots marked AH, BK, and DG on the plan. The first of these, which measures only 16 cawnies or thereabouts, has already been taken up and salt manufacture has commenced, the operations being conducted by the Salt Deputy Collector under Dr. Ratton's supervision. The Collector recently reported that the expenditure on this plot amounted to Rupees 8,336, and the Board sanctioned the outlay which had been incurred in connection with it from the provision of Rupees 12,800 made in the current year's

Board's Proceedings, dated 1st February 1876, No. 803.
Board's Proceedings, dated 10th December 1875, No. 3,481,
recorded in Government Order, 15th February 1876,
No. 219, R.D.

budget for the Harigoshti project, and requested the sanction of Government for the retransfer to the Revenue Department of Rupees 10,000 transferred to the Department of Public Works Budget. A further sum of nearly Rupees 7,490 is apparently required to complete the works.

3. The second and third plots measure about 80 and 250 acres respectively, and Dr. Ratton's proposals for laying them out on the French system entail the cutting of a considerable length of channel and the lifting of the brine-supply by means of a steam-pump. The estimated cost of the works at Manambadi (BK) amounts to Rupees 20,300 and at Harigoshti (DG) to a lakh of Rupees in round numbers. The Collector estimates the annual return, taking Rupees 4 per garee as the cost of manufacture and 5 per cent. as the interest on the outlay, at three lakhs of Rupees in the former case and 11½ lakhs in the latter, and requests early sanction for laying out the pans at the plot BK, leaving plot DG for treatment hereafter, if Dr. Ratton's proposals in regard to it are not accepted.

12930
 Revenue 1876 Depts
 Govt. of Madras.
 PUBLIC WORKS.

THE DISTRICT ENGINEER,
 SOUTH ARCOT.
 &c. &c. &c.

Dated June 23rd.

Issued

Recd. 7 July 76 Recd.

G. O., 27th June 1876, No. 1579.

JUNE

Nos. 432-434.

Harigashli Salt Project, South Arcot Dis-
 trict.—Papers relating to the — ordered to
 be forwarded for the approval of the
 Government of India.

1723
 Communicated to the Govt.

Recd

21 July 1876

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14 Ld. Secy. of the Govt.