(17)

(1) பக்கங்களின் எண்ணிக்கை 34

(2) புதுக்கித் திருப்பிய நாள் 27/9/88

(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம் 28/9/88

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

பெரம்பலூர் வட்டம்

அரசாணை எண்.
மு. கோப்புத் தாள் எண். 3129(W) அச்சகம் பலவகை

நாள் : 19.12.1884 198 .

மடிக்கவோ கண்டபடி கையாளவோ கூடாது

ஆவண. கா-1—18,006—15-6-87.

3129

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following letter from LOUIS CORNET, Esq., to the Deputy Chief Engineer, Public Works Department, dated Madras, 15th December 1884.

In reply to your letter, No. 2069 C., dated the 13th instant, I have the honor to forward a statement of the terms on which I will agree to undertake an experimental artesian boring at Madras on the conditions mentioned in paragraph 2 of your letter.

2. The depth of the well not being given I have taken it at 120 metres or, say, 393 feet.

3. The tools and appliances, &c., required for the above-mentioned specification will cost about Rs. 12,500, as per details in the estimate and abstract appended hereto. Of this sum Rs. 11,000 are required for tools and appliances to be imported and Rs. 1,500 for masonry, staging and sheds to be erected on the spot.

4. The masonry, staging and shed require to be erected first. While the masonry is settling the staging and shed may be made. The whole can be made ready in one month.

5. After striking a gushing spring the site has to be cleared and a masonry basin constructed. The cost of this work is not included in the next paragraph.

6. The following five items are charges payable by Government :—

(*a*) I shall require payment of about Rs. 1,500 for the erection of masonry, staging and shed. This payment is to be made as soon as I receive orders to begin work. These works will be executed according to the data of the Public Works Department. I consider my estimate sufficient for the purpose. Any saving under this head will accrue to Government.

(*b*) I shall require payment of about Rs. 11,000 for cost of tools and appliances to be imported. This payment is to be made as soon as I deliver the tools and appliances on the works. The exact cost is to be determined by the amount of the manufacturer's invoice *plus* usual charges.

(*c*) I shall require monthly a payment of the sum of Rs. 400 for my salary.

(*d*) I shall require monthly a payment of a sum of about Rs. 150 for the wages of workmen. Savings under this head to accrue to Government.

(*e*) I shall require once for all a credit of Rs. 200 to be availed of as required to provide fuel, iron, steel and other materials for repairs.

7. With the tools specified I undertake to sink a well, to the depth stipulated, through any soil, however hard or difficult to work.

8. My service is to begin as soon as I join work under the orders of Government, and it is to cease on one month's notice, or as soon as the basin referred to in paragraph 5 is completed.

9. I am prepared to begin work as soon as I receive orders. The tools and appliances have to be imported. They are to be had ready made at Paris. They will probably be here within three months. In anticipation of their arrival the masonry, staging and shed may be erected.

10. I cannot stipulate for a fixed rate of progress, but I may mention what I can do in the several cases that may turn up:—

(*a*) *Through clay or through coarse river sand.*—Three to five metres daily according to the depth already attained.

(*b*) *Through pure gravel.*—About one metre daily.

(*c*) *Through rock.*—Progress variable according to hardness. No estimate possible.

(*d*) *Through fine movable sand, dry or in water-bearing stratum.*—Work may be considerably delayed through choking of pipe by continuous spouting up of a column of fine sand. No estimate of progress possible

(*e*) *Accidents as detailed in paragraph 2 of explanatory memorandum.*—No estimate of progress possible.

11. In cases (*d*) and (*e*) of the preceding paragraph, and also in case a gushing stream is struck, it will be necessary to work night and day without interruption. In such cases I shall give my personal extra labor free, but the workmen must be paid night work at double the rate for the day.

12. To give some idea of the total time taken in boring a well I may mention that at Pondicherry I have been engaged during periods varying from three weeks to four months on wells varying in depth from 28 metres to 100 metres.

13. The estimate for tools and appliances includes all the extra piping (120 metres) of small bore (21 centimetres) for the purpose mentioned in paragraph 3 of the explanatory memorandum attached hereto. For the reasons given there only 80 metres of 26 centimetres gauge are included with 120 metres of 21 centimetres gauge.

Enclosures.

Approximate Estimate for Boring Tools, Nos. 0, 1, 2, 3, for a depth of 120 mètres with piping, &c., complete.

Number of Tools.	Description of Tools.	Diameter.	Weight in Kilog.	Price in Francs.	
1	Téte de soude, No. 3	..	10	30	
1	Clef de relevée, Nos. 1, 2, 3	..	37	111	
1	Clef de retenue, Nos. 1, 2, 3	..	18	45	
6	Tourne-à-gauche	..	55	110	
1	Grand manche de manœuvre, No. 3	..	22	38	
1	„ „ No. 1	..	21	63	
1	Moraillon pour la chaîne	25 n/m	9	31	50
1	Chaîne cable de 2, 6 mètres de	560 n/m	370	444	
1	Poulie et son axe de	..	95	133	
1	Treuil, No. 1, complet pouvant être mû à bras ou actionné par une machine à vapeur avec ses pièces de rechange	..	2,000	2,800	
1	Esse à brides	..	10	20	
1	Poupée, No. 1, avec ferrures de levier	..	250	500	
1	Paire d'emmanchements, No. 0 de rechange de	..	50	150	
1	„ No. 1 „	..	36	108	
1	„ No. 2 „	..	28	84	
1	„ Nos. 2 et 3 „	..	37	111	
1	„	..	193	270	20
1	Maîtresse tige, Nos. 0, 1, de 5 mètres	..	200	300	
2	Tiges, No. 1, de 6 mètres	..	20	60	
1	Raccord, Nos. 1, 2, de 1 mètre	..	95	142	50
1	Tige raccord, Nos. 1, 2, de 6 mètres	..	385	577	50
5	Tiges, No. 2, de 6 mètres	..	15	45	
1	Raccord, Nos. 2, 3, de 1 mètre	..	74	111	
1	Tige raccord, Nos. 2, 3, de 6 mètres	..	570	855	
10	Tiges, No. 3, de 6 mètres	..	40	72	
1	Allonge, No. 3, de 4 mètres	..	32	64	
1	„ „ 3, de 3 „	..	23	52	90
1	„ „ 3, de 1 „	..	14	50	
2	Trépans 1 plat et 1 à gouges avec emmanchements, No. 0 de	250 n/m	170	595	
2	Trépans 1 plat et 1 à gouges avec emmanchements, No. 0 de	200 n/m	100	375	
1	Soupape à clapet, No. 1 de	240 n/m	160	262	50
1	„ 1 de	180 n/m	64	238	
1	Soupape à boulet, „ 1 de	230 n/m	92	322	
1	„ 1 de	180 n/m	70	260	
1	Tarière ouverte, „ 1 de	240 n/m	58	232	
1	„ 1 de	190 n/m	45	168	
1	Tarière rubannée, „ 1 de	240 n/m	44	176	
1	„ 1 de	260 n/m	65	480	
1	Elargisseur, No. 1 de	210 n/m	56	351	
1	„ 1 de	..	28	84	
1	Caracole, Nos. 0, 1, 2, 3	..	62	310	
1	Cloche à vis, Nos. 0, 1, 2, 3	..	..	110	
1	Caisse à outils divers pour forgerons	..	95	133	
1	Poulie et son axe pour câble	..	235	304	58
1	Câble en fil de fer de 200 mètres	18 n/m	8	24	
1	Tête de soude, No. 2 à œil	..	10	10	
1	Moraillon pour câble en fil de fer	..	26	78	
1	Harpon „ „	..	..	..	
	Total	..	6,087	11,889	68
	4 % pour caisses, emballage, et camionnage en gare	..	..	476	
	Total net en Francs	..	..	12,365	68

Approximate Estimate for Boring Tools Nos. 0, 1, 2, 3, for a depth of 120 mètres, &c.—(*Contd.*)

3129/2

Pipes of 26 and 21 Centimètres with Appliances required to join them and to force them through the Soil.

Number of Tools.	Description of Tools.	Diameter.	Weight in Kilog.	Price in Francs.	
80	Mètres de tuyau de 260 n/m par bouts de 2 mètres (le mètre de tuyau pèse 24 kilogs. et coûte Fr. 31-20	..	1,920	2,496	
120	Mètres de tuyau de 210 n/m par bouts de 2 mètres (le mètre de tuyau pèse K. 19-50 et coûte Fr. 25-35	..	2,340	3,042	
		..	..	20	
		..	..	60	
100	Boulons de jonction de tuyaux	260 n/m 210 n/m	165	333	
1,000	Rivets d'assemblage de tuyaux à Fr. 6 le 100				
1	Rivoir pour tuyaux de 2 mètres avec manchons de 26 et 21 n/m	260 n/m 210 n/m	305	1,067	50
1	Jeu de vis de pression complet avec têtes de tuyaux de 260 et 210 n/m	..	..	..	
	Total	..	..	7,018	50
	4 % pour caisses, emballage et camionnage en gare	..	..	280	74
	Total net en Francs	..	4,730	7,299	24

Abstract of Cost.

	Francs.
Perforating tools	12365, 68
Piping with rivetting and forcing tools	7299, 24
	19664, 92
	Rs.
At exchange of two francs per rupee	9,832
Freight, insurance, agent's commission, and charges interest, landing, cartage, &c.	1,168
	11,000
Masonry, staging and shed	1,500
	12,500

Explanatory Memorandum.

1. *Choice of tools.*—There is a great variety of tools used for boring artesian wells. In some spots specially favored the tools required (for narrow bores) and the process of boring are reduced to such simplicity that any intelligent foreman will in a few days acquire all the information necessary to bore a well with tools worth a few hundred rupees. Such is the case with most wells at Pondicherry. This however is far from being so in every locality. Most borings, particularly of large diameter, are impeded by difficulties which can be overcome by the use of proper tools in the hands of an operator who has had much experience. A few words will explain the disparity of circumstances under this head. Let us, for instance, take into consideration the wells, Nos. 8, 9, 11, and 13, mentioned in the Proceedings of the Sanitary Commissioner under No. 39, dated the 11th January 1883, and G.O., of 26th January 1883, No. 170, Financial. These wells being bored in modern alluvium and in tertiary soils, the simplest form of apparatus was sufficient. Well No. 14 bored at Bahour, and the well at Karikal having struck secondary rock, a choice assortment of tools was needed. The easy wells I refer to are 20 to 40 metres deep. The more difficult ones exceed 100 metres. One well is about 200 metres deep. Such deep wells cannot be sunk with cheap tools. Above all I may mention the well that I have sunk at Trivandrum, of which the last six feet were through solid gneiss found at a depth of 246 feet from the level of the ground.

2. *Accidents.*—In boring artesian wells the least foreseen of accidents might occur, and they require the display of the greatest ingenuity for the contrivance of special tools adapted to the peculiar circumstances of the case. I may mention the following cases:—

(*a*) Obstruction of the lower end of the bore by the fall of a broken piece of the boring tool.

(*b*) Wedging in of the boring tool between the pipe and some hard substance, causing the tool to become fixed and immovable.

(*c*) Deviation of the pipe from the vertical line brought about by neglect in testing sufficiently often the accuracy of the vertical. It is also brought about by the bending of bad material.

(*d*) The rupture of rivets connecting two successive pipes.

(*e*) The compression of the pipe by such pressure of the earth as to render it immovable.

Each of these cases includes thousands of varieties which if they be detailed would fill up volumes over volumes. Although it is impossible to indicate in a few words how all these cases are to be met, it may be said that with a proper assortment of tools in competent hands all difficulties may be overcome.

3. *Compression of pipe.*—Case (*e*) among accidents must be expected in great depths. In the trial boring of 10 inches at Madras the pressure at 80 metres will most likely arrest further progress of the 26 centimetres pipe. In that case a pipe of 21 centimetres must be introduced into the original pipe and the boring continued. Under these circumstances a great variety of cases may occur, which can all be met with the piping and tools specified.

4. *Inefficiency of cheap tools.*—Cheap tools bring about accidents. When such occur they are unfit to remedy them. Moreover no great depth can be attained and rock cannot be cut through with cheap tools. With such tools, particularly in the hands of amateurs, a small boulder is enough to arrest for ever the progress of a very promising well, or failure is due to some small accident which would be a trifle with good tools and material, but is insuperable with cheap tools. Should a trial be made at Madras with inefficient tools and failure ensue, the possibility of successfully boring an artesian well will be anything but tested, and yet the failure will act as a damper on further enterprise and arrest for a long while all search for artesian springs. In this as in all other matters the cheapest is to procure the best available material and tools. It is so specially in this case, when it is considered that the right tools once acquired all subsequent borings will be reduced in cost to a very low figure.

5. *Missing the spring.*—All artesian wells do not spout up to their best as soon as they are tapped. Owing to obstructions that are removable some of the best springs are often very lazy and require much coaxing before they begin to flow. A case of this sort may in incompetent hands be mistaken for a worthless spring. I have seen cases of this sort.

6. *Information on tools specified.*—These tools are exactly like those now used by the French Government at Pondicherry, and they are to be indented for from the same manufacturers, who supply also the requisite for wells of bigger and of smaller bore.

3129/3

Order—dated 19th December 1884, No. 3129 W., Public Works.

This letter refers to a tender submitted by Mons. L. Cornet for sinking an artesian well at Madras to a depth of 393 feet (120 metres).

2. The tools and appliances are estimated to cost Rs. 12,500. Of this sum masonry and staging will cost Rs. 1,500. The latter will first be put in hand, and will be ready against the arrival of the apparatus for which it is proposed to telegraph. Mons. Cornet demands a salary of Rs. 400 per mensem, and approximately estimates the wages of workpeople at Rs. 150 per mensem.

3. The approximate cost of the well will be as follows:—

	Rs.
Apparatus	11,000
Masonry, staging, &c.	1,500
Salary of Engineer for four and-a-half months	1,800
Pay of workpeople for do. do.	675
Masonry cistern to hold supply	300
Fuel, iron and steel for repairs, &c.	200
Total ...	15,475

4. This rough estimate is based on the assumption that the apparatus will arrive from Paris within six weeks, and that it will take three months to sink the well 393 feet. The latter period will however depend entirely on the nature of the strata to be penetrated. If much rock be encountered the work may occupy a longer time, but if nothing but clay and sand be traversed the well will probably be sunk in six weeks.

5. It is understood that, if water of good quality or of sufficient quantity be not tapped at a depth of 393 feet, the necessary tubes for lining the bore, should it have to be carried further down, can be made up quickly and cheaply at Madras.

6. It is observed that apparatus, other than tubing, valued at about Rs. 6,000 will, on completion of the well now proposed, be available for similar wells elsewhere.

7. His Excellency the Governor in Council considers that it is in every way desirable to make the experiment, and accordingly resolves to accept Mons. Cornet's offer.

8. The site of the experiment will be fixed by the Chief Engineer, Public Works Department.

9. The question of an allotment of funds will be considered in the Financial Department.

(True Extract.)

Major, R.E.,
Under Secy. to Govt., P.W.D.

To Mons. L. Cornet.
To the Financial Department.
" Superintending Engineer, V Circle.
" Examiner, Public Works Accounts.

Exd. C. Howarth.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1884} Madras.

PUBLIC WORKS.

Dated December, 19th.

Recd.

Encl.

G.O., 19th Dec. 1884, No. 3129 W.

DECEMBER.

Artesian Well at Madras

Orders on Monsieur Cornet's tender for sinking an —.

Some time ago a grant of Rs. 1000/- was made to Lan: Commissioner for the purpose of making experiment in sinking an Artesian well in Madras.

Please show papers.

3129/4

8.12.84

G.W.

Complete file submitted. The grant of Rs. 1000 was made in Fin. order No. 170 dated 26th January 1883.

S.S.
8/12/84.

W 3129 v

Mons: Cornet's tender for artesian well at Madras

Depth of well to be 393 ft.
Tools & appliances will cost Rs. 12500.

If this sum masonry & staging will cost Rs. 1500. Then will find be taken in hand & will be ready by the time the tools, tubing, &c. which will be telegraphed for, arrive. Mons. Cornet demands a salary of Rs. 400 per mensem.
Wages of workpeople will be approximately Rs. 150 per mensem.
If we suppose the apparatus to arrive from Paris within 6 weeks of Mons: Cornet receiving orders (he says it will arrive in a month, but that I should say is very doubtful), the cost of well will very roughly be as follows: —

3129

apparatus — Rs. 11000
masonry, staging, sheds — 1500
Engineer, salary for 4½ months 1800
workpeople — — — 675
masonry cistern to hold supply 300
Fuel, iron & steel for repairs, &c 200
Rs. 15475

In this approximate Estimate I have assumed that it will take 3 months to sink the well 393 feet. The time will of course entirely depend

on the strata traversed. If much rock is encountered the work may take much longer; if nothing but clay + sand have to be traversed the bore will be sunk perhaps in 8 or 10 weeks.

You will observe that about Rs. 600 is cost of apparatus other than tubing which, this well sunk, will be available for similar wells elsewhere.

Suppose we do not tap water of good quality or sufficient quantity at the depths of 393 ft, what then?

Hunt: Comet informs me that the necessary tubes for lining the bore, should it have to be carried further down, can be made up quickly + cheaply in Madras.

The apparatus we intend indenting for on S. of S. is to cost £1951. The papers explanatory of this sum being at present at the Workshops I cannot give details regarding it.

The well is to be 10" diam: for a depths of 80 metres; and then for 40 metres 8" diam:.

C.S.
17.12.84

Hunt. Comet will commence on 6th January.

The work people employed by him will be paid weekly by Govt on the bill or statement submitted.

The "chevre" will be made up in P.W. Workshops according to Plan he will exhibit by 3rd Jany.

He will himself put the machinery in hand as soon as the site is settled.

3129/6

X

Mem. 3129/1

Arranged with Messrs Arbuthnot & Co. this morning per despatch of telegram ordering the set of Artesian boring apparatus.

C.S.
23-12-84

This note to be placed with the original of G.D. 3129 w dy 19.12.84.

R.S.
23.12.84

HA

Read the following Letter

Madras 15th. December 1884

To Major C. Bowen R. E.

Deputy Chief Engineer P. W. D.

Madras

3129/86

Sir,

In reply to your letter No. 2069 C. dated the 13th. inst., I have the honor to forward a statement of the terms on which I will agree to undertake an experimental artesian boring, at Madras, on the conditions mentioned in para 2 of your letter.

2. The depth of the well not being given, I have taken it at 120 metres or say 393 feet.

3. The tools and appliances &c. required for the above mentioned specification will cost about Rs 12500 as per details in the estimate and abstract appended hereto. Of this sum Rs 11000 are required for tools and appliances to be imported, and Rs 1500 for masonry, staging and sheds to be erected on the spot.

4. The masonry staging and shed require to be erected first. While the masonry is settling, the staging and shed may be made. The whole can be made ready in one month.

5. After striking a gushing Spring, the

Site has to be cleared and a masonry basin constructed.
The cost of this work is not included in the next
para.

6. The following five items are charges payable
by Government:—

A. I shall require payment of about Rs 1500
for the erection of masonry, staging and shed. This
payment is to be made as soon as I receive orders to
begin work. These works will be executed according
to the data of the P. W. D. I consider my estimate
sufficient for the purpose. Any saving under this
head will accrue to Government.

B. I shall require payment of about Rs 11000
for cost of tools and appliances to be imported. This
payment is to be made as soon as I deliver the
tools and appliances, on the works. The exact cost
is to be determined by the amount of the manufacturer's
invoice, plus usual charges.

C. I shall require monthly a payment of
the sum of Rs 400 for my salary.

D. I shall require monthly a payment of
a sum of about Rs 150 for the wages of workmen.
Savings under this head to accrue to Government.

E. I shall require once for all a credit
of Rs 200 to be availed of as required to provide
fuel, iron, steel and other materials for repairs.

7. With the tools specified, I undertake to

sink a well, to the depth stipulated, through any soil
however hard or difficult to work.

8. My service is to begin as soon as I join work,
under the orders of Government; and it is to cease
on [redacted] notice or as soon as the basin referred
to in para 5 is completed.

3129

9. I am prepared to begin work as soon as I
receive orders. The tools and appliances have to be
imported. They are to be had ready made at Paris.
They will probably be here within three months.
In anticipation of their arrival, the masonry,
staging and shed may be erected.

10. I cannot stipulate for a fixed rate of
progress, but I may mention what I can do in
the several cases that may turn up.

A. Through clay or through coarse river sand: 3 to 5
metres daily according to the depth already attained.

B. Through pure gravel: About 1 metre daily.

C. Through rock: Progress variable according
to hardness. No estimate possible.

D. Through fine moveable sand, dry or in
water-bearing stratum: Work may be considerably
delayed through choking of pipe by continuous
spouting up of a column of fine sand. No
estimate of progress possible.

With Ltr. No. 1041 B

E. Accidents as detailed in para 2 of explanatory memorandum: No estimate of progress possible.

11. In cases D and E of the preceding para also in case a gushing stream is struck, it will necessary to work night and [redacted] out interm In such cases I shall give my personal extra lab but the workmen must be paid night at double the rate for the day.

12. To give some idea of the total time to in boring a well, I may mention that at Pond I have been engaged during periods varying f 3 weeks to 4 months on wells varying in depth from 28 metres to 100 metres.

13. The estimate for tools and applia includes all the extra piping (120 metres) of sm bore (21 centimetres) for the purpose mentione para 3 of the explanatory memorandum at hereto. For the reasons given there, only 80 m of 26 centimetres guage are included with 120 of 21 centimetres guage

I have the honor to be

Sir

Your most Obedient Ser

Louis Cornet

CSE 1041B

3

Approximate Estimate for Boring Tools Nos 0-1-2-3 for a depth of 120 mètres with piping &c Complete.

3129

10

Number of Tools	Description of Tools	Diameter	Weight in Kilog	Price in Francs	
1	Tête de Sonde No 3		10	30	
1	Clef de relevée No 1-2-3		37	111	
1	Clef de retenue Nos 1-2-3		15	45	
6	Tourne à gauche		55	110	
1	Grand manche de manœuvre No 3		12	36	
1	" No 1		21	63	
1	Morailon pour la Chaîne	25/m	3	31	50
1	Chaîne cable de 26 mètres de	56/m	370	444	
1	Poulie et son axe de		95	133	
1	Treuil No 1 complet pouvant être mû à bras ou actionné par une machine à vapeur avec ses pièces de rechange		2000	2800	
1	Ecrou à Brides		10	20	
1	Poupée No 1 avec ferrures de levier		250	500	
1	Paire d'emmanchements No 0 de rechange de		50	150	
1	" No 1 "		36	108	
1	" No 2 "		28	84	
1	" No 2 et 3 "		37	111	
1	Maîtresse Tige Nos 0-1 de 5 mètres		193	270	20
2	Tiges No 1 de 6 mètres		200	300	
1	Raccord Nos 1-2 de 1 mètre		20	60	
1	Tige raccord Nos 1-2 de 6 mètres		95	142	50
5	Tiges No 2 de 6 mètres		385	577	50
1	Raccord Nos 2-3 de 1 mètre		15	45	
1	Tige raccord Nos 2-3 de 6 mètres		74	111	
10	Tiges Nos 3 de 6 mètres		570	855	
1	Allonge No 3 de 4 mètres		40	92	
1	Allonge No 3 de 3 mètres		32	64	
1	" No 3 de 2 mètres		23	52	90
1	" No 3 de 1 mètre		14	50	
2	Tépans 1 plat et 1 à gouges avec emmanchements No 0 de	250/m	170	595	
2	" " "	200/m	100	375	
1	Soupape à clapet No 1 de	240/m	160	262	50
1	"	180/m	62	238	
1	Soupape à boulet No 1 de	230/m	92	322	
1	"	180/m	70	260	
1	Varière ouverte No 1 de	240/m	58	232	
1	"	190/m	45	168	
57			5458	9829	10

A Reporter

Number of tools	Description of Tools	Diameter	Weight in Kilogs	Price in Francs	
57					
1	Tarière rubannée N° 1 de — Report —	240 m/m	5158	9829	10
1	Alésoir N° 1 de	260 m/m	44	176	
1	—"— N° 1 de	260 m/m	65	480	
1	—"— N° 1 de	210 m/m	56	351	
1	Coracole N°s 0-1-2-3		28	84	
1	Cloche à Vis N°s 0-1-2-3		62	310	
1	Caisse à outils divers pour forgerons		"	110	
1	Poulie et son axe pour câble		95	133	
1	Câble en fil de fer de 200 mètres	18 m/m	235	304	50
1	Tête de sonde N° 2 à œil		4	24	
1	Moraillon pour câble en fil de fer		10	10	
1	Harpon —"—		26	78	
68			6087	11889	68
	Total —			476	
	4 % pour caisses, Emballage, et Camionage en Gare —				
	Total net en Francs			12365	68

Pipes of 26 and 21 Centimeters with appliances required to join them and to force them throughb the soil

Nos	Description of Tools	Diameter	Weight in Kilogs	Price in Francs	
	Mètres de tuyau de 260 m/m par bouts de 2 mètres (le mètre de tuyau pèse 24 Kilogs et coûte 31f 20 — — — — —		1920	2496	
120	Mètres de tuyau de 210 m/m par bouts de 2 mètres (le mètre de tuyau pèse 19k 50 et coûte 25f 35 — — — — —		2340	3042	
100	Boulons de jonction de tuyaux — — — — —			20	
1000	Rivets d'assemblage de tuyaux à 6fs le 100 — — —			60	
1	Rivoir pour tuyaux de 2 mètres avec manchons de 26 et 21 m/m	260 m/m 210 m/m	165	333	
1	Vis de pression complet avec tête de tuyaux de 260 et 210 m/m	260 m/m 210 m/m	305	1067	50
	Total —			7018	50
	4 % pour Caisses, Emballage et Camionage en Gare —			280	74
	Total net en Francs		4730	7299	24

Abstract of Cost

Perforating tools —	Francs	12365, 68
Piping with riveting and forcing tools —	—"—	7299, 24
	Francs	19664, 92
at exchange of 2 Francs per Rupee —	Rupees	9832
Freight, insurance, agents commission & charges interest, landing, cartage &c &c —	Rupees	1168
	Rs.	11000
Masonry, staging and shed —		1500
	Rupees.	12500

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Explanatory Memorandum

1. Choice of tools. There is a great variety of tools used for boring Artesian wells. In some spots especially favoured, the tools required (for narrow bores) and the process of boring are reduced to such simplicity that any intelligent foreman will in a few days, acquire all the information necessary to bore a well with tools worth a few hundred Rupees. Such is the case with most wells at Pondicherry. This however is far from being so in every locality. Most borings particularly of large diameter, are impeded by difficulties which can be overcome by the use of proper tools, in the hands of an operator who has had much experience. A few words will explain the disparity of circumstances under this head. Let us, for instance, take into consideration the wells Nos. 8, 9, 11 & 13 mentioned in the Proceedings of the Sanitary Commissioner under No. 39 dated the 11th January 1883 and G.O. of 26th January 1883 No. 170 Financial. These wells being bored in modern alluvium and in tertiary soils, the simplest form of apparatus was sufficient. Well No. 14 bored at Bahour, and the well at Karikal, having struck secondary rock, a choice assortment of tools was needed. The easy wells I refer to are 20 to 40 metres deep. The more difficult ones exceed 100 metres. One well is about 200 metres deep. Such deep wells cannot be sunk with cheap tools. Above all I may mention the well that I have sunk at Tiruvandrum, of which the last six feet were through solid gneiss found at a depth of 246 feet from the level of the ground.

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2. Accidents. In boring Artesian wells, the least forseen of accidents might occur, and they require the display of the greatest ingenuity for the contrivance of special tools adapted to the peculiar circumstances of the case. I may mention the following cases: —

A. Obstruction of the lower end of the bore by the fall of a broken piece of the boring tool.

B. Wedging in of the boring tool between the pipe and some hard substance, causing the tool to become fixed and immoveable.

C. Deviation of the pipe from the vertical line, brought about by neglect in testing sufficiently often the accuracy of the vertical. It is also brought about by the bending of bad material.

D. The rupture of rivets connecting two successive pipes.

E. The compression of the pipe by such pressure of the earth as to render it immoveable.

Each of these cases includes thousands of varieties which if they be detailed would fill up volumes over volumes. Although it is impossible to indicate in a few words, how all these cases are to be met, it may be said that with a proper assortment of tools, in competent hands, all difficulties may be overcome.

3. Compression of pipe. Case E among accidents must be expected in great depths. In the trial boring of 10" at Madras, the pressure at 80 metres will most likely arrest further progress of the 26 centimetres pipe. In that case a pipe of 21 centimetres must be introduced into the original pipe and the boring continued. Under these circumstances a great

variety of cases may occur, which can all be met with the piping and tools specified.

4. Inefficiency of cheap tools. Cheap tools bring about accidents. When such occur they are unfit to remedy them. Moreover no great depth can be attained, and rock cannot be cut through with cheap tools. With such tools, particularly in the hands of amateurs, a small boulder is enough to arrest for ever the progress of a very promising well, or failure is due to some small accident which would be a trifle with good tools and material, but is insuperable with cheap tools. Should a trial be made at Madras with inefficient tools and failure ensue, the possibility of successfully boring an Artesian well will be anything but tested, and yet the failure will act as a damper on further enterprise and arrest for a long while all search for Artesian springs. In this as in all other matters, the cheapest is to procure the best available material and tools. It is special in this case, when it is considered that the right tools once acquired all subsequent borings will be reduced in cost to a very low figure.

5. Missing the spring. All Artesian wells do not spout up to their best as soon as they are tapped. Owing to obstructions, that are removable, some of the best springs are often very lazy and require much coaxing before they begin to flow. A case of this sort may in incompetent hands be mistaken for a worthless spring. I have seen cases of this sort.

6. Information in tools specified. These tools are exactly like those now used by the French Government at Pondicherry; and they are to be indented for from the same manufacturers who supply also the requisite for wells of bigger and of smaller bore.

No. 2
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No. 3129. W

P. W. Department,

Civil Works

Proceedings of the Madras Government,

Under date the 19th December 1884

Read the following —

Letter from Mons. L. Cornet Louis d/ December 15th 1884

3129/19

This letter refers to a tender submitted by Mons. L. Cornet, for sinking an artesian well at Madras to a depth of 393 feet, (120 metres).

2. The tools and appliances are estimated to cost Rs 12,500/-. Of this sum, masonry and staging will cost Rs 1500/-. The latter will first be put in hand, and will be ready against the arrival of

the apparatus for which it is proposed to telegraph. Mons: Cornet demands a salary of Rs 400 per mensem, and approximately estimates the wages of work people at Rs 150 per mensem.

3. The approximate cost of the well will be as follows:—

	Rs
Apparatus	11,000
Masonry, staging &c.	1,500
Salary of Engineer for 4½ months	1,800
Pay of work people for do	675
Masonry cistern to hold supply	300
Fuel, wire and steel for repairs &c.	200.
Total	Rs 15,475

4. This rough estimate is based on the assumption that the apparatus will

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arrive from Paris within six weeks, and that it will take three months to sink the well 393 feet. The latter period will however depend entirely on the nature of the strata to be penetrated. If much rock be encountered, the work may occupy a much longer time, but if nothing but clay and sand be traversed, the well will probably be sunk in six weeks.

3/29/15

5. It is understood that, if water of good quality or of sufficient quantity be not tapped at a depth of 393 feet, the necessary tubes for lining

the bore, should it have to be carried further down, can be made up quickly and cheaply at Madras.

6. It is observed that apparatus, other than tubing, valued at about Rs 6000/- will, on completion of the well now proposed, be available for similar wells elsewhere.

7. His Excellency the Governor in Council considers that it is in every way desirable to make the experiment, and accordingly resolves to accept Mons: Cornet's offer.

8- The site of the experiment will be fixed by the Chief Engineer, P.W. Dept.

9- The question of an allotment of funds will be considered in the Financial dept.

L.S.
18-12-84

Cl.
17.12.84

3129/16

To,
Mons: L. Cornet. ✓
Financial dept ✓
S.E. V Circle ✓
E.P.W. Accts. ✓

pee 22/12/84

Certain Will.

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Read in Council, when
Chief Secretary undertook
the provision of funds.

16-12-84

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Govt. of {1884} Madras.

PUBLIC WORKS.

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Dated

Rec'd. Enel. ✓

G.O., 19th Dec 1884, No. 3129 W

Note
Placed in E.T vide

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