

(1) Number of pages 11(2) Date of repair (3) Initials of the Referencer

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	423	Press
B.P. No.		Mis.
Dated	15 - 2	6875
		195

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*Proceedings of the Madras Government, Public Works Department,
15th February 1875.*

Read the following papers:—

No. 334. From Captain J. W. HINDLE, Officiating District Engineer, Vizagapatam, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Camp at Vizianagram, 21st October 1874, No. 1,402.

As directed in G. O., No. 1,501, of 8th June 1874, I have the honor to submit, herewith, a report in detail on the
1 Report. construction of two wells at Vizianagram.

Report in detail on the construction of two Wells on the English method at Vizianagram.

THE wells are not yet completed, and, as a considerable quantity of water stands in each, and no means are available for keeping the water under, it will not be possible to carry on the work until January next. One well has, however, been excavated and steined to a depth of 50 feet (the depth allowed in the estimate); but, as the supply of water is small, it will be necessary to carry it down an additional 10 or 12 feet: the second well has been excavated and steined to a depth of 38 feet, and the supply of water is so plentiful that it will not be necessary to carry it down any further.

The excavation, which was commenced on the 19th January last, was cylindrical, 8 feet in diameter, and carried through gravel to a depth of 4 feet; this done, the bottom was carefully levelled, the brick steining commenced and carried up to the surface of the ground: as the brick-work proceeded, all vacuities behind were filled in with concrete and rammed hard; the bricks were specially moulded for the work and were laid in chunam; the excavation was resumed in the centre of the shaft and carried down another 4 feet; and when the brick-work above was thoroughly dry, a benching, which had been left all round to support the steining, was cut away, and the excavation completed to the full diameter (8 feet); the bottom having been levelled, the brick-work was commenced below that already executed a plummet and line being used to ensure its being carried up perpendicularly; and this was built to a height of 2 feet in chunam and filled in behind with concrete; above this the bricks were laid in mud, and puddled behind, and carried up to meet the steining of the upper section. The bricks were laid all headers; the work was continued in the manner described above until the water put a stop to it.

The cost incurred up to date in sinking the two wells is Rupees 234-2-9; of this, Rs. 58-6-8 were spent on superintendence and sundries; the latter item (Sundries) includes the cost of ropes, pots, and a windlass which were used at both wells; the remainder, viz., Rupees 195-12-1, was spent on the earth-work steining and concrete backing of both wells.

The 50-feet well has cost Rupees 136-2-6, viz.:—

<i>Items of Cost of 38-feet well.</i>				RS. A. P.			
Earth-work	...	...	...	13	15	1	Earth-work ... 22 11 9
Steining	...	...	...	58	1	5	Steining ... 78 8 11
Concrete backing	...	...	...	9	7	1	Concrete backing ... 12 15 10
Sundries	...	...	...	16	8	8	Sundries ... 21 14 0
Total				98	0	3	Total ... 136 2 6

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Details of earth-work are as follow:—

Section.	Diameter.	Depth.	Cubical Contents in Yards.	Rate.	Amount.	Nature of Soil.
1st	8 feet.	4 feet.	7½	RS. A. P.	RS. A. P.	
2nd	8 do.	4 do.	7½	0 1 0	0 7 6	
3rd	8 do.	4 do.	7½	0 1 6	0 11 3	
4th	8 do.	4 do.	7½	0 2 0	0 15 0	
5th	8 do.	4 do.	7½	0 2 6	1 2 9	
6th	8 do.	4 do.	7½	0 3 0	1 6 6	
7th	8 do.	4 do.	7½	0 3 6	1 10 3	
8th	8 do.	4 do.	7½	0 4 0	1 14 0	
9th	8 do.	4 do.	7½	0 4 6	2 1 9	
10th	8 do.	4 do.	7½	0 5 0	2 5 6	
11th	8 do.	4 do.	7½	0 5 6	2 9 3	
12th	8 do.	4 do.	7½	0 6 0	2 13 0	
13th	8 do.	2 do.	3½	0 6 6	3 0 9	
				0 7 0	1 10 3	
Total ...					22 11 9	

Details of Brick Steining and Brick-in-clay.

Description of Work.	Section.	Depth.	Quantity.	Rate.	Amount.
Brick in chunam	1st	4 feet	2 9½	RS. A. P.	RS. A. P.
Do. in do.	2nd	2 do.	1 4½	2 8 7	5 15 5
Do. in clay		2 do.	1 4½	2 9 5	3 0 8
Do. in chunam	3rd	2 do.	1 4½	2 3 4	2 9 6
Do. in clay		2 do.	1 4½	2 10 3	3 1 8
Do. in chunam	4th	2 do.	1 4½	2 4 2	2 10 6
Do. in clay		2 do.	1 4½	2 11 1	3 2 8
Do. in chunam	5th	2 do.	1 4½	2 5 0	2 11 6
Do. in clay		2 do.	1 4½	2 11 11	3 3 8
Do. in chunam	6th	2 do.	1 4½	2 5 10	2 12 6
Do. in clay		2 do.	1 4½	2 12 9	3 4 8
Do. in chunam	7th	2 do.	1 4½	2 6 8	2 13 6
Do. in clay		2 do.	1 4½	2 13 7	3 5 8
Do. in chunam	8th	2 do.	1 4½	2 7 6	2 14 6
Do. in clay		2 do.	1 4½	2 14 5	3 6 8
Do. in chunam	9th	2 do.	1 4½	2 8 4	2 15 6
Do. in clay		2 do.	1 4½	2 15 3	3 7 8
Do. in chunam	10th	2 do.	1 4½	2 9 2	3 0 6
Do. in clay		2 do.	1 4½	3 0 1	3 8 8
Do. in chunam	11th	2 do.	1 4½	2 10 0	3 1 6
Do. in clay		2 do.	1 4½	3 0 11	3 9 8
Do. in chunam	12th	2 do.	1 4½	2 10 10	3 2 6
Do. in clay		2 do.	1 4½	3 1 9	3 10 8
Do. in chunam	13th	2 do.	1 4½	2 11 8	3 3 6
				3 2 9	3 11 8
Total ...					78 8 11

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15th February 1875.

Data for one cubic yard Brick-in-chunam Steining of Upper Section.

Quantity.	Description of Work.	Rate.	Per Item.	Amount.	Total.
350	Bricks ...	RS. A. P.	1,000	RS. A. P.	RS. A. P.
2	Bricklayers ...	3 0 0	each.	1 0 9	
2	Men coolies ...	0 5 0	Do.	0 10 0	
6	Small do. ...	0 1 8	Do.	0 3 4	
2	Paras chunam ...	0 1 0	Garce.	0 6 0	
2	Paras sand ...	6 0 0	Para.	0 3 10	
		0 0 4		0 0 8	
Total ...					2 8 7

Data for one cubic yard Brick-in-mud Steining to Second Section.

Quantity.	Description of Work.	Rate.	Per Item.	Amount.	Total.
350	Bricks ...	RS. A. P.	1,000	RS. A. P.	RS. A. P.
2	Bricklayers ...	3 0 0	each.	1 0 9	
2	Men coolies ...	0 5 0	Do.	0 10 0	
4	Women do. ...	0 1 8	Do.	0 3 4	
2	Paras clay ...	0 1 0	Do.	0 4 0	
		...	...	0 1 3	
Total ...					2 3 4

Details of Concrete and Puddling.

Section.	Description.	Depth.	Quantity.	Rate.	Amount.
1st	Concrete	4 feet	1 C. yard.	RS. A. P.	RS. A. P.
2nd	Puddle	2 do.	½ do.	0 15 8	0 15 8
3rd	Concrete	2 do.	½ do.	0 12 2	0 6 1
4th	Puddle	2 do.	½ do.	1 0 2	0 8 1
5th	Concrete	2 do.	½ do.	0 12 8	0 6 4
6th	Puddle	2 do.	½ do.	1 0 8	0 8 4
7th	Concrete	2 do.	½ do.	0 13 2	0 6 7
8th	Puddle	2 do.	½ do.	1 1 2	0 8 7
9th	Concrete	2 do.	½ do.	0 13 8	0 6 10
10th	Puddle	2 do.	½ do.	1 1 8	0 8 10
11th	Concrete	2 do.	½ do.	0 14 2	0 7 1
12th	Puddle	2 do.	½ do.	1 2 2	0 9 1
13th	Concrete	2 do.	½ do.	0 14 8	0 7 4
	Puddle	2 do.	½ do.	1 2 8	0 9 4
	Concrete	2 do.	½ do.	0 15 2	0 7 7
	Puddle	2 do.	½ do.	1 3 2	0 9 7
	Concrete	2 do.	½ do.	0 15 8	0 7 10
	Puddle	2 do.	½ do.	1 3 8	0 9 10
	Concrete	2 do.	½ do.	1 0 2	0 8 1
	Puddle	2 do.	½ do.	1 4 2	0 10 1
	Concrete	2 do.	½ do.	1 0 8	0 8 4
	Puddle	2 do.	½ do.	1 4 8	0 10 4
	Concrete	2 do.	½ do.	1 1 2	0 8 7
	Puddle	2 do.	½ do.	1 5 2	0 10 7
	Concrete	2 do.	½ do.	1 1 8	0 8 10
Total ...					12 15 10

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Data for one cubic yard Concrete of Upper Section.

Quantity.	Description of Work.	Rate.	Per Item.	Amount.	Total.
4½	Paras chunam ...	RS. A. P. 0 1 11	Para.	RS. A. P. 0 8 3	ES. A. P.
2	Men coolies ...	0 1 4	Each	0 2 8	
4	Women do. ...	0 1 0	Do.	0 4 0	
1	Boy do. ...	0 0 9	Do.	0 0 9	
Total ...					0 15 8

Data for one cubic yard Puddling for Second Section.

Quantity.	Description of Work.	Rate.	Per Item.	Amount.	Total.
2	Men coolies ...	RS. A. P. 0 1 4	Each	RS. A. P. 0 2 8	ES. A. P.
4½	Women do. ...	0 1 0	Do.	0 4 6	
1	Boy do. ...	0 0 9	Do.	0 0 9	
1 C. yd.	Clay ...	0 4 3	C. yard.	0 4 3	
Total ...					0 12 2

The advantages derived by the adoption of the new system, as deduced from the present experiment, are —

- 1st.—Economy; the comparative statement appended shows this conclusively.
- 2nd.—Greater safety to workmen.
- 3rd.—The possibility of deepening the wells during an exceptionally dry season; this cannot always be done with wells sunk on the old system.
- 4th.—With the old system the earth for some distance round the well being filled in subsides after a time, and this renders the relaying of annular pavements necessary; also, on such loose earth, the construction of bathing or filtering cisterns is unadvisable; the new system has no such disadvantages.

WALTAIR,
21st October 1874.

(Signed) J. W. HINDLE, Captain,
Offg. District Engineer.

Proceedings of the Madras Government Public Works Department,
15th February 1875.

Comparative Statement showing the Cost of Excavating a Well 50 feet deep on the old and new system.

Old Style of Excavation.	Number of Yards in depth.	Mean Diameter.	Depth.	Yards.	Rate.	Amount.	New Style of Excavation.	Order of Excavation.	Depth.	Contents in Cubic Yards.	Rate.	Amount.
With sloping sides one horizontal to three perpendicular.	1st ...	41	3	150 7½	RS. A. P. 0 0 10	RS. A. P. 7 13 8	Cost of filling in round steining being the total excavation less content of a cylinder 8 feet in diameter, and 50 feet deep.	1st	4 feet.	7½	RS. A. P. 0 0 7	RS. A. P. 0 7 6
	2nd ...	39	3	136 4	0 1 1	9 3 7		2nd	4 do.	7½	0 11 3	0 3 0
	3rd ...	37	3	122 19	0 1 4	10 3 7		3rd	4 do.	7½	0 15 0	0 9 6
	4th ...	35	3	109 26	0 1 7	10 14 1		4th	4 do.	7½	1 2 9	6 3 0
	5th ...	33	3	97 25	0 1 10	11 3 4		5th	4 do.	7½	1 6 3	0 0 9
	6th ...	31	3	86 15	0 2 1	11 4 4		6th	4 do.	7½	1 10 0	9 6 3
	7th ...	29	3	75 25	0 2 4	11 1 11		7th	4 do.	7½	1 14 1	9 6 3
	8th ...	27	3	65 26	0 2 7	10 9 11		8th	4 do.	7½	2 2 5	6 3 0
	9th ...	25	3	56 20	0 2 10	10 0 9		9th	4 do.	7½	2 5 6	3 0 9
	10th ...	23	3	48 5	0 3 1	9 4 5		10th	4 do.	7½	2 13 0	9 3 3
	11th ...	21	3	40 9	0 3 4	8 6 3		11th	4 do.	7½	3 0 7	0 1 10
	12th ...	19	3	33 4	0 3 7	7 6 5		12th	4 do.	7½	3 6 0	6 6 0
	13th ...	17	3	26 19	0 4 1	6 5 8		13th	4 do.	7½	4 0 7	7 0 0
	14th ...	15	3	20 26	0 4 4	5 5 10						
	15th ...	13	3	15 24	0 4 7	4 4 9						
	16th ...	11	3	11 14	0 4 10	3 4 9						
	17th ...	9	2	5 6	0 4 10	1 9 2						
					0 0 10	52 10 6						22 11 9
					...	191 0 9						

(Signed) J. W. HINDLE, Captain,
Offg. District Engineer.

WALTAIR,
— October 1874.

Proceedings of the Madras Government, Public Works Department,
15th February 1875.

No. 335. From Major F. HINDLE, Officiating District Engineer, Vizagapatam, to Colonel G. W. WALKER, R.E., Chief Engineer, Public Works Department, dated Waltair, 28th December 1874, No. 1,891.

With reference to paragraph 2 of your Memorandum, No. 936, of the 7th December 1874, I have the honor to inform you that I have no data from which I can give you the relative cost of brick lining according to the old and new method, in consequence of no native work of brick-in-chunam having been carried out in this district.

2. The wells that have been constructed in these parts have been lined with cut stone, but, I think, it will be seen from the following statement that the new method must be much cheaper than the old one under any circumstances. I am doubtful as to how the new method would act if rock were encountered during excavation; very great care and constant supervision by an European would be required to prevent the steining above being loosened by the blasting below. But Mr. Supervisor Cormac, who very carefully and assiduously carried out the work at the two wells at Vizianagram, does not anticipate much danger on that account, though he is of opinion that constant supervision of a competent European Officer will be necessary to prevent the natives from using too large charges of powder in their blasting.

3. At present the new method does not find favor with the native workmen, as they are in constant dread of the top part of the work caving in upon them whilst excavating below it. Indeed, during the process of sinking the two wells at Vizianagram, the Sepoys of the 12th Regiment Native Infantry so frightened the coolies with their forebodings of a collapse, that for some time they refused to work, but were ultimately induced to continue, and by degrees seemed to gain confidence. I imagine that the same difficulty will be experienced in most places at first, till the workmen have from actual experience found that there is no more danger to be feared in the new mode of operation than in the old.

Cost of excavation (old method)	RS. A. P.
Do. (European)	191 0 9
... ..	22 11 9
Deduct cost of steining	Difference ... 168 5 0
Difference in favor of European method	78 8 11
... ..	89 12 1

No. 336. ORDER THEREON, 15th February 1875, No. 423.

CIVIL WORKS, No. 22.

The practical result of the substitution of an improved method of well sinking for the rude method in use at Vizianagram, and of brick for stone insisted on by the Chief Engineer, appears to be that the cost of a well of 8 feet internal diameter and 50 feet deep originally estimated at Rupees 700, then brought down to Rupees 613, and afterwards sanctioned at Rupees 350 in G. O., No. 2,424, of 3rd October 1873,

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has been finally reduced to Rupees 136; a second well of 38 feet in depth costing Rupees 98.

2. The data afforded by the report will be communicated to District Engineers for information.

(True Extract)

Colonel, R.E.,
Secretary to Government.

To District Engineers.
,, the Executive Engineer, Wynaad.

Exd. A. Grubert.

Spare Copies

Report in detail on the construction of
two Wells on the English method at
Virianagram.

The wells are not yet completed, and as a considerable quantity of water stands in each, and no means are available for keeping the water under, it will not be possible to carry on the work until January next; One well has, however, been excavated and stined to a depth of fifty feet (the depth allowed in the Estimate) but as the supply of water is small, it will be necessary to carry it down an additional ten or twelve feet; The second well has been excavated and stined to a depth of thirty eight feet, and the supply of water is so plentiful that it will not be necessary to carry this down any further.

The excavation, which was commenced on the 19th January last, was cylindrical, eight feet in diameter, and carried through gravel to a depth of four feet; this done, the bottom was carefully levelled, the brick stining commenced and carried up to the surface of the ground: as the brick work proceeded, all vacuities behind were filled in with concrete, and rammed hard; the bricks were specially moulded for the work and

were laid in chunam, the excavation was resumed in the centre of the shaft and carried down another four feet, and when the brick work above was thoroughly dry, a benching which had been left all round to support the steining, was cut away, and the excavation completed to the full diameter, (eight feet) the bottom having been levelled, the brick work was commenced below that already executed, a plummet and line being used to ensure its being carried up perpendicular. by; and this was built to a height of two feet in chunam, and filled in behind with concrete; above this the bricks were laid in mud, & puddled behind, and carried up to meet the steining of the upper section. The bricks were laid all headers, the work was continued in the manner described above until the water put a stop to it.

The cost incurred up to date in sinking the two wells is Rs. 234-2-9; of this Rs. 58-8-8 were spent on superintendence and Sundries; the latter item (Sundries) includes the cost of ropes, pots, and a windlass, which were used at both wells, the remainder viz. Rs. 195-12-1 was spent on the earth work steining and concrete backing of both wells.

The

Items of Cost of 38 ft. well
Earthwork Rs. 13-15-1
Steining — 58-1-5
Concrete backing } — 9-7-1
Sundries — 16-8-8
Rs. 98-0-3

The fifty feet well has cost Rs. 136-2-6
viz Earth work — Rs. 22-11-9
Steining — 78-8-11
Concrete backing — 12-15-10
Sundries — 21-14-
136-2-6

Details of earth works are as follows:-

Section	Diameter	Depth	Cubical Contents in yards	Rate	Amount	Nature of Soil
1 st	8 feet	4 feet	7 1/2	1	7 6	
2 nd	8	4	7 1/2	1.6	11 3	
3 rd	8	4	7 1/2	2	15	
4 th	8	4	7 1/2	2.6	19 9	
5 th	8	4	7 1/2	3	22 6	
6 th	8	4	7 1/2	3.6	27 3	
7 th	8	4	7 1/2	4	30	
8 th	8	4	7 1/2	4.6	34 9	
9 th	8	4	7 1/2	5	37 6	
10 th	8	4	7 1/2	5.6	42 3	
11 th	8	4	7 1/2	6	45	
12 th	8	4	7 1/2	6.6	49 9	
13 th	8	2	3 3/4	7	25 6	
					<u>221 9</u>	

Details of Brick Steining and Brick in clay

Description of work	Section	Depth	Quantity	Rate	Amount
Bricks in Chunam	1 st	4 feet 2-9 $\frac{1}{2}$	287	5155	
D. in clay	2 nd	2 feet 1-4 $\frac{3}{4}$	293	358	
D. in clay		2 feet 1-4 $\frac{3}{4}$	234	296	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2103	318	
D. in clay	3 rd	2 feet 1-4 $\frac{3}{4}$	242	2106	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2111	328	
D. in clay	4 th	2 feet 1-4 $\frac{3}{4}$	25	2116	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2111	338	
D. in clay	5 th	2 feet 1-4 $\frac{3}{4}$	2510	2126	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2129	348	
D. in clay	6 th	2 feet 1-4 $\frac{3}{4}$	268	2136	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2137	358	
D. in clay	7 th	2 feet 1-4 $\frac{3}{4}$	276	2146	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2145	368	
D. in clay	8 th	2 feet 1-4 $\frac{3}{4}$	284	2156	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	2153	378	
D. in clay	9 th	2 feet 1-4 $\frac{3}{4}$	292	36	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	31	388	
D. in clay	10 th	2 feet 1-4 $\frac{3}{4}$	210	316	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	311	398	
D. in clay	11 th	2 feet 1-4 $\frac{3}{4}$	21010	326	
D. in Chunam		2 feet 1-4 $\frac{3}{4}$	319	3108	
D. in clay	12 th	2 feet 1-4 $\frac{3}{4}$	2118	336	
D. in Chunam	13 th	2 feet 1-4 $\frac{3}{4}$	329	3118	

78811

Data for one cubic yard brick in Chunam steining of upper section

Quantity	Description of work	Rate	Per item	Amount	Total
350	Bricks	3	1000	1.9	
2	Bricklayers	5	each	10	
2	New Coolies	18	do	34	
6	Small D.	1	do	6	
2	Paras Chunam	6	para	10	
2	Paras sand	4	para	8	
	Total				287

Data for one cubic yard Brick in mud steining to second section

Quantity	Description of work	Rate	Per item	Amount	Total
350	Bricks	3	1000	1.9	
2	Bricklayers	5	each	10	
2	New Coolies	18	do	34	
4	Women D.	1	do	4	
2	Paras clay			13	
	Total				234

Details of Concrete and puddling

Section	Description	Depth	Quantity	Rate	Amount
1 st	Concrete	4 feet	1 Cyd.	15.8	15.8
	Puddle	2 feet	1/2 Cyd.	12.2	6.1
2 nd	Concrete	2 feet	1/2 Cyd.	12.2	6.1
	Puddle	2 feet	1/2 Cyd.	12.8	6.4
3 rd	Concrete	2 feet	1/2 Cyd.	12.8	6.4
	Puddle	2 feet	1/2 Cyd.	13.2	6.6
4 th	Concrete	2 feet	1/2 Cyd.	13.2	6.6
	Puddle	2 feet	1/2 Cyd.	13.8	6.9
5 th	Concrete	2 feet	1/2 Cyd.	13.8	6.9
	Puddle	2 feet	1/2 Cyd.	14.2	7.1
6 th	Concrete	2 feet	1/2 Cyd.	14.2	7.1
	Puddle	2 feet	1/2 Cyd.	14.8	7.4
7 th	Concrete	2 feet	1/2 Cyd.	14.8	7.4
	Puddle	2 feet	1/2 Cyd.	15.2	7.6
8 th	Concrete	2 feet	1/2 Cyd.	15.2	7.6
	Puddle	2 feet	1/2 Cyd.	15.8	7.9
9 th	Concrete	2 feet	1/2 Cyd.	15.8	7.9
	Puddle	2 feet	1/2 Cyd.	16.2	8.1
10 th	Concrete	2 feet	1/2 Cyd.	16.2	8.1
	Puddle	2 feet	1/2 Cyd.	16.8	8.4
11 th	Concrete	2 feet	1/2 Cyd.	16.8	8.4
	Puddle	2 feet	1/2 Cyd.	17.2	8.6
12 th	Concrete	2 feet	1/2 Cyd.	17.2	8.6
	Puddle	2 feet	1/2 Cyd.	17.8	8.9
13 th	Concrete	2 feet	1/2 Cyd.	17.8	8.9

12 15 10

Data for 1 Cubic yard Concrete of upper Section

Quantity	Description of work	Rate	Per item	Amount	Total
4 1/2	Paras Chunam	1	Para	8.3	
2	Men Coolies	1	each	2.8	
4	Women	1	"	4.0	
1	Boy	9	"	9.0	
	Total				15.8

Data for 1 Cubic yard Puddling for Second Section

Quantity	Description of work	Rate	Per item	Amount	Total
2	Men Coolies	1	each	2.8	
4 1/2	Women	1	"	4.6	
1	Boy	9	"	9.0	
10 1/2	Clay	4.3	Cy	43.0	
	Total				12.2

The advantages derived by the adoption of the new system, as deduced from the present experiment, are:-

1st Economy; the comparative statement appended shews this conclusively.

2nd Greater safety to workmen.

3rd The possibility of deepening the wells during an exceptionally dry season; this cannot always be done with wells sunk on the old system.

4th With the old system the earth for some distance round the well being filled in subsides after a time and this renders the relaying of annular pavements necessary; also, on such loose earth, the construction of bathing or filtering cisterns is inadvisable; the new system has no such disadvantages.

District Engineers office

Waltair 21 October 1874

M. P. B. Captain

Offg District Engineer

Vizagapatam.

7.

Cost of filling in round steining
being the total excavation less
content of a cylinder 8 feet in
diameter and 50 feet deep.

M. H. Pringle. Captain
offg District Engineer, Vizagapatam

21/11

N^o 1402

District Engineer's Office
Camp Virianagram
Waltair 2nd October 1874

From

Captain J. W. Hindle
Offg. District Engineer
Viragapatam

To

Colonel G. W. Walker C.E.
Secretary to Govt. P.W.D.
Madras

Sir

As directed in G.O. N^o 1501
of 8th June 1874, I have the honor to
submit herewith a report in detail
on the construction of two Wells at
Virianagram.

I have the honor to be
Sir

Your most Obedt. Servt.
J. W. Hindle Captain
Offg. Dist. Engr. Viragapatam

P. M. 6858/74

Report in detail
on the construction of
two Wells on the English
method at Virianagram

N^o 1891 District Engineers Office
Maltair 28 December 1874

From
Major J. W. Hindle
Offg. District Engineer
Vizagapatam

To
Colonel G. W. Walker R.E.
Chief Engineer P.W.D.
Madras

With reference to para two of your
Memo N^o 936 of the 7th December 1874 I have
the honor to inform you that I have no data
from which I can give you the relative cost of
brick lining according the old and new method,
in consequence of no native work of bricks in
Chunam having been carried out in this District.

2. The Wells that have been constructed in
these parts have been lined with cut stone, but
I think it will be seen from the following state-
ment that the new method, must be much cheaper
than the old one, under any circumstances. I am
doubtful as to how the new method would, act, if
rock

Recd. 9-11-74
Despatched 2-11-74

To
Secretary to Govt. P.W.D.
Madras
J. W. Hindle
Offg. District Engineer
Vizagapatam
N^o 1891
Maltair 28 December 1874
Recd. 2nd Dec 1874
Despatched 2nd Dec 1874
N^o 1891
Maltair 28 December 1874
Recd. 2nd Dec 1874
Despatched 2nd Dec 1874

Handwritten notes in the bottom left corner, including "Submitted" and "Maltair".

rock were encountered during excavation, very great care and constant supervision by an European would be required to prevent the steining above being loosened by the blasting below. But Mr. Supervisor Cormiac, who very carefully and assiduously carried out the work at the two wells at Virianagram does not anticipate much danger on that account, though he is of opinion that constant supervision of a competent European Officer will be necessary to prevent the natives from using too large charges of powder in their blasting.

3. At present the new method does not find favour with the native workmen as they are in constant dread of the top part of the work caving in upon them whilst excavating below it. Indeed during the process of sinking the two wells at Virianagram the Sepoys of the 12th Regiment N.I. so frightened the Coolies with their forebodings of a collapse, that for some time they refused to work, but were ultimately induced to continue.

induced to continue, and by degrees seemed to gain confidence. I imagine that the same difficulty will be experienced in most places, at first, still the workmen have, from actual experience, found that there is no more danger to be feared in the new mode of operation than in the old.

Cost of excavation (old method)	Rs. 191-0-9
Do (European do)	22-11-9
Difference	168-5-0
Deduct cost of steining	78-8-11
Difference in favor of European method	89-12-1

I have the honor to be
 Sir
 Your most Obedt. Servant
 M. Whittle Major
 Offg. District Engineer
 Vindhya Pradesh

P. W. D.

Proceedings of the Madras Government,

Under date the

187

Read the following:—

423

from the offg: St. Engineer

Tizianagram

(18. E. No. 1402 of 21. Oct 1891. 28. Dec 1891)

The practical result of the substitution of an improved method of well sinking for the rude method in use at Tizianagram, and of brick for stone, insisted on by the Chief Engineer, appears to be that the cost of a well of 8 feet internal diameter, and 50 feet deep originally estimated at Rs 700, has been brought down to

[Signature]

[Handwritten notes]

D. W. 1875 20/11

St. Engineer

Tizianagram

Dec. 28 1891

1891

Report that he has no data from which he can give the relative cost of brick lining according to the old and new method of sinking well.

St. No. 423 15/2-95

Dec 23

to Rs 613, and afterwards
sanctioned at Rs 350
in G. O. No. 2434 of 3rd
October 1873, has been
finally reduced to Rs 136.
a second well of 38 ft
depth costing Rs 98.

The data afforded by
the Report will be com-
municated to District
Engineers for information.

Ans.

G.M.

to District Engineers ✓
Executive Offg. Hyderabad

Recd-17-2-75

Govt. of Madras
PUBLIC WORKS.

To

Dist. Engineer
S. H. S. S. S.

Dated

Recd.

Encl. /

G. O. 15 Feb. No. 423

No. 334-336.

All concerning The
data afforded by the
port of well sinking
the old and new
method of ~~sinking~~
~~the~~ ~~case~~ in the
Singapore S.
and to S. Engineers
information -