

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works.

DEPARTMENT

G.O. No.	1712	Press
B.P. No.		~~Mis.~~
544 to 547		
Dated	25-6-1874	195 .

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
25th June 1874.*

Read the following papers : —

No. 544. From Lieutenant-Colonel R. A. ROBERTS, R.E., District Engineer, Madura, to Colonel G. W. WALKER, R.E., Chief Engineer, Public Works Department, dated Peracolum, 8th April 1874, No. 35.

I HAVE the honour to report that it has this day been brought to my notice by a gentleman who has just arrived at this place, by route of the new Goodaloor Ghaut, that a tremendous storm passed down the ghaut valley on the 28th ultimo, and as it would appear that the ghaut has received considerable damage, I have considered it advisable to desire Lieutenant Greer, R.E., to revisit the ghaut at once, report what has actually occurred, and to take such immediate steps as he may consider necessary until Mr. Supervisor Potter arrives and takes charge of the work.

2. On receipt of Lieutenant Greer's report, I shall do myself the honour of addressing you further on the subject.

No. 545. Endorsement of the District Engineer, Madura, dated Madura, 24th April 1874, No. 292.

From Lieutenant M. GREER, R.E., Executive Engineer, on special duty, to Lieutenant-Colonel R. A. ROBERTS, R.E., District Engineer, Madura, dated Madura, 23rd April 1874, No. 9.

I HAVE the honour to report, for your information, that I inspected the Goodaloor Ghaut as directed in your memorandum No. 36, dated 8th April 1874, in company with Mr. Potter, on the 20th instant.

2. The top mile and a half and also the two miles at the bottom have received little or no damage; it is in the centre mile that the damage has occurred, and is owing to the fact that no catch-drain had been constructed along it. The consequence was the water rushed down and across the road at various places, and wherever it went over the revetment walls it undermined them and they slipped. The extent of the damage is about Rupees 1,800, and a detailed estimate will be forwarded without delay, also an estimate for constructing the remaining portion of the catch-drain and parapet walls along the dangerous portions of the ghaut. This latter item was not included in the original estimate.

3. I ought to state the reason the catch-drain was not made along the above portion was that until the ghaut was passable for handies it was impracticable to cart up bricks, chunam, etc., with which it was proposed to construct the drain across the rocky portions, and as the ghaut was only finished just as the feverish season set in there was no time left to make it. It was also thought that such heavy rain only occurred in the north-east monsoon, and that the risk entailed by leaving the catch-drain unconstructed was very small, but unfortunately this proved to be an exceptional year. The natives say they have not had such rain for 20 years, and as I have myself gauged 3 inches in half an hour on the Goodaloor Ghaut it shows it must have been very heavy. The portion where the damage has occurred was also the portion that has only just been completed, and there was no time for any grass, etc., to grow on the hill sides, so that considering the catch-drain had not been constructed it is a wonder more of the revetments did not give way.

*Proceedings of the Madras Government, Public Works Department,
25th June 1874.*

4. The soil on the Goodaloor Ghaut is very sandy, not like that on the Western Coast, which is, I believe, of a clayey nature; I think, therefore, that wherever there are high revetments, it would be well to slope the surface of the ghaut inwards for about two years, until grass and trees have time to grow on the hill sides immediately below the ghaut, and also till the filling in below the revetment walls have time to consolidate.

5. Finally, I ought to state that all the bridges are in good order. I would feel obliged by your giving Mr. Potter sanction to go on with the catch-drain and repairs pending the sanction of Government. I have ordered Mr. Potter to put a maistry and some coolies to cut drains, etc., across the ghaut at suitable points, so as to prevent any more damage being done in case of rain coming on before the catch-drain is finished.

FORWARDED to the Chief Engineer, Public Works Department, in continuation of this office letter No. 35, dated 8th instant.

2. Considering the emergency of the case Mr. Supervisor Potter has been directed to proceed with the catch-drain and repairs pending the sanction of Government to the estimate, which will be shortly submitted.

(Signed) R. A. ROBERTS, Lieut. Colonel, R.E.,
District Engineer, Madura

No. 546. From Lieutenant-Colonel R. A. ROBERTS, R.E., District Engineer, Madura, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madura, 14th May 1874, No. 547.

In continuation of my letter No. 35, dated 8th ultimo, to the Chief Engineer, and

1 Revised Estimate of Rupees 51,900 for constructing road from foot of ghaut to Travancore frontier.

1 Comparative Statement.

1 Estimate for repairing damages done to the Goodaloor Ghaut Road by the late storm of the 28th March 1874, Rupees 1,870.

1 Detailed Estimate of Rupees 7,295-8-8 for bridges included in the general estimate of Rupees 51,900.

my subsequent endorsement No. 292, dated 24th idem, I have the honour to submit herewith a revised estimate of Rupees 51,900 and an emergent estimate of Rupees 1,870 for the Goodaloor Ghaut Works.

2. The emergent estimate is for the works rendered necessary in making

good the damages done to the ghaut during the storm of the 28th March 1874, reported in my letter above quoted. It will be observed that the work principally consists in the rebuilding of the damaged dry stone revetments and of the injured wing-walls of culverts. The work has been already set in hand under Mr. Supervisor Potter's superintendence, and it will be completed with all practicable despatch.

3. The revised estimate is accompanied by a comparative statement explaining the causes of divergence between the original and the revised estimates. The revised estimate includes for the construction of a parapet wall along the dangerous portions of the ghaut, an item for which no allowance was made in the original estimate; it also includes for a brick in chunam catch-drain at those spots where rock is met, and which causes the original amount for the catch-drain

*Proceedings of the Madras Government, Public Works Department,
25th June 1874.*

to be nearly doubled. There can be no doubt but that the rate of 2 Annas per running foot allowed in the original estimate was altogether too small.

4. The necessity for the parapet wall mentioned in the above paragraph has been clearly demonstrated, as it is precisely in those spots where the ghaut is so protected that no damage has occurred.

5. I would refer you, in conclusion, to paragraph 4 of Lieutenant Greer's letter, submitted with my endorsement already quoted. The soil on the Goodaloor Ghaut is sandy and totally dissimilar in tenacity to the clayey soils of the Western Ghats; when with such a soil, after a drought of about five months, a terrific storm passes, as it did on the 28th March last, down the ghaut valley, it is a wonder that more damage was not done than actually happened to the ghaut, and that we have not very serious disasters to chronicle instead of the comparatively trifling damage that has actually occurred.

Chief Engineer's Memorandum.

THE damage done to the new Goodaloor Ghaut by a storm on the 28th March, while the earthworks were comparatively new, appears from these reports to have been confined chiefly to one mile of its length where no catch-drain had been constructed. The omission of this most important feature of a ghaut road which had shortly before been reported complete, the proposal to complete the missing portion with brick in chunam, and that to slope the road surface inwards, savour of inexperience of such works on the part of the executive and supervising Engineers.

2. A catch-drain is an essential accompaniment to every yard of a ghaut road, but in the thousands of miles of catch-drain in existence along the Western Ghats and on the Neilgherries no where is brick in chunam used; and it is feared by the Chief Engineer that resort to it in the present instance must be with a view to the interception and carrying to a distance of bodies of water which should be allowed to find their quickest way to the road, and to cross it at once by under-drains of adequate size.

3. The idea that certain portions of roads on hill sides in certain soils should be sloped inwards is a fallacy which has beset inexperienced ghaut makers all over the Presidency as well as in Madura. The Chief Engineer can recollect perfectly well, in 1856, when every road on the Neilgherries was so sloped inwards with most disastrous effect. There can be but one accurate section for a road of full width and that is with a fall to each side quicker than its longitudinal fall, so that if the road surface be kept good whatever rain falls on it shall run off *at once*, without accumulating. Unaccumulated rain thus trickling off on the outer side of a road, however bad the soil may be, can do no harm. Attention to road surface, and not a vicious section, is the cure for the evil feared by the District Engineer and his energetic executive officer.

4. Taken in connection with the proposal to construct 970 running yards of catch-drain with brick in chunam, Lieutenant Greer's proposal in paragraph 5 to cut open drains across the ghaut, leads the Chief Engineer to suspect that a sufficiency of rough stone under-drains has not been provided. He averages the provision made in the estimate at one for every 150 yards, and that may not be enough.

Proceedings of the Madras Government, Public Works Department,
25th June 1874.

5. The rate of Rupees $1\frac{1}{2}$ per cubic yard of rough stone work in the repair estimate is excessive, being double the Neilgherry rate. It may be justifiable by peculiar circumstances affecting labour at an unhealthy time of year, the rate allowed in the ghaut estimate being 50 per cent. less.
(Signed) G. W. WALKER, Colonel, R.E.,
Chief Engineer.
5th June 1874.

No. 547.

ORDER THEREON, 25th June 1874, No. 1,712.

CIVIL WORKS, No. 34.

His Excellency the Governor in Council sanctions the estimate of Rupees 1,870 for repairing the damage done to the new Goodaloor Ghaut in Madura by a storm on the 28th March. Considering the newness of the work, and the fact that the damages (which were to revetments and wing-walls and dry stone work) occurred chiefly in a mile of ghaut unprotected by catch-drains, it does not appear that they were very serious.

2. The revised estimate of Rupees 51,900 is returned for specification of sundries and superintendence in more detail, as that heading is in excess of the maximum of 10 per cent., which can ~~surely~~ be allowed, and must never be exceeded. The District Engineer will likewise reconsider the subject of catch-drains and under-drains with reference to the Chief Engineer's remarks. The proposed construction of parapet walls is highly desirable.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

To the District Engineer, Madura. *with Estimate*
.. Controller of Public Works Accounts.

Exd. S. T. Austin.

Spare Copies



No 35
From

District Engineer's Office
At Serampore 8 April 1874

Vicent Colonel N. A. Roberts R.E.
District Engineer, Madura

To

Colonel G. W. Walker R.E.
Chief Engineer D.F.W.

Sir,

I have the honor to report that it has this day been brought to my notice by a gentleman who has just arrived at this place, by route of the New Goodaloor Ghaut, that a tremendous storm passed down the Ghaut Valley on the 28th ultimo, and as it would appear that the Ghaut has received considerable damage I have considered it advisable to desire Vicent Green R.E. to peruse it

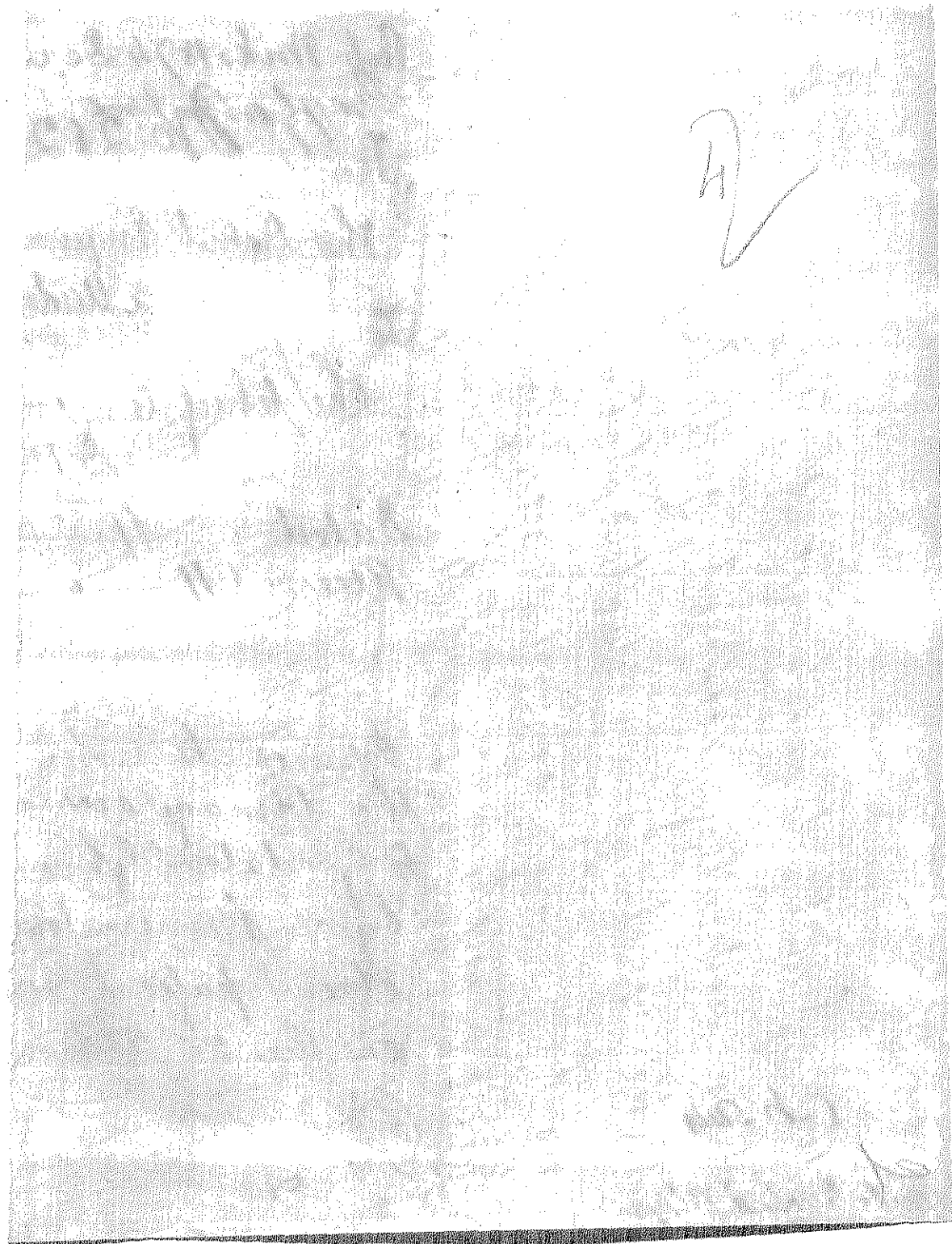
the Agent at once report what
has actually occurred, and to
take such immediate steps
as he may consider necessary
until the Supervisor of the mines
and takes charge of the work.

2. On receipt of Agent Green's
report, I shall do myself the honor
of addressing you further on
the subject.

I have the honor to be
Your Most Obedt. Servant

Wm. H. Hunt
District Engineer

No. 49 Special Executive Order



H

at various places and wherever

Recd. Marks 1874 Sept.
No. 2124.

The District Engineer
Madura

To
The Chief Engineer
B.M.

Dated 8 April 1874
Received 11

Prings to notice
the damage occurred
to Goodaloor Ghan (Kor)
by a tremendous
storm passed down
on the 28th ultimo.

C.B. No: 17/2.25-6-74.

Ar 544

Copy to B.M. 11 April 1874



No. 292

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Special Executive Engineer's Office
Madura 23rd April 1874

From

Lieutenant. M. Green, R.E.
Executive Engineer

To

Lieut. Col. D. A. Roberts, R.E.
District Engineer
Madura

I have the honor to report
for your information, that I
inspected the Goodaloor Ghan
as directed in your Memo No.
36 dated 8th April 1874 in
company with Mr. Potter on
the 20th instant.

2) The top mile and a half
and also the two miles at the
bottom have received little or
no damage; it is in the centre
mile that the damage has
occurred and is owing to the
fact that no catch drain
had been constructed along it.
The consequence was the water
rushed down across the road
at various places and where

Madura
24th April
1874

District Engineer
Madura

it went over the revetment walls it under-
mined them and they slipped. The extent
of the damage is about Rs 1,800 and a
detailed Estimate will be forwarded without
delay, also an Estimate for constructing the
remaining portion of the catch drain and
parapet walls along the dangerous portions
of the Ghaut. This latter item was not
included in the original Estimate.

3. I ought to state the reason the
catch drain was not made along the
above portion was that until the Ghaut
was passable for Donkeys it was impracticable
to cart up bricks Churnam &c with which
it was proposed to construct the drain
across the rocky portions and as the Ghaut
was only finished just as the feroish Season
set in there was no time left to make it.
It was also thought that such heavy
rain only occurred in the North East
Monsoon and that the risk entailed by
leaving the catch drain unconstructed was
very small but unfortunately this proved
to be an exceptional year. The natives
say they have not had such rain for
20 years and as I have myself gauged
3 inches in half an hour on the Goodaloot
Ghaut it shows it must have been very heavy.
The portion where the damage has occurred
was also the portion that has only just

just been completed and there was no
time for any grass &c to grow on the hill
sides so that considering the catch drain
had not been constructed it is a wonder
more of the revetments did not give way.
4. The Soil on the Goodaloot Ghaut is
very sandy not like that on the Western
coast which is I believe of a clayey nature,
I think, therefore, that wherever there are
high revetments it would be well to slope
the surface of the Ghaut inwards for about
two years until grass and trees have time
to grow on the hill sides immediately below
the Ghaut and also till the filling in behind
the revetment walls have time to consolidate.

5. Finally, I ought to state that all
the Bridges are in good order. I would
feel obliged by your giving Mr. Potter
Sanction to go on with the catch drain
and repairs pending the sanction of
Government. I have ordered Mr. Potter
to put a Maistry and some coolies to cut
drains &c across the Ghaut at suitable
points so as to prevent any more damage
being done in case of rain coming on before
the catch drain is finished.

I have &c
Waggeer Gur
Lieutenant R.E.
Executive Engineer and S.D.O.

✓

1857
Ch^o 9

Friend
The Ex Engineer
on special duty
Indians

To the Bill Eng
Indians

Dated 23rd of April 1874
Received by

Cuth-

Shows the damage
done to the Goddard
Chain Road by the
terrible storm
which down the
Grand Valley on the
28th of June.

Pub: Works 1874 Depart.
No: 2497.

From

The Dist. Engineer
Madura

Dated 24th April 1874.
Received 27th —

No. 292.

Submitting a
letter from Sant Gaur
reporting the damage
caused to the Gorda-
loor Ghant by
heavy rains and
intimating that a
catch drain ^{has}
has been provided
with pending the
sanction of Govt
to an estimate for
the work.

Q.O. No: 1712-25-6-74.

No 525
Respectfully signed by
[Signature]



District Engineer's Office
Madura 14 May 1874
No 577
From

Vic. Colonel N. A. Roberts R.E.
District Engineer, Madura

To

Colonel G. W. Walker R.E.
Secretary to Government

Sir,

In continuation of my

Enc: 4 letter, No 35, dated 8 ultimo
to the Chief Engineer and my
subsequent endorsement, No 292,
dated 24th April

- 1 Revised estimate of Rupees 51900 for
constructing Road from foot of Ghant
to Sparavore frontier.
- 1 Comparative statement
- 1 Estimate for repair damages done
to the Goodaloor Ghant road by
the late storm of the 28 March 1874
Rs 1870
- 1 Detailed estimate of Rs 7295-8-8
for bridges included in the
general estimate of Rs 51900.

dated 24th
idem, I
have the
honor to sub-
mit herewith
a revised
estimate of

Rupees 51900 and an emergent
estimate of Rupees 1870 for the
Goodaloor Ghant Works.

2. The emergent estimate is for the works rendered necessary in making good the damages done to the ghaut during the storm of the 28th March 1874, reported in my letter above quoted. It will be observed that the work principally consists in the rebuilding of the damaged dry stone revetments, and of the injured wing walls of culverts. The work has been already set in hand under Mr. Supervisor Potters' superintendence, and it will be completed with all practicable despatch.

3. The revised estimate is accompanied by a comparative statement explaining the causes of divergence between the original and the revised estimates. The revised estimate includes for the construction of a parapet wall along the dangerous portions

of the ghaut, and items for which no allowance was made in the original estimate; it also includes for a brick-in-churnam catch drain at those spots where rock is met, and which causes the original amount for the catch drain to be nearly doubled. There can be no doubt but that the rate of 2 annas per running foot allowed in the original estimate was altogether too small.

4. The necessity for the parapet wall mentioned in the above para. has been clearly demonstrated, as it is precisely in those spots where the ghaut is so protected that no damage has occurred.

5. I would refer you in conclusion to para. 4. of Mr. Green's letter submitted with my endorsement already quoted.

The soil on the Goodaloo Ghanst
is sandy and totally dissimilar
in tenacity to the clayey soils
of the western ghants; when
with such a soil, after a draught
of about 5 months, a terrific
storm passes, as it did, on the
28 March last, down the Ghanst
valley, it is a wonder that more
damage was not done than
actually happened to the
Ghanst and that not have not
very serious disasters so
chronic instead of the comparatively
trifling damage that has actually
occurred.

I have the honor to be
Sir
your Most Obedt servant.
Wm. H. R. R.
District Engineer.

Pub. Works, 1874 Dept.
No. 2937

Thos. Richard Engineer
Madura

To
The Secretary to
Government P.W.

Dated 14 May 1874
Received 18 —

Order to

Submit to proceed
estimates for the
Lardaloo Wharf
Madura

OK 456

G.O. No. 1712 25-6-74

Recd to Govt 18 May 1874

Comparative Statement showing the difference between the Sanctioned and the Revised Estimates for constructing Road from foot of Ghaut to Tranacore frontier

Particulars	As per Sanctioned Estimate			As per revised Estimate			Decrease or Saving	Increase or Excess	Remarks
	Quantity	Rate	Amount	Quantity	Rate	Amount			
Final yards of Bamboo jungle	1790	" 4	147 8	1790	" 4 6	502 7		55 15	
Do Do large Do	1021	" 2 6	159 8 6	1021	" 2 9	175 7 9		15 15 3	
Do Elephant Grass and trees	4513	" 2	561 2	4502	" 2	562 12	1 6		
Clearing yards of excavating black earth	5701 1/2	" 1	356 5 3	2228 3/4	" 1 1	157 10 4	198 10 11		The quantities in the Revised Estimate are according to the measurements and in some cases the rates allowed in the Sanctioned Estimate have been found too small.
Do Red Earth	5772 1/2	" 2	746 8 4	16134	" 2	2054 5 3		1307 12 11	
Do Gravel and hard rotten rock	37703 1/2	" 3	7106 11 9	2285 1/2	" 4	5713 7 10	1393 6 11		
Do Small boulders	16454 1/2	" 5	5142 2 2	9676 1/2	" 6	3636 2 7	1505 15 7		
Do Boulders requiring blasting	4236 1/2	" 12	3777 10	2944 1/2	" 12 6	2300 4 8	877 5 4		
Do Blasting rock	3588 1/2	" 12	6279 14	4632 1/2	" 15	8976 5 1		2696 7 1	
Do Embankments in earth	7496 1/2	" 1 6	702 12 9	280 1/2	" 1 9	963 5 5		260 8 8	
Do Retaining wall	1580 1/2	" 1	1580 8	2622 1/2	" 1 5	2854 6 10		1273 14 10	
Trenching rock for foundation	116	" 12	308 0 0		"	300 0 0	8		
Final yards of Acclling surface	7323	"	229 2 6	7313	"	266 9 11		37 7 5	
Do Do of metalling including lamping	7323	" 10	1683 2	7013	" 10	4383 2	200 0 0		
Do Do of catch drain	7323	" 2	916 10	6342	" 1 5	561 8 6	355 1 6		
Guards of Parapet wall below concrete				729 1/2	" 1	729 10 8		729 10 8	Nothing allowed in the original Estimate for this item - amount allowed in Do Do Do too small. Amount allowed for iron works about 3 times too little, the rate allowed for the masonry (Rate 2) also too little and the quantity of masonry in each bridge exceeded the quantity allowed in the Sanctioned Estimate with the exception of No. 2 bridge, where the stones had to be brought up hills for a considerable distance.
Do Catch drain brick in chumam				971	" 1 4	1213 12		1213 12	
Platform Bridge No. 1 of 25 feet span	1	1030 0 0	1030 0 0	1	1130 4 4	1130 4 4		100 4 4	
Do Do No. 3 Do Do	1	1030 0 0	1030 0 0	1	1160 11 4	1160 11 4		130 11 4	
Do Do No. 4 Do including blasting	1	1380 0 0	1380 0 0	1	1525 8 4	1525 8 4		145 8 4	
Do Do No. 2 of 15 ft span	1	700 0 0	700 0 0	1	1020 1 1	1020 1 1		320 1 1	The reason of this is partly that the bridge being at the bottom of the ghaut, the timber had to be brought from Chimbattur; it also includes a masonry dam which had to be made below the bridge owing to the immense depth at which the rock was at the side of the bridge the rate for the masonry was increased owing to the difficulty of getting stones - a saving has been effected by substituting a masonry dam with a concrete dam - Do Do Do building a masonry bridge with 2 vents instead of the wooden bridge.
Do Do No. 7 Do Do	1	700 0 0	700 0 0	1	1490 2 7	1490 2 7		790 2 7	
Do Do No. 5 Do Do	1	700 0 0	700 0 0	1	454 14 0	454 14 0	245 2		
Do Do No. 6 Do Do	1	700 0 0	700 0 0	1	513 15 0	513 15 0	186 1		
Road Dam with 3 vents	1	210 0 0	210 0 0	1	292 3 0	292 3 0		52 3 0	
Leakages - 1st Class	5	200 0 0	1000 0 0	1	300 0 0	300 0 0	700 0 0		a saving has been made as only one was considered necessary. Do Do Do two were Do Do Staking the stones has been included in sundries. Do Do Do
Do 2nd Class	6	120 0 0	720 0 0	2	69 12 6	139 9 0	580 7 0		
Do 3rd Class	37	80	2960 0 0	36	57	2052	908 0 0		
Road Tunnel	8	40 0 0	320 0 0	11	16 3	178 1	141 15 0		
Cost of Survey from 1st			500 0 0			500 0 0			
Superintendence and Sundries			3719 39			5790 4 6		2071 9	
			4800 0 0			51900 0 0	7301 7 3	11201 7 3	
								4901 7 3	

Amount to be sanctioned 3900 0 0

Pl. Executive Engineer's office
Madras 10/14

Per Mr. C. L. C. & Co.
District Engineer Madras

Supervision
Inch of Penacolum Sub. Div.

Macparr Guv
Executive Engineer on Special duty

Detailed Estimate - to 21 of 1874-75
Madura District Peraculum Talook
 Works for constructing a Plank form Bridge of 25 feet span on the Road
 from foot of Shank to Trancomore frankies.

Particulars of work	Number	Measurements			Cubical
		Length	Breadth	Height	
<u>Foundation and Superstructure</u>					
Lower Abutment	18	14	5	1260	
Wing wall	21	11	3	693	
Upper " " "	21	7	3	441	
Abutment	18	12	5	1080	
Lower wing wall	21	12	5	1260	
Upper wing wall	12	10	3	360	
Total rough about in cubical feet				5024	
or cubic yards				182 $\frac{2}{3}$	

<u>Wood work</u>					
Beams about <u>corbels</u> _____	4	30	12"	8"	80
<u>Do corbels</u> _____	8	5 1/2	12"	8"	29 1/2
Joists large _____	8	20	6"	4"	26 2/3
<u>Do small</u> _____	7	16	6"	4"	18-8
Planks _____	1	16	28	1 1/2"	56
Railings <u>Bottom Planks</u> _____	2	28	3	1 1/2"	2.1
<u>Posts</u> _____	16	3 1/2	4"	3"	4-8
<u>Hand rails</u> _____	14	4	4"	3"	4-8
Diagonal pieces _____	28	6	4"	3"	14
<u>Struts to posts</u> _____	16	3	3"	2"	2
Total <u>wood work</u> in <u>cubical feet</u> _____					257-0

Granite Stones for corbels to rest on - 8 1-3 1-6 1-6 8

<u>Iron work</u>					
Iron pieces for <u>posts</u> _____	32				
<u>Bolts with nuts</u> _____	80	6"	1/2"		
<u>Do do</u> _____	16	12"	3/8"		

One: Saw a letter from the District Engineer Madras to the Secretary to Government D.M. dated 14 May 1874 No 577

Comparative statement showing the difference between the frankies and series of Estimates for constructing Plank form foot of Shank to Trancomore frankies.

Rs. 2937/14
 2/14

Bolts with nuts	16	8"	1/2"	
Do Do	8	28"	1/2"	
Iron Screws 3"	22	Dogans		

Constructing a 3 or 25 feet Bridge.

Foundations and Superstructure

Upper abutment	18	15	5	1350
Wing wall	25	9	3	675
Lower	26	7	3	546
Abutment	18	15	5	1350
Upper Wing wall	18	3	3	162
Lower	30	12	3	1080
Total rough stone in chunam cubic feet				5163
or cubic yards				191 2/3

Granite Stones

Wood work

Beams above corbels	4	30	12"	8"	80
Do corbels	8	5-6	12"	8"	29.4
Joints large	8	20	6"	4"	26.8
Do Small	7	16	6"	4"	18.8
Planks	1	16	28	1 1/2"	56
ceilings Bottom Planks	2	28	3	1 1/2"	21
Posts	16	3-6	4"	3"	4.8
Hand rails	14	4	4"	3"	4.8
Diagonal pieces	28	6	1"	3"	14
Shuts to posts	16	3	3"	2"	2
Total wood work in cubic feet					257

Iron work

Iron pieces for posts	32			
Bolts with nuts	80	6"	1/2"	
Do Do	16	12"	5/8"	
Do Do	16	8"	1/2"	

Bolts with nuts	8	28"	1/2"	
Iron Screws 3"	22	Dogans		

Constructing a 3 or 25 feet Bridge

Foundations and Superstructure

Upper abutment	18	14	6	1512
Wing wall	31	10	3 1/2	1085
Lower	22	12	3 1/2	924
Abutment	20	10	6	1200
Upper Wing wall	48	7	3 1/2	1176
Lower wing wall	15	10	3 1/2	525
Total rough stone in chunam				6422
or cubic yards				237 2/3

Granite Stones

Wood work

Beams above corbels	4	30	12"	8"	80
Do corbels	8	5-6	12"	8"	29.4
Joints large	8	20	6"	4"	26.8
Do Small	7	16	6"	4"	18.8
Planks	1	16	28	1 1/2"	56
ceilings Bottom Planks	2	28	3	1 1/2"	21
Posts	16	3-6	4"	3"	4.8
Hand rails	14	4	4"	3"	4.8
Diagonal pieces	28	6	1"	3"	14
Shuts to posts	16	3	3"	2"	2
Total wood work in cubic feet					257

Iron work

Iron pieces for posts	32			
Bolts with nuts	80	6"	1/2"	
Do Do	16	12"	5/8"	

Bolts with nuts	16	8"	1/2"	
Do Do	8	28"	1 1/2"	
Iron Screws 3"	22	Dozens		

Constructing 1/2 or 15 feet Bridge

Foundation and Superstructure

Upper abutment	18	8	5	720
Wing wall	19	6	3	342
Lower	15	6	3	270
Abutment	18	7	5	630
Upper Wing wall	16	6	3	288
Lower Wing wall	20	6	3	360
Total rough stone in chain and cut in feet				2610
or cubic yards				96 2/3
cut Granite Stones	8	16	1	0.6

Wood work

Beams over Granite Stones	4	18	8"	12"	4.8
Joists over Beams large	4	20	4"	6"	13.4
Do Do Small	6	15.6	4"	6"	15.6
Top & bottom on longitudinal pieces	4	18	3"	4"	6
Do Upright pieces	8	2.6	3"	4"	1.8
Braces behind upright pieces	8	2	2"	3"	0.8
Cross Do Do	12	6	3"	4"	6

Total Wood work cubic feet 91.2

Planking over joists 1 18 15.6 2" 4.6.6

Total two inches planking including wood work 137.8

Iron work

Iron pieces for posts	16			
Bolts with nuts	40	6"	1/2"	
Do Do	8	12"	5/8"	

Bolts with nuts	8	8"	1/2"	
Iron Screws Dozens	11			

Constructing 1/2 or 15 feet Bridge
Foundation

Abutments	2	26	4	1	832
Wing wall	4	4	4	3	192
Chain wall	13	4	3		156

Superstructure

Abutments	2	26	8	1	1664
Wing wall	4	4	8	3	384
Body wall	4	12	3		1476
Wing wall	6	4	3		792
Wing wall	4	4	2		384
Total rough stone in chain and cut in feet					5880
or cubic yards					217 1/4

Granite

8	16	1	0.6
---	----	---	-----

Wood work

Beams over Granite Stones	4	18	8"	12"	4.8
Joists over Beams large	4	20	4"	6"	13.4
Do Do Small	6	15.6	4"	6"	15.6
Top & bottom on longitudinal pieces	4	18	3"	4"	6
Do Upright pieces	8	2.6	3"	4"	1.8
Braces behind upright pieces	8	2	2"	3"	0.8
Cross Do Do	12	6	3"	4"	6
Total Wood work cubic feet					91.2

Planking over joists 1 18 15.6 2" 4.6.6
Total 2 inches planking including wood work 137.8

Iron work

Iron pieces for posts	16			
Bolts with nuts	40	6"	1/2"	
Do Do	8	12"	5/8"	
Do Do	8	8"	1/2"	
Iron Screws Dozens	11			

Constructing a Culvert instead of No. 6 Bridge

Foundation

Abutment	2	21	4	6	1008
Pier	1	21	2	6	252
Wing wall	3	11	3	6	594
"	1	6	3	6	108

Superstructure

Abutments	2	21	3	4	504
Pier	1	21	2	4	168
Wing wall	3	11	2	6	396
Parapet wall	2	3	2	6	72
Covering stones	2	21	4.6	0.9	141.9
Total rough stone in chunam or kekul yard					335 3/4 122 1/2

Abstract Estimate No. 4 1874-75 Madura District Ponnaculum Talook Work Constructing 25 feet 1 1/2 feet Bridges & on the Road from foot of Chank to Traanamore front.

Quantity	Description of work	Rate	Amount	Total
188 3/4	Constructing No. 1 or 25 ft Bridge kekul yards of rough stone in chunam	2 12	518 13 1/4	
257	kekul feet of wood work wrought and put up including painting & varning	1 13	165 13	
8	Stones for corbels to rest on	4 10 6	37 4	
155	lbs of Iron including boring holes & complete			
80	Bolts with nuts 6" x 1/2"			
16	Do Do 1 1/2" x 5/8"			
16	Do Do 1" x 1/2"			
8	Do Do 3/8" x 1/2"			
22	Dozen Iron screws including carriage & complete			
			92 3 8	

Constructing a Road Dam instead of No. 5 Bridge

Road Dam	11	6	3	198
Total rough stone including kekul yd				198

	Sundries	16 2 4	1130 4 4	
			1130 4 4	
191 3/4	Constructing No. 3 or 25 feet Bridge kekul yards of rough stone in chunam	2 12	527 1 1/4	
8	Granite stones for corbels to rest on	4 6	35	
257	kekul feet of wood work wrought & put up including painting & varning	1 13 9	177 13 9	
155	lbs of Iron including boring holes & complete			
80	Bolts with nuts of 6" x 1/2"			
16	Do Do 1 1/2" x 5/8"			
16	Do Do 1" x 1/2"			
				826 11 8
				840 10 8
				7295 8 2

8 Bolts with nuts of 28 "x 1/2" 1039 15 1 1130 4 4
 22 Iron screws 92 3 8
 Carriage of the above

Sundries 28 8 7

Total Estimate of No. 3 Bridge 1100 11 4 2290 15 8

Constructing No. 4 or 25 feet Bridge

23 2/3 Cubic Yds of rough stone in chum 1 13 " 431 1 8
 8 Stones for corbels to rest on 5 12 9 46 6 "

25 7 Cubic feet of wood work wrought and put up including painting and Tarring 1 12 10 463 2 2

155 Lbs of Iron including boring holes & complete 1 12 10 463 2 2

80 Bolts with nuts of 6 "x 1/2"
 16 Do Do of 1 1/2 "x 5/8"
 16 Do Do of 1 "x 1/2"
 8 Do Do of 2 "x 1/2"

95 7 8

22 Dozens of Iron screws including the carriage of the above

Blasting out the Channel 376 1 "

Superintendence & Sundries 113 5 10

Total Estimate of No. 4 Bridge 1525 8 4 3816 8 0

Constructing No. 2 or 15 feet Bridge

96 2/3 Cubic Yards of rough stone in chum 6 " 580 0 0
 8 Stones for Abutments to rest on 1 14 9 15 6 0

137 Cubic feet of Bangor wood wrought and put up including painting & Tarring 2 11 " 368 3 0

77 1/2 Lbs of Iron including boring holes & complete

40 Bolts with nuts of 6 "x 1/2"
 8 Do Do of 1 1/2 "x 5/8"
 8 Do Do of 1 "x 1/2"

36 1 10

11 Dozens of Iron screws including carriage

Sundries 20 6 3

Total Estimate of No. 2 Bridge 1020 1 1 4836 9 1

Constructing No. 7 or 15 feet Bridge

217 7/9 Cubic Yards of rough stone in chum 4 3 " 911 15 1

137 Cubic feet of wood work wrought and put up including painting & Tarring & complete 3 1 " 419 9 "

77 1/2 Lbs of Iron including boring holes & complete

110 Bolts with nuts 6 "x 1/2"
 8 Do Do of 1 1/2 "x 5/8"
 8 Do Do of 1 "x 1/2"

42 6 10

11 Dozens of Iron screws including carriage of the above iron

Superintendence and Sundries 116 3 8

Total Estimate of No. 7 Bridge 1490 2 7 6326 11 8

Constructing Culvert instead of No. 6 Bridge

122 2 1/4 Cubic Yards of rough stone in chum 3 13 " 1108 3 2

Sundries including Blast & Superintendence 45 11 10

Total Estimate of the Culvert 513 15 0 6840 10 8

Constructing a Road Dam instead of No. 5 Bridge

198 Cubic Yards of rough stone in chum 2 1 " 445 8 0
 Sundries 9 6 0

Total Estimate of the Road Dam 454 14 7295 8 8

4245 88

Ragsdale
 District Engineer
 Lincoln College
 Graduate
 Madison

Rep: the damages to vessel must be all 2nd half 9
Do Do Do a culvert on 2nd half 10

Env. In a letter from the
District Engineer Madras
to the Secretary to Govt. of M.
dated 11/11/74
Detailed and abstract

Revised Estimate

Madras District

No 21

Amount of Estimate Rs

7295-0-0

Work Constructing No. 1,
3 1/2 of 25 feet and 25,647 ft
15 ft spans on Road from
foot of Chaur to Travancor
frontier

18/7/74 June 1/74

P. N. 2937/74
3

Detailed Estimate No. of 1874/75
Madras District Perambalur Taluk
Emergency Estimate for repairing the damages done to the Panchayat
Shant Road by the storm of the 24th March 1874

Particulars	Number	Measurement			Costs
		L	B	H	
Repairing the damages to wing walls of 2 culverts on 3 rd mile from top	1	"	"	"	
Do do to Revetment wall and a culvert on 3 rd mile	2				
Do do to wing wall of a culvert	3				
Revetment walls	"	60	21	1 1/2	5670
"	"	80	17	1	5440
"	"	51	15	4	3060
		190	53	6 1/2	1680
Total Revetment walls of L					15850
or culvert yard					587 1/2
Repairing the damages to 2 Revetment walls on 3 rd mile	4				
		10	13	3 1/2	1820
				or culvert yard	67 1/2
Rep ^y the damages to 2 Revetment walls on 3 rd mile	5				
Rep ^y the damages to Revetment wall	6				
		80	19	3 1/2	3360
				or culvert yard	124 1/2
Rep ^y the damages to wing wall of a culvert on 2 nd mile	7				
Do do	8				
Rep ^y the damages to Revetment wall 2 nd mile	9				
Do do do a culvert on 2 nd mile	10				

Abstract Estimate to 9/10/75
 Madras District Prisons Saloon
 Work Repairing the damages done to the Phank Road by the
 storm of the 28 March 1874

Quantity	Particulars	Rate	Amount	Total
1/2	Repairing the damages to wing walls of 2 culverts on 3 rd mile from top	" " "	50 0 0	
1/2	Rep ^y the damages to breast wall and culvert on 3 rd mile	" " "	50 0 0	
1/2	Rep ^y damages to wing walls of a culvert on 3 rd mile	" " "	75 " "	
58 1/2	Leaving yard of dry stone works	1 8 "	880 8 11	
	Rep ^y the damages to 2 breast walls on 3 rd mile		60 0 0	
6 1/2	Leaving yd of dry stone works	1 8 "	101 1 9	
	Repairing the damages to 2 breast walls on 3 rd mile		70 " "	
	Do Do		50 " "	
12 1/2	Leaving yd of dry stone works	1 8 "	186 10 8	
	Rep ^y the damages to wing wall of a culvert on 2 nd mile		20 0 0	
	Do Do		60 0 0	
	Rep ^y the damages to breast wall on 2 nd mile		40 0 0	
	Do Do to a culvert on 2 nd mile		60 0 0	
	Superintendence and Sundries at 10 per cent			1703 5 4
				166 10 8
				1870 0 0

Madras District Prisons
 District Engineer Madras

W. P. Macgregor Esq
 Superintendent
 District Engineer Madras

with a view to the interception and carrying the a distance of bottles of water which should be allowed to find their quickest way to the road, and to crop it at once by under-drains of adequate size.

3. The idea that certain portions of roads on hill sides ~~should~~ in certain soils should be sloped inwards is a fallacy which has been experienced about makers all over the Presidency as well as in Madras. The Chief Engineer can recollect perfectly well, in 1856, when every road on the Malabar hills was so sloped inwards, with most disastrous effect. There can be but one accurate section for a road of full width, and that is with a fall to each side quicker than its longitudinal fall, so that if the road surface be kept good whatever rain falls on it shall run off at once, without accumulating. Unaccumulated rain thus trickling off on the outer side of a road, however broad the

soil may be, can do no harm. Attention to road surface, and not a vicarious section, is the cure for the evils feared by the District Engineer. This energetic Executive Officer - H. Taken in connection with the proposals to construct 970 running yards of Match Drain with which ^{in para 5.} L. Green's proposal, to catch open drains except the Ghaut, leads the Chief Engineer to suspect that a sufficiency of rough stone masonry has not been provided. He averages the provision made in the 80th create at 1 for every 150 yards; and that may not be enough -

Lyons

5. The rate of Rs 1⁷/₂ per cubic yard of Rough Stone Work in the Report Estimate is excessive, being double the Neilgherry rate. It may be justifiable by peculiar circumstances affecting labour at an unhealthy time.

576



The Revised Estimate of
A, 57900 is returned for
specification of Soundings
and Superintendence
in more detail, so that
hereafter is in effect of

The maximum of 10 per
cent, which can rarely
be allowed, and must
never be exceeded -
The District Engineer will
likewise consider the
subject of Latch Windows
and Under Windows with
reference to the Chief
Engineer's Remarks -
The proposed construction
of Pompey Walls is highly
objectionable -

By order
S. B. 74

To the S. C. Madras with Estimation
" Controller
S. Copies despatched to the 14/7/74

2124 ✓
2497 ✓
2937

Cont. of 1874 Madras.

PUBLIC WORKS.

To
The Dy. Insp.

Madras.

26/11

Dated

Recd

Part 3

15 June 17/10

No. 546-547.

New Gooda loor Grant

Estimate of Rs. 1870
for repairing the damage
done to the Gooda loo
Grant in the Madras
P. sanctioned, and the
revised Estimate of Rs.
51900 for the Grant
itself returned for
cutting revision.