blic Works (1898) Department.

G.O., No. 1314 W

DATED 23rd May 98

(Despatch Abstract.)

Lower Jalnis; stating that H E the Governor in Council is not disposed to sanction the estimate of Rs 4,81,800 for opening out the — in the Maura Dist by means of a bridle-path, and desiring that the estimate be revised on the lines shown

P. W. 15

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PA

G.O.	No.	Department.	Da				

BUILDINGS AND ROADS.
CIVIL WORKS.

Government (1898) of Madras.

PUBLIC WORKS.

Recd. } 1898. *Enclosures*

Regd. *Spare copies*

G.O., No. 1314 W., 23rd May 1898.

MAY.

Lower Pulneys

Stating that His Excellency the Governor in Council is not disposed to sanction the estimate of Rs. 1,81,800 for opening out the — in the Madura district by means of a bridle-path and desiring that the estimate be revised on the lines shown.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following papers :—

From W. HUGHES, Esq., Superintending Engineer, VI Circle, to the Chief Engineer, Public Works Department, dated Trichinopoly, 28th September 1896, No. 1227-M.D.

I have the honour to submit the estimate for a bridle-path from Kodaikánal to Attúr, called for in G.O., No. 3281 W., dated 26th December 1895 (the enclosures of which are herewith returned). The papers accompanying the Government Order contain full information regarding the line of the road and the probable traffic. No alteration of the line has been made since my inspection in February 1895, but in making the estimate it has been thought advisable to allow for a width including side drains of 10 feet instead of 9 feet originally proposed. This and the provision which has been made for fully bridging the road brings the estimate to much more than the amount previously reported as probable.

2. The road is divided into three sections: The first of these is the upper 16½ miles of Law's ghât, of which about 11½ miles have been made, but the road is very narrow, especially in rocky parts where excavation is most expensive. The cost of widening the made part to 10 feet and making the following five miles will be Rs. 22,800.

3. The second section of 25 miles length is the portion especially required for opening up the cultivated part of the hills and facilitating communication with the plains. The estimated cost is Rs. 1,31,000. The length may seem excessive compared with the point to point distances, but it is found that the position of the line is so limited at many places that an increase of the steepest gradient to 1 in 12 would make very little difference in the length except in miles 20 to 24 and to gain this slight decrease of length the possibility of future wheeled traffic would have to be surrendered. Where short cuts are found advantageous it may be left to the planters to make them. The steepest gradient both on Law's ghât and on this section is 1 in 19 which also is the gradient of the Coonoor, Gudalur (Madura) and some other ghât roads.

4. The third section (estimate Rs. 28,000) is an ordinary second-class road, 5¼ miles in length from the foot of the hills through Attúr village to join the Kannivadi-Butlagundu road. It will be advisable to extend this road across the angle between the Kannivadi and Dindigul roads in order to shorten the distance to the latter place, but this work is one that may be left to the District Board.

5. It is presumed that goods will be transferred to or from carts at Attúr, as the malarious nature of the climate at certain seasons will prevent the establishment of depôts much nearer the hills. The bridges between Attúr and Kodaikánal are therefore designed with a view chiefly to pony traffic, but at the same time are made wide enough—9 feet between parapets or railings—to take a single line of carts. There is no reason why the road should not be used for wheeled traffic if Government give such power of regulation as can be used to prevent vehicles going in opposite directions on any section the same day. Thus, if the journey from Attúr to Kodaikánal be reckoned to occupy two days, only up-traffic would be allowed between Attúr and Tandigudi on say Mondays, Wednesdays and Fridays and between Tandigudi and Kodaikánal on Tuesdays, Thursdays and Saturdays and down-traffic on the days not set apart for up-traffic. The up and down traffic would then cross only at, or some place prepared nearer the Tandigudi junction. If wheeled traffic should become considerable, portions of the road would have to be metalled.

6. With regard to the materials of which the bridges and culverts are to be built, it has been thought necessary to provide masonry walls for all the larger waterways. Dry stone walls will be built where sufficiently good stone is available and can be safely used, and where covering slabs are not obtainable in places whence they can be easily carried by coolies or carted, jungle timber may have to be substituted. The rates for iron and wood work are based on the supposition that work will be begun from the foot of the hills and that materials can be taken by cart to the site of each bridge in succession. It is strongly recommended that Government should insist on the road being carried out in this way. The portion between Kodaikánal and Tandigudi should not be touched until that between Attúr and Tandigudi is completed.

7. The labour items in the rates are roughly double what is paid in the plains, the daily wages being higher and the working hours shorter. The coolies on the estates are not paid very high wages, but as they generally come up from the plains (about 3,000 feet of ascent) and return each day the amount of work they can put in is not very large. From enquiry it would appear that there is a very remarkable difference in salubrity between the river valleys and neighbouring hill tops, and if it could be arranged to hut the coolies on the latter and supply them with boiled water, they could probably remain on the hills all through the feverish season. There is, however, no security from fever anywhere below the 8th mile of section I, and it is to be feared that the subordinates in charge of the work will have to be frequently changed.

8. An estimate* for a carriage road, 16 feet wide, including drain is also submitted. The bridges are the same as for the bridle-path as they are all short and any very large traffic is not to be expected. This estimate has not been called for, but its preparation has caused no delay in the completion of the other estimate.

	RS.
* Section I	1,07,300
Do. II	3,20,800
Do. III	28,000
Total ...	4,56,100

From the Chief Engineer for Irrigation, dated 6th October 1897.

Note by the Chief Engineer, Public Works Department.

The Superintending Engineer, VI Circle, submits an estimate, amounting to Rs. 1,81,800, for opening out the Lower Pulneys by means of a bridle-path. The estimate is divided into three sections.

Section I consists of the first 16½ miles of Law's ghât, an old trace, for which an estimate, amounting to Rs. 3,20,000, was sanctioned in G.O., No. 2090 W., dated 8th May 1878. About 11 miles of this road was made and the remainder traced and a narrow path cut when the work had to be abandoned owing to financial pressure arising from the Afghan war. The first section of the present estimate provides for widening and improving the first 16½ miles of this old trace to a 9 feet bridle-path at an estimated cost of Rs. 22,800.

Section II is an entirely new trace, leaving Law's ghât at 16½ miles from Kodaikánal. Just below the point where it crosses the Mulyur river, it finds its way down to the plains through a group of villages lying on the eastern slopes of the Pulneys, and is intended to tap the greater part of the cultivated lands lying on this side of the range. The length of this section is 25 miles, and its estimated cost Rs. 1,31,000.

Section III is an ordinary third-class road from the foot of the ghât passing through Attúr village and joining the Kannivadi-Butlagundu road. This section is 5¼ miles in length and will cost Rs. 28,000.

2. The total length of the path therefore is $46\frac{3}{4}$ miles and the average cost per mile approximately Rs. 3,900.

3. The distance by road from the end of the trace to the nearest railway station, viz., Ambattari, is 4 to 5 miles.

4. The total rise in the length of the road is 5,932 feet, the maximum gradient being 1 in 19; this low gradient is allowed to enable the path to be converted hereafter into a driving road. The great length of the path compared to the rise is due to the fact that a considerable portion of its length which passes through several estates is nearly level. The details of the gradients are as follows.

5. The gradients are irregular in all the sections, but in no case exceed 1 in 19 which is a fair gradient for a hill road; the Ootacamund ghât has a ruling gradient of 1 in 18. The fall in the first section is from + 7,004 to + 4,037 = 2,967 feet in $16\frac{1}{2}$ miles. In the second section the fall is from 4,037 to 1,177 = 2,860 feet in 25 miles. The third section is on the plains and is practically flat, being only 105 feet in $5\frac{1}{4}$ miles (from + 1,177 to + 1,072).

6. The path has been made 10 feet wide throughout to allow of two pack ponies or bullocks to pass or a single line of carts to travel along it.

7. The Superintending Engineer states that the line is the best that can be selected and the estimate may be accepted as correct, but several alterations in detail will be required during construction some of which may cause a saving and some an excess; but I do not think sanction need be delayed on this account, as it is almost impossible to frame an estimate for such a length of ghât road that will be so correct as not to require small alterations during construction. The disposal of the cross drainage has received careful attention and the arrangements for the disposal of it are ample. The alterations in details that are necessary are—

1*st*. When the path is on a side slope only one drain to be allowed on the inside instead of one on each side; this will add another foot to the width of the path and at the same time effect a saving.

2*nd*. The catch-drain to be at least 10 feet from the top of the cutting; this may make a slight difference in the estimate.

3*rd*. The sites of the bridges will have to be more carefully investigated as to nature of soil and hydraulic details before they are constructed; this will probably cause a saving in some cases and an excess in others.

8. The path will no doubt be most useful for opening out the Lower Pulneys, but before it is sanctioned I think the following points should be considered.

9. The Superintending Engineer says that the road is principally intended to give means of access to the plains for the villages between Muliyur on Law's ghât and Manalur opposite Attur, and also for Kodaikánal. It seems very doubtful if Kodaikánal will benefit by extending this ghât up to it. There is in existence a ghât road with an average gradient of 1 in 10 from Periyakulam to Kodaikánal and the distance from the plains to Kodaikánal is 12 miles by this ghât. The distance from the foot of the hills to Kodaikánal by the proposed ghât is $40\frac{1}{2}$ miles.

10. In paragraph 5 the Superintending Engineer says "Kodaikánal must always depend on Periyakulam for the greater part of its food supplies; there can be little carriage traffic as European visitors and residents are not numerous or wealthy enough to support a tonga service from Dindigul and the principal traffic would therefore be between the plains and the villages on the Lower Pulneys. The traffic to Kodaikánal would consist of all those things which are now brought from Madras *viâ* Periyakulam—building materials and many other things which are now taken up from the plains with much difficulty and expense."

11. From Ammayanáyakkanúr to the foot of the ghât is about 35 miles along the plains and then it is 12 miles up the ghât to Kodaikánal.

From Dindigul to the foot of the proposed ghât is about 14 miles along the plains and then $41\frac{1}{2}$ miles through the hilly feverish country.

12. If a road were made to Ambattari, the nearest railway station, the distance would be 9 to 10 miles on the plains and $41\frac{1}{2}$ at the ghât.

13. There is therefore reason to doubt if building materials, &c., would be got up to Kodaikánal any cheaper by the proposed ghât. Visitors would, it is thought, prefer the present route as it is shorter.

14. There seems therefore very little advantage to be gained by constructing the first $16\frac{1}{2}$ miles of the proposed ghât.

15. From the village of Muliyur to the village of Manalur, a distance of $16\frac{1}{4}$ miles, the road passes through cultivated land and would tap many fertile valleys, especially that of Tandigudy. From Manalur to the foot it is only $7\frac{3}{4}$ miles. This portion of the ghât road would without doubt be very useful in opening up a large cultivated area and giving easy access to the plains. It would therefore seem advisable to construct the bridle-path from Muliyur to the plains, a distance of 24 miles, 16 of which runs through cultivated land.

16. The District Board might be asked to construct the road from Attur to the foot, a distance of 5 miles.

17. The bridle-path from Muliyur to the foot opposite Attur is estimated to cost Rs. 1,13,000.

Of this amount—

	RS.
Earthwork and blasting costs	78,835
Eleven bridges 12 feet span and over	10,014
Culverts and drains	15,611
Check channel or catch drains	3,000
Levelling and surfacing including side drains	3,000
Compensation for land	10,700
Cooly lines, &c.	1,000
Contingencies at 5 per cent.	5,480
Petty supervision at 3 per cent.	3,360
Total ...	1,31,000

18. The Superintending Engineer also submits an estimate for forming a driving road amounting to Rs. 4,56,100; this need not be considered at present.

(Signed) D. McNEIL CAMPBELL, Col., R.E.,
Chief Engineer.

5th December 1896.

ORDER—No. 1314 W., dated 23rd May 1898.

After careful consideration of the papers read above, His Excellency the Governor in Council is not disposed to sanction the estimate of Rs. 1,81,800 for opening out the Lower Pulneys in the Madura district by means of a bridle-path, and desires that the estimate shall be revised on the following lines:—

(1) The improvement or construction of the road from Kodaikánal to Pannaikadu, a distance of about $18\frac{1}{2}$ of miles, should be abandoned, as this road is not likely to be used in preference to the one from Periyakulam to Kodaikánal, which already exists and is shorter.

(2) The construction of an ordinary third-class road from the foot of the hills to the main road near Attur, a distance of about $5\frac{1}{8}$ miles, should, it is considered, be undertaken by the District Board and should therefore be omitted.

(3) For the remainder of the proposed road the width should be reduced to 8 feet including side drains, and causeways substituted for drains as far as possible. Bridges should be omitted wherever rivers have hard beds or where causeways would be sufficient to facilitate crossing. Parapets over revetments are not required. The catch-drain on the up-hill side of the road will be useful for demarcation, but need not be made more than 1 foot wide and 1 foot deep generally. The side slope in cutting for the road may be reduced to $\frac{1}{4}$ to 1 in gravel or good clay. In rock, it should be vertical.

(4) Bearing in mind that the road is to be made at first only for pony traffic, but laid out in such a way that it can afterwards be widened and made suitable for cart traffic, what is possible should be done to reduce the length. It is apparently possible to save $\frac{3}{4}$ mile in the distance between Pannaikadu and the Uralapatti river.

In other places the trace should be realigned where practicable to shorten the bends which it takes up the valleys of streams. Causeways may perhaps be made somewhat lower down the streams with ramps of moderate slope leading to them. Endeavours should be made to avoid the heavy rock cutting shown in some miles. Where zigzags would do much to effect this, they may be provided in strict moderation. From the 18th to the 24th mile the gradient is much flatter than the prescribed gradient of 1 in 19. There is no apparent necessity for holding up and thus lengthening the line. The trace should be gone over and reconsidered.

(True Extract.)

Under Secretary to Government.

To the Superintending Engineer, VI Circle,
with plans and estimates.
„ Local and Municipal Department.
„ Chief Engineer for Irrigation.

Exd. S. J. Pereira.

[40/500]

Public Works DEPARTMENT.

Papers to be read in proceedings :—

Again G.O., dated 189 , No.
Again G.O., dated 189 , No.
Current No. Press 60 of 1896, dated 3rd October 1896, from the Suptg. Engineer VI Circle
T.S.P. „ Quidaz 9 „ 1897, „ 6th October 1897, „ the Chief Engineer for Irrigation no:—.
„ 189 , „ „
Note by the Chief Engineer, Public Works Department, dated ~~3rd~~ 5th December 1896.

N-1314 W 23.5.98

ORDER.

(To the L & M. Depts. for counter-initials)

W.P.

After careful consideration of the papers read above, His Excellency the Governor in Council is not disposed to sanction the estimate of Rs 1,81,800 for opening out the Lower Palnis in the Madura District by means of a bridle path, and desires that the estimate should be revised on the following lines:-

(1) The improvement or construction of the road from Kodaikanal to Pannaikad a distance of about 18½ miles, should be abandoned, as this road is not likely to used in preference to the one from Peri Kulam to Kodaikanal, which alrea exists and is shorter.

(2) The construction of an ordin third class road from the foot of hills to the main road near Ai, a distance of about 5⅛ miles, sld, it

L & M Dept for ci 17/5/98

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necessity for holding up and thus length-
ening the line. The trace Should be
gone over and reconsidered.

APK
13.5.98.

17.5.98

Maj

20.5.98

No. 3197

P. W.
DEPT.

RIGATION.

file of ba
98. plans

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te.

To
The Suptg: Engineer VI Circle; with plans and estimates. 61
" Local and municipal Deptt
" C. E. for Irrigation

D.K. 15/6/98

Note. Plans sent separately by

E. I. Form No. 22—2,000—8-8-96.

P. W. Current No: 3197

GOVT. OF MADRAS. 1898. P. W. DEPT.

CHIEF ENGINEER FOR IRRIGATION.

— Encls 1 file of ba
& plans

Madras, 7 April 1898.

OFFICE NOTE No. 127

Recd: 7.4.98

Circulation Register.

To	From	Despatch Date.	Receipt Date.
W	I		

KEEP-WITH.

No. , dated 189 .

Resubmitted to the Honourable Sir H. W. Bliss K.C.I.E.

23.4.98

W

I have no idea how these papers lay with me so long - I am sorry I overlooked them. The note of 2/9/97 meets my views.

HWB
25/4/98

These papers were sent to the Honourable Sir Henry Bliss on the 22nd October 1897 and were returned to this office on the 6th April 1898. The cover containing the papers has not apparently been opened by the Hon which are now therefore forwarded to W. for disposal

No. 3281 W d/ 26-12-95
2487 C d/ 10-8-95
1959 W d/ 9-8-95
2242 D d/ 22-5-95
1791 C d/ 10-5-95
& file

Resubmitted to the
able Sir H. H. [illegible]

[illegible]

perhaps

E.I. Form No. 4—200—14-4-93.

PUBLIC WORKS DEPARTMENT,
IRRIGATION BRANCH.

~~His Excellency the Governor.~~

The Hon'ble Sir Henry Bliss K.C.S.I.

READ the following :—

Subject. Lower Pulnis Ghat Road.

I understand that these proposals contemplate a cart-road gradient. On that understanding, the proposals are appd.

A.S.H.
8.9.97

See last sentence of note. The present gradient is to be kept in 19.

W.H.

FOR ORDERS.

Formal orders are requested for the revision of the Estimate for the Ghat Road from Kodaikanal to Attur, on the following lines which are believed to be in accordance with the wishes of Government—

1. The improvement or construction of the road from Kodaikanal to Pannackadu, a distance of about 18½ miles, and from the foot of the hills to the main road near Attur, a distance of about 5⅝ miles will be omitted from the estimate.

2. The width of the road will be reduced to 8 feet including side drain, Causeways substituted for drains as far as possible. Bridges will be omitted wherever rivers have hard beds or where Causeways would be sufficient to facilitate crossing — Parapets or revetments will not required.

The Catch drain on the up-hill side of the road will be useful for demarcation but need not be made more than 1 ft width and general depth 1 ft – The side slope in cutting for the road may be reduced to 1/4 to 1 where in gravel or good clay. In rock it should be vertical.

3. Bearing in mind that the road is to be made at first only for pony traffic, but laid out in such a way that it can afterwards be widened and made suitable for cart traffic what is possible should be done to reduce the length. For example it is apparently possible to save 3/4 mile in the distance between Barnackady and the Uralapatti River. In other places the trace should be re-aligned when practicable to shorten the bends which it takes up the valleys of streams. Causeways may perhaps be made somewhat lower down the streams with ramps of moderate slope leading to them – Endeavours should be made to avoid the heavy rock cutting shown in some miles. Where zig-zags would do much to effect this, they may be provided in strict moderation – Further

18th to the 24th mile the gradient is much flatter than the prescribed gradient of 1 in 19 – There is no apparent necessity for holding up and thus lengthening the line. The trace should be gone over and reconsidered –

W.H.

2.9.97

FOR ORDERS.

Urgent

E. I. Form No. 22—2,000—8-8-96.

GOVT. OF MADRAS. 1897. P. W. DEPT.

CHIEF ENGINEER FOR IRRIGATION.

The Hon. Sir Henry Bliss. K.C.I.E.

Madras, 24. July 1897.

OFFICE NOTE No.

Papers on the subject of the Lower Pulney ghât road

Circulation Register.

To	From	Despatch Date.	Receipt Date.
D. W.	D. I.	26/7	

KEEP-WITH.

No. , dated 189 .

The attached D.O. from Mr. Hughes together with these papers and plans should be sent to the Hon. Sir H. Bliss. It will be seen that the saving in length of road which would be effected by making the ruling gradient 1 in 15, ~~with~~ would be about 1 3/4 miles. Is it worth while, for this small saving, to change the proposed gradient, and to make the road for all time, a bad one for wheel traffic?

A.H.H.
28.7.97

I should like to speak to Mr. Hughes about this. He might bring me the papers after next Council

HB
30/7/97

On Saturday last the 17th at Ootacamund a file on the subject of the Lowe Pulney ghât road together with a bundle of plans were received from W for a note by the Chief Enginee for Irrigation as the latter had some personal knowle of the subject and had already conferred with H.

with reference to it. The papers were received late in the afternoon and E. I. was leaving Ootacamund on the next morning. By an oversight the bundle of plans were placed before E. I. without the file who believing that they had come direct from H.E. with reference to a conversation he had had with H.E. disposed of them by a D.O. letter addressed to the Private Secretary.

This was discovered after E. I. had left office and the file was consequently returned to W with an intimation that E. I had returned the plans with a D.O. letter to the Private Secretary.

E. I. has now received a D.O. letter from the Private Secretary dated the 21st in which he asks for the return of the papers.

Will

Will you kindly put this aright and send the papers to H.E. if not already done, explaining if necessary that E. I had only the plans before him and not the papers when he wrote his D.O. letter.

W. I.
24/7

24/7

Kodaikanal Ghat road

P. W. DEPARTMENT.

READ the following:—

From the Superintending Engineer VI Circle, No. 1227 M. D., dated 28th September 1896.

Note by the Chief Engineer, P. W. Department, dated 5th December 1896.

FOR ORDERS.

The estimate was prepared in this Department on the supposition that what was required was a good bridle path to open up the lower Pulneys, and which could afterwards be turned into a carriage road. Consequently the gradient was made slight, and bridges were allowed.

2. From the remarks of the Hon. Mr. Bliss it appears that all he considers necessary is a path 6' wide on the average with a gradient of 1 in 15, and occasionally 1 in 12, and with road dams instead of bridges when the depth of water does not exceed 6'.

3. As the estimate had been prepared under the directions of Mr. Hughes, I asked him for a note with reference to the Hon. Member's remarks, and I enclose herewith a copy of it, and it explains many of the points referred to by the Hon'ble Member

I should like to talk this over with Mr. Hughes, who knows the whole country well. Please return the papers to me at Ooty after the Easter holidays.

A.S.H
30.3.97

Have just seen Mr. Hughes on the subject of this file. The papers and plans are returned to him with the request that he will state the saving of length of road which would be obtained on section II of this road by the adoption of the gradients proposed by Sir H. Bliss, in his Note of 10.12.6; and the saving of cost on the same section by the adoption of the alterations of details of bridges, of gradient, compensation for land, parapets, catch-drains &c, which Sir H. Bliss suggests.

A.S.H
16.7.97

Member. The question to be settled is whether the path is to be made so that it can be converted without much expense into a driving road or whether a path as proposed by the Hon. Mr. Bliss will suffice. In the former case I think the -- estimate already submitted may be sanctioned, section II beginning at Mulliyar. Some trifling alterations in the alignment may be necessary during construction but they will cause a saving on the estimate.

4. In the latter case a revised estimate must be prepared and a fresh trace must be made.

5. The Hon. Member states that he doubts if there will be more than 10 carts a day on the road in which case it hardly seems necessary to go to any great expense, but it must be remembered that the money spent on a steep path will be almost entirely wasted if at any ~~further~~ future -- time it is considered necessary to make a road, but the Hon. Member --- thinks that this will not be required for 10 generations at least.

12/2/97

W.

FOR ORDERS.

H.S. 13/2/97.

Bridle path for lower Palnis

P. W. Department.

Read the following:—

From the Superintending Engineer, II Circle, No. 1227 Md. d/ 28th September 1896.

Note by the Chief Engineer P.W.D., dated December 1896.

FOR ORDERS.

5/12/96

I cannot see the smallest reason why this should have been marked "Special", so that I had to break off my ordinary work to look at it, & should have been sent here at 5.15 P.m. — Let it be sent by the cart at the usual time

HS
9/12/96

Seen
JG
22/12/96

43—500-22-1-96

FOR ORDERS.

6 P

P. W. Department
C. No. 8860

Note by the Chief Engineer, P. W. Department.

The Superintending Engineer, VI Circle, submits an estimate amounting to Rs 1,81,800 for opening out the Lower Pulneys by means of a bridle path. The estimate is divided into 3 sections:—

Section I consists of the first 16½ miles of Law's ghât, an old trace for which an estimate amounting to Rs 3,20,000 was sanctioned in G. O. 2090 W dated 8th May 1878. About 11 miles of this road was made and the remainder traced and a narrow path cut when the work had to be abandoned owing to financial pressure arising from the Afgan war. The first section of the present estimate provides for widening and improving the first 16½ miles of this old trace to a 9 ft Bridle path at an Estimated cost of Rs 22,800.

Section II is an entirely new trace, leaving Law's ghât at 16½ miles from Kodaikanal. Just below the

point

It would, I should think, be economy in the end, to make a cart. road at once. I notice that it is thought that this road will not go far to facilitate access of Kodaikanal.

The Hon. Mr. Bliss takes much interest in this project and knows the country. A note from him would be of great value. He should see the papers.

A.G.H
8.12.96

I agree that Section I should be abandoned, for the present at least. Section II should begin, not at Mullayar, but at Pannaiyar, which will save 2 miles. A great addl. saving in the length of this section may be made by straightening the trace, which appears as if it had been laid out with the express purpose of making it as long as possible, instead of the other way. For instance, from Pannaiyar to the 4th mile (2 miles) the differce in level is (4545 − 4411) 134 feet only and the lowest intervening point (4320) is only 91 feet lower than the 4th mile stone will be. Obviously unless the maps and sections are all wrong, this bit of the road might be shortened by half or more. As it is, it is lengthened by 2 huge bends, the use of which I fail to see. Similarly from the 20th to the 24th mile the fall is only 946' or 236' feet a mile. But at 1 in 19 the fall per mile would be 271'. The fall in this distance is about 1 in 22½. That is to say, the gradient [illegible] much mistaken, than H.E. the point where it crosses the Mulyar River, it finds its way down to the plains through a group of villages lying on the Eastern slopes of the Pulneys, and is intended to tap the greater part of the cultivated lands lying on this side of the range. The length of this section is 25 miles and its estimated cost Rs 1,31,000.

Section III is an ordinary 3rd class Road from the foot of the ghât passing through Athoor village and joining the Kannivadi Batlagundu Road. This section is 5¼ miles in length and will cost Rs 28,000.

The total length of the path therefore is 46¾ miles and the average cost per mile approximately Rs 3900.

The distance by road from the end of the trace to the nearest railway station viz. Ambaturai is 4½ miles

The total rise in the length of the road is 5932 feet, the maximum gradient being 1 in 19: this low gradient is allowed to enable the path to be converted hereafter into a driving road. The great length of the path compared to the rise is due to the fact that a considerable portion of its length which passes through several Estates is nearly level. The details of the gradients are as follows:-

The gradients are irregular in all the sections, but in no case exceed 1 in 19, which is a fair gradient for a Hill Road: the Ootacamund ghât has a ruling gradient of 1 in 18. The fall in the 1st Section is from +7004 to +4037 = 2967 ft in 16½ miles. In the second section the fall is from 4037 to 1177 = 2860 ft in 25 miles. The third section is on the plains and is practically flat being only 105 ft in 5¼ miles (from +1177 to +1072)

The path has been made 10' wide throughout to allow of two pack ponies or bullocks to pass or a single line of carts to travel along it.

The Superintending Engineer states that the line is the best that can be

Govr. drives up & down every day at Ooty between Govt. House & his Lodge Gate - A part of the road up to my house at Ooty ~~is~~ is about 1 in 9½ - I would not of course advocate such a gradient for any road, but 1 in 15 with an occasional bench of 1 in 12, is by no means a bad road & quite good enough for the Lower Pulneys for the next ten generations I should say - One in 22½ is a simple extravagance in every way - not only is the expense of making the road much increased, but the expense of using it is unnecessarily increased for all time. I agree that it will be best to lay the road out on a gradient such that it can be converted into a cart road at some future time, but even a gradient of 1 in 19 is extravagant - Why give the Lower Pulneys actually a better gradient than the Coonoor Ghaut?

I may add that from the 20th to the 24th mile is not a case where distance has to be gained. This is a mere case of going into a gorge in order to come out again and for all the map & section show, the length of the road can be decreased by increasing the gradient to any extent that may be thought desirable - I should ~~contract~~ increase it to 1 in 15 at least - Even so, I am willing to bet that the cattle drovers will make a short cut for themselves down one side of the gorge & up the other at any gradient up to 1 in 5 or 6. This was my experience in the Upper Pulneys years ago. The late Col: Coaker had made a beautiful trace of 1 in 30 or thereabouts from Kodaikanal to [illegible] & other places. No one used it. I made a 6 ft path with a 1 foot inner drain much of which was 1 in 10 or worse & Everyone used it at once.

I consider the trace should be seriously revised with a view to reduce its length. I should say some miles could be saved.

Then as to the breadth of the path -

but there is no made road for the distance

I assume that a cart road is out of the question - Even if we had the money, I doubt if such a road would carry ten cartloads a day on the average for many years to come & we can't afford 4½ lakhs for such an infinitesimal traffic as that - I should answer for three times the amount - I should [illegible] 6 feet, with an inner drain of 1 foot. My experience is that this is ample. Occasionally where the ground is very steep & dangerous, the path might be widened for a short distance, unless a parapet wall of rough stone would be cheaper, as would often be the case; or a 'lay-by' might be formed to allow droves of cattle to pass one another without difficulty -

Then as to the waterways - The plan is studded with entries of bridges & culverts and drains of all sorts and sizes; the very great majority of which will not be needed for a bridle path, though some ~~[illegible]~~ might be for a cart road - Hardly one of these bridges &c has a greater depth of waterway than 6' - I can understand the need of a bridge to cross a nullah ten, 15 or 20 feet deep. But why to cross a nullah under 6 feet deep? Irish bridges will do perfectly well in almost all such places, and also in all places where cross drains (there are 200 small ones provided) are required to pass the water of the side drain across the road. Even if we were going to make a cart road, I should say the same of most of these culverts &c, for these hill streams run down in a few hours, almost in a few minutes, & the people who will use the road are not carriage folk who can't bear to wait a bit occasionally - Besides, people don't want to travel in the Hills when rain is expected.

As to the compensation for land, I will say nothing, but that it seems to me very high - The trace, however, seems now to run through as much cultn. as possible - In revising it, it should be taken as far as possible clear of cultn. - when this is done, it will be time to consider the rates.

I made a remark above [illegible] parapets - On looking into be selected and the estimate may be accepted as correct, but several alterations in detail will be required during construction some of which may cause a saving and some an excess, but I do not think sanction need be delayed on this account; as it is almost impossible to frame an Estimate for such a length of ghât road that will be so correct as not to require small alterations during construction. The disposal of the cross drainage has received careful attention and the arrangements for the disposal of it are ample. The alterations in details that are necessary are

1st When the path is on a side slope only one drain to be allowed on the inside instead of one on each side: this will add another foot to the width of the path and at the same time effect a saving.

2nd The catch-drain to be at least 10' from the top of the cutting: this may make a slight difference in the estimate

3rd The sites of the bridges will have to be more carefully investigated as to nature of soil and hydraulic details before they are constructed; this will probably cause a saving in some cases and an excess in others.

The path will no doubt be most useful for opening out the Lower Pulneys but before it is sanctioned I think the following points should be considered:—

The Superintending Engineer says that the road is principally intended to give means of access to the plains for the villages between Mulyur on Law's Ghat and Manalur opposite Attur, and also for Kodaikanal. It seems very doubtful if Kodaikanal will benefit by extending this ghât up to it. There is in existence a ghât road with an average gradient of 1 in 10 from Periakolam to Kodaikanal and the distance from the plains to Kodaikanal is 12. miles by this ghât. The distance from the foot of the hills to Kodaikanal by the proposed

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the papers further, however, I see that parapets are provided wherever revetments are provided — ~~In~~ This seems to me quite unnecessary — It is an easy way of making an estimate, but extravagant. The provision made for revetments is also extravagant. It is based on the assumption that, in gravel, the cuttings will stand at 2 to 1 & the banks at 1 to 2 — now if I had to make such a road through gravel I should cut the cuttings nearly or quite perpendicular & should trust to the gravel taking a slope of not much worse than 1 in 1; and I should be right — Every day experience in such a place as Ootacamund, where the rain fall is heavier than on the Lower Pulnis, and the soil hardly as good as gravel, is to this effect. Rs 11445 are! provided for these revetments & parapets. It seems to me an absurd sum —

As to Section III, that in the plains, I should leave it to the Local Bd, which will no doubt be able, if Section II is made, to spare a few hundred rupees to improve the existing track which serves to extent most part of the way & which is probably all that is required — It is safe to say that they won't spend Rs 5000 a mile on making a 3rd (!) class village road.

Hs

As to the catch drain, I see 25 miles of it is provided. It must be quite the most extraordinary country that ever existed if this is really necessary. The ~~for~~ provision is much more likely, I should think, to have been made to save the trouble of a careful consideration of the places where it is, and is not, really needed.

Hs
10/12/96

I do not know the country, but a consideration of the remarks of the Hon Mr Blair who does convinces me that the trace shd be shortened & the estimate revised so as to reduce the expenditure considerably. We shd not be justified in spending so much as is required for Section II on the Lower Pulneys at present. This section only shd be made by Govt.

JG
22/12/96

?

proposed ghât is 40½ miles.

In para 5 the Superintending Engineer says "Kodaikanal must always depend on Periakolam for the greater part of its food supplies, there can be little carriage traffic as European visitors and residents are not numerous or wealthy enough to support a tonga service from Dindigul and the principal traffic would therefore be between the plains and the villages on the Lower Pulneys. The traffic to Kodaikanal would consist of all those things which are now brought from Madras via Periakolam, building materials and many other things which are now taken up from the plains with much difficulty and expense."

From Ammayanayakanur to the foot of the ghât is about 35 miles along the plains and then it is 12 miles up the ghât to Kodaikanal.

? 31
WH

From Dindigul to the foot of the proposed ghât is about 14 miles along the plains and then ~~40½~~ 41½ miles through the hilly feverish country.

If a road were made to Ambattari the nearest railway station, the distance would be 9 to 10 miles on the plains and 41½ up the ghât

9P

I quite agree. I should leave this section for a future generation and begin the new path, not from Mulayan village, which is only a few huts, but from Pannaikadu village, 2 miles nearer the plains, which is a considerable place. This will be quite enough to do to begin with.
HS

I do so

There is therefore reason to doubt if building materials &c would be got up to Kodaikanal any cheaper by the proposed ghât. Visitors would, it is thought, prefer the present route as it is shorter.

There seems therefore very little advantage to be gained by constructing the first 16½ miles of the proposed ghât.

From the village of Mulayur to the village of Manalur a distance of 16¼ miles, the road passes through cultivated land and would tap many fertile valleys, especially that of Tandigudy. From Manalur to the foot it is only 7¾ miles. This portion of the ghât road would without doubt be very useful in opening up a large cultivated area and giving easy access to the plains. It would therefore seem advisable to construct the bridle path from Mulayur to the plains, a distance of 24 miles, 16 of which runs through cultivated land.

The District Board might be asked to construct the road from

Athur

Attur to the foot a distance of 5 miles.

The bridle path from Vilpatti to the foot opposite Attur is estimated to cost Rs 1,31,000.

Of this amount –

	Rs
Earthwork & blasting costs	78,835
11 Bridges 12' span & over	10,014
Culverts & drains	15,611
Check channel or catch drains	3,000
Levelling & surfacing including side-drains	3,000
Compensation for land	10,700
Cooly lines &c	1,000
Contingencies @ 5%	5,480
Petty Supervision @ 3%	3,360
	1,31,000

The Superintending Engineer also submits an Estimate for forming a drawing road amounting to Rs 4,56,100: this need not be considered at present.

5/12/96

EW

1314W

Note

As the estimate for the Kodaikanal-Athur Ghat road was prepared under my direction, Col. Campbell has asked me for such explanation as I can give with reference to the Hon. Mr Bliss' remarks.

2. The first important point is th ruling gradient. The tractive power required on an ordinary gravelled roa is probably 100 lbs a ton or a little more, say $\frac{1}{20}$ of the load; the tractive power required on the level and for gradients of 1 in 20, 1 in 15, and 1 in 20 is in the proportion of 1, 2, 2½, and

? 12

3. One can only judge from experience what the most suitable gradient is- Animals can for short distances exert far greater power than they can keep up on a long march, and often have to do this as for instance in crossing the sandy beds of rivers or in going up the ramps. The question is, what such animals as would be employed on the proposed ghat could do. On the Coonoo ghat which has a gradient of 1 in 18 it is a common thing to see two pair of bullocks yoked to a cart. On the ghat leading to the Periyar which is laid out to the same gradient as the Coono ghat for 5½ miles I have never seen more than one pair of bullocks in a cart but a second pair is sometimes

taken

taken for a change. I conclude that for the proposed road on which for one length of 7½ miles and for shorter lengths on other places the steepest gradient allowable has to be adopted the estimated gradient of 1 in 19 which will work out to about to 1 in 18 through easing of curves &c., is suitable. I assume it to be settled that the road is to be ~~abjured~~ aligned so that it can be converted into a regular cart road when the traffic justifies it. Otherwise a gradient of 1 in 12 would be the best but very little of it could be incorporated with a future cart road.

3. With regard to the width of the roadway I at first proposed 9feet including side drain but considering the space required for two laden ponies crossing, the manner in which the edge of a road wears down and the desirability of having ample level ground for a cart I had the estimate made for a width of 10 feet. The side slope of the cutting has been taken as ½ to 1 for hard soil. This is of course only an average slope. It must vary with the nature of material and if there are boulders it cannot possibly be said beforehand what the slope would be. For the most part there will be earth above and gravel perhaps mixed with boulders below. My instructions to Mr. Close to allow cutting for the full width of the road wherever there

is

is no rock and the natural slope of the ground is over 26° or 2:1 was based on experience of a road from Kodaikanal to Pillar Rocks on which I found that in steeper ground the excavated earth thrown on the lower side of the road to increase its width in a short time slid down the slope and was of no use.

4. If Government decides that the road is not to be at once made to accommodate cart traffic causeways can of course be very largely substituted for culverts and bridges but I would deprecate the omission of any works required to prevent drainage flowing down the road or across it except at the places prepared. The want of proper drainage arrangements enormously increases the cost of maintenance and may turn the road into a mere watercourse like a great part of the Manavanur road referred to by the Hon. Mr. Bliss and make it impracticable for laden men or animals. I believe there is only one track-that via Fort Hamilton-from Kodaikanal to Manavanur. When I saw it last in 1891-I have no doubt it is worse now-nearly all the parts in steep ground were impassable and way farers had to use tracks at the side of it.

5. Mr. Bliss points out that the difference of level between mile 2

and

and 4 shown in the section is only 134 feet and that for any thing shown on the plans the road could be much shortened. With regard to this I wish to point out that the crossing of the ridge at 4m-3360 ft. is practically a fixed point and the gradient of 1 in 19 back from this fixes the point at which the Uralaipatti river should be crossed. Between the river and mile 2 some choice may be exercised. It was thought desirable for the accommodation of the village to take the road through instead of below it and also to utilise the existing road to the west of it for some distance. Other-wise the villagers would have to make another road to connect their village with the main line. It is quite practicable to shorten the line but not much as there is a deep depression in the direct line between Pannikadu and Uralaipatti. The line of the existing roads indicates the difficulty of a direct line. I cannot account for the reduction of the fall between miles 20 and 24 to an average of 236 feet a mile. Enquiry might be made. A gradient of 1 in 19 would save something like half a mile in distance. It was not anticipated that short cuts would not be used in places but it was thought that it might be left to the planters and others to make them.

6. The

6. The Hon. Mr. Bliss refers to the alignment of the road through cultivated land. It was not taken through valuable land where any better line was practicable. In any case it has to be considered (1) that the road will be most beneficial where it passes through cultivation (2) that it can be very cheaply excavated in such places (3) that in all probability even allowing for the compensation it is cheaper ~~than~~ than taking it above the cultivation since the cultivation generally extends from the bottom of ~~villages~~ valleys as high up as there is a fair amount of soil and a road above this would be in a great measure in rocky ground. The minimum width of ground proposed to be acquired is 20 feet, the maximum 40 feet but this is in waste or ground of little value. The rate for compensation has been fixed either by the Revenue Officers or on information supplied by them.

7. Revetments are provided only where stone is available from the excavation and where it would be cheaper to build them than excavate a greater width. Parapets are required only if cart traffic is to be allowed. They add but little to the estimate

8. If the line is not to be carried on to Kodaikanal it does not much matter

as

as far as I know, if the first two miles of section 2 are omitted but it would be as well to enquire. With regard to section 3 there is just the same reason for its construction at the expense of Government as the rest of the line viz. that the District Board has no funds for it.

(Signed) W. Hughes
Chief Engineer
for Irrigation

Cir 3197

W

The papers relating to the proposed Lower Palni ghat road were sent to S.E. in July 1897, to note on, as he had a personal knowledge of the project as S.E. VI circle.

The file was circulated by S.E. to H.E. the Govr in Sept 1897, & subsequently to the Hon. Sir H. Bliss in Octr 1897. It was sent back to S.E. [illegible] on the 6th inst, but the cover apparently was never opened by the Hon. — S.E. now returns the file to W for disposal.

The papers are

Public Works Department.

Current No. 8860
Letter No. 1227 nd.
Dated 28 September 1896
From the SE. VI. Circle

NOTE BY TECHNICAL SECTION.

Name of work Constructing a Bridle Path from Kodaikanal to Attuvampatti

Amount of Estimate Rs: 1,81,80

With reference to G.O. 1381 W dated 26.12.'95 the SE. VI Circle submits Plans and Estimates, amounting to Rs. 1,81,800 for Constructing a Bridle path 9 feet wide, from Kodaikanal to as

The Estimate has been divid into 3 Sections as under:—

Section I. Consists of the f 16½ miles of Law's ghât, an trace for which an Estimate amounts to Rs 3,20,000 was Sanctioned in G.O. 2090 W. dated 8 May 1878 About 11 miles of this Road was made and the remainder traced a narrow path cut when the work had to be abandoned owing to financial pressure arising from Afghan war. The first Section the present Estimate provide idening and improving the first 6½ miles of this old trace to a 9ft Bridle path at an Estimated cost of s. 22.800.

Section II is an entirely new race, leaving Law's ghât at 16½ iles from Kodaikanal, just below point where it crosses the Mulyur ver it finds its way down to the lains through a group of villages ying on the Eastern slopes of the Palneys, and is intended to tap he greater part of the cultivated lands lying on this side of the ange. The length of this section 25 miles, and its Estimated cost s: 1.31.000

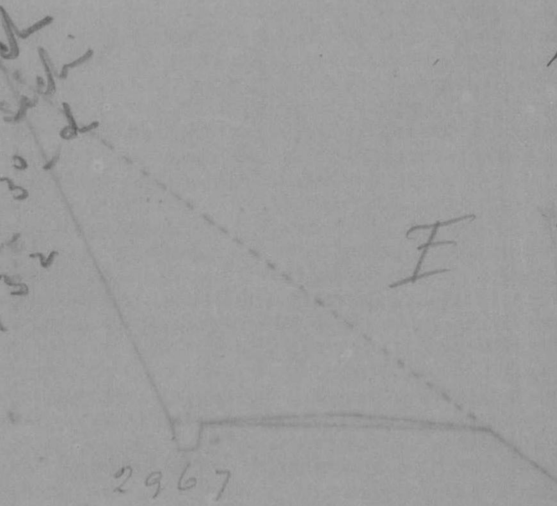
Section III is an ordinary 3rd class ad from the foot of the ghât, passing Atter village and joining e Kannivadi - Batlagundu Road. his section is 5¼ miles in length nd will cost Rs. 28,000.

The Total length of the path erefore is 46¾ miles and the verage cost per mile approximately s: ~~6000~~ 3900

An alternative Estimate for a 16ft. Roadway, cost as under is also submitted.

	Rs:
Section I.	1.07.300
Section II.	3.20,800
Section III.	28,000.
Total cost.	Rs: 4.56.100.

This Estimate has not been dealt with in this note, as it merely provides for a wider roadway being otherwise the same as the Estimate for the Bridle path.



2967 1st sectn
2860 2nd sectn
105 3rd d
5932

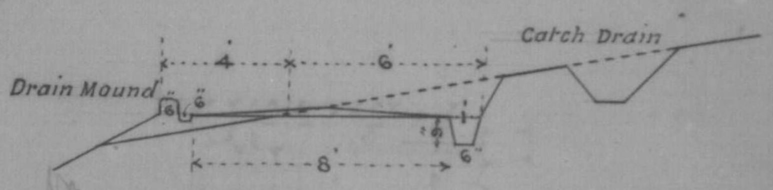
2967
2860
290 / 5827 (20
580
27

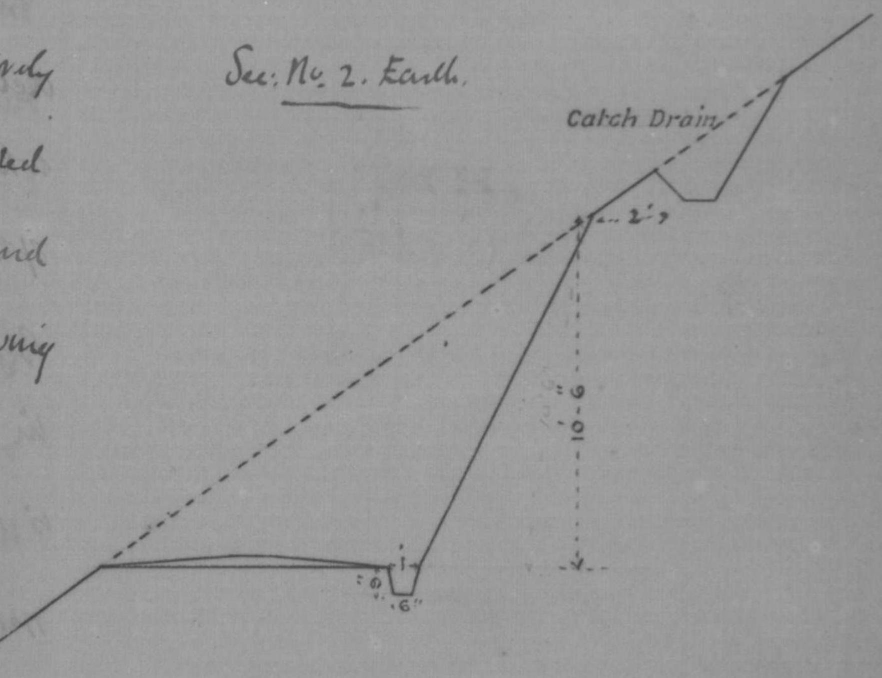
With a rise of 1 in 18 the road from the foot need only be 20 miles. Whereas it is 16½ + 25 = 41½. The road seems unnecessarily long.

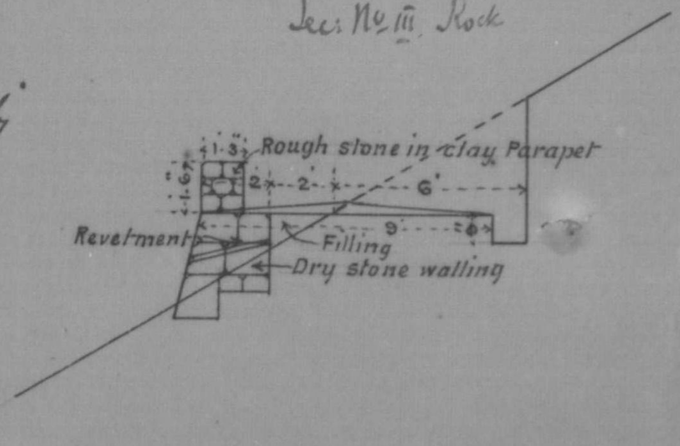
F

Gradients. The gradients are irregular in all the Sections, but in no case exceed 1 in 19 which is a fair gradient for a Hill Road. The Ootacamund ghât has a ruling gradient of 1 in 18. The fall in the 1st section is from +7004 to +4037 = 2967 ft in 16½ miles. In the second section the fall is from 4037 to 1177 = 2860 ft in 25 miles. The 3rd section is on the plains and is practically flat being only 105 ft in 5¼ miles (from +1177 to +1072).

Section of Path. The width of the path throughout is 10ft including the side drains. It has been assumed that the scarp will stand at a slope of ½ to 1.- while in embankment a slope of 2 to 1 is allowed on the khud side. On sidelong sloping ground where the angle of slope is less than 26° the road will be partly in cutting and partly in embankment. For steeper slopes than 26° the road will be entirely in cutting. In rock it is proposed to have the path 6 ft in cutting and 4 ft in revetment. A sheet shewing 3 typical sections of the path accompanies the Estimate. These sections are reproduced in the margin. It will be seen from them that a barreled section is proposed. but this section involves in most cases 2 side drains (vide Sect: I.) and unnecessarily curtails the width of a path already inconveniently narrow for wheeled traffic which is contemplated. In embankment too a drain in the made earth would almost inevitably cause sinking & slipping of the portion embanked


Sec: No I. Earth.


Sec: No 2. Earth.

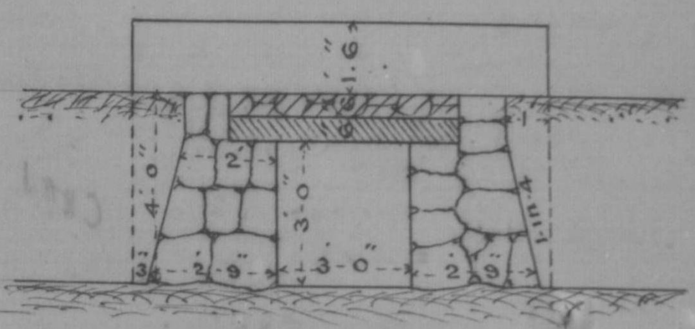

Sec: No III. Rock

It is submitted therefore that it would be better to have only one slope on the path & that inwards towards the scarp, as on the Coonoor ghât. As a drain is already provided at the toe of the scarp with necessary culverts this alteration in section would not affect the cost of the Estimate.

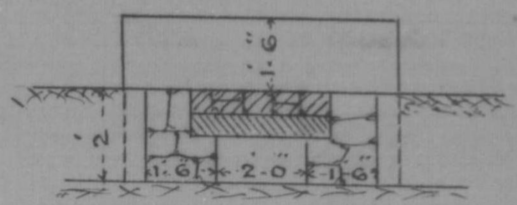
Drainage. There is of course no detail in connection with ghât Roads which approaches in importance that of the disposal of the cross drainage. This question seems to have received attention in this Estimate and a liberal provision is made for such disposal. From the maps submitted every natural stream & watercourse has been provided with Bridge or Culvert. There are however one or two minor details which appear to require re-consideration. Type designs with Estimates for culverts & drains of various sizes are submitted with the Estimate. The common Road culverts ~~ar~~ or drains are of two types called in the Estimate "large drains" and "common drains" respectively. The Estimate provides for 69 of the former and 360 of the latter. and it is presumed that the larger drains are intended for places where the ~~catch drains are~~ water from the catch drains ~~are~~ on the scarp is taken under the Road. The smaller drains apparently being intended only to carry the accumulated water from the side drains at the toe of the scarp under the path. The section of the smaller drain (see margin) appears too small ~~of~~ to be of any practical utility especially on a non-metalled road, as a handful of silt would choke it. It is suggested that the smallest culvert should be at least 2 ft deep, the width provided is probably sufficient. Both drains should also be provided with flooring especially as the discharging end of the drain will usually be in made earth.

Catch Drain. The catch drain as shewn in Typical Section No 2. is too near the edge of the scarp. (2 ft. horizontally) & if so constructed would probably very soon breach for a scarp of the height shewn in the section the catch drain should be at least 8 to 10 ft back from the

Large drain.



Small drain.



These catch drains are often the cause instead of prevention of landslips – They get choked with leaves & sticks & branches & silt through

edge of the scarp. As a large percen of the soil is described as "gravel mix with boulders" there would probably be a lot of percolation through the catch drain, and if near the edge of the scarp, the drain would most probably breach by the scarp side slipping.

Bridging In view of the probability of the path being at some future time improved into a proper ghât Road, and also of the possibility of wheeled traffic on it, as at present designed, provision has been made in the Estimate for proper permanent Bridges for all the principal streams. with a clear Roadway of 9 ft. These bridges are designed of uniform type as under:- Foundations generally rock. Superstructure Rubble in mortar Platform. 3" Planking carried on rolled steel girders to ~~which~~ the upper flanges of which ~~a~~ spiking beams are bolted.. girders 2'3" apart centre to centre or 4 to each span. — Wooden Handrails — The steel girders provided are in depth = $\frac{1}{24}$ span. e.g. for a 15 ft span a 7½" girder for 18 ft span a $9\frac{1}{16}$" girder for 12 ft span a 6" girder. Such girders would probably be equal to any strain that is likely to be thrown upon them at present, but as the expressed intention is to have the bridges made for a pucka road. it would be as well to adhere to rules and have the girders of proper dimensions i.e. not less than $\frac{1}{20}$ span in depth.

CARRY

Further the girders mentioned in the Estimate are not stock sections. The following Sections are suggested.

	Section.	Weight per ft
For Bridges of 12 ft Span. –	8"×4" .	19 lbs. Yes CARRY
" " " 15 ft "	10"×5" .	29 " – 9"×3½" with single CARRY
" " . 18 ft "	12"×5".	– 32 " Yes CARRY

In Sections I. and II. of the Road.

23 Bridges are provided. Of these 11 are of ~~a Type~~ uniform. design single 12 ft span a plan of the Bridge is submitted with the Estimate. Of the remaining 12. – 5 are single span Bridges (4 of 18 ft span and 1 of 15 ft span)

3 have 2 spans of 15 ft.

2 " 3 " of 18 ft

1 has 3 " of 15 ft. and for 1 Bridge no details are given a Lump sum of Rs 1400 for its construction being provided in the Estimate.

Where a Bridge has more than 1 span piers of R. Stone in mortar are provided.

It is considered that the 6 Bridges with piers, should be cancelled and single span Bridges provided even though the cost may

CARRY.

Vide calculation sheet.

12 ft Span.

w = 1.5 × 12 = 18. For this 5½"×2" ~~7"×2¾"~~, weighing 10½ lbs per foot would probably suffice: but as the depth would be rather less than $\frac{1}{20}$th the span. 8"×4" may be allowed.

15 ft Span.

w = 2.07 × 18 = 37.26

For this a girder 6"×4½" would be suitable. But it should be at least 9" deep to fulfil the condition of $\frac{1}{20}$th the span. and a girder ~~9 13"×4½~~" 9"×3¾" weighing 20 lbs per sq: ft will fulfil this condition

18 ft Span.

w = 2.5 × 18 = 45.

12"×5" weighing 32 lbs per foot run will suit.

be considerably greater. In any case the additional cost would be insignificant, when compared with the aggregate of the Estimate. The largest span required would probably* be 50 ft or say 60 ft. 2 Bridges of this span would be required. 1 Bridge of 50 ft and 3 bridges of 30 ft. – Piers are always a source of danger in bridging mountain streams, and it is considered that the extra cost involved by erecting single span bridges, would be in the end a real Economy.

CARRY.

* No Hydraulic details from which the waterway could be checked, are given with respect to any of the Bridges. These spans are merely assumed as equivalent to the spans given in Est.

The following Errors and Omissions are noted in the Estimates for the Bridges as submitted.

Bridge No I. 3 spans of 15 ft.

8 girders are provided instead of 12 required.

Bridge No 3. 3 spans of 18 ft. Length of girders provided in Estimate 18 ft. instead of 21 ft.

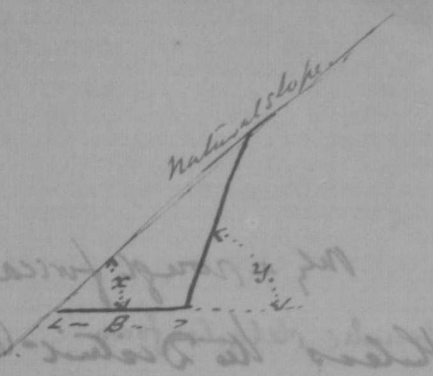
Bridge No 16 3 spans of 18 ft.

8 girders provided instead of 12.

Rates Data sheets of rates are submitted with the Estimate, the rates are struck on an average to make them uniform for the full length of road they appear to be fair. though the rate for rolled steel girders Rs 11-12-0 is probably rather low.

The Earthwork calculations are based on Molesworth's formula

$A = \frac{1}{2}\left(\frac{B}{\cot x - \cot y}\right)^2$ (see margin)



They have been checked here and there and found correct, but no attempt at a systematic arithmetical check has been made in this Office

FWL
29.10.96

DW

For orders.

The linked file which contains all the previous papers on the subject, was found among the old records & handed to me only today, although I called for it repeatedly. There was some difficulty in tracing it.

It is clear from Col. Pennycuick's "yes" at the end of my note of 18.12.95, attached to the paper flagged (K) in linked file, that the ~~for~~ bridle path is to be constructed from Provincial funds. After completion it will be handed over to the Dist Board for maintenance.

CWHS

In Col. Pennycuick's note No 1381 C of 1.6.95 in linked file, the cost of the bridle path was roughly estimated at Rs 83,000. The present estimate is Rs 1,81,100.

It has also to be decided whether the S.E.'s proposal for a cart-road to cost Rs 4,56,100 can be taken into consideration. It is not likely that funds for such a large work will be allotted just now.

The notes on the linked file were ordered to lie over until this estimate came in. It has to be decided whether any further action on them is needed.

CES
6.11.96.

Only a rough forecast.

Nevertheless the District Board in their Resolution No 215 dated 23rd August 1895 expressed an opinion that the construction of a Bridle-path was justified on the understanding that the cost would not exceed Rs 85,000.

The estimate for a cart-road Rs 4,56,100 need not be taken into consideration at all. It was never called for. No

The notes in the linked file were ordered to lie over pending receipt of estimates which would, it was expected, clear up the mystery in regard to submitting an estimate for a cart-road. Apparently no further action on them is necessary, for the preparation of the cart-road estimates seems to have merely a freak of fancy.

CWHS
11.11.96.

Public Works (1897) Department.

CURRENT No. 10029

c7

From The Joint Secretary to Govt Irrigation Branch.

No.

Dated 6th October 1897

Received Do

Registered 9-10-97

Enclosures

Spare copies

SUBJECT.

Athur. Kodaikanal ghat.

Forwards 4 rolls of plans of — detained in his office by oversight.

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

E. I. Form No. 22—2,000—8-8-96.

GOVT. OF MADRAS. 1897. P. W. DEPT.

CHIEF ENGINEER FOR IRRIGATION.

Ooty ~~Madras~~, 6 Oct 1897.

OFFICE NOTE No.

Circulation Register.

To	From	Despatch Date.	Receipt Date.
W	I	6/10/97	

KEEP-WITH.

No.   , dated   189 .

Encs. 4.

I send 4 rolls of plans ~~w~~ of Attur-Kodaikanal Ghat detained in my office by oversight.

W.H.
I

CN° 7079
7359/96

N°

lic Works (1896) Department.

CURRENT No. 8860

Order

From

The Supdt. Engineer
VI circle.

No. 1227 md

Dated 28th September 1896.
Received 29/ 3.10.96
Enclosures 60 61* (29* plans)
Spare copies

SUBJECT.

Bridle path from Kodaikanal to Attur: —
submits the estimate for a —— with another for a carriage Road 16 ft. wide —

1

O.S.L.9

EW

BACK PAPERS.

G.O.	No.	Department.	Date.
memo	1238D	P.W.	7-9-96
"	1201D	"	2-9-96
C. Nos	7079 + 7389		
memo	901D	P.W.	29-7-96
"	837D	"	21-7-96
"	808D	"	18-7-96
"	380D	"	9-6-96
"	2393C	"	2-6-96
G.O.	3281W	"	26-12-95
memo	2487C	"	10-8-95
G.O.	1959W	"	9-8-95
memo	224D	"	22-5-95
"	1791C	"	10-5-95
"	1381C	"	1-4-95
G.O.	269W	"	4-2-95
"	164W	"	22-1-95
memo	113C	"	15-1-95
"	3969C	"	8-12-94
"	168D	"	18-5-94
G.O.	781W	"	20-3-94
memo	462C	"	1-2-94
"	427C	"	30-1-94
"	246C	"	20-1-94
"	4386C	"	18-12-93
"	4313C	"	15-12-93
"	5732C	"	18-12-91
"	5495C	"	7-12-91
"	581D	"	24-7-91
"	3081	"	18-11-76
"	1853	"	21-7-76
"	1037	"	25-4-76
"	780	"	28-3-76
"	3147	"	5-11-75

FURTHER PAPERS.

G.O.	No.	Department.	Date.

1607 W. 28-6-94

2411 D, 29-5-94

No. 1227 md, 1P

Supg Engineer's office, VI Circle,
Trichinopoly 28 September/96.
D 29/-

From.

W. Hughes Esquire,
Supg Engineer
VI Circle

To.

The Chief Engineer
P.W.D.

Sir,

Enclosures: 59 as per list accompanying

I have the honour to submit the estimate for a bridle path from Kodaikanal to Attur called for in G.O. No. 3281 W d/26 December 1895 (the enclosures of which are herewith returned). The papers accompanying the Government order contain full information regarding the line of the road and the probable traffic. No alteration of the line has been made since my inspection in February 1895 but in making the estimate it has been thought advisable to allow for a width including side-drains of 10 feet instead of 9 feet originally proposed. This and the provision which has been made for fully bridging the road brings the estimate to much more than the amount previously reported as probable.

2. The road is divided into three sections. The first of these is the upper 16½ miles of Law's ghât of which about 11½ miles have been made but the road is very narrow, especially in rocky parts where excavation is most expensive. The cost of widening the made part to 10 feet & making the following 5 miles will be Rs 22,800.

3. The second section of 25 miles length, is the portion especially required for opening up the cultivated part of the hills and facilitating communication with the plains. The estimated cost is Rs 131,000. The length may seem excessive compared with the point to point distances

but it is found that the position of the line is so limited at many places that an increase of the steepest gradient to 1 in 12 would make very little difference in the length except in miles 20 to 24 and to gain this slight decrease of length the possibility of future wheeled traffic would have to be surrendered. Where short cuts are found advantageous it may be left to the planters to make them. The steepest gradient both on Law's ghât & on this section is 1 in 19 - which also is the gradient of the Coonoor, Gudalur (Madura) and some other ghât roads.

4. The third section (Estimate Rs 28,000) is an ordinary second class road 5¼ miles in length from the foot of the hills through Attur village to join the Kanivadi Batlagundu road. It will be advisable to extend this

road across the angle between the Kanivadi and Dindigul roads in order to shorten the distance to the latter place, but this work is one that may be left to the District Board.

5. It is presumed that goods will be transferred to or from carts at Attur as the malarious nature of the climate at certain seasons will prevent the establishment of depôts much nearer the hills. The bridges between Attur and Kodaikanal are therefore designed with a view chiefly to pony traffic but at the same time are made wide enough — 9 feet between parapets or railings — to take a single line of carts. There is no reason why the road should not be used for wheeled traffic if Govt. give such power of regulation as can be used to prevent vehicles going in opposite directions on any

section the same day. —

Thus, if the journey from Attur to Kodaikanal be reckoned to occupy two days only up-traffic would be allowed between Attur and Tandigudi on say Mondays Wednesdays and Fridays and between Tandigudi and Kodaikanal on Tuesdays, Thursdays and Saturdays and down traffic on the days not set apart for up traffic. The up and down traffic would then cross only at, or some place prepared nearest the Tandigudi Junction. If wheeled traffic should become considerable, portions of the road would have to be metalled.

6. With regard to the materials of which the bridges and culverts are to be built it has been thought necessary to provide masonry walls for all the larger waterways. Drystone walls will be built where sufficiently good

stone is available and can be safely used and where covering slabs are not obtainable in places whence they can be easily carried by Coolies or carted, jungle timber may have to be substituted. The rates for iron and woodwork are based on the supposition that work will be begun from the foot of the hills and that materials can be taken by cart to the site of each bridge in succession. It is strongly recommended that Government should insist on the road being carried out in this way. The portion between Kodaikanal and Tandigudi should not be touched until that between Attur and Tandigudi is completed.

7. The labour items in the rates are roughly double what is paid in the plains, the daily wages being higher and the working hours shorter. The Coolies on the estates are not paid very high wages, but as they generally come up from the plains (about 3000 feet of ascent) and return each day the amount of work they can put in is not very large. From enquiry it would appear that there is a very remarkable difference in salubrity between the river valleys and neighbouring hill tops and if it could be arranged to hut the coolies on the latter and supply them with boiled water they could probably remain on the hills all through the feverish season. There is however no security from fever anywhere below the 8° mile of section I and it is to be feared that the subordinates in charge of the work will have to be frequently changed.

8.

8. An estimate for a carriage road 16 feet wide including drain is also submitted. The bridges are the same as for the bridle path as they are all short and any very large traffic is not to be expected. This estimate has not been called for but its preparation has caused no delay in the completion of the other estimate.

Section	I	Rs	107300
"	II	"	320,800
"	III	"	28,000
	Total	Rs.	456,100

I have the honor to be
Sir,
Your most obedient Servant

W. Hughes
Superintending Engineer
VI Circle

For orders

4/3

The estimates now submitted in this case are on the supposition that what was required was a good bridle path to pass on the line Palam, and which could afterwards be turned into a carriage road. Consequently the gradients were made steeper & margins were allowed.

From the remarks of the Hon Mr Palmer it appears that he has considered necessary in a path 6' wide on the average ~~with steeper~~ with a gradient 1 in 15 & occasionally 1 in 12 & with some causeways in lieu of bridges where the depth of water does not exceed 6'

As the estimates had been prepared under the directions of Mr Hughes I asked him to a route with reference to the Hon. Member [illegible] I believe however a copy of [illegible] and at [illegible] of the points referred to by the Hon. Member

The question to be settled is whether the path is to be made so that it can be converted without much expense into a dray road or whether a path as proposed by the Hon. Dr. Pollen will suffice.

If the former case I think the whole should [illegible] only be undertaken with the survey of Mr. Mulligan some likely alterations in the alignment may be necessary during construction but they will cause a saving in the distance.

If the latter case a rough estimate must be prepared & a fresh tender must be made.

The Hon. Member states that he doubts if there will be more than 10 carts a day on the road in which case it is unnecessary to go to any great expense, but it must be remembered that the money spent on a track path will be almost entirely wasted if at any future time it is considered necessary to make a road, but the Hon. Member thinks that this will not be required for 10 generations or less.

11/2/87

B

My dear Campbell,
I have made a note which may be either fair copied & sent on or used for your own information
Wm

As the estimate for the Kodaikanal – Attur Ghat road was prepared under my direction Col. Campbell has asked me for such explanation as I can give with reference to the Hon. Mr. Bliss' remarks.

2 The first important point is the ruling gradient – The tractive power required on an ordinary gravelled road is probably 100 lbs a ton or a little more, say $\frac{1}{20}$th of the load. ~~A gradient of $\frac{1}{20}$ doubles the tractive power required and a gradient of $\frac{1}{10}$ trebles it – The gradient of $\frac{1}{15}$ suggested by the Hon. Mr. Bliss demands 2½ times the power needed on the level –~~ One can only judge from experience what the most suitable gradient is – Animals can for short distances exert far greater power than they can keep up on a long march, and often have to do this as for instance in crossing the sandy beds of rivers or in going up the ramps ~~from the rivers~~. The question is, what such animals as would be employed on the proposed

The tractive power required on the level and for gradients of 1 in 20, 1 in 15, and 1 in 20 is in the proportion of 1, 2, 2½, and 3.

ghât could do. On the Coonoor
ghât which has a gradient of
1 in 18 it is a common thing
to see two pairs of bullocks
yoked to a cart. On the
~~[illegible]~~ ghât leading to the
Peryar which is laid out to the
same gradient as the Coonoor
ghât ~~but is of this gradient~~ of
~~only~~ for 5½ miles I have
never seen more than one
pair of bullocks in a cart but
a second pair is sometimes taken
for a change. I conclude that
for the proposed road on which
for one length of 7½ miles and
for shorter lengths in other
places the steepest gradient
allowable has to be adopted
the ~~proposed~~ estimated gradient of
1 in 19 which will work out
about to 1 in 18 through easing of
curves &c, is suitable. I
assume it to be settled that the
road is to be aligned so that it
can be converted into a regular
cart road when the traffic
justifies it. Otherwise a gradient
of 1 in 12 would be the best
but very little of it could be
incorporated with a future cart
road —

3. With regard to the width of
the roadway I at first proposed

9 ft including side drain but
considering the space required for two
laden ponies crossing, the manner
in which the edge of a road wears
down and the desirability of having
ample level ground for a cart I had
the estimate made for a width of
~~after cutting the~~
10 ft — ~~with the side slopes have been~~
~~estimated at ½ to 1~~ The side slope
of the cutting has been taken as ½ to 1
for hard soil. This is of course only
an average slope. It must vary
with the nature of material and
if there are boulders it cannot
possibly be said before hand what
the slope would be. For the most
part there will be earth above
and gravel ~~p~~ perhaps mixed with
boulders below — My instructions
to Mr. Close to allow cutting for
the full width of the road wherever
there is no rock and the natural
slope of the ground is over 26° or
2:1 was based on experience
of a road from Kodaikanal to
Pillar Rocks on which I found that
in steeper ground the excavated
earth thrown on the lower side of
the road to increase its width
in a short time slid down the
slope and was of no use —

4. If Government decides that
the road is not to be at once
made to accommodate cart traffic
causeways can of course be
very largely substituted for

culverts and bridges but I would deprecate the omission of any works required to prevent drainage flowing ~~across~~ or down the road or across it except at the places prepared. The want of proper drainage arrangements enormously increases the cost of maintenance and may turn the road into a mere watercourse like a great part of the Manavanur road referred to by the Hon. Mr. Bliss. and make it impracticable for laden men or animals. I believe there is only one track – that via Fort Hamilton – from Kodaikanal to Manavanur. When I saw it last in 1891 – I have no doubt it is worse now – nearly all the parts in steep ground were impassable and wayfarers had to use tracks at the side of it.

5. Mr. Bliss points out that that the difference of level shown between mile 2 and 4 on the section is only 134 ft and that for anything shown on the plans the road could be much shortened. With regard to this I wish to point out that the crossing of the ridge at 4 m – 3360 ft is practically a fixed point and the gradient of 1 in 19 back from this fixes the point at which the Malaipatti river should be crossed. Between the river and Mile 2 some choice may be exercised. It was thought desirable for the accommodation of the village ~~and~~ to take the road through it instead of below it ~~and also~~ and also to utilize the existing road to the west of it for some distance – Otherwise the villagers would have to make another road to connect ~~up~~ their village with the main line. It is quite practicable to shorten the line but not much as there is a deep depression in the direct line between Pannaikadu and Malaipatti – The line of the existing roads indicates the difficulty of a direct line. I cannot account for the reduction of the fall between miles 20 and 24 to an average of 236 ft a mile. Enquiry might be made – A gradient of 1 in 19 would save something like half a mile in distance.

I ~~believe I suggested in one of my reports that the planters~~ It was not anticipated that short cuts would not be used in places but it was thought that it might be left to the planters and others to make them.

6 The Hon. Mr Weir's refers to the alignment of the road through cultivated land. It was not taken through valuable land ~~for choice~~ where any better line was practicable. In any case it has to be considered (1) that the road will be most beneficial when it passes through cultivation (2) that it can be very cheaply excavated in such places (3) that in all probability even allowing for the compensation it is cheaper than taking it above the cultivation since the cultivation generally extends from the bottom of valleys as high up as there is a fair amount of soil and a road above this would be in a great measure in rocky ground — The minimum width of ground proposed to be acquired is 20 ft, the max^m 40 ft but this is in waste or ground of little value — The rate for compensation has been fixed either by the Rev officers or on information supplied by them —

7. Revetments are provided only where stone is available from the excavation and where it would be cheaper to build them than excavate a greater width — Parapets are required only if cart traffic is to be allowed — They add but little to the cost.

8 — If the line is not to be carried on to Kodaikanal it does not much matter so far as I know, if the first two miles of Section 2 are omitted but it would be as well to acquire ~~the~~

With regard to Section 3 there is just the same reason for its construction at the expense of Govt. as the rest of the line viz that the Dist Board has no funds for it.

8/1

Read the following:—

Note for His Excellency the Governor

~~FOR ORDERS.~~

With reference to His Excellency's note dated 8.12.96. & the Hon'ble Mr. Bliss's note on the proposed ghât road for the Lower Palnis the following remarks are submitted.

The Hon'ble Mr. Bliss remarks that from the village of Pannaikadu to the IV mile the road appears to have been laid out with the express purpose of making it as long as possible. With reference to the first bend the Superintending Engineer says "It next descends to Uralappatti following an existing road for some distance & diverging to get round a deep valley".

Flag G

The maps &c.. do not show how deep this valley is. It is possible that a path might be taken down into the valley & up the other side but it would probably be a steep climb. & as the distance round is only 3/4 mile it would be probably easier to go round. It must also be borne in mind that it is agreed that the line of the road should be made so that it may at some future date

~~FOR ORDERS~~.

be converted into a carriage road.

With reference to the second bend it might be slightly shortened by taking it ~~might be~~ down one side of the valley & up the other with a gradient of 1 in 15

With reference to the remarks concerning the 20th to 24th mile, it is impossible to tell from the map whether it could be shortened. The Superintending Engineer writing of this alignment says "It seems to me an excellent piece of work and susceptible of a little improvement. The adoption of a steeper ruling gradient than 1 in 19 will make little difference in the length of the road as many points are fixed by saddles which have to be crossed".

Flag H

With reference to the width of the road it has been ascertained that 9 ft including drains is the least breadth in which animals with packs on their backs can pass one another. It would not therefore be advisable to make the road with side drains less than 9 ft wide.

With reference to the remark on waterways. No doubt Irish bridges can be constructed more cheaply than ordinary bridges & culverts but it is submitted that the first cost is

---

READ the following:—

~~FOR ORDERS~~.

not the only light in which to look at this matter. The annual cost of repairing Irish bridges & keeping them fit for traffic is much greater than keeping ordinary bridges & culverts in repair. and there is no doubt that it is money well spent if proper bridges are built in place of Irish bridges. The road when completed is to be handed over to the Local Fund Dept. to be kept in repair. It would be hardly fair on them to hand them over a road with a large number of Irish bridges which would require a large amount annually to repair, & even then are never satisfactory.

With reference to the remark about revetments & the slope of cuttings. The proposals made by the Honble. Mr. Bliss cannot be approved. If such steep cuttings are insisted on the P. W. Dept. must be relieved of all responsibility in case of accidents. It may be noted here that a short Tunl

FOR ORDERS.

ago an accident occurred on the Cornoor ghât by the earth slipping in one of the sandy stands where the earth was sloped back about ½ to 1. & two men & some pigs buried & killed.

With reference to the catch drains they will probably only be required for the last 7 miles. The 1st section of 16½ miles is where most the catch drains were required & there is no reason to suppose that the matter was not carefully gone into. The whole length of the original road is 40½ miles & 25 miles of catch drains does not seem extravagant for this length.

Note [illegible]

The S. E. 6th Circle submits an estimate amounting to Rs 18180[illegible] for opening out the [illegible] Railway by means of a bridle path

The estimate is divided into 3 sections for the first 18½ miles of [illegible]

See note [illegible] for portion marked A to B

The distance of road from the end of the tram to the nearest [illegible] station viz [illegible] is miles

The total rise in the length of the route is feet the maximum gradient being 1 in 19, the low gradient is allowed to enable the path to be converted hereafter into a driving road, the great length of the path compared to the rise is due to the fact that a considerable portion of its length which passes through [illegible] is [illegible] level x

The path has been made 10' wide throughout to allow of two pack ponies or bullocks to pass or a [illegible] of Carts to travel along it.

x The details of the gradients are as follows

See [illegible] note

T [illegible] from mark I to T

The S.E. states that the line is the best that can be selected and the estimate may be accepted as covering but detail alterations in detail will be required during construction some of which may cause a saving and some an excess but I do not think sanction need be delayed on this account; as it is almost impossible to frame an estimate for such a length of ghat road that will not be exceeded by but it requires [illegible] alterations during construction.* The alterations in detail that are necessary are

1st When the path is on a hillside only one drain to be allowed on the inside instead of one on each side, this will add another foot to the width of the path and at the same time effect a saving

2nd The catch drain to be at least 10' from the top of the cutting, this may make a slight difference in the estimate

* The disposal of the cross drains has received careful attention & the means for the disposal of it are ample.

3rd The sites of the bridges will have to be more carefully investigated as to the nature of soil & hydraulic sections before they are constructed, this will probably cause a saving in some cases & an excess in others

The ~~xxx~~ path will no doubt be most useful for opening out the Lower Palneys but before it is sanctioned I think the following points should be considered

[illegible]

C.E.D.

The S.E. also submits an estimate for a driving road amounting to Rs 45610 this need not be considered at present

Ed

Flagged A.

C X

Note by the Chief Engineer.

In para 1 of his "Note on the Proposed Road from Kodaikanal to Attur". The S. E. says that the road is principally intended to give means of ~~access~~ access to the plains for the villages between Mulyar on Laws Ghat & Manalur opposite Attur, & also for Kodaikanal.

It seems very doubtful if Kodaikanal will benefit by extending this ghât up to it. There is in existence a ghât road with an average gradient of 1 in 10 from Periakolam to Kodaikanal & the distance ~~of~~ from the plains to Kodaikanal is miles by this ghat.

The distance from the foot of the hills to Kodaikanal by the proposed ghât is 40½ miles.

In para 5 the S.E. says "Kodaikanal must always depend on Periakolam for the greater part of its food supplyes; there can be little carriage traffic as European visitors & residents are not numerous or wealthy enough to support a tonga service from Dindigul & the principal traffic would therefore be between the plains & the villages on the Lower Pulneys. The traffic to Kodaikanal would consist of all those things which are now brought from Madras via Periakolam, building materials & many other things which are now taken up from the plains with much difficulty & expense"

From Ammayanayakanur to the foot of the ghât is about 35 miles along the plains, & then it is 12 miles up the ghât to Kodaikanal.

From Dindigul to the foot of the proposed ghât is about 14 miles along the plains & then 40½ miles through hilly feverish country.

There is therefore reason to doubt if building materials &c. would be got up to Kodaikanal any cheaper by the proposed ghât – Visitors would it is thought prefer the present route as it is shorter –

There seems therefore very little advantage to be gained by constructing the first 16½ miles of the proposed ghât –

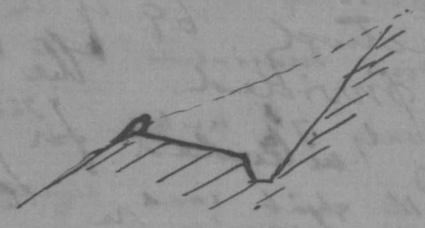
From the village of Muliguer to the village of Manalur a distance of 16½ miles ~~the~~ ~~Manalur~~ the road passes through cultivated land – & would tap many fertile valleys. Especially that of Tandigudy – From Manalur to the foot it is only 7¾ miles. This portion of the ghât road would without doubt be very useful in opening up a large cultivated area & giving easy access to the plains – It would therefore seem advisable to construct the bridle path from Muliguer to the plains a distance of 24 miles, 16 of which runs through cultivated land.

The District Board might be asked to construct the road from Attur to the foot a distance of 5 miles –

The bridle path from Muliguer to the foot opposite Attur is estimated to cost Rs 1,31,000 –

Flagged B.

D X



Of this amount -

	Rs.
Earthwork & Blasting costs —	78.835
11 Bridges 12' span & over —	10,014
Culverts & drains. —	15,611
Check Channel or Catch Drain —	3000
Levelling & surfacing including side drains —	3000
Compensation for land —	10700
Cooly lines &c.	1000
Contingencies @ 5% —	5480
Petty Supervision @ 3% —	3360
	1,31,000

The section given the ~~road~~ path is a barrel shape with a drain on either side - a reduction in earthwork ~~might~~ would be effected by giving the path a slope from the outer edge towards the scarp.

The bridges & culverts have been made 9 ft wide on the supposition that this trace will eventually be made into a carriage road - From the remarks made ~~[illegible]~~ by S.E. & quoted above, it is very doubtful if this will ever be done. The width of the bridges & culverts should be reduced to 6 ft.

The estimate should be revised in accordance with the above remarks.

Note by the Chief Engineer P.W.D.

It is observed that a barrel-sectional path is proposed. As this section generally involves two side drains, curtailing the width of the path, and as a drain, where the earth is in embankment, would inevitably cause subsidence or slips, it is considered preferable to construct the path with only one slope, and that inwards towards the scarp.

2. The common road culverts proposed are of two types called in the estimate "large drains" and "common drains" respectively, 69 of the former and 360 of the latter being provided. The larger drains are, it is presumed, intended for places where the water from the catch-drains on the scarp is taken under the road, while the smaller drains are meant to carry the accumulated water from the side-drains at the toe of the scarp under the path. The ~~[illegible]~~ vents of the latter are, it is considered, too small, being only 2' broad × 1' deep. The depth should be doubled, ~~as~~ or they will probably get choked with silt.

3. The catch-drain, as shewn in typical section No. 2, is only 2 feet horizontally from the edge of the scarp. If placed there it would probably breach. It would be well to lay it back from the edge 8 or 10 feet at least.

4. The above deviations could be carried out

without altering the amount of the estimate materially. But as regards the Bridging ~~to~~ a complete revision seems necessary.

5. The following errors and omissions are noted in the estimates for the Bridges as submitted.

(a) Bridge No. I. 3 spans of 15 feet. 8 girders are provided instead of 12 required.

(b) Bridge No. II. 3 spans of 18 feet. Length of girders provided 18 feet instead of 21 feet.

(c) Bridge No. XVI. - 3 spans of 18 feet. 8 girders provided instead of 12 required.

(d) The water-ways cannot be checked for want of hydraulic details.

6. The depth of the steel girders provided = $\frac{1}{24}$ span. It should be not less than $\frac{1}{20}$ span in each case, for though the girders, provided in the estimate, may be equal to any strain likely to be thrown on them at present, the intention is to have the bridges strong enough for the traffic on what may be ultimately a permanent cart-road.

The girders should, therefore, be of sections suitable for that ulterior purpose. Moreover the girders mentioned in the estimate are not stock sections. The following sections are suggested:—

		Section		weight per foot run
For Bridges	12 feet span.	8" × 4"	- -	19 lbs
"	15 "	" 9" × 3¾"	- -	20 lbs
"	18 "	" 12" × 5"	- -	32 lbs.

~~7. For one Bridge no details are given but a lump sum of Rs 1400 is provided. This is not sufficient information.~~

~~8.~~ 7. Of 23 Bridges allowed for, eleven are of the same design — a single span of 12 feet —, two are single span bridges — 4 of 18 feet and one of 15 feet —, three have 2 spans of 15 feet, two 3 spans of 18 feet and one 3 spans of 15 feet: while for one bridge no details are given, but a lump sum of Rs 1400 is provided.

8. It is considered desirable to cancel the designs for all bridges of more than one span, and to substitute for them single span bridges, for piers are a source of danger in bridging mountain streams: whereas the extra cost will not be much compared with the estimate.

CWH 11.4.86.

than the draft in the file

W.

Flagged A In G.O.* No. 1965 L. Mis: dated
the Chief Engineer was ask
"to depute, when possible,
competent officer to the purpo
of examining the bills (query
and reporting on the present
scheme," i.e a cart ghat
from Aiyyapalaiyam to jo
Road No. 49, Lower Palnis.

In December -1893- two years
after the issue of this order
Mr. Wood was sent for duty
in connection with this work. In
Flagged B G.O. No. 246 dated 20th Janua
1894 Mr. Wood was directed to
examine Mr. Minchin's proposals.
letter in the same file, in the light
remarks of Mr. Turner (whose letter is
also in the file), and the Chief Engin
and to inspect the ground. and lay
out what he might consider to be the
best possible trace for the road
and submit a full report on the
subject with an approximate
estimate. Mr. Minchin's proposal
was for a road, the trace for wh
followed Lacos ghat as far
Neulicar village, and then stri
right across the Lower Palnis
passing through, or near, most
the important villages which we
rich, owing to the large traffic in
coffee and cardamoms, though, fr

for want of adequate communication, nearly everything had to be carried ~~up~~ by coolies. Mr Minchin's line started at the 17th mile of Road No 49, passing the Pannakad villages and Thandipudi to Kannanoor, thence via Manalore to the plains, making a total distance of 17 + 22½ = 39½ miles from Kodaikanal to the foot which is 14½ miles from Ammanayakanur Railway Station.

Colonel Law's trace, made especially for Kodaikanal, is 30 miles or only 9 miles less than this trace which was to benefit so many villages, while his total distance from Ammanayakanur is 49 miles against Mr Minchin's 53 miles, thus:-

17 + 22½ (above mentioned) + 14½ (do) = 54.

but he makes it 53 by entering the new trace as 16, instead of 17, from its commencement to Kodaikanal.

Mr Wood took over his new duties on 15th ~~March~~ Feby 1894, and by 1st March 1894, had gone over most of the line of the proposed road from Kodaikanal to Aiyyapalaiyam.

and on that date he submi an estimate for the necessar establishment to carry on work (vide copy of his letter fl C). Two months later Mr Wood was transferred to Tinnevelly; and on 22nd May Colonel Pennycuick applied for the services of Lt Close R.E. vide note for H.E. flagged D. The following work was done by Mr Wood during his short tenure:

(1) He examined almost the whole of Mr Minchin's line, and a good deal of the surround country.

(2) He levelled, and took meas ments for widening, as necess the first 16½ miles of Law's Ghat from Kodaikanal to Mulyar where the new trace was to start, together with sections of the streams where bridges are necessary.

(3) He went over about four miles of the line from Mulyar with the surveyor, appointed to help him, and started the man in running a trial trace.

The services of Lt Close

e obtained under Indian
No. 1813 M.W dated 21st
1894: and the Gradation
shews that he joined his
pointment in July 1894:
from his letter No. 70 dated
~~December 1894~~, flagged E,
December 1894, it will appear
he took over charge in August:
that letter he reports the work
e as follows:-
Tracing 5½ miles
veying, levelling,
nning, and
ckspitting. 22 miles; and he
timates that it will be
mpleted by 20th April 1895.

In G.O. No. 164 W dated
22nd January 1895, Sanction was
accordingly given for the further
employment of one surveyor for
months, and of ten lascars for
months. And the Superintending
Engineer was directed to "take
an early opportunity of going
over the line with Lieut: Close,
and submitting his inspection notes
thereon to the Chief Engineer
for the information of Government".
All that is known with reference
of this is that the Superintending
Engineer submitted a preliminary
report on the Project in February
1895. This was noted on by E.W. and
transferred to the Local and
Municipal Dept:

On 18th Jan: 1895, the

Sheet 2

Superintending Engineer submitted a revi
estimate, amounting to Rs 3940, "for cutting
trace of Ghât road from Attur to
Road No. 49, Lower Pulnis". This estim
was sanctioned under G.O. No. 269 W
6th Feb: 1895 - flagged G - which "obse
that the present estimate provided f
a trace from Attur, instead of from
Ayempolein (Aiyyapalaiyam) as originally
proposed", and requested the Superinten
Engineer to explain the cause of this
deviation. This he did on 2nd May 1895
(document flagged H) stating that it
"was furnished in the note on the prop
road, submitted in this office No. 1375
20th Feb: 1895 Para 3. This document i
stated to have been transferred to
the Local and Municipal Department
but it may, perhaps, be assumed
that the reason for the deviation was
satisfactory.

On 2nd June 1895 in his letter No.
flagged I
209, the Superintending Engineer virtually
states that the work is being delayed
for want of land, to be temporarily
handed over by the Revenue Departme
for making the trace. In that letter
he says "Lieut: Close has made the measur
measurements for a road, but can not make
an estimate for want of instruction which I a
unable to give him". Apparently nothing
could be done till the District Board

had considered the Project. This they did on 15th July 1895, the result being that an estimate for a bridle path was called for in G.O. No. 3281 W dated 26th December 1895. Flagged J. On 18th May 1896 in his letter No. 542 the Supt. Engineer reported that the estimate for the Bridle Path had just been received from the Executive Engineer, and would be submitted without delay. This estimate has not been received, in this office, up to date. On 9th June a memorandum Flagged L. No. 380 ~~[illegible]~~ was issued from this office calling for a report shewing the work done by Mr. Clore R.E. since the date of his appointment, and as to the additional length of time the work would take him to complete. To this the Superintending Engineer replied in his letter No. 824 dated 21st July (Flagged M): but the reply is of a very general character and made without a full knowledge of details. It is to the effect that Mr. Clore had submitted estimates for a pony path (query Bridle path?) and that he was still engaged in preparing the estimate for a carriage road which he expected to finish before going on leave on 1st August 1896. Why he should go on with estimate for a carriage road is clear. It does not seem likely the District Board will approve it but from a reference to their proceedings, Flagged K, it will b clear that the Planters' Association and local bodies are in favour of a bridle path which the District Board have expressed their willingness to take over and mainta when constructed. The intention, i would appear, was to construct the work from Provincial Funds, an make it over to the District Board. To prepare an estimate for a carri road might be a waste of labour. Funds would not, in all probabili be voted for years, and then the work would have to be done all over again and fresh estimates prepared. A Statement shewing the work done by Mr. Clore is Flagge N. If his notes of inspection were called for it might transpire th he had been allowed to spend much time at Kodaikanal on work which had no connection with this project, though it is possible that, as the estimate for the bridle path had been received in May 1896, by the Executive Engineer, Lt. Close may have been deputed to look after work at Kodaikanal pending scrutiny of the estimate. This, however, is pure surmise, information on the subject being as meagre as it well can be. We know nothing as to the period spent by this officer on work which had nothing to do with this project; and if he can be employed on the carriage road trace now, it is not clear why work connected with the project could not have been found for him all through, instead of employing him on minor works in Kodaikanal. From the Superintending Engineer's last letter No. 995 dated 11th August 1896, it would seem that Lieut: Close, though wholly inexperienced, was allowed to commence operations without any guidance from an officer of experience. In Feby 1895 when the Superintending Engineer inspected the line he found many of the marks lost. This is probably, due to an absence of permanent land marks, as stated by Mr Wood in his letter, flagged C, to be necessary; where he says that heaps of stones would be ~~necessary~~ required. Again the Superintending Engineer, in his letter flagged O, says that the estimate for the third section of the road was so badly prepared that it had to be returned to the Executive Engineer, who, we must presume, can not have given Lt. Close the full benefit of his advice, although the latter's headquarters had with that object been transferred to Madura. But what we want with a road estimate at all is not clear. The latest orders refer to a bridle path.

7.9.96.

Mr J.K. Batten, Asst. Sub-Collector and President Dindigal Taluq Board states that the principal places to which food are taken from the plains are:—

1 Devadanapatti by the Pannaikadu – Devadanapatti
2 Aiyampolliam " " Thandikudi – Aiyampolliam
3 Ahbur " " Pillavilli – Ahbur
4 Pannipatti, for " " Adalur – Pannipatti "
I Dindigal.
5 + Virupatchi " " Pachalur – Virupatchi "

No. 1 and 4 are bridle-paths on which money is being spent for their upkeep; on the other routes pack-ponies can be taken down but not up. The gradients are not stated – probably they were never levelled to – but Mr Batten describes them as "steep traces" on which it is not advisable to fritter away money.

2. The District Board, at a meeting held on 18th November 1895, was unanimously in favour of accepting the offer of the Government to take over the maintenance of a bridle-path when constructed – and they had no hesitation in assert

that the benefits which would accrue to the Lower Palnis would justify an expenditure of Rs 85,000. They express no opinion as to the gradient.

C.O.S.W.

21/1/97

C.A.W.

Can you tell me why the document flagged I was marked ? It seems to have required handing up to the Revenue Dept. with a view to the temporary acquisition of the land -.

AWH

5/9/86

Please let me have a reply as I am writing a note on this subject which I should like to finish before leaving office

AWH

5.9.86.

D.W.

The portions of the file sent does not enable me to say precisely. There were other papers in the file when the draft in quest.

... in ... ding
... far as I can judge
nothing could then be done
until the Local Board
had considered the Project.
They said they would take
it up at their meeting of
the "15th Inst." i.e. 15th July 95.
It would, I thought, have
been premature to
acquire land or do
anything else in the
Govt. office till the
Local Board's views
were before Govt.

R.S.

7. Sep 96.

Herewith the rest of the file with my unfinished note. I should like to know why Lieut. Close was allowed to remain on this project after the period, for which his establishment had been engaged & provided for in the revised estimate, had expired. No application seems to have been made for a prolongation of his services.

CWS
7.9.96

I find that Lieut.

W.

It seems necessary,
for reasons stated
in the proposed note
of the Chief Engineer P.W.D, to
return these estimates
for revision - But as H.E.
has personally interested
himself in this Project
perhaps you may see
fit to send the papers
on to him first.

Please observe that
the estimate is very
much larger than
anticipated viz. R/181,100
against R/85,000

CWH
11.11-96

(~~63~~ 13) L.6. No 201

I have heard from S.E. 6th that the estimates will be submitted of est. in a month or later; the mystery about the bridle path & carriage road will then perhaps be cleared up. In the meantime these papers can lie over.

8/9/86

CWOS 8.9.86

W.
The estimates are now submitted. No explanation for those for the cart-road are given. The SE. in the last para of his letter No 1227 dated 28/9/86 says "This estimate was not called for, but its preparation has caused no delay in the completion of the other estimates."

CWOS 11/86.

Lie over till revised estimate is received

8/11/86

~~F.W.~~

C.W.

There is said to be trouble over this business & I should like to see a complete file showing what the work to be done by Mr Close was & what information the Museum had of the date Mr Close joined & what instructions he received & from whom, what assistance he had & under whom he was supposed to be working.

So far as I can make out he has been left entirely to his own devices without receiving instructions from anyone & naturally as a young & unexperienced officer just out from home he has made a mess of things.

18/8/96

S.A.W.
Kindly order complete file to be sent up.

18/8/96

Cir. 1389

W.

The complete file relating to Lt. Close's employment in this Dept. is submitted as ordered.

The proposal originated with G.O. No 1965 L. Mis of 14-8-91, in which the P.W.D. was requested to investigate a ~~[illegible]~~ project for constructing a ghat road from Aiyampalayam to join Road No 49 Lower Palnis.

No officer was available for the work until Decr 1893, when Mr Wood was posted to it.

The nature of the duties to be undertaken by Mr Wood is detailed in Memo No 246 C of 20-1-94.

Who is Mr Wood

Shortly afterwards, i.e. in May 1894, Mr. Wood's services were required for charge of the Tinnevelly division, & Col. Pennycuick then made the suggestion that a R.E. officer should be obtained from the Mily. W. Dept or the Sappers to continue the special duty commenced by Mr. Wood — vide No. 210 D of 24.5.94.

On this Mr. Closé's services were obtained — G.O. No. $\frac{1607W}{A}$ W of 28.6.94.

In January 1895, the S.E. VI Circle submitted a report on Mr. Closé's work, & the continued employment of the establishment under the latter was sanctioned — G.O. No. 164 W of 22.1.95.

In July 1895, the S.E. submitted a preliminary report on the project. This was asked on by S.W., & transferred to the C. & M. Dept. under endt. No. 1381 C of 1.4.95.

In G.O. No. 3281 W of 26.12.95, detailed plans & estimates for a bridle path were called for.

Apparently this is the work Mr Close has been engaged on since, & but from the S.E.'s recent letter, it appears that he has also been employed in completing the estimates for a cart road, & has been given other work at Kodaikanal.

Ch
24.9.96

No report has been recd. from the Chr. [illegible] called for. Ref. to the Chn [illegible] on other part

this seems to have started a new line [illegible]

S.W. Please go into the matter & [illegible] information the [illegible] is one of S.E.'s [illegible] the latter should be [illegible]

Flagged

[illegible]

of Close's engagement has never been limited by any specified date. There is, therefore, no question of any application for a prolongation of his services. The Chief Engineer has been informed from time to time as to how this officer was being employed. This will be seen from the correspondence in the file. The quarterly distribution returns also show this. Colonel Pennycuick evidently knew all about Mr Close's work, and did not think it necessary to call for special reports. The present Chief Engineer was not so informed, and in his Memo No. 380 D d/ 9 June 96 called for special reports, which have since been submitted.

My former reply, as to why C.D. the paper bearing No. 2487 C d/ 10 Aug 95 was "Recorded" is, I think, correct.

C.L.
7. Sep 96

7

8860

P.W.

The file is incomplete.

The only G.O. put up is a fair copy of No. 269 W. d/14-2-95, but there is a large S.AW. file on the subject.

Having looked up with Cus 7389 G.O. No. 3281 W. d/26-12-95 S.B. 30-10-96 & previous papers, they will probably all be found to be disposed on Cus. 7389 which may Submitted W. 28.10.96 be found in D. S.B. 30/10/96 series.

Dr. of close R.E. S.E.V. reporting the nature of Works turned out by —

30/10

I have retained 3 rolls of plans & the Sections.

B (Jergman hunt)

A Hoggatt

Do you remember what disposal was made on Case 7389? (Recover).

CF

30 Oct 06

E Hoggatt

being taken to Odd by Asst Junior Clerk.

CW/1002

There appears to be no necessity to keep this current in the L.O. list any longer.

H
5.4.98

R.K

W recently directed that S.I should be asked to return these papers. Kindly put up the office Note sent S.I.

RwR 5.4.98.

Law

The loan was not recorded means. It was only a "requisition"

[illegible]

[illegible]

H
2/4/98

L.C.W. 26.

343

I office Clerk
-

Please say where the papers on this subject are. /

H.C.
6.10.97

With H. M.

6/10

Note

Plans have been retained in office

6/10/97

Lie over till the return of the papers which are said to be in circulation

6/10/97

Saw

H.C.

The plans are in the I office and are

Kodaikanal Bridle Pa

Loads on Bridges

12 ft span

cubft

Timber.

Spiking Beams. $4 \times 12 \times \frac{7}{24} \times \frac{1}{4} =$ 3.50.

Flooring $12 \times 9 \times \frac{1}{4} =$ 27.00

Handrails. Horizontals. $4 \times 12 \times \frac{7}{24} \times \frac{1}{4} =$ 3.50

Uprights $2 \times \frac{5}{2} \times \frac{7}{24} \times \frac{7}{24} =$ 0.42

Diagonals $8 \times 6 \times \frac{7}{24} \times \frac{5}{24} =$ 2.92

Total cubft = 37. 34.

lbs.

Taking this at 50 lbs per cub ft to allow for Spikes nails &c: = 1867

Live load $12 \times 9 \times 120$ = 12960

Total load on span = 14827 lbs

or 6.1 tons.

Load on each girder = 1½ tons

---

15 ft span

cubft.

Timber

Spiking beams. $4 \times 15 \times \frac{7}{24} \times \frac{1}{4} =$ 4.37

Flooring. $15 \times 9 \times \frac{1}{4} =$ 33.75

Horizontal rails $4 \times 15 \times \frac{7}{24} \times \frac{1}{4} =$ 4.37

Uprights $4 \times \frac{5}{2} \times \frac{7}{24} \times \frac{7}{24} =$ 0.84

Diagonals $12 \times 5 \times \frac{7}{24} \times \frac{5}{24} =$ 3.64

Total cubft = 46.97

lbs.

46.97 cft Timber at 50 lbs = 2348

Liveload. $15 \times 9 \times 120$ = 16200

Total load on each span = 18548 lbs.

or 8.28 tons

Load on each girder = 2.07 tons.

Kodaikanal Bridle Path

Load on Bridges

18ft span

Timber:

		cub ft.
Spiking Beams	$4 \times 18 \times \frac{7}{24} \times \frac{1}{4} =$	5.25.
Flooring.	$18 \times 9 \times \frac{1}{4} =$	40.50
Horizontal rails	$4 \times 18 \times \frac{7}{24} \times \frac{1}{4} =$	5.25.
Uprights.	$4 \times \frac{5}{2} \times \frac{7}{24} \times \frac{7}{24} =$	0.84
Diagonals	$12 \times 6 \times \frac{7}{24} \times \frac{5}{24} =$	4.37
Total cub ft.		56.21

	lbs
56.21 cft. Timber at 50lbs.	2810
Live load. $18 \times 9 \times 120 =$	19440
Total load =	22250

= 10 tons very nearly on each span

or 2½ " " " on each girder

Fwl
11.11.96.

Returned by Private Secretary to H.E. without any remarks (may be recorded)

31/10

P.K. The plan should have been returned with the file. As it has been so long, it may be kept now until called for by the S.E.

4/11/98

Returned to records

31-10-98

H.C.

The accy: plan is connected with G.O. 1314 W d/ 23/5/98. All the other plans & Estes have been returned to the S.E. W.I. C., and it is not known whether this plan should be kept with the original or [illegible]

[illegible]

It will be well [illegible] plan & return to proper place [illegible] drawer

GOVERNMENT OF MADRAS.
.. Public Works Department,
Irrigation Branch,
MADRAS,

~~Chepak,~~ Ooty 17 July 1897.

My dear Sir,

As far as I can judge the following saving in length of road can be made by making the ruling gradient 1 in 15.

3rd mile	—	2000 ft
4th	—	500
6th	—	500
7th	—	500
8th to 19th	short lengths in places	1000
19 to 24	—	5000
		9500

Say 1¾ miles — There would

be a further large saving if it should be decided once for all that the road is not to be for cart traffic as the crossings of small streams could be effected by cheap causeways and the large bridges omitted where the rivers are shallow — also the parapets to which Lieut Bliss objected could be omitted — I do not remember that any revetments are allowed for except in rock cutting when their use is more economical than blasting out an extra width of rock — Without the Est. I cannot judge what the amount

of saving might be

Yours sincerely

W. Hughes