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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

P.W.D. DEPARTMENT

G.O. No.	524. W.	Press.
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26TH FEBRUARY 1884, No. 524 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers :—

From Colonel J. BEATTY, R.E., Superintending Engineer, IV Circle, to the Chief Engineer, Public Works Department, dated Coimbatore, 31st January 1884, No. 43.

I have the honor to forward herewith for your information, a preliminary report by the Executive Engineer on special duty in Wynaad. I have thought it best he should send such a report with the view of eliciting your opinion on several points in connection with the estimate for the Calicut-Vayitri road now about to be prepared and submitted.

1 Report from Mr. Nordmann.
1 Sketch map.

2. That road passes over a succession of small hills and valleys in the twenty-seven miles commencing at Calicut. Then the Tāmraçhéri ghât begins, its foot being about 200 feet above the sea. The length of the ghât to its summit near Lakkidi is 8 miles, and the total rise in that distance is 2,400 feet or 300 feet per mile which is less than 1 in 18. There is then a slight fall to Pookote, which is situated about $37\frac{1}{2}$ miles from Calicut, and 2 miles from the head of the ghât.

3. As might be expected the gradient on the ghât is not uniform throughout and there are steep bits, which the levels, Mr. Nordmann is about to have taken will show. Fortunately the revetments appear to have been very substantially built, and I did not observe any of them out of order. But the roadway, which at the narrowest parts varies from $11\frac{1}{2}$ to 13 feet including the side drain, is very rough and badly needs metalling throughout.

4. The hill sides on the ghât are exceedingly steep, and the rainfall of that part particularly heavy. Consequently as the under-tunnels are few in number, the drainage often overflows the road, and sweeps away everything, leaving only the rough surface of bare rock below. For the protection of the metalled surface, I consider that on the ghât there should be not less than two slab drains to each furlong, and where the gradient is steeper than 1 in 16, there should be one at every 100 feet.

5. Where the width on the ghât is less than $13\frac{1}{2}$ feet from the parapet to the hill side, it should be made that width by blasting or cutting. There is probably not a furlong altogether, in bits at different places along the ghât, where this widening is needed, so that it should not involve any great expense.

6. In the undulating country between the foot of the ghât and Calicut, there are several steep gradients which require to be corrected. But the chief improvements along the whole line are the substitution of iron bridges for the old rickety timber ones and that of broken stone well rolled for the present surface of inferior gravel.

7. With regard to the bridges which should in my opinion have a superstructure of iron with the exception of a bare floor of 3-inch planking, I consider that a width of $10\frac{1}{2}$ feet, including 9-inch wheel-guards on either side, will be ample. Having now ridden over the whole line from Calicut to Manantoddy, I observe that where bridges have been made wider there is only a track in the centre used, and the side spaces are overgrown with grass. The parapets may be $2\frac{1}{2}$ feet high.

8. I propose to make the road surface of broken granite 12 feet wide and 6 inches thick with a top coating of one inch of gravel. The embankments to be 18 feet wide with side slopes of $1\frac{1}{2}$ to 1; the berms and side slopes to be turfed; and

rough stone parapets to be provided where the embankments are more than 4 feet in height.

9. I agree generally in what Mr. Nordmann has proposed in paragraphs 16 to 34 with the following exceptions:—

(1) I think the first * thing to be done for improving the Tāmrachéri ghât is to increase the number of

* Paragraph 16 of the report.
under-drains. Any money now sanctioned for metalling would be a grant-in-aid for maintaining the present imperfect ghât road, and ought to be handed over to Local Funds. I have no objection to Government assisting Local Funds by a grant-in-aid, but I consider that this has nothing to do with the special work for which Mr. Nordmann is sent to Wynaad. Owing to the want of a sufficient number of under-drains, much of the repair work now done by the Local Fund establishment is frequently swept away.

(2) Mr. Nordmann has proposed a depth † of metalling of 6 inches only on the ghât; I think $7\frac{1}{2}$ inches

† Paragraph 20.
should be provided, so as to allow a thickness of 9 inches in centre and 6 inches at the sides. In regard to width, 12 feet everywhere appears to have been already ordered.

(3) There are few bridges on the line over 100 feet in length, so that, I think

‡ Paragraph 29.
a width ‡ of roadway of $10\frac{1}{2}$ feet, as proposed above, would be ample. For bridges of 200 or more feet in length, I would have provided a sufficient width for two bandies to pass, but for the short bridges and culverts on this line, I think a greater width than $10\frac{1}{2}$ feet would only needlessly add to the cost of the improvements.

ENCLOSURE.

From K. F. NORDMANN, Esq., Executive Engineer, on Special Duty, Wynaad, to the Superintending Engineer, IV Circle, dated Vayitri, 25th January 1884, No. 27 V.

With reference to G.O., No. 395 E., dated 26th September 1883, I have the honor to submit the following preliminary report.

2. I arrived in Wynaad on the 6th November 1883, and attended the meeting of the Planter's Association at Pookote on the 7th idem.

3. Being without establishment or instruments, I could not immediately begin the survey. But I inspected several roads, especially that from Calicut to Vayitri with the Tāmrachéri ghât. I consulted some of the principal planters and made myself acquainted with the orders of Government on the subject of Wynaad roads, as well as with the views of the planters and their agents on the coast.

4. Having submitted estimates of the probable cost of establishment required to aid me in my work, and having indented for the necessary surveying and drawing instruments, I advertised in the *Fort St. George Gazette*, and in two Madras newspapers for surveyors, draftsmen, and office hands. The final sanction of Government for the establishment proposed was given in G.O., No. 3664 W., dated 20th December 1883, received by me on the 6th January.

5. I have taken detail notes of the state of the road from Calicut to Vayitri, and collected all available information required to form the data for the road and bridge estimates, and those for the buildings proposed to be erected for shelter of the establishments.

6. One of my office clerks arrived here on the 31st December and the head clerk only on the 11th January. The surveying and drawing instruments came on the 1st January. No surveyor or draftsman has joined me as yet. One surveyor (Mr. Green of Bellary) was appointed, but unfortunately died suddenly before he could come up. Two surveyors and two draftsmen have now been sent for, and I hope some of them will shortly join. One draftsman has just reported his departure from Madras. I have rented a small bungalow for my office near Pookote.

7. The survey and levels of the line from Calicut to Vayitri via the Tāmrachéri ghât, and the estimate for putting this road into thorough order, including the reconstruction of the bridges and many of the culverts, will be first taken in hand, after which the other roads enumerated in

G.O., No. 1416 W., dated 6 June 1882, will be taken up in the order of their importance, which seems to stand as follows:—

	MILES.
I. Calicut to Vayitri by the Tāmrachéri ghât	43
II. Vayitri to Gúdálúr	43
III. Gúdálúr to Ootacamund via Nāduvatam	27
IV. From 4 miles north-east of Vayitri via Kalputty and Sultan's Battery to the Mysore frontier	30
V. Kalputty via Pannamaram to Manantoddy	20
Total ...	163

The last named line I would propose to substitute for the road from Vayitri to Manantoddy via Terriote (30 miles), thereby effecting a saving of 10 miles of road; besides which the line via Kalputty to Manantoddy is an easier line, carries more traffic, has better gradients, and requires fewer bridges than that via Terriote. The Terriote road is not much used, except for the first 8 miles out of Vayitri; and it can be kept up from Local Funds as heretofore.

8. As regards shelter for the establishment, I propose to build wooden houses instead of masonry ones, the latter being more than twice as costly as wooden buildings. The style of the wooden houses proposed would be that now in vogue in South Wynaad, where many planters live in neat and substantial buildings of sawn timber which effectually keep out heat, cold, wind and rain, and last with ordinary care and small repairs from 25 to 30 years. The Local Fund bungalow at Lakkidi (built by Colonel Kennedy), the store and club buildings at Pookote, and others in the neighbourhood are of this description. I would use Mangalore tiles for the main roofs, corrugated iron for the verandahs, and cement for the flooring.

9. It is proposed to include provision for the following buildings in the estimate (to be submitted first of all) for the road from Calicut to Vayitri:—

Executive Engineer's dwelling-house at Vayitri.

Do. do. office and stores at do.

Dwellings for office establishment at do.

1 Inspection bungalow at Tāmrachéri.

3 Houses for upper subordinates, viz., one at Vayitri, one at Pudupady near the foot of the ghât, and one at Pudanellum, 9 miles out of Calicut.

1 House for the Hospital Assistant.

3 Cooly lines.

I have found a suitable site near Vayitri for the buildings to be erected; this site is at present private property and will have to be acquired by Government, if my proposal is approved. I do not propose for the present to build more than 3 cooly lines in connection with the Calicut-Vayitri road, as I expect that most of the work will be done by contract, and the contractors will themselves provide temporary accommodation for their labourers.

10. I calculate, approximately, that the cost of establishment for the whole project of Wynaad roads will not exceed 25 per cent. of the expenditure on works, and that the amount of compensation for land will be within Rs. 50,000. The rough abstract estimate for the whole scheme would then stand as follows:—

WORKS.					RS.
Original.					
(a) Reformation or completion of 163 miles of road at an average rate of Rs. 5,000 per mile	...	...	...	...	8,15,000
(b) Buildings	...	...	...	...	1,00,000
(c) Compensation for land	...	...	...	...	50,000
Repairs.					
					RS.
To roads during construction	...	...	...	70,000	
To houses and offices	...	...	...	12,500	
					<hr/>
					82,500
					<hr/>
Total Works					10,47,500
Establishment.					
(Calculated at 25 per cent. on cost of works)	...	...	...	...	2,28,750
Tools and Plant.					
(Calculated at 2½ per cent. on cost of works)	...	...	...	...	22,875
					<hr/>
Total					12,99,125

Say in round numbers 13 lakhs.

11. As regards the establishment required during say 5 years, for projection, estimation and execution of the works, it will probably be found sufficient to have one Executive Engineer, with head-quarters at Vayitri, two assistants, stationed at Manantoddy and Devála, eight upper subordinates, stationed at Manantoddy, Devála, Vayitri, Sultan's Battery, Pudupady, Pudaneilum, Naduvatom and Moopenád, with two medical subordinates, one at Gúdálúr and the other at Kalputty.

12. Assuming that the work begins in October next, the following provision of funds would probably have to be made:—

1884-85 (half-year)	...	...	...	...	...	...	RS.
1885-86	"	"	"	"	"	"	50,000
1886-87	"	"	"	"	"	"	1,50,000
1887-88	"	"	"	"	"	"	2,00,000
1888-89	"	"	"	"	"	"	3,00,000
1889-90	"	"	"	"	"	"	4,00,000
							2,00,000
Total ...							13,00,000

13. It had been proposed to make certain deviations on that portion of the Calicut-Vayitri line which lies between Calicut and Támrachéri, on account of some of its steep gradients, and to take a new line by a circuitous route with easier gradients, viz., Challaye. But I find that all parties interested in the subject seem agreed that there is no need to make a new line provided some of the gradients of the existing road can be improved, and that the flatter the survey and line of levels will show that the steep gradients are easily susceptible of being flattened, at no excessive cost, and that no gradients steeper than 1 in 18 need be retained on the existing road. If such turns out to be the case, I would advocate that the existing road be adhered to and no extensive deviation of the nature suggested (*via* Challaye) be made; although minor deviations of less than a mile in length may in two or three places have to be carried out on the present line.

14. One of the chief objections to the deviation *via* Challaye (besides its great length) is that it would require several large bridges, while there is not a single large bridge on the present line; this is unquestionably a great point in connection with any road in Malabar. Besides, a very small proportion of the traffic now seeks the more circuitous route *via* Challaye to Támrachéri, and if this new route were improved instead of the existing old one, a considerable proportion of the traffic would yet utilize the present road which would still have to be kept up from Local Funds, to accommodate the local traffic. The expediency of improving the longer new line, instead of the shorter old one, seems therefore very doubtful.

15. The most important link in the whole scheme of Wynaad roads, now under consideration, is the Támrachéri ghát, and it is of paramount necessity that this ghát should be put and kept in good order, as without it the communication with the coast is interrupted. Faulty though the original conception of the present line of ghát may have been (it not being the best trace that could have been made in the desired direction), yet, the faulty trace having been accepted and its opening out taken in hand, some twenty-two years ago, the work was thenceforward carried on vigorously and in the most thorough manner; the result being a first-class ghát road, solidly and substantially built, reflecting credit on the Engineer and calculated to last, with ordinary care and repairs for ages to come. But the work is not completed, the surface is unfinished; and this being the part that most immediately affects the traffic, the latter is put to great inconvenience and risk, especially during the rains. The ghát is scarcely ever absolutely impassable for cart traffic, but the surface is so rough, and apt to become so much out of and positively dangerous in the monsoon, that it must necessarily be looked to before any other portion of the proposed scheme of Wynaad roads.

16. The remedy for the most glaring defects of the ghát is the metalling of it throughout with good stone-metal to a depth of not less than 6 inches, the metal being consolidated by heavy rollers of stone or iron. The sooner this work can be taken in hand, the greater will be the benefit to the planting community and to traffic in general. If the collection of metal could be begun immediately, some appreciable progress might be made before the next monsoon puts a stop to out-door work. If the work is not now begun, it will have to lie over until after the monsoon, say October next, and thus a portion of one working season will have been lost, and the completion of the whole work delayed by one season, and the traffic will have to face the dangers of the ghát during yet another monsoon. If the Government have any funds at their disposal now, of the official year, such funds could be most usefully employed in collecting metal for the Támrachéri ghát, and a sum of Rs. 5,000 to 6,000 could be profitably laid out in this manner between this and the 31st March. Thus a suitable beginning would have been made with the most urgent part of the whole programme, which would be highly satisfactory to the parties most interested, i.e., the planters.

17. There is another important portion of the system of Wynaad main roads which seems to have been kept in the background in the late discussions on the subject; this is the Periah ghát, connecting Manantoddy and Tellicherry. The new Periah ghát was traced, and partly made twenty years ago, having been sanctioned, because it was then considered to be urgently required for the development of the resources of that part of the country, and although North Wynaad seems to have of late lost some of its former importance as a planting district, yet any scheme for Wynaad roads could hardly be called complete without providing for this link also. I would therefore suggest that the road from Manantoddy to the foot of the new Periah ghát, a distance of 28 miles be treated as part of the main system of Wynaad roads, the continuation from the foot of the ghát to Tellicherry to be taken care of by the Local Fund Board.

18. I now come to the details of some of the items to be included in the estimate for the road from Calicut to Vayitri, and partly in the other road estimates also, and I should be glad to receive orders on the subject as to whether my proposals below detailed are approved of or not, before the estimates are submitted for final sanction. Thus time may be saved in the disposal of the estimates.

19. *Gradients.*—All steep gradients above and below ghát to be corrected to at least 1 in 18, which is to be considered the maximum steepness allowable. The average gradient on the ghát itself is believed to be not steeper than this (as the line of levels will show) and need not therefore be interfered with, except on short bits of road, here and there where through faulty cutting the original trace may have been spoilt for a short distance, especially at sharp turnings. In the low country and on the plateau the required improvements to gradients can generally be easily effected, either by cuttings on the summits and embankments in the adjoining hollows, or else by new traces for short distances, in places where the original trace has not been laid out so as to take full advantage of the capabilities of the configuration of the hill sides. The estimate will provide for all necessary alterations of this nature.

20. *Metal and Gravel.*—The road to be metalled throughout to a depth of not less than 6 inches, and to a width of 13 feet. The metal to be of hard granite or gneiss, broken as uniformly as practicable into cubical pieces of a size to pass through an iron ring $1\frac{1}{2}$ inches in diameter. The metal to be well consolidated by heavy rollers; the transverse section of the road to be level, i.e., to slope neither inwards nor outwards, but to have a slope from the centre of the road to the sides of 4 inches. The surface of the metalled road to be covered with a blinding of one inch of good gravel well rolled.

21. Where the roads surface is very uneven, as is the case on the Támrachéri ghát at present, I propose first to remove all loose matter, such as dust, sand, and mud, until the hard and solid surface is exposed; then level the surface transversely by filling up the ruts and hollows with stone metal, then roll; then on the level surface thus obtained lay a coating of metal averaging 6 inches in thickness, and sloping from the centre to both sides at an inclination of 1 in 20, then roll; then spread one inch of good gravel over the metal, and roll again, after which add $\frac{1}{2}$ of an inch of clean sand. The surface will then be fit to carry the existing traffic, and more, at all seasons, without yielding.

22. *Catch-drain.*—A catch-drain to be cut on the upper side of the road (in hilly ground) wherever practicable, 33 feet or $\frac{1}{2}$ a Gunter's chain (horizontally) from the centre of the road. This drain is to discharge itself wherever there are culverts, tunnels or under-drains; the water to fall into a shallow well or pool, there to gather and thence to flow off through the under-drain.

23. *Under-drains on the ghát.*—The existing ones are, as a rule, substantially built and answer their purpose. But there is not a sufficient number of them; hence much storm-water discharges irregularly across the road and helps to damage the surface. There should be not less than two of these drains per furlong, according to the requirements of the configuration of the hill side in each separate mile. In steep places, and at sharp turnings, they should be more frequent than along ordinary reaches of the road. They can be built of dry rough-stone abutments (the largest procurable size of stone being used), covered with stone slabs.

24. *Culverts and tunnels, above and below ghát.*—All existing timber culverts to be reconstructed with laterite or stone abutments, and rail and plank superstructure, or arches of brick or laterite. Such existing culverts, with laterite or brick abutments and arches, as are in good order, to be retained; likewise all minor bridges that are now in serviceable condition.

25. *Small bridges up to 12 feet span* may be built of iron rails (broad gauge, double-headed, weighing about 80 lbs. to the yard) laid across abutments of laterite and covered with well seasoned 3-inch teak planking; the planks to be laid $\frac{1}{2}$ of an inch apart. I propose to make use of iron rails wherever they can be introduced advantageously and economically.

26. *Small bridges up to 20 feet span* to be built with brick or laterite abutments, and brick or laterite arches, wherever either good brick or laterite is easily procurable.

27. *Wooden piles,* wooden girder-beams, and timber trusses should not be used for permanent bridges in Wynaad or Malabar; they answer very well for temporary structures and in dry districts, but not for packa bridges in a climate and with a rainfall like those on the Western Coast and Gháts. Stone and iron should be resorted to as much as possible.

28. *Bridges of larger spans.*—It has been found that the description of "Warren girder," put up for several bridges in Wynaad, consisting of a combination of wood and iron, has not been able to withstand the climate long. The wood, exposed to the extremes of temperature, and alternately to excessive dryness and excessive moisture, and pierced by iron bolts, &c., soon decays, and the structure becomes unstable in a comparatively short space of time. I would not therefore advise any more bridges of this description being built, but would use *iron girders only* for all larger spans, with abutments of solid stone masonry (not laterite) laid in chunam, and a roadway of well seasoned 3-inch teak planking, or else iron "buckle plates," whichever may be considered preferable.

29. *Width of roadway and parapets.*—The clear width between parapets should not be less than 12 feet. Masonry parapets should be $2\frac{1}{2}$ feet high, their corners protected by guard stones.

30. *Earth embankments* should not be less than 18 feet wide at top; and where high, they should have parapet walls or railings for the greater safety of the traffic.

31. *Scales for surveys and sections.*—The surveys to be drawn on a scale of 12 inches to the mile, arranged in book form, each leaf to contain one mile. Longitudinal sections of roads to be on the same scale as the surveys; vertical scale 20 feet to the inch.

On the ghât, where the fall per mile is nearly 300 feet, the vertical scale will have to be less than in the plains, say 50 feet to the inch.

Cross sections of roads and rivers to be on a scale of 10 feet to the inch.

32. A paper containing some brief notes on the present state of the road from Calicut to Vayitiri *viâ* the Tâmrachêri ghât, is appended to this report.

33. It only remains to notice the proposed Wynaad railway alluded to in the papers which were sent to me in connection with my present special work. The proposal to lay a line of railway along the Tâmrachêri ghât involves interference with the existing road-traffic, which is undesirable. Moreover, this ghât is, owing to its zigzag and steep, rocky slopes, not as well suited for a railway as some of the longer ravines, with easier slopes leading from the plateau into the low country.

The head of one of the easiest natural ghâts, along which a railway on the metre-gauge could be economically laid down to connect the Wynaad plateau with the coast, is to be found about eight miles out of Manantoddy, on the Periah road, whence a long valley with easy slopes extends for several miles in a westerly direction through the Kôttayam taluk, which valley can be connected without difficulty with Tellicherry, the principal shipping port for the coffee trade.

Other easy natural lines are the Kuttiyâdi ghât and the Kuttipuram ghât north of the former, both leading down in the direction of Tellicherry, and the Terriote ghât leading towards Badagara.

34. Supposing the railway to have been made from Mysore *viâ* Gundalpet to Gûdalûr, which is not improbable in the near future, the continuation which would best serve the interests of the whole of Wynaad would seem to be a line from Gûdalûr *viâ* Sultan's Battery and Manantoddy to Tellicherry, a distance of about 130 miles.

A railway taken from Gûdalûr down the Karkur ghât, or down the Moopanad (Tholadi) ghât, would benefit only a small portion of South-east Wynaad.

A line from Gûdalûr to Vayitiri, and down by the Tâmrachêri ghât, or by the Terriote ghât, would benefit South-east and South Wynaad only, while the line from Gûdalûr *viâ* Sultan's Battery and Manantoddy, and down by either of the two Kuttiyâdi ghâts, or in the direction of the Periah ghât to Tellicherry, although the longest of all, would benefit the whole of Wynaad equally, running, as it would, through the very centre of the district, and leading to the most important shipping place, which is at the same time near to the Military station of Cannanore.

The coast railway will probably in time be extended from Calicut to Cannanore.

APPENDIX.

Notes on the present state of the road from Calicut to Vayitiri, viâ the Tâmrachêri Ghât.

1. The greater part of the road runs over laterite soil, is not metalled, and consists of a succession of ups and downs, as will be seen by a glance at the following notes.

2. All culverts and bridges required have been built, some require reconstruction; there are remarkably few bridges required, which compensates to some extent for the many ascents and descents.

3. The 1st mile is in fair order.

In the 2nd mile the canal is crossed. Between the 3rd and 5th furlongs of the 2nd mile is a steep gradient which might be circumvented by a new trace either to the east or west.

3rd mile 1st furlong. Another rise, but not as steep as the last. Surface fair; 3rd mile 4th furlong rise and subsequent fall.

3rd mile 6th furlong. Here begins a descent which takes the road down to the 4th mile-stone.

4th mile 2nd furlong. Rise up to the 4th furlong, then descent to the 6th furlong; then a rise up to the 5th mile.

From the 5th mile-stone a gradual descent for $3\frac{1}{2}$ furlongs, then a level stretch with a culvert. 5th mile 4th furlong. A bridged stream; thence rise up to $5\frac{1}{2}$ furlongs; then descent down to a paddy flat, crossed by a high embankment with a minor bridge.

From 5th mile 7th furlong the road is level up to the 6th mile; here is a culvert.

From the 6th mile a gentle rise for 2 furlongs.

Culvert. The line then runs at a level to the 3rd furlong; ascent from the 3rd to 4th furlong, with a culvert. Then a fall to the 5th furlong; then level.

At 6th mile 6th furlong the surface was soft and much cut up.

From the 7th furlong a descent to paddy-fields; then a short rise up to the 7th mile; then a fall again. Here the road runs close to the bank of the river which accompanies the road on the west side along a considerable portion of its length. At 7th mile 2nd furlong a steep rise up to the 4th furlong, and an easier slope thence to the 5th furlong; then level to beyond the 6th furlong. A culvert; then a rise up to 7th mile 7th furlong; near the top of the ascent is the village of Karandur with an amshom cutcherry. From here a descent to past the 8th mile-stone; then a level stretch.

8th mile 1st furlong. Steep slope down to paddy-fields. Rise from 2nd to 4th furlong; then a fall followed by a level piece.

8 $\frac{1}{2}$ mile. Village of Thorai Kadu, with a Public Works Department (Local Fund) shed. At the 7th furlong a slight rise; thence fall to the 9th mile near which there is a small bridge. The road ascends an easy slope for about a furlong, then leads down by an easy descent.

9th mile 2nd furlong. Road to Chettugâdu branches off.

New mosque and well. A culvert. Village of Mâkuta.

9th mile $3\frac{1}{2}$ furlong. Level; then a paddy-field; then descent to another paddy-field; then a rise from 9th mile $6\frac{1}{2}$ furlong to the 10th mile; then descent, followed by a level reach then a rise.

A steep slope down to 10th mile $3\frac{1}{2}$ furlong.

10th mile $3\frac{1}{2}$ furlong. Here begins an ascent which gradually becomes steeper and leads over a saddle to 10th mile 5th furlong. Then a descent followed by a level; and again descent to past the 11th mile.

Paddy-field; rise up to 11th mile 1st furlong; then a level, followed by descent. The road here runs near the bank of the river.

Across a paddy-field near Padâlte village.

11th mile 3rd furlong. Police station.

11th mile 4th furlong. A well.

Road level then descent; again level to 12th mile, close to the river.

Slight rise; then fall to 1st furlong. Culvert.

Bennakâtu village. Road level. 12th mile 7th furlong, steep descent to 13th mile. 13th mile 1st furlong. Rise and fall; again rise and fall to 13th mile 4th furlong. Then a level followed by a rise, and again level. Road surface soft and cut up.

13th mile 6th furlong. Close to the river.

Track to Kuruvai village.

14th mile 3rd furlong. Steep descent.

From the 15th mile-stone the road runs close to the river up to the 6th furlong. The river-bed about here is rocky in several places.

16th mile level.

16th mile 6th furlong. A great mass of gneiss rock to the west of the road.

16th mile 7th furlong.—Quartz on the east side.

17th mile level.

17th mile 3½ furlong. A small circular well built of laterite. Water close to the surface.

17th mile 6th furlong. Large well and mosque. Rise up to 17th mile 6¼ furlong, wooden bridge; then down to the 18th mile. Here the jungle begins.

18th mile 3rd furlong. A steep rise then fall; then rise again. Road easy up to Tāmra-chéri (18th mile 5th furlong).

4. From Tāmra-chéri to the foot of the ghât (distance 27 miles 6 furlongs from Calicut) the character of the road is much the same as that described in the above notes. The distance from Tāmra-chéri to the foot of the ghât is 9 miles; the total rise from the coast to the foot is under 200 feet. From the foot to the head of the ghât near Lakkidi, the rise is nearly 2,400 feet in 8 miles.

5. There are three larger bridges required to be reconstructed on the section of the road from Tāmra-chéri to the foot of the ghât, viz. :—

at the 24th mile, one 70-feet span,

„ 27th mile, one 80-feet span,

„ 28th mile, one 50-feet span.

The existing bridges at these three places are unsafe.

6. The ghât itself, although far from being in good order, is fairly passable for carts in the dry weather, except that the surface is very uneven and rough, so much so that carts occasionally upset; owing to this cause, and their loads, if of a fragile nature, such as delicate machinery, instruments, furniture, glassware, &c., are apt to be seriously damaged or broken by the shaking they receive. Besides, the surface not having been properly consolidated, is by the traffic ground into fine dust to a considerable depth. As soon as the rains set in, this dust is at once converted into adhesive mud, forming deep and dangerous traps where carts are often stuck and can only be extricated with much labor. Hollows and ruts are now being gradually filled in with stone metal by the Local Fund Department; but, probably owing to want of sufficient funds, the work is not of a nature and extent calculated to permanently improve the road, which will be provided for in the estimate now being prepared.

7. That portion of the road from the head of the ghât, near Lakkidi to Vayitri, is on the whole slightly better than the ghât itself just described.

ORDER—dated 26th February 1884, No. 524 W., Public Works.

With his letter above recorded, the Superintending Engineer, IV Circle, submits a preliminary report from Mr. Nordmann in which he suggests a plan of operations, and brings forward the points upon which he requires definite orders, to enable him to proceed with the requisite surveys and estimates for the improvement of communications in Wynaad.

2. In memorandum No. 395 E., dated 26th September 1883, Mr. Nordmann was instructed to make himself thoroughly acquainted with local requirements upon which to base a programme of operations. The most urgent work in the opinion of the Wynaad Planter's Association being the road from Calicut to Vayitri (43 miles); attention was in the first instance to be confined to this line, estimates for which were to be prepared.

3. Of the two alternative routes to the foot of the Tāmra-chéri ghât, suggested for consideration, Mr. Nordmann, after collecting information as to the work required on each route and the cost of the improvements, gives a decided preference to the shorter though somewhat steeper line *via* Puddanellum. The route *via* Challye besides being more circuitous, will cross several large waterways on which expensive bridges will be required. Mr. Nordmann states that this preference is shared by all persons interested in the subject; and, as it is expected that the steep gradients on the existing line *via* Puddanellum will be found susceptible of improvement at no great cost, and that the ruling gradient need not be steeper than 1 in 18, this route may be adopted should the proposed surveys confirm present anticipations.

4. The Tāmra-chéri ghât itself, though somewhat faulty as regards trace, is a substantial work requiring only surface improvement and proper conservancy. The proposals in paragraph 19 of Mr. Nordmann's report for improving the gradient of the ghât in places, and his subsequent suggestions for consolidating the surfaces along the whole line, are approved. It is considered however, that, on the ghât itself, the thickness of metal should not be less than 9 inches; elsewhere it may be reduced to 6 inches. The metal should be spread over a minimum width of 12 feet, which should also be the minimum width of the roadway over bridges.

5. Under-drains on the ghât should be provided as recommended by the Superintending Engineer, viz., not less than two slab drains to each furlong; and, where the gradient is steeper than 1 in 16, one at every 100 feet. Catch-drains should also be provided wherever practicable.

6. The width of roadway on the ghât should be increased to a minimum of 16 feet.

7. The bridges and culverts may be provided as recommended by Mr. Nordmann.

8. Provision should also be made for camping grounds for carts at convenient places on the ghât, as well as on the road between the foot of the ghât and Calicut, should such halting places not already exist.

9. Shelter for establishments may be provided as proposed.

10. The Government are not prepared to make any grant for the maintenance of the present imperfect ghât road, as suggested by Mr. Nordmann in paragraph 16 of his report. The scope of the action contemplated by the appointment of a special Engineer and survey establishment does not embrace the maintenance of existing lines of road, the charge of which devolves on the Local Fund Board.

11. The surveys and levels of the line from Calicut to Vayitri through the Tāmra-chéri ghât should first be taken in hand, and an estimate framed of the cost of improvements, as indicated above. The inquiry may then be extended to the other lines of communication, as proposed by Mr. Nordmann. The development of these additional lines will, however, depend on the resources at the disposal of Government; due

regard being paid to the numerous pressing demands for assistance from other parts of the Presidency.

(True Extract.)

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, IV Circle.
" Honorary Secretary, Wynaad Planter's Association
" Financial Department.
" Consulting Engineer for Railways.

Exd. A. Aubert.
Spare Copies

524
6

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1884) Madras.

PUBLIC WORKS.

Dated February, 26th.

Recd.

Encl.

G.O., 26th Feb. 1884, No. 524 W.

FEBRUARY.

Wynaad Communications

Passing orders on the preliminary report
by Mr. K. F. Nordmann on the —.

524/37
W. Nordmann's report can
be carefully gone through
in Technical Branch,
and a brief note prepared
of the points on which
special orders are required

lll
2-2-84

Public Works Department, 1883-84.

524/86
Current No. 923

Letter No. 43

Dated the 31st Jan 1884

From the S.E. IV Circle

NOTE OF REMARKS.

Mr. Nordmann's preliminary report on Ignaad roads is herewith submitted with reference to No. 395 E of the 20th Sept. 1883. The report is chiefly written on the construction of a road from Calicut to Sagittie. In an early part of his report, Mr. Nordmann brings forward his proposal as to how the E.E. and the establishments under him should be accommodated. He recommends the structures should be of wood, with Mangalore tiles for the main roofs, and corrugated iron for verandahs; the flooring to be of cement. He states many buildings in the

neighbourhood of the pro-
posed site and ^{to be built}
and afford comfortable
shelter. Wood structures
are not half so costly as
masonry ones; and, in
this instance, they are
not required to be permanent.
3. The road from Balicut
to Vajithi passes over the
Tamaracheri shat and
from Balicut to the head
of the shat. There are two
routes - one of which must
be accepted as the base
line (generally) of the
proposed new road as far
as the shat. The route via
Challge possesses this one
advantage over the other
- that it is flatter, and
of a less uneven surface.
The points in favor of the
route via Puddaullam
are - that, though passing
over severe gradients, it
is much shorter, and will
prove less costly than the
Challge route. It is, therefore,
less

as the Challge route will
require the construction of
expensive bridges, which
is not the case in the Pu-
dallam route. - Mr.
Stodmann and those
interested in the question
give the preference to the
latter route. In connection
with the construction of
the road, Mr. Stodmann
gives the following details:
The gradient not to exceed
1 in 13 - this, not severe, 1 in 25
under ordinary circumstances
should be the maximum,
1 in 20 in cases of exceptional
difficulty. Breadth of track
is to be 13 ft. (should be 12 ft.
wide 8 ft. 6 in. para. 7); depth
6 inches of broken stone, 1/2" dia.,
and 1 inch covering of gravel.
When the road passes over
an embankment, parapets
2 1/2 feet high to be erected on outer
lines of berms, if embankment
be higher than 4 feet.
4. Mr. Stodmann proposes
that all culverts, tunnels
and small bridges (12 ft. span)

should ^{be} of rail and plank
superstructure - thickness
of planking 3 inches; bridges
between 12 and 20 ft spans,
of arches of brick or laterite
in mortar; bridges of larger
span to be of iron girders
planked over - thickness
of plank to be 3 inches. The
breadth of roadway is to
be 12 feet. S.E. suggests that
roadways of small bridges
should be 10 1/2 ft - no strong
reason is adduced for
the change.

5. Mr. Nordmann speaks
in high terms of what
may be termed the basis
of the Shat, but describes
the surface as being in a
very bad state. He proposes
metastat it in a similar
manner to the road, with
the addition of 1/4 inch of
sand over gravel. The
breadth of Shat, from para-
pet to hill side, is to be
13 1/2 feet throughout. Under-
drains are to be pro-
vided along the line

of Shat at intervals of
330 feet (2 to 1 furlong) to
prevent the drainage
from hill side sweeping
over the road, and
washing away the metal,
where the gradient is
very steep, under drains
to be placed 100 ft. apart.
Catch drains have been
provided on all hill
sides above road, at a
distance of 33 feet.

3. The scales proposed to
be adopted for surveys
and levels (horizontal
and vertical) are well
chosen.

524/39

45 Feb/84

RSH

W.1

Preliminary Report of Mr. Hodgman
on the ~~to~~ ^{and} Roads. — 324/100

The points on which orders are
required are as follows: —

Gradients. (para 19). To be corrected,
1 in 18 being accepted as the maximum
gradient. This is stated to be the
average gradient on the Tamlachewari
ghat. As a ruling gradient this
is, in my opinion, too steep by far, but
as there is apparently no help for it
but to stick to the old ghat, it will
apparently be impossible to get any
better, and probably even this it
will be difficult to obtain throughout,
more especially I should say at
the zigzags.

1 in 18 is attainable on the section
between foot of ghat & Calicut by
"cutting & filling" & short deviations.
Along this part I think it might be
well not to accept anything steeper
than 1 in 21.

But on this point it has not been
clearly & definitely shown that it
would not be better to make the
detour shown on index map. The
arguments adduced against this
detour are not final, and judging
from the description of the old line
to be followed I am of opinion further
inquiry should be made as to the
comparative merits of the alternative
lines. Even with expensive bridges there
is much to be said in favour of a
much flatter though longer route, especially
when the steep continuous ascent is off

the ^{of} coming after this section
is taken into ^{account}. I would
recommend ^{consultation} ^{& cross section}
& a survey of both routes ⁱⁿ ^{advance}
before a final decision is made &
a large sum of money is involved, the
development of the highway is the object
& the ^{through} improvement of the
communications the order of the day,
so the very best solution of all points
should be arrived at.

Metal & gravel. (para 20). Mr. Hardman
recommends 6 inches of metal (just
safer the same) and 13 feet wide.
Col. Meally advocates $7\frac{1}{2}$ inches, so as
to give 9 inches at centre and 6 inches
at sides. He states a width of 12 feet
has everywhere been ordered.

Now I have no hesitation in saying
that on the grant the roadway should
be metalled to its full width from
the edge of the inner drain to the
outer parapet wall, or (if in cuttings)
to the edge of outer gutter.

and for thickness 9 inches will be
required. The formation of a proper
transverse section over the exposed solid
surface (see para 21) should be made
with 2 inch metal - over this a thickness
of 6 inches of $1\frac{1}{2}$ inch metal - or a
thickness of 9 inches for full width of
roadway should be estimated for.

In the low country & on the plateau
12 ft. width will suffice & 6 inches of
consolidated metal. 1 inch of gravel
thickset will not, in my experience,
suffice.

The metal to be rolled by heavy stone
or iron rollers. I don't know if Mr. Hard-
man has considered the difficulty

of the consolidating metal on an
excessively steep grant. — ²⁴

Catch-drains. To be cut. ²⁵

Under-drains on the grant. A sufficient

number of these should no doubt be
the first thing to provide. An average
of 2 per foot long is said to be required.

Culverts & tunnels above & below grant.

Existing timber culverts to be reconstructed
(para 24) with concrete or stone abutments.
A necessity. Existing ones with masonry
abutments & arches to be retained - like-
wise all serviceable minor bridges. of course.

Small bridges up to 12 ft. span. (para 25)

To be of iron rails & 3 inch teak planking.

Small bridges up to 20 ft. span.

Arch or lattice arches to be used.

Bridges of larger spans. (para 28).

Iron girders recommended, with
teak planking or iron "buckle plates".
This detail may be considered afterwards.
Wrought iron floors also good.

Width of Roadway and Parapets. (para 29)

Width between parapets should not
be less than 12 feet, Mr. Hardman says.

Col. Meally considers a width of $10\frac{1}{2}$
ft. will be ample (see his para 7).

In my humble opinion neither of these
recommendations is correct, as we are
going in for perfecting these communications
once for all. A development of traffic
should be looked for, not stagnation.
On the grant certainly the roadway
over bridges should not be less than
the width of roadway of grant. And
in the low country 15 ft. between
parapets once for all. The extra

Expense so entailed will be but an infinitesimal fraction of the whole outlay to be incurred in the roads, and it would in my mind be a pity under the circumstances to skimp the roadway over bridges.

Here I may remark that S. E. in his para 3 states that the roadway of Ghant at the narrowest spots varies from $11\frac{1}{2}$ to 13 feet including the side drains. In para 5 he says that where the width is less than $13\frac{1}{2}$ ft. from the parapet to the hill side it should be made that width. That will be a very miserable improvement. I would most strongly urge that a clear roadway of 15 ft. for the whole length of Ghant be insisted on.

As regards my previous para I may note that S. E. states (para 7 of his report of 28 Jan 86) that "advantage might be taken of such renewals (of bridges) to increase the width of the roadway from 12 to 16 ft. throughout."

An outlay of 13 lacs is spoken of. The expense of widening the Ghant to a really efficient width & making the new bridges ample for future requirements ought not to be allowed to weigh.

A collateral point to be dealt with at once is Lt. Hardmann's request for an allotment this year to allow of collection of metal as the Ghant being provided with. To

the Col. Bentley demands (para 9 of his report). As he states, any money now given for metalling would be a grant in aid for maintaining the present imperfect Ghant road & ought to be handed over to Local Funds.

Nothing has been said in the correspondence about Camping Grounds.

I believe the provision of a good halting place for bandies at some favorable point on the Ghant would be a real boon - also two or three between foot of Ghant & Calicut, if not already existing. In fact on the Ghant such a place must be almost indispensable.

The provision of buildings for the staff as proposed by Lt. Hardmann might well I think be sanctioned at once.

Cd.

14-2-84

524/13

This draft may go, as
proposed to the Chief
Secretary for counters
initials, — but then
it may be issued without
going to the Hon: Member,
who will be away on
tour for some little
time.

524
48

W

20-2-87

Munro

To D.W.

Lo's data d/15.2.84
shows how the several
points have been
decided.

L.S.
22.2.84

C.A.W.

524/46

Seen - via communicate
to C.A. Harty - d/o. —
12' to 1' the minimum
width of roadway on bridge.

C.A.W. 524/46

In deciding the points raised by W. H. in this report, it must be borne in mind - (1) - that the Provincial resources at command of the Govt are extremely limited, - (2) - that there were numerous pressing demands for assistance from all parts of the Presidency, (3) - that what is desired is to carry out the improvements to the roads in Koynead within a reasonably short time, not to spread the work over a very long series of years.

Looking to these points, the proposals of D. W. seem to me rather too ambitious. Without doubt, if carried out, the result would be first class roads, - but I do not think the necessary funds would be forthcoming within a reasonable number of years, - and ^{they} could be made available only by favouring Koynead at the expense of other parts of the Presidency equally in need of assistance.

I am inclined therefore to accept W. H.'s proposals in paras 13 & 19 as to route & gradients.

With respect to metals & gravel, I accept D. W.'s proposals, that on the flat

there should be a thickness of
9" — and elsewhere of 6"

The metal should be spread
over a minimum width of 12"
— which should also be the
minimum width of roadway
on bridges.

Underdrains on the silt side
be provided as recommended
by the S.E.

Respecting bridges & culverts
I think Mr. N.'s suggestions
may be accepted in their
entirety.

The width of roadway on
flat should be increased
to a minimum of 15', as
suggested by D.W.

I concur with S.E.'s
remarks in his para 9 - (1)

I concur with D.W.'s
remarks about provision
of suitable halting places for
carts.

Please draft orders to
on the points brought forward
by Mr. Hordmann, in
accordance with foregoing
remarks, — & if any points
have been omitted, bring
my notice.

W.S.

16.2.1911

52 1/2



SKETCH MAP
SHOWING THE GENERAL DIRECTION OF THE PRESENT
ROAD FROM CALICUT TO WYNAAD VIA VAYITRI
AND THE SUGGESTED ALTERNATIVE ROUTE VIA CHALLEYE



R. M. S. COLONEL, R.E.
SUPERINTENDING ENGINEER CIVIL
11/1/84

N 4 43

Superintending Engineer's Office, 4th Circle
Calcutta, 31st January 1874.

From

524
A

The Superintending Engineer,
Fourth Circle.

To

The Chief Engineer,
P. W. Department.

Sir,

Enclosures 2

I have the honor to forward herewith
1 Report from for your information, a preliminary report
Mr. Forde on a
1 sketch map by the Executive Engineer on special duty
in Wynad. I have thought it best
he should send such a report with the
view of eliciting your opinion on several
points in connection with the estimate
for the Calicut-Wayitri road now about
to be prepared and submitted.

2 That road passes over a succession
of small hills and valleys in the twenty
seven miles commencing at Calicut.
Then the Tambracherry ghaut begins,
its foot being about 200 feet above the
sea

have been omitted
my notice.

sea. The length of the ghaut to its summit near Luckady is 8 miles, and the total rise in that distance is 2400 feet or 300 feet per mile which is less than 1 in 18. There is then a slight fall to Pookote, which is situated about $3\frac{1}{2}$ miles from Calicut, and 2 miles from the head of the ghaut.

3. As might be expected the gradient on the ghaut is not uniform throughout and there are steep bits, which the levels Mr. Nordmann is about to have taken will show. Fortunately the revetments appear to have been very substantially built, and I did not observe any of them out of order. But the roadway, which at the narrowest parts varies from $11\frac{1}{2}$ to 13 feet including the side drain, is very rough and badly needs metalling throughout.

4. The hill sides on the ghaut are exceedingly steep, and the rainfall of that part particularly heavy. Consequently as the under-tunnels are
few

few in number, the drainage often overflows the road, and sweeps away every thing, leaving only ^{the} rough surface of bare rock below. For the protection of the metalled surface, I consider that on the ghaut there should be not less than two slab drains to each furlong, and where the gradient is steeper than 1 in 16, there should be one at every 100 feet.

5. Where the width on the ghaut is less than $13\frac{1}{2}$ feet from the parapet to the hill side, it should be made that width, by blasting or cutting. There is probably not a furlong altogether, in bits at different places along the ghaut, where this widening is needed, so that it should not involve any great expense.

6. In the undulating country, between the foot of the ghaut and Calicut, there are several steep gradients which require to be corrected. But the chief improvements along the whole line are the substitution of iron bridges for the
old

old rickety timber ones and that of broken stone well rolled for the present surface of inferior gravel.

7. With regard to the bridges which should in my opinion have a super-structure of iron with the exception of a bare floor of three inch planking. I consider that a width of $10\frac{1}{2}$ feet, including 9-inch wheel guards on either side, will be ample. Having now ridden over the whole line from Calicut to Manantoddy, I observe that where bridges have been made wider there is only a track in the centre used, and the side spaces ^{are} overgrown with grass. The parapets may be $2\frac{1}{2}$ feet high.

8. I propose to make the road surface of broken granite 12 feet wide and benches thick with a top coating of one inch of gravel. The embankments to be 18 feet wide with side slopes of $1\frac{1}{2}$ to 1; the berms and side slopes to be surfed; and rough stone parapets

to be provided where the embankments are more than four feet in height.

24/9. I agree generally in what Mr. Nordmann has proposed in paras 16 to 34 with the following exceptions:—

* para 16 of the report

(1) I think the first thing to be done for improving the Tambracherry Ghant is to increase the number of under drains. Any money now sanctioned for metalling would be a grant in aid for maintaining the present imperfect ghant road, and ought to be handed over to Local Funds. I have no objection to Government assisting Local Funds by a grant in aid, but I consider that this has nothing to do with the special work for which Mr. Nordmann is sent to Wynad. Owing to the want of a sufficient number of under drains, much of the repair work now done by the Local Fund establishment is presently swept away.

* para 20

(2) Mr. Nordmann has proposed a depth of metalling of 6 inches only;

on the gault, I think $4\frac{1}{2}$ inches should be provided, so as to allow a thickness of 9 inches in centre and 6 inches at the sides. In regard to width, 12 feet everywhere appears to have been already ordered.

(3) There are few bridges on the line over 100 feet in length, so that I think a width of roadway of $10\frac{1}{2}$ feet, as proposed above, would be ample. For bridges of 200 or more feet in length, I would have provided a sufficient width for two bands to pass, but for the short bridges and culverts on this line, I think a greater width than $10\frac{1}{2}$ feet would only needlessly add to the cost of the improvements. *para 29

I have the honor to be,

Sir,

Your most obedt. servant.

L. Beatty - Col. R.E.,
Supg. Engineer, 4th Circle

524
21

No. 146 W a/b 6.82
 " 2821 W a/b 14.11.81
 " 311 E a/b 27.8.83
 " 366 E W a/b 20.12.83
 " 395 E a/b 26.9.83

From
 The Supg. Engineer,
 Fourth Circle.

No. 524 W a/b 26th Feb/84

Dated 31st January
 Despd: 1st February } 1883.

No. 43

Enc: 2

Preliminary Report on
 Dymaa Pass:—

Forwards for
 information a — by
 Mr. H. J. Nordmann,
 Executive Engineer.

No. 27
V

Vayitri, Dymaad
 25th January 1884

524
12

From
 H. J. Nordmann Esq
 Executive Engineer
 on Special duty
 Dymaad.

To
 Colonel J. Peathy R.E.
 Supg. Engineer
 4th Circle.

Sir,
 With reference to G.O.
 No. 395 E dated 26th September 1883,
 I have the honor to submit the follow-
 ing preliminary report.

2. I arrived in Dymaad
 on the 6th November 1883 and attended
 the meeting of the Planters' Associa-
 tion at Postole on the 7th idem.

3. Being without establish-
 ment or instruments, I could not
 immediately begin the survey. But I

I inspected several roads, especially that from Calicut to Vayitri with the Samra cherru Ghant. I consulted some of the principal planters, and made myself acquainted with the orders of Government on the subject of Wynad Roads, as well as with the views of the planters and their Agents on the Coast.

4. Having submitted estimates of the probable cost of establishment required to aid me in my work, and having indicated for the necessary surveying and drawing instruments I advertised in the Port of Saint George Gazette and in two

Madras

8/5

Madras Newspapers for Surveyors, Draftsmen and Office hands. The final sanction of Government for the establishment proposed was given in G. O. No. 3664 W dated 20th December 1883, received by me on the 6th January.

524/13

5. I have taken detail notes of the state of the road from Calicut to Vayitri, and collected all available information required to form the data for the road and bridge estimates, and those for the buildings proposed to be erected for shelter of the establishment.

6. One of my Office Clerks arrived here on the 31st December

and

and the Head Clerk only on the 11th January. The surveying and drawing instruments came up on the 1st January. No Surveyor or Draftsman has joined me as yet. One Surveyor (Mr. Green of Bellary) was appointed but unfortunately died suddenly before he could come up. Two Surveyors and two draftsmen have now been sent for and I hope some of them will shortly join. One draftsman has just reported his departure from Madras. I have rented a small bungalow for my office near Fort St. George.

The survey & levels of the line from Calicut to Vayitri

Vayitri via the Samracheri Ghaut, and the estimate for putting this road into thorough order, including the reconstruction of the bridges and many of the Culverts, will be first taken in hand, after which the other roads, enumerated in G. O. No. 1416 D dated 6th June 1882, will be taken up in the order of their importance, which seems to stand as follows:-

- | | | |
|--|----|-------|
| I. Calicut to Vayitri by the Samracheri Ghaut | 43 | miles |
| II. Vayitri to Goodalur | 43 | |
| III. Goodalur to Ottacamund via Kaduvattam | 27 | |
| IV. From 4 miles northeast of Vayitri via Kallipatty & Sultan's Battery to the Mysore frontier | 30 | |

V. Kulpatty via Panna.
 = maram to Manan.
 = totty ————— 20
 163

The last named line I would pro-
 pose to substitute for the road from
 Payitri to Manantoddy via
 Perote (30 miles), thereby effecting
 a saving of 10 miles of road,
 besides which the line via
 Kulpatty to Manantoddy
 is an easier line, carries more
 traffic, has better gradients
 and requires fewer bridges than
 that via Perote. The Perote
 Road is not much used, except
 for the first 8 miles out of
 Payitri, and it can be kept up
 from Local Funds, as heretofore.

8. 94/96 As regards shelter for
 the establishment, I propose to build
 wooden houses instead of masonry
 ones, the latter being more than
 twice as costly as wooden building.
 The style of the wooden houses pro-
 posed would be that now in vogue
 in South Mysore, where many
 planters live in neat and sub-
 stantial buildings of same timber
 which effectually keep out heat,
 cold, wind and rain, and last
 with ordinary care and small
 repairs from 25 to 30 years. The
 Local Fund Bungalows at Chikara
 (built by Colonel Kennedy), the
 store and Club buildings at Pookote,
 and others in the neighbourhood
 are

are of this description. I would use
Mangalore Tiles for the main roofs,
corrugated iron for the verandahs
and cement for the flooring.

9. It is proposed
to include provision for the follow-
ing buildings in the estimate
(to be submitted first of all)
for the road from Calicut to
Vayitri:-

Executive Engineer's Dwelling
house at Vayitri

Do- office & stores at do-
Dwellings for office estab-
lishment at do-

1 Inspection Bungalow
at Samraacheri

3 Houses for Upper Subordi-
nates, viz: one at Vayitri,
one at Poodoody near the

8/11/8
the foot of the Ghaut, and one
at Poodanellum, 9 miles out
of Calicut.

1 House for the Hospital
Assistant.

3. Cooly lines.

I have found a suitable site near
Vayitri for the buildings to be
erected; this site is at present
private property and will have
to be acquired by Government,
if my proposal is approved.

I do not propose for the present
to build more than 3 Cooly lines
in connection with the Calicut-
Vayitri Road, as I expect that
most of the work will be done
by Contract and the Contractors
will themselves provide temporary
accommodation for their labourers.

10. I calculate, approximately, that the cost of establishment for the whole project of Wynaad Roads will not exceed 25 per cent of the expenditure on works, and that the amount of Compensation for land will be within Rs. 50,000. The rough abstract estimate for the whole scheme would then stand as follows:-

<u>Works.</u>	
<u>Original</u>	
(a) Reformation or completion of 163 miles of Road at an average rate of Rs. 5000 per mile—	8,15,000
(b) Buildings—	1,00,000
(c) Compensation for land—	50,000
Carried over—	9,65,000

8/19

Brought over—		9,65,000
<u>Repairs</u>		
To Roads during Construction—	Rs.	524/19
To Houses & Offices—	12,500	82,500
Total Works		10,47,500

<u>Establishment</u>	
(Calculated at 25 per cent on cost of works)———	2,28,750
<u>Tools and Plant</u>	
(Calculated at 2½ per cent on cost of works)———	228,75
12,99,125	
Say in round numbers 13 lakhs.	

11. As regards the establishment, required during say 5 years for projection, estimation and execution of the works, it will probably be found sufficient to have one Executive Engineer, with head quarters at Vazhira,

two Assistants, stationed at Man-
-antoddy, and Devala, 8 upper
Subordinates, stationed at Man-
antoddy, Devala, Vayithi, Sultan-
Bathery, Sudupady, Suda-nellum,
Sadurattam and Moopenad,
with 2 Medical Subordinates,
one at Godalur and the other
at Kuttanthy.

12. Assuming that the
work begins in October next, the
following provision of funds would
probably have to be made.

	Rs.
1884-85 (half year) —	50,000
1885-86 —	150,000
1886-87 —	200,000
1887-88 —	300,000
1888-89 —	400,000
1889-90 (half year) —	200,000
Total	1,300,000

13. ²⁴/₁₈₈₉ It had been proposed to
make certain deviations on that
portion of the Calicut-Vayithi line
which lies between Calicut and
Samaracheni, on account of
some of its steep gradients, and
to take a new line by a circuit-
ous route with easier gradients,
via Chabaye. But I find that
all parties interested in the subject
seem agreed that there is no need
to make a new line, provided
some of the gradients of the
existing road can be improved,
and that the flatter gradients of
the proposed deviation would not
compensate for its additional
length. I believe the survey and
line of levels will show that the
steep

steep gradients, are easily susceptible of being flattened, at no excessive cost, and that no gradients steeper than 1 in 18 need be retained on the existing road. If such turns out to be the case, I would advocate that the existing road be adhered to, and no extensive deviation of the nature suggested (via Challage) be made, although minor deviations of less than a mile in length may in 2 or 3 places have to be carried out on the present line.

14. One of the chief objections to the deviation via Challage (besides its great length) is

524 8/11
is that it would require several large bridges, while there is not a single large bridge on the present line, this is unquestionably a great point in connection with any road in Malabar. Besides a very small proportion of the traffic now seeks the more circuitous route via Challage to Samsacherry, and if this new route were improved instead of the existing old one, a considerable proportion of the traffic would yet utilize the present road which would still have to be kept up from Local Funds, to accommodate the local traffic. The expediency of improving the longer new line, instead of the shorter old one, seems therefore very

very doubtful.

15

The most important link in the whole scheme of Wy. - naad Road, now under con- sideration, is the Samracheni Ghant, and it is of paramount necessity that this Ghant should be put and kept in good order, as without it the communication with the coast is interrupted.

Faulty though the original con- ception of the present line of Ghant may have been (it not being the best trace that could have been made in the desired direction), yet, the faulty trace having been accepted and its opening out taken in hand some

22 years

(5)

524

8/12

22 years ago, the work was thencefor- ward carried on vigorously and in the most thorough manner, the result being a first-class ghant road, solidly and substantially built, reflecting credit on the Engi- neers and calculated to last, with ordinary care and repairs, for ages to come. But the work is not com- pleted, the surface is unfinished, and this being the part that most immediately affects the traffic, the latter is put to great inconvenience and risk, especially during the rains. The ghant is scarcely ever absolutely impassable for Cart-traffic, but the surface is so rough, and apt to become so much cut up and positively dangerous,

dangerous in the monsoon that it must necessarily be looked to before any other portion of the proposed scheme of Mysore Roads.

16. The remedy for the most glaring defects of the ghaut is the metalling of it throughout with good stone-metal, to a depth of not less than 6 inches, the metal being consolidated by heavy rollers of stone or iron. The sooner this work can be taken in hand, the greater will be the benefit to the planting community and to traffic in general. If the collection of metal could be begun immediately, some appreciable

The under-drains must first be attended to.

524 8/13
appreciable progress might be made before the next monsoon put a stop to out-door work. If the work is not now begun, it will have to lie over until after the monsoon, say October next, and thus a portion of one working season will have been lost, and the completion of the whole work delayed by one season, and the traffic will have to face the dangers of the ghaut during yet another monsoon. If the Government have any funds at their disposal now, which cannot be advantageously laid out on works of similar character elsewhere, before the close of the official year, such funds could be most usefully employed

in collecting metal for the Dimerachin
Ghaut, and a sum of Rs 5000 to
6000 could be profitably laid out
in this manner between this and
the 31st March. Thus a suitable
beginning would have been made
with the most urgent part of
the whole programme, which
would be highly satisfactory
to the parties most interested,
ie, the Planters.

17 There is another im-
portant portion of the system of
Wynnad Main-Roads, which
seems to have been kept in
the background in the late
discussions on the subject, - this is
the Periak Ghaut, connecting
Manantoddy

524 3/16
Manantoddy and Ellicherry. The
new Periak Ghaut was traced, and
partly made, twenty years ago, having
been sanctioned because it was
then considered to be urgently
required for the development of
the resources of that part of the
country, and although North Wynnad
seems to have of late lost some of
its former importance as a planting
district, yet any scheme for Wy-
nнад Roads could hardly be called
complete without providing for
this link also. I would therefore
suggest that the road from Man-
antoddy to the foot of the new Per-
eriak Ghaut, a distance of 28 miles,
be treated as part of the main-
system of Wynnad Roads, the
Continuation

Continuation from the foot of the
Ghaut to Detticherry to be taken
care of by the Local Lind Board.

18. I now come to the
details of some of the items to
be included in the estimate for
the Road from Calicut to Vayitil,
and partly in the other road estimates
also, and I should be glad to
receive orders on the subject as
to whether my proposals below
detailed, are approved of or not,
before the estimates are submitted
for final sanction. This time
may be saved in the disposal
of the Estimates.

19. Gradients All steep gradients
above

524/28 8/15
above and below ghaut to be corrected
to at least 1 in 18, which is to be con-
sidered the maximum steepness al-
lowable. The average gradient on the
Ghaut itself is believed to be not
steeper than this (as the line of levels
will shew) and need not therefore
be interfered with, except on short
bits of road, here and there where
through faulty cutting the origi-
nal trace may have been spoilt
for a short distance, especially
at sharp turnings. In the low
Country and on the plateau the re-
quired improvements to gradients
can generally be easily effected,
either by cuttings on the summits,
and embankments in the adjoin-
ing hollows, or else by new traces for

for short distances, in places where the original trace has not been laid out so as to take full advantage of the capabilities of the configuration of the hill sides. The estimate will provide for all necessary alterations of this nature.

20. Metal ^{and} Gravel. The road to be metalled throughout to a depth of not less than 6 inches, and to a width of 13 feet. The metal to be of hard granite or gneiss, broken as uniformly as practicable into cubical pieces of a size to pass through an iron ring $1\frac{1}{2}$ inches in dia. meter. The metal to be well consolidated

(7) 584/6 9/16
solidated by heavy rollers, the transverse section of the road to be level, i.e., to slope neither inwards nor outwards, but to have a slope from the centre of the road to the sides of $\frac{1}{4}$ inches. The surface of the metalled road to be covered with a blinding of one inch of good gravel, well rolled.

21. Where the road surface is very uneven, as is the case on the Samraachini Ghant at present, I propose first to remove all loose matter, such as dirt, sand and mud, until the hard and solid surface is exposed, then level the surface transversely by filling up the ruts and hollows with stone metal, then roll, then on the level surface

surface thus obtained lay a coating of metal averaging 6 inches in thickness, and sloping from the centre to both sides at an inclination of 1 in 20, then roll, then spread 1 inch of good gravel over the metal, and roll again, after which add $\frac{1}{4}$ of an inch of clean sand. The surface will then be fit to carry the existing traffic, and more, at all seasons, without yielding.

22. Catch-drain. A catch-drain to be cut on the upper side of the road (in hilly ground) wherever practicable, 33 feet or $\frac{1}{2}$ a Gunter's Chain (horizontally) from the centre of the road. This drain

is to discharge itself wherever there are Culverts, tunnels or under-drains, the water to fall into a shallow well or pool, there to gather and thence to flow off through the under-drain.

23. Under-drains on the G. Hant.

The existing ones are, as a rule, substantially built and answer their purpose. But there is not a sufficient number of them, hence much storm-water discharges irregularly across the road and helps to damage the surface. There should be not less than 2 of these drains per furlong, according to the require-
ments

ments of the configuration of the hill side in each separate mile. In steep places, and at sharp turnings, they should be more frequent than along ordinary reaches of the road. They can be built of dry rough-stone abutments (the largest procurable size of stone being used), covered with stone slabs.

24. Culverts & Tunnels above and below Ghant. All existing timber Culverts to be reconstructed with laterite or stone abutments, and rail-and-plank superstructure, or arches of brick or laterite. Such existing culverts, with

524 8/2 18
with laterite or brick abutments and arches, as are in good order, to be retained, likewise all minor bridges that are now in serviceable condition.

25. Small bridges up to 12 feet span may be built of Iron Rail (broad gauge, double headed, weighing about 80 lbs to the yard) laid across abutments of laterite and covered with well seasoned 3 inch teak planking, the planks to be laid $\frac{1}{4}$ of an inch apart. I propose to make use of iron rails wherever they can be introduced advantageously and economically.

26. Small Bridges up to 20 ft span

to be built with brick or laterite
abutments, and brick or laterite
arches, wherever either good brick
or laterite is easily procurable.

27. Wooden piles, wooden girder-
beams, and timber trusses should
not be used for permanent bridges
in Wynnad or Malabar, they
answer very well for temporary
structures and in dry districts,
but not for pukka bridges in
a climate and with a rain-fall
like those on the Western Coast
and ghats. Stone and Iron should
be resorted to, as much as possi-
ble.

28. Bridges of larger spans. If

329/28 8/19
It has been found that the descrip-
tion of "Warren Girder," put up for
several bridges in Wynnad, con-
sisting of a combination of
wood and iron, has not been able
to withstand the climate long.
The wood, exposed to the extremes
of temperature, and alternately
to excessive dryness and excessive
moisture, and pierced by iron
bolts &c, soon decays, and the struc-
ture becomes unstable in a com-
paratively short space of time.

I would not therefore advise
any more bridges of this des-
cription being built, but
would use iron girders only
for all larger spans, with
abutments

abutments of solid stone masonry
(not laterite) laid in Chunan, and
a roadway of well seasoned 3 inch
teak planking, or else iron "buckle
plates," whichever may be con-
sidered preferable.

29. Width of Roadway, and Parapets.

The clear width between para-
pets should not be less than
12 feet. Masonry parapets
should be 2½ feet high, their
corners protected by guard
stones.

30. Earth Embankments should
not be less than 18 feet wide
at top, and, where high, they
should

524/29 3/20
should have parapet walls or
railings, for the greater safety
of the traffic.

31. Scales for Surveys and Sections

The surveys to be drawn on a
scale of 12 inches to the mile,
arranged in book form, each
leaf to contain one mile.

Longitudinal sections of road
to be on the same scale as the
surveys, vertical scale 20 feet
to the inch.

On the plan, where the fall
per mile is nearly 300 feet, the
vertical scale will have to be
less than in the plains, say 50 feet
to the inch.

Crop

Cross sections of roads and rivers to be on a scale of 10 feet to the inch.

32. A paper, containing some brief notes on the present state of the road from Calicut to Vayittu via the Samracheri Ghaut, is appended to this report.

33. It only remains to notice the proposed Wynad Railway alluded to in the papers which were sent to me in connection with my present special work. The proposal to lay a line of railway along the Samracheri Ghaut

524 8/21
Ghaut involves interference with the existing road-traffic, which is undesirable. Moreover, the Ghaut is, owing to its zigzags and steep, rocky slopes, not as well suited for a railway as some of the longer ravines, with easier slopes, leading from the plateau into the low country.

The head of one of the easiest natural Ghauts, along which a railway on the metageauge could be economically laid down to connect the Wynad plateau with the Coast, is to be found about eight miles out of Manantowry, on the Senak Road, whence a long valley

with easy slopes extends for several miles in a westerly direction through the Kolayam Taluk, which valley can be connected without difficulty with Sellicherry, the principal shipping port for the Coffee trade.

Other easy natural lines are: the Kuteadi Ghant and the Kootipuram Ghant (north of the former), both leading down in the direction of Sellicherry, and the Teriote Ghant leading towards Badagara.

34. Supposing the Railway to have been made from Mysore via Gundalpet to Gudalur

524 9/22
Gudalur (which is not impossible in the near future), the continuation which would best serve the interests of the whole of Wynaad, would seem to be a line from Gudalur via Sultan's Battery and Manantoddy to Sellicherry, a distance of about 130 miles.

A railway taken from Gudalur down the Parkur Ghant, or down the Moopenad (Tholadi) Ghant, would benefit only a small portion of South East Wynaad.

A line from Gudalur to Vayittu, and down by the Samracheri Ghant, or by the Teriote Ghant, would

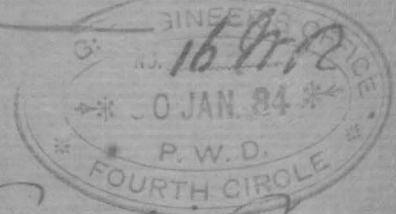
would benefit South East and
South Wynaud only; while
the line from Giddalur via
Sultan's Battery and Manan-
toddy, and down by either of
the two Kuliade Ghauts, or
in the direction of the Senah
Ghaut to Tellicherry, although
the longest of all, would
benefit the whole of Wynaud
equally, running as it would
through the very centre of the
District and leading to the
most important shipping
place, which is at the same
time near to the Military
Station of Cannanore -
the

524/22 1/2 23
The Coast Railway will pro-
-bably in time be extended
from Calicut to Cannanore.

I have the honor to be
Sir
Your most obedt Servt

W. Madhavan
Executive Engineer

P. W. D.



From
The Executive Engineer
on Special duty

Wynaad

To
The Sugg. Engineer
4th Circle

Dated 25th
Dupd 25th } Jan'y 1884
Recd.

No 27

Enclosure, one

Subject

Submitting a Pre-
liminary Report on
Wynaad ~~Chank~~
Roads, with refer-
-ence to G.O. No 395E
dated 26th September 1883.

With one Appendix.

Appendix.

Notes on the present state of the road
from Calicut to Vayathu via the
Sauracherri Ghant.

1. The greater part of the road runs over tarent soil, is not metalled and consists of a succession of ups and downs, as will be seen by a glance at the following notes.
2. All culverts and bridges required have been built; some require re-construction, there are remarkably few bridges required, which com-pensates to some extent for the many ascents and descents.
3. The 1st mile is in fair order. In the 2nd mile the Canal is crossed. Between the 3rd and 5th mile long of the 2nd mile is a steep gradient, which might be circumvented by

by a new trace either to the east or west.

3. mile, 1st furlong. Another rise, but not as steep as the last. Surface fair. - 3 m. 4 f. rise, and subsequent fall.

3 m. 6 f. Here begins a descent which takes the road down to the 4th mile stone.

4 m. 2 f. Rise up to the 4th furlong, then descent to the 6th furlong, then a rise up to the 5th mile.

From the 5th mile stone a gradual descent for 3 $\frac{1}{2}$ furlongs, then a level stretch, with a culvert.

5. m. 4 f. a bridged stream, thence rise up to 5 $\frac{1}{2}$ furlongs, then descent down to a paddy flat, crossed by a high embankment with a minor bridge.

From 5 m. 7 f. the road is level up to the 6th mile. here is a culvert.

From the 6th mile a gentle rise for.

2 furlongs.

Culvert. - The line then runs at a level to the 3rd furlong, ascent from the 3rd to 4th furlong, with a Culvert. Then a fall to the 5th furlong, then level.

At 6 m. 6 f. the surface was soft and much cut up.

From the 7th furlong a descent to paddy fields, then a short rise up to the 7th mile, then a fall again. Here

the road runs close to the bank of the River which accompanies the road on the west side along a considerable portion of its length.

At 7 m. 2 f. a steep rise up to the 4th furlong, and an easier slope thence to the 5th furlong, then level to beyond the 6th furlong. - A culvert. - Then a rise up to 7 m. 7 f. Near the top of the ascent is the village of Parandia with an Anshom Cutcherry. From here a descent

to pass the 8th mile stone, then a level stretch.

8 m. 1 f. Steep slope down to paddy-fields. Rise from 2 to 4th furlong, then a fall, followed by a level piece.

8 1/2 m. Village of Chorai K'adu, with a D.P.M. (Local Land) shed.

At the 7th furlong a slight rise, thence fall to the 9th mile near which there is a small bridge.

The road ascends an ~~easy~~ ^{easy} slope for about a furlong, then leads down by an easy descent.

9 m. 2 f. Road to Chetugadu branches off.

New mosque and well. A culvert. - Village of Makuta. -

9 m. 3 1/2 f. Level, then a paddy-field, then descent to another paddy-field, then a rise from 9 m. 6 1/2 f. to the 10th mile, then descent, followed by a level

level reach, then a rise. ^{524/8 p 26}
~~24~~ 115

A steep slope down to 10 m. 3 1/2 f. Here begins an ascent which gradually becomes steeper and leads over a saddle to 10 m. 5 f. Then a descent, followed by a level, and again descent to pass the 11th mile. -

Paddy-fields, rise up to 11 m. 1 f. then a level, followed by a descent. The road here runs near the bank of the River. -

Across a paddy-field near Padaitte village. -

11 m. 3 f. Police Station.

11 m. 4 f. A well.

Road level then descent, again level to 12 mile close to the River. -

Slight rise, then fall to 12 1/2 furlong. Culvert.

Pennakatte village. Road level. -

12 m. 7 f. Steep descent to 13 mile.

13 m. 1 f. Rise and fall, again rise and fall, to 13 m. 4 f. Then a level, followed

followed by a rise, and again level. Road surface soft and cut up.

13 m. 6f. Close to the River.

Track to Kurnoori Village.

14 m. 3f. Steep descent.

From the 15th mile-stone the road runs close to the River, up to the 6th furlong. The river bed about here is rocky in several places.

15th Mile Level.

16 m. 6f. A great mass of gneiss rock to the west of the road.

16 m. 7f. Quartz on the east side

17 m. Level.

17 m. 3½ f. A small circular well built of latite. Water close to the surface.

17 m. 6f. Large well, and Maque. Rise up to 17 m. 6½ f. Wooden bridges. Then down to the 18th mile. Here the jungle begins.

18 m. 3f. a steep rise. Then fall, then rise again. Road easy up to Samra-
chemi (18 m. 5f.)

524
38 27

4. ~~Samrachemi~~; From Samrachemi to the foot of the ghant. (distance 27 m. 6f. from Calicut.) The character of the road is much the same as that described in the above notes. The distance from Samrachemi to the foot of the ghant is 9 miles. The total rise from the foot to the foot is under 200 feet. From the foot to the head of the Ghant near Luckade, the rise is nearly 2400 feet in 8 miles.

5. There are three larger Bridges required to be reconstructed on the section of the Road from Samra-
chemi to the foot of the ghant viz.

at the 24th mile, one 70 feet span,

" " 27th mile, one 80 feet span,

" " 28th mile, one 50 feet span.

The existing bridges at these three places are unsafe.

6. The Ghant itself, although far from being in good order,

is fairly passable for Carts in the dry weather, except that the surface is very uneven and rough, so much so that carts occasionally upset, owing to this cause, and their loads, if of a ^{fragile} ~~fragile~~ nature, such as delicate machinery, instruments, furniture, glass ware &c, are apt to be seriously damaged or broken by the shaking they receive. Besides, the surface not having been properly consolidated, is by the traffic ground into fine dust to a considerable depth. As soon as the rains set in, this dust is at once converted into adhesive mud, forming deep and dangerous traps where Carts are often stuck, and can only be extricated with much labour.

524/36A7 8/28
labour. - Hollows and ruts are now being gradually filled in with stone metal, by the Local Endowment Department, but, probably owing to want of sufficient funds, the work is not of a nature and extent calculated to permanently improve the road, which will be provided for in the estimate now being prepared.

7. That portion of the road from the head of the ghant near Lucknow, to Vagiti, is on the whole slightly better than the Ghant itself, just described.

W. M. M. M. M.
Vagiti
25 January 1874
Executive Engineer

In a letter to the Supy.
Engineer 4th Circle, dated
25 January 1884. N^o 27
32
923/84

Appendix

Notes on the present
state of the road from
Caticut to Vayalpur
via the Tanjorecherry
Ghaut.

I. W. Department. B. & P.
No 524 W
Proceedings of the Madras Government,
Under date the 26th February/84
Read the following:—

Letter from the S.E. IV Circle (H.E. N^o 13 d/ January 3rd 1884)
524
44/84

With his letter above
recorded, the Supy. Engineer
IV Circle submits a preliminary
report from Mr. Nordmann
in which he suggests a
plan of operations, and
brings forward the points
upon which he requires
definite orders, ~~so as~~ to
enable him to proceed
with the requisite surveys

and estimates for the
improvement of communications
in the Wynaad.

In Memorandum No 395
E of 26th September 1883, Mr.
Nordmann was instructed
to make himself thoroughly
acquainted with local
requirements upon which to
base a programme of
operations. The most urgent
work in the opinion of the
Wynaad Planters' Association
being the road from
Calicut to Vayittor, (43
miles,) attention was in
the first instance to be
confined to this line, estimates
for which were to be
prepared.

524
49

Of the two alternative
routes to the foot of the
Samracheri ghat, suggested
for consideration, Mr.

Nordmann, after collecting
~~desired~~ information as to
the work required on each
route and the cost of the
improvements, gives a decided
preference to the shorter
though ^{somewhat} steeper line via
Suddanellum. The route
via Chally besides

being more circuitous, will
~~it is explained, have to~~
cross several large water-
ways on which expensive
bridges will be required.
Mr. Nordmann states that
this preference is shared
by Mr. Nordmann states, by

all persons interested in
the subject; and, as it is
expected that the steep
gradients on the existing
line via Suddanellum
will be found susceptible
of improvement at no
great cost, and that the
ruling gradient need not
be steeper than 1 in 18,
this route may be adopted,
should the proposed
surveys confirm present
anticipations.

The Samracheri ghāt
itself, though somewhat
faulty as regards the
trace, is a substantial
work requiring only

1231
surface improvement and
proper conservancy. The
proposals in para 19 of Mr.
Nordmann's report for im-
proving the gradient of the
ghāt in places, and his
subsequent suggestions for
consolidating the surfaces
along the whole line, are
approved. It is considered,
however, that, on the ghāt
itself, the thickness of metal
should not be less than
9 inches; elsewhere it may
be reduced to 6 inches. The
metal should be spread
over a minimum width
of 12 feet, which should
also be the minimum

width of the roadway
over bridges.

Under-drains on the ghāt
should be provided as
recommended by the Suptg
Engineer, viz^t, not less than
two slab drains to each
furlong; and, where the
gradient is steeper than
1 in 16, ~~there should be~~
one at every 100 feet.

Catch-drains should also
be provided wherever
practicable.

The width of roadway
on the ghāt should be
increased to a minimum
of 15 feet.

The bridges and culverts

1232
may be provided as
recommended by Mr. Nordmann.

524/49/51
Provision should also
be made for camping ground
for carts at convenient
places on the ghāt, as
well as on the road
between the foot of the
ghāt and Calcutta, should
such ^{existing} places not already
exist.

Shelter for establishments
may be provided as proposed.

The Govt are not
prepared to make any
grant for the maintenance
of the present imperfect
ghāt road, as suggested
by Mr. Nordmann in

para 16 of his report.
The scope of the action
contemplated by the
appointment of a special
Engineers and Survey
Establishment does not
embrace the maintenance
of existing lines of road,
the charge of which
devolves on the L. I.
Board.

The survey and levels
of the line from Cahint
to Vayitri through the
Samracheri ghat should
first be ~~in~~ in hand,
and an estimate ^{framed} of the
cost of improvements,

as indicated above.
~~should be found.~~ The
524/62 inquiry may then be
extended to the other lines
of communication, as
proposed by Mr. Nordmann.
The development of these
additional lines will,
however, depend on the
resources at the disposal
of Govt; due regard being
paid to the numerous
pressing demand for
assistance from other
parts of the Presidency.

Para 33 & 34 of
Mr. Nordmann's report on
the subject of railways

extensions will be referred
to the Com. & go for Supp.

11/2
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Dr

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SE W. Gribb 9

Honorary Secy. W. G. Aard 3
Planters Association

Swainson & Co. 7

C. E. fu Railways 24

(To the Chief Secretary
for counterinitials)

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