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# MADRAS RECORD OFFICE.

## Government of Madras.

C.R

Public Works DEPARTMENT.

G.O. No. 2942 Press ~~Mis.~~

538-539

Dated 21. 9. 1867.

*Not to be folded or roughly handled*

No. 538. Read the following letter from the Secretary to the Government of Bombay, Railway Department, to the Secretary to the Government of Madras, dated Bombay Castle, 19th August 1867, No. 1,720 :—

1. I am directed by His Excellency the Governor in Council to forward copy of the Inspection Report by Captain White, R. E., Deputy Consulting Engineer for Railways, of the works in progress on Contracts 18 and 19, extending from Sholapoor to Raichore, and subsequent correspondence with the Agent, G. I. P. Railway Company.

2. An extract, paragraphs 35 to 38 of the Report, relating to feeders to the Railway, was communicated to the Resident at Hyderabad, with a view to His Highness the Nizam being prevailed upon to construct and maintain the feeders recommended by Captain White, and also those which may be needed hereafter.

3. The Resident replied that he could not promise anything very effectual being done, but that he would represent the matter for the attention of the Nizam's Government. In a further communication, just received, the Resident states that no objection is entertained by His Highness the Nizam's Government, provided the cost of the construction of the feeders is not excessive, nor above that for which they could be constructed by its own agency, and inquires whether the Railway Department will be able to favor him with rough estimates of the cost from village to village, in order that the Nizam's Government may be enabled to charge it accordingly, whether against the Government or against the Jagheerdars. The Agent of the G. I. P. Railway Company has accordingly been asked to state whether he can furnish the estimates.

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From Captain J. H. WHITE, R. E., Deputy Consulting Engineer, Railway Department, to the Consulting Engineer for Railways, dated Bombay, 31st January 1867.

1. Having returned from the inspection of the works in progress on Contracts 18 and 19, extending from Sholapoor to Raichore, the point of junction with the Madras Railway, I have the honor to submit my report thereon.

CONTRACT 18.

2. *General Description.*—The works on this contract were reported on this time last year by Lieutenant Sargeaunt; since the date of his inspection the Contractors, Messrs. Adamson and Clowser, made a demand for higher rates, which was eventually referred for decision to the Secretary of State for India, the Contract having been let in England. Pending a favorable answer to their demands, the Contractors have slackened work for some months. All masonry works have been stopped, and only those works are now being carried on which afford a sure profit to the Contractor, such as the finishing up of the earth-work, ballasting, and permanent way laying. The cuttings are comparatively untouched.

3. There is no doubt that the works were being pushed on with great energy up to the commencement of September, as $\frac{13}{20}$ths of the banks have been completed, and a large amount of masonry turned out; but from that time the masonry work slackened; in September very little was done, and from the 1st of October all viaducts, bridges, and culverts were entirely stopped. The loss of

the present cold working season is much to be regretted, and as all the labor has now become scattered, there is little prospect of the line being opened for traffic within the contract period, viz., 31st March 1868.

4. *Earth-work and Cutting.*—The progress of the banks up to the end of December 1866 has been as follows:—

| | Amount to be done. | Amount done. |
|---|---|---|
| Embankments ... | Cubic yards. 2,883,103 | Cubic yards. 2,749,979 |
| Cuttings... | ,, 487,221 | ,, 58,430 |

showing that 95 per cent. of the embankments has been completed, but only 12 per cent. of the cuttings. In all future contracts of the Company, where the rate for banks includes that for cuttings, a clause should certainly be inserted, that the banks would not be paid for in full, monthly, unless the fair proportion of cuttings were also taken out.

5. The soil throughout this Contract is decidedly not favorable to earth-work; the very worst part of the line is near Sholapoor, where the side trenches have had to be scraped to a very considerable area on either side of the bank; but a few miles beyond Sholapoor the ground improves, and beneath the top soil there is seldom anything worse to be encountered than soft moorum.

6. Compared with other Contracts the banks are remarkably heavy, averaging upwards of 40,000 cubic yards to the mile, while Contracts 13, 14, 1 , 16, and 17 vary from 16,000 to 21,000 cubic yards to the mile: this is a very considerable difference, and is caused by the broken nature of the country, and the steepness and depth of the numerous valleys issuing from the main water-shed.

7. *Cuttings.*—With reference to the large amount of cutting which now remains to be done, is rather difficult to judge of the way it will turn out. Of the few cuttings that have already been completed, I saw a very little that looked as if blasting had been required, whereas the nature of the top soil gave every indication of the presence of hard trap rock a few feet beneath surface. The portions of the line near Sholapoor and Koolburga will probably present the greatest difficulties in this respect.

8. *Masonry.*—The masonry of the Contract is as light as the earth-work is heavy, the only works of any importance being the viaducts over the Boree and Murridjee rivers.

9. *Boree Viaduct.*—This work consists of twenty 30-feet girder openings. The trap of which it is built is procured at no great distance from the works, and if the same description of stone is employed that I saw collected in the right bank of the river, there can be little doubt that good work will be turned out. Four land piers have been finished, and a considerable amount of material has been brought on to the ground; there will probably be a little difficulty in getting in one of the foundations, but beyond this there is nothing whatever to delay the early completion of the work.

*Murridjee Viaduct.*—This consists of ten 30-feet arches, some material has been collected, but no masonry to speak of has been yet turned out.

10. *Character of Masonry.*—The general character of the masonry throughout the Contract is decidedly good, and the few centerings that I saw up were of good

*Proceedings of the Madras Government, Public Works Department,*
**21***st September* 1867.

construction, but I observed that in several of the bridges, pyramidal, seal-shaped stones have been employed, and considerable quantities of them are now collected on the works, which I trust the Company's Engineers will be called upon to reject.

The total value of masonry executed is as follows:—

| | Gross value. | Amount paid. |
|---|---|---|
| Viaducts and Bridges... | Rs. 1,784,139 | Rs. 414,318 |

so that nearly one-fourth of the viaducts and bridges may be said to be completed.

11. *Culverts.*—About 40 per cent. of the culverts have been finished; the masonry appeared to me in some few cases decidedly inferior, and not up to the Specification. I think attention should be given to this point, as nothing causes so much trouble and expense to Engineers in charge of open line as the constant repairing of a lot of these small works scattered about at distant intervals. The gross value of work done is as follows:—

| | Gross value. | Amount paid. |
|---|---|---|
| Culverts ... ... | Rs. 208,237 | Rs. 84,919 |

12. *Ballasting.*—Since the close of the monsoon a considerable amount of ballast has been spread; it consists almost entirely of moorum from Sholapoor to Koolburga, little else can be obtained. It will be necessary that the ballast which is used for packing the pot-sleepers should be of a smaller size than the general description of moorum which is now being spread, otherwise the pot-sleeper road will hardly have a fair trial.

13. The following statement shows the amounts of ballasting, earth-work, and cuttings in detail in the different districts, the amounts that are to be done, and the amounts done up to the end of December 1866.

| District. | Length of District. From M. | Ch. | To M. | Ch. | Banks To be done. | Banks Done. | Cuttings To be done. | Cuttings Done. | Ballasting To be done. | Ballasting Done. |
|---|---|---|---|---|---|---|---|---|---|---|
| No. 1..... ..... | ... | ... | 17 | 35 | 515,122 | 480,204 | 86,267 | 39,960 | 98,173 | 57,520 |
| ,, 2..... ..... | 17 | 35 | 35 | 38 | 826,880 | 802,028 | 139,021 | 17,604 | 101,551 | 21,426 |
| ,, 3..... ..... | 35 | 38 | 52 | 10 | 747,005 | 718,241 | 97,039 | 300 | 93,739 | 15,022½ |
| ,, 4..... ..... | 52 | 10 | 70 | 20 | 794,096 | 734,416 | 164,894 | 570 | 102,044 | 7,340 |
| | Total Cubic yards... | | | | 2,883,103 | 2,749,979 | 487,221 | 58,430 | 395,507 | 101,808½ |

14. *Fencing.*—No fencing has yet been commenced. According to the general drawing, where the nature of the ground will allow of it, it is intended to put up Morton's fencing, consisting of tapering, oval galvanized iron posts, with six strands of galvanized wire, this will be a better description of fence than any that has as yet been erected on the Railway, and will, I am sure, turn out to be well worth its increased cost.

15. *Permanent-Way.*—The Contractors have already carted out about thirty miles of permanent-way, pot-sleepers and rails; upwards of 300 carts have been daily employed, 150 on the average delivering material each day on to the works. The permanent-way laying commenced in December, and a few miles were linked in during the present month.

Large amounts of material have been delivered by the Company at Sholapore, ample to supply the requirements of Contract 18 for some little time to come.

16. *Stations and Plate-layers' Bungalows.*—It is much to be regretted that nothing whatever has yet been done towards the station and other buildings on this Contract. It was an understood matter, I believe, that these should be pushed on from the first, in order to afford some accommodation to Companys' Engineers and Inspectors during the progress of the works; but owing, as I was led to understand, to difficulties made by the Contractors, not one of them has been yet commenced.

17. *Kurrubgaum.*—The first station out from Sholapoor is Kurrubgaum, the station for Akulkote; it is a question whether Ichoor would not have been the best place, as it is a larger village.

This would increase the distance from Akulkote to the Railway by about a mile and a half, but the traffic of Akulkote is all in the direction of Sholapoor, and the total distance by road and rail should be shorter by Ichoor than by Kurrubgaum. If Kurrubgaum, twenty-one miles from Sholapoor, is retained as the station for Akulkote, I think it would be advisable to break up the length of run by an intermediate station at Arooz. A short line of road from Aheerwaree, which is a village of some size would, I have no doubt, bring in a very fair traffic.

18. *Koolburga.*—The station of Koolburga is about two miles from the town, the plan of the station is good, and a great improvement on most of the existing structures of this class. This is more than can be said for the elevation, which partakes of the usual unpicturesque character of G. I. P. buildings, as Koolburga abounds in handsome Mahomedan remains, a little more architectural effects would have been admissible.

I would propose a few alterations in the arrangements of the waiting-rooms. There is only one 1st and 2nd class waiting-room, the ladies retiring-room is too small, and the refreshment-room unnecessarily large. The distribution should be altered so as to give smaller refreshment-room and better accomodation for ladies and gentlemen. Even at present there is a considerable traffic by road between Sholapoor and Secunderabad, and when communication is opened up to Koolburga, it is probable that it will increase very largely; the accommodation, therefore, should be on a liberal scale, and the waiting-rooms for the 2nd class should be altogether separate from those for the first. When the main line is completed Koolburga will be the station for Hyderabad as regards the Bombay traffic, which will be very considerable, and in the event of a branch Railway being carried to Hyderabad, Koolburga will probably be the point of junction with the main line; it will, therefore, always be an important station, and it might be advisable to provide for a separate hotel there as at Bhosawul, instead of adding to the station accommodation. This is a matter for the consideration of the Railway Company.

19. *Completion of Contract.*—If the works had not been stopped during the present working season, the line might, in all probability, have been opened to Koolburga by the close of 1868; even as it is if the works are resumed with vigour, I see nothing to prevent the Contract being completed by the hot season of 1869. The Boree viaduct is the only work of any importance, and its construction presents no difficulties; it could easily be completed in eighteen months; allowing for the leading forward of the permanent-way material beyond the Boree, and estimating for an average of five to six miles of line being laid each month, this Contract might readily be finished by March or April 1869.

*Proceedings of the Madras Government, Public Works Department,*
**21*st September* 1867.**

CONTRACT 19.

20. *General Description.*—This Contract extends from Koolburga to Raichore, a distance of 88 miles 17 chains, it was let in England to Mr. Joseph Bray, who also executed No. 9 Contract, from Poona to Sholapoor, and ground was broken in May 1866. The time for the completion of the Contract terminates on the 30th June 1869; considering the facility with which building materials are obtained throughout the entire length from Koolburga to Raichore, there is no reason why the whole of the works, with the exception of the Kistna viaduct, should not be finished within the contract time.

21. From Koolburga to Raichore the line runs entirely within the Nizam's dominions, and has a course very nearly parallel to the Beemah river. The country, a few miles after leaving Koolburga, presents a most marked contrast to that traversed by Contract 18; a different geological formation is entered upon, the trap rock gives place to limestone and granite, the soil becomes richer, and the whole district more fertile. The geological divisions of the contract are shown roughly in the sketch map attached to this.

22. *Building Stones.*—The limestone, which is first met with near Murtoor, is a very compact stone, of a smooth uniform texture, lying in beds varying from 1 inch to 1½ feet in thickness; it will not cleave parallel to the bed, but will split very regularly in any required direction at right angles to the bed; any greater thickness than 15 inches is very difficult to procure, the general run of the stone averaging only 6 or 7 inches.

Slate is also procurable, and I believe the supply is plentiful; it breaks up into laminæ, as thin as one-third of an inch, and looks as if it would be perfectly suitable for all roofing purposes. The granite of the country is a grey stone, met with either in a compact or a laminar decomposed form, in situ or in large detached cuboidal masses, it is capable of being split into any required size. The larger and more regularly shaped blocks are all obtained by splitting up the huge boulders, and the original rock itself, by means of wedges; the smaller by lighting fires on the sheet rock and then pouring water over the heated surface; this latter process gives very good material for rubble.

In the fort walls of Raichore I observed blocks of a size varying from 10 to 16 feet long and 3 feet deep, some of which could not have weighed less than ten tons; one monolith, which was used as a statcher in the masonry, actually measured 41 feet 8 inches long by 2 feet 8 inches in depth.

The mineral products of the district are, therefore, of some little importance, and if only by a judicious treatment of the tariff the beautiful stone which abounds throughout the length of this Contract can be made to bear the expense of its carriage, the Company may start a fair traffic in ornamental building stones, for which there is soon likely to be a great request in Bombay.

23. At the time of my inspection of the Contract very little work had been done; progress had been made in the banks, but the masonry was only just being started.

24. *Embankment.*—The gross quantity of embankment in the whole work amounts to 3,295,223 cubic yards, showing an average of 37,000 yards to the mile.

25. The gross quantity of cuttings, the price of which is included in that for embankment, amounts to 484,300 cubic yards, the banks being to the cuttings nearly as 7 to 1.

26. The contract is divided into four districts, the work on each district and the progress made is shown in the accompanying table.

| No. of Districts. | Mileage. | Gross quantity of embankment on each District. | Embankment. | | Gross quantity of cutting on each District. | Cuttings. | |
|---|---|---|---|---|---|---|---|
| | | | Quantity excavated up to end of December 1866. | Quantity excavated on each District. | | Quantity excavated up to end of December 1866. | Quantity excavated on each District. |
| | M. Chs. | Cub. Yds. | Cub. Yds. | Cub. Yds. | Cub. Yds. | Cub. Yds. | Cub. Yds. |
| 1 ... ... ... | 21-08 | 967,085 | 547,200 | 419,885 | 93,252 | 37,250 | 56,002 |
| 2 ... ... ... | 44-10 | 777,790 | 147,370 | 630,420 | 116,199 | 1,000 | 111,599 |
| 3 ... ... ... | 65-55 | 520,875 | 44,695 | 482,182 | 158,004 | 1,000 | 157,004 |
| 4 ... ... ... | 88-1753 | 1,129,473 | 421,900 | 701,573 | 116,965 | 38,100 | 31,865 |
| | | 3,295,223 | 1,161,165 | 2,134,060 | 484,300 | 77,900 | 406,400 |

27. *Masonry.*—The masonry works are comparatively heavy, but in the absence of the detailed schedules of viaducts, bridges, and culverts, it is difficult to speak with any certainty on this point. Stone, however, is readily procurable, and is easily worked; the lime is good, and water is generally to be obtained close at hand. With these advantages there are grounds for hoping for the early completion of this portion of the contract.

28. *Cangnee Viaduct.*—The design for the Cangnee viaduct consists of fourteen land arches of 30 feet span, seven on each bank and eleven 84-feet girders, the clear span between the piers being 74 feet. It is the opinion of the Resident Engineer that the waterway is insufficient, but the matter is left to be settled after inspection by the Company's Chief Engineer.

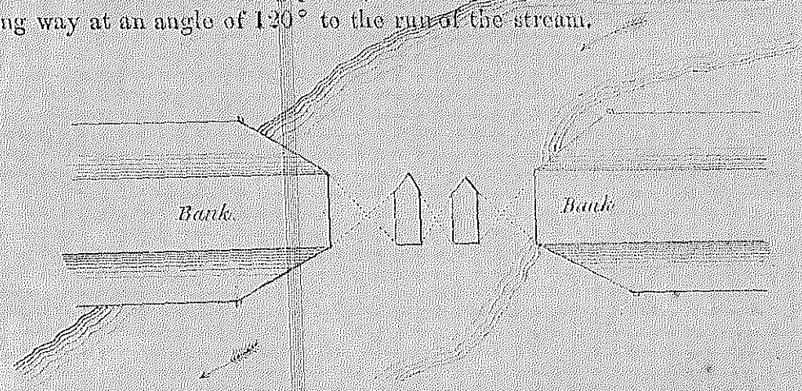
The rail level, as at present designed, is 48-feet above the bed of the river. The whole viaduct will be built of limestone, with the exception of the bed-plates for the girders, which will probably be of granite; large amounts of material have been already collected.

The foundations for two of the piers will probably give some trouble, as water will be encountered; but beyond this there is nothing to prevent the work going on rapidly, and I anticipate that the piers will be ready to receive the girders in less than two years from this date.

On the further side of the Cangnee there is a very long bank, which has a good deal of waterway through it. I observed one bridge of three 10-feet arches, the



foundations of which were being put in, and which was lined out somewhat in the following way at an angle of 120° to the run of the stream.




On the G. I. P. Railway there are no general drawings for skew bridges, and there is no doubt that it is very advisable not to put in more skew arches than is necessary; but the present case is one where a skew bridge is strictly necessary; and if skew arches could not be managed it would have been easy to substitute girder openings, the construction of which is simple and easy.

In the Cangnee design, as in all other G. I. P. designs, 2 feet of ballast only is allowed for over the arches; the common practice on English Railways, I believe, is to give 6 inches of puddling in addition, or such a depth of ballast as shall lessen the concussion of passing trains. I mention this here, as I think the flat bedded stone of which the Cangnee, and, in fact, all the arches on this district are to be built, is a stone peculiarly liable to split, and means might be taken to protect the arch as much as possible.

29. *Kistna Viaduct.*—The design for the Kistna viaduct consists of fourteen 142-feet girders and fourteen 30-feet land arches, seven on each bank. The clear span of the piers, which are 12 feet thick, is 138 feet, and the rail level is 84 feet above the bed of the river. It is proposed to increase the waterway of this viaduct also by substituting twenty 40-feet arches for the ten 30-feet, and raising the level of the rails 4 to 5 feet; the highest known flood comes to within 3 feet of the bottom of the girder, which would hardly allow of floating materials being carried down the stream without being entangled in the girders: the backwater too is not sufficiently provided for. The viaduct will be built of grey granite; all the better description of stone will be brought from the quarries at Goodabedloor, from two to three miles distant, whilst the rubble stone is procurable in considerable quantities at the site of the bridge. From 200 to 300 stone-cutters and a large number of quarrymen are now employed on the works; but beyond this nothing further has been done towards the commencement of the work. The foundations of this work will, it is to be feared, be rather difficult to get in, and pumping power will be necessary; at the site of two of the piers it is said that there is never less than 10 feet of water, and most likely the Contractors will not be able to work at them for more than a few months in the year. As far as I could see, however, no measures have yet been taken to push on this difficult portion of the work, and it is probable this season will be lost, which is a matter of regret. It is an idea of the Resident Engineer to float down

the iron work of the bridge and also portions of the permanent way by the Baroma river, during the monsoon months; it would be worth while to ascertain whether the plan is a feasible one, and would not come cheaper than carting. If rafts were made up at Decksal water carriage would be substituted for altogether 100 miles of railway and 150 miles of road; the permanent-way of that portion of the line from Yedagerry to the Kistna might be floated down as far as Kykal ferry, and then carted onwards from there, and so for the Raichore portion which could be landed at Indapoor. The girders for the bridge would be landed at the very works, and would, I should imagine, stand a less chance of injury in transit than by carts. As the iron work of the viaduct is not a portion of the Contractor's work, the Company are free to act as they like in the matter.

With reference to the time that it will take to complete this viaduct, it is difficult to arrive at any correct conclusion, so much depends on the energy with which the works are carried on. The Taptee took little more than two years to build, but there was no difficulty to speak of in getting in the foundations. On the Kistna viaduct the lead of the stone is rather less than at the Taptee, and as the design at present stands there are a few thousand yards less of masonry, but some of the foundations will present difficulties. Taking those points into consideration, and that not a stone of the viaduct has yet been laid, I hardly think we can now look for the completion of this work before the close of the monsoon of 1870.

30. *Permanent-Way.*—The contract for carting out the permanent way from Sholapoor to Koolburga was let by the Company to Messrs. Callander Sowler and hitherto the work has progressed very favorably. At the close of this month there will be about 25 miles of pot-sleepers and rails stacked at Koolburga. The Contractors have not yet commenced carting this forward.

31. *Turn-table.*—I think it would be very desirable both on this Contract and on No. 18 to avoid the expense of the large 40 feet turn-tables, which are so apt to get out of order, and when out of order so troublesome to repair.

Reversing triangles should be made from the first, and not after the expense of the turn-table has been already incurred, and ground which can be obtained very cheaply here should be taken up for the purpose at once.

32. *Stations.*—The following places have been selected as stations :—

| | At miles. |
|---|---|
| Shahbad ... ... ... ... ... ... ... | 10½ |
| Nalwur ... ... ... .. ... ... ... | 31 |
| Yedagerry ... ... ... ... ... ... ... | 46½ |
| Sydapoor ... ... ... ... ... ... | 60½ |
| Indapoor ... ... ... ... ... ... | 73½ |
| Raichore ... ... ... ... ... ... ... | 88½ |

I see nothing to object to in the places chosen, except that I think the site of the Raichore station should be shifted a little to the southward. The present station is too close to the fort walls, and in case of any sudden outbreak could be easily fired into and rendered untenable; if shifted the site would come upon the Madras line, but I have no doubt this difficulty might be easily met; judging by the eye the ground there is as favorable for station works as at the existing site.

None of the stations or plate-layers' bungalows have been yet commenced, the

***Proceedings of the Madras Government, Public Works Department.***
**21*st September* 1867.**

Contractors not having had the plans given them; some arrangement ought to be made with the Contractors whereby these buildings should be completed at once, and be made use of as residences for Engineers during the progress of the works; sufficient rent might be charged to cover the cost of repairs.

33. *Electric Telegraph.*—The telegraph from Sholapoor to Koolburga and Raichore might with advantage be completed at an early date; the cost of the working, *minus* the receipt, to be borne by Capital until the line is opened.

There were no other works in progress during the period of my inspection.

34. The probable date of completion of the whole contract may be set down at about the close of the monsoon of 1870, with the exception of a break at the Kistna viaduct communication should be complete with Raichore at least a year before this date.

35. *Railway Feeders.*—I regret that the time at my disposal was insufficient to enable me to acquaint myself thoroughly with the requirements of the country, from Sholapoor to Raichore, in the matter of Railway feeders; I can only point out roughly the roads that should be first taken in hand.

36. From Sholapoor to Raichore there is little chance of much in the way of local traffic: the country is stony and arid, the villages are small, and there is little trade or commerce; the Railway too, for the most part, does not run in British territory, so that the difficulty of getting roads made will be increased.

The following feeders were recommended in the last Inspection Report of Lieutenant Sargeaunt :—

| | |
|---|---|
| Afzulpoor to Dooduch ... ... ... ... ... ... (9 in Hyderabad territory, 4 in Myndurga) | 13 miles. |
| Myndurga to Dooduch ... ... ... ... ... ... | 10 „ |
| Nunburga to *Goodoor* ... ... ... ... ... ... | 5 „ |
| Rutkul to road from Hominabad .. ... ... ... | 11 „ |

Kurrinjee to Kurrubgaum 7 miles, and to these should be added two short lines of 2 miles each from Nagasoor to Kurrubgaum and from Koolburga to Koolburga station. The country is by no means a difficult one for road-making, and as the whole extent from Sholapoor to Koolburga is quite innocent of any communication, something ought to be done to improve this state of things before the Railway is complete. For a small sum of 20,000 Rupees much might be effected, and at a future time when funds were more abundant, those roads might easily be improved on which the traffic turned out to be of importance.

The great feeder, however, to this 70 miles of line will be the road from Hyderabad to Koolburga, of this the portion from Hyderabad to Haminabad along the main road to Sholapoor already exists, and is by report in fair condition; the branch from Haminabad to Koolburga I was led to understand is now being taken in hand. The opening up of communication to Koolburga will lessen the road journey from Secunderabad to Sholapoor by 55 miles; the present route by road is about 200 miles along, while the Railway route will be made up of 145 miles of road and 70 of rail. If the direct road from Koolburga to Hyderabad were carried out, the road journey would be lessened by nearly 20 miles, but as there is a likelihood of a branch line of Railway being eventually carried out along this

direct route, it has been thought better to avoid the expense of a new line and make use of the road that already exists.

37. *Feeders to Contract* 19.—From Koolburga to the Kistna the following short feeders to the different stations are strictly necessary :—

From Shahbad to Shahbad Station ... ... ... 1½ miles.
„ Nalwur to Nalwur „ ... ... ... 1 „
„ Yeragole to Nalwur „ ... ... ... 3½ „
„ Yedageery to Yedageery „ ... ... ... 1½ „

And in addition to these the following important roads must eventually be carried out :—

From Mulkaid to Koolburga with a branch thrown of midway to Shahbad.
„ Narainpeth to Yedageery
„ Shorapoor to Sydapoor.
„ Suggur to meet Shorapoor and Sydapoor road.

From Hyderabad to Raichore, a distance of 135 miles, there is already a very fair line of road the whole way, this will act as a feeder to the Madras line ; it is the only communication at all worthy of the name of a road throughout the entire distance of 159 miles from Sholapoor to Raichore.

38. There is no reason but want of funds that these roads should not be surveyed and commenced at once, if only a grant could be procured from the Nizam's Government for the purpose they might be carried out by the Company's Engineers without any detriment to their other duties.

No. 539 ORDER THEREON, 21st September 1867, No. 2,942.

RAILWAY, No. 35. Communicated to the Consulting Engineer for Railways.

(True Extract.)
(Signed) J. H. M. SHAW STEWART, Major, R. E.,
*Under Secretary to Government.*

To the Consulting Engineer for Railways.

Exd S. T. Augustin.

No. 1720 of 1867.
Railway Department

To
The Secretary to the Govt.
of Madras.

Sir,

I am directed by His Excellency the Governor in Council to forward copy of the Inspection Report by Captain A. White R.E. Deputy Consulting Engineer for Railways, of the works in progress on Portions 18 and 19, extending from Sholapoor to Raichore, and subsequent correspondence with the Agent G. I. P. Railway Company.

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states that no objection is entertained by His Highness the Nizam's Government provided the cost of the Constabulary for the feeders do not exceed nor about that for which they could be constructed by its own Agency, and enquires whether the Railway Department will be able to favor him with rough Estimates of the cost from Village to Village in order that the Nizam's Government may be enabled to charge it accordingly whether against the Government or against the Jagheerdars. The Agent of the G.I.P. Railway Company has accordingly been asked to state whether he can furnish the Estimates.—

I have the honor to be
Sir
Your most obedient Servant

Bombay Castle
19th August 1867

Secretary to Government

Bombay 31st January 1868

To,

The Executive Engineer for Railways.

Sir,

Having returned from the inspection of the works in progress on Contracts 18 and 19 extending from Shoolapoor to Raichore, the point of junction with the Madras Railway, I have the honor to submit my report thereon.—

Contract 18

General Description.

2 The works on this contract were reported on this time last year by Lieutenant Sargeaunt, since the date of his inspection the Contractors Messrs Robertson and Cleveden made a demand for higher rates which was eventually referred for decision to the Secretary of State for India, the Contract having been let in England.— Pending a favorable

if cuttings were also taken into
5. the end throughout the contract
is decidedly not favorable to quick
work. the very worst part of the line
is near Shalapan where the side
trenches have had to be completed
to a very considerable depth on either
side of the bank; but a few miles
beyond Shalapan the ground
improves and beneath the top soil
said there is seldom any heavy
quarry to be encountered. the
difficulties. —

6. Compared with other —
Contracts the bands are "extremely
heavy" averaging 65 rounds of
40.000 cubic yards to the mile.
while contract 13. 14, 15, 16, vary
vary from 16,000 to 21,000 cubic yards
to the mile. this is a very consi-
derable difference and is caused
by the broken nature of the country

and

Cuttings

and the steepness and depth of the
numerous valleys issuing from the
main water shed. —

7. With reference to the large
amount of cutting which now re-
mains to be done, is rather difficult
to judge of the way it will turn
out — Of the few cuttings that have
already been completed I saw a very
little that looked as if blasting had
been required, owing to the nature
of the top soil gave every indica-
tion of the presence of hard rock
rock a few feet beneath surface. —
The portion of the line near Shalapan
and Koolburga will probably —
present the greatest difficulties
in this respect. —

Masonry

8. The masonry of the contract
is as light as the earth work is —
heavy, the only works of any im-
portance being the viaducts over the
Bence and Inerridjee Rivers. —

This

9. This work consists of 30, 20 feet girder openings. The kind of which it is built is procured at a great distance from the works and if the same description of stone is employed that I saw collected in the right bank of the river there can be little doubt that good work will be turned out. Four land piers have been finished and a considerable amount of material has been brought on to the ground, there will probably be a little difficulty in getting in one of the foundations, but beyond this, there is nothing whatever to delay the early completion of the work.

This consists of 10-30 feet arches, ozzie material has been collected, but no masonry to speak of, has been yet turned out.

Viaducts & Bridges

Character of masonry

10 The general character of the masonry throughout the Contract is decidedly good, and the foundations that I saw up were of good construction, but I observed that in general of the bridges, — pyramidal, dead stepped, stones have been employed, and considerable quantities of them are now collected on the works, which that the Company's Engineers will be called upon to reject.

The total value of masonry executed is as follows.—

| | Gross value | Amount paid |
|---|---|---|
| Viaducts & Bridges | Rs 1734,139 | Rs 414,318 |

so that nearly one fourth of the Viaducts and bridges may be said to be completed.—

Culverts

11 About 40 per cent of the culverts have been finished, the masonry appeared to me in some few cases decidedly inferior, and not

[illegible] up to the specification [illegible] Should a Tender should be given to this point as nothing causes so much trouble and expense to Engineers in charge of open line as the constant repairing of a lot of open small works scattered about at distant intervals. The gross nature of work done is as follows.

| | Gross Value | Amount done |
|---|---|---|
| Culverts | 208,227 | 84,719 |

Ballasting

12. Since the close of the year a considerable amount of ballast has been spread; it consists almost entirely of Quarries from Shalafoor to Woolburga; little else can be obtained. It will be necessary that the ballast which is used for packing the sleepers should be of a smaller size than the general description of Quarries which is now being spread, otherwise the post sleeper road will hardly have a fair trial.

13. The following statement shews the amounts of ballasting earth work and cuttings in detail in the different districts the amounts that are to be done and the amounts done up to the end of December 1866.—

| District | Length of decided Works | | | | Cuttings | | | | Ballasting | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yards chs. | chs | To be done chs. | | Done | To be done | Done | To be done | Done | |
| No 1 | 11 | 11 | 17 | 25 | 215,122 | 48,284 | 86,267 | 32,960 | 98,178 | 57,520 |
| " 2 | 17 | 22 | 25 | 38 | 826,830 | 50,208 | 139,022 | 17,600 | 104,551 | 21,426 |
| " 3 | 35 | 28 | 52 | 10 | 747,095 | 78,244 | 97,039 | 200 | 93,789 | 15,022½ |
| " 4 | 52 | 10 | 70 | 20 | 794,006 | 73,446 | 164,894 | 370 | 102,044 | 7,840 |
| Total Cubic yards | | | | | 2,583,103 | 274,978 | 487,221 | 58,430 | 395,503 | 101,808½ |

14. No fencing has yet been commenced. According to the general drawings, where the nature of the ground will allow of it, it is intended to put up Martins fencing consisting of tapering, oval galvanized iron posts with 6 strands of galvanized wire. This will be

a better description of fence than any that has as yet been erected on the Railway and will I am sure turn out to be well worth the increased cost.—

15. The Contractors have already carted out about 30 miles of permanent way, part sleepers and rails; upwards of 300 carts have been daily employed, 150 are the average delivering material each day on to the works. The permanent way laying commenced in December and a few miles were finished in during the present month.—

Permanent way

Large amounts of material have been delivered by the Company at Shahpoor ample to supply the requirements of Contract 18 for some little time to come.—

16. It is much to be regretted that nothing whatever has yet been done towards the station and other buildings on this Contract. It was understood matter I believe that these should be pushed on from the first, in order to afford some accommodation to Company Engineers and Inspectors during the progress of the works; but nothing as I was led to understand to difficulties made by the Contractors, not one of them has been yet commenced.—

Stations and Platelayers Bungalows

Kurrudgaum

17. The first station out from Shahpoor is Kurrudgaum, the station for Akulkote, it is a question whether Shahpoor would not have been the best place as it is a larger village.—

This would increase the distance from Akulkote to the Railway by about a mile and a half, but the traffic of Akulkote is

is all in the direction of Modapoor and the total distance by road and rail should be shorter by 3 chains than by Kurrachee.— If Kurrachee, 21 miles from Modapoor, is retained as the station for Hyderabad, I think it would be advisable to break up the length of these 3 sections by an intermediate station at Mirpoor.— a short piece of road from the Serai enclosure which is a village of some size would I have no doubt bring in a very good traffic.—

15. The station of Kotdinga (Kotdinga) is about 2 miles from the town; the plan of the station is good and a great improvement on most of the existing structures of this class.— This is more than can be said for the elevation which partakes of the usual simpleness

give

give character of G. I. P. Buildings as Kotdinga abounds in handsome buildings remains a little more architectural effect would have been advisable.—

I would propose a few alterations in the arrangements of the waiting rooms.— There is only one 1st & 2nd Class waiting room, the ladies retiring room is too small and the refreshment room unnecessarily large.— The distribution should be altered so as to give a smaller refreshment room and better accommodation for ladies and gentlemen.— Even at present there is a considerable traffic by road between Modapoor and Secunderabad and when communication is opened up to Kotdinga it is probable that it will increase very largely.

the

the accommodation therefore should be on a liberal scale and the waiting rooms for the 2nd class should be altogether separate from those for the first — when the main line is completed Kodhurga will be the station for Hyderabad as regards the Bombay Traffic, which will be very considerable and in the event of a Branch Railway being carried to Hyderabad, Kodhurga will probably be the point of junction with the main line, it will therefore always be an important station and it might be advisable to provide for a separate hotel there as at Bhoosawul instead of adding to the station accommodation. This is a matter for the consideration of the Railway Company.—

Completion of Contract

9th. If the works had not been stopped during the present working season, the line might, in all probability, have been opened to Kodhurga by the close of 1868; even as it is if the works are resumed with vigour & see nothing to prevent the contract being completed by the 1st season of 1869—The Bore viaduct is the only work of any importance and the construction presents no difficulties, it could easily be completed in 12 months, allowing for the leading forward of the permanent way material beyond the Bore and estimating for an average of 5 to 6 miles of line being laid each month, the contract might readily be finished by March or April 1869.—

Contract

## Contract 19

## General Description

20 This contract extends from Kaiapoi to Waiehore a distance of 88 miles 17 chains, it was let in England to Mr. Joseph Bray who also executed the contract from Rangiora to Christchurch and formed and broken in May 1876. The time for the completion of the contract terminates on the 30th June 1877, considering the facility with which building materials are obtained throughout the entire length from Kaiapoi to Waiehore, there is no reason why the whole of the works with the exception of the Kaiapoi Viaduct, should not be finished within the contract time.

21 From Kaiapoi to Waiehore the line runs entirely within the Cheviot downlands and has a course very nearly parallel to the Waimakariri River. The country a few miles after leaving Kaiapoi is covered in most parts with a different geological formation to that traversed by contract 18. a different geological formation is noticed upon the top rock passed before, the soil becomes redder in colour and the whole district more fertile. The geological divisions of the contract are shown roughly in the sketch map attached to this report.

Rail Map sheet 5

22 The limestone which is first met with near Amuri is a very compact stone of a smooth uniform texture by reason it is dark in colour; it will not cleave parallel to the bed but will often split regularly in any required direction at

right angles to the bed; any greater thickness than 15" is very difficult to procure, the general run of the stone averaging only 6 or 7 inches.

Slate is also procurable and I believe the supply is plentiful; it breaks up into laminae of an inch and a third or an inch and looks as if it would be perfectly suitable for all roofing purposes.

The granite of the country as a group does not with either in a compact or a laminar decomposed form in sites or in large detached cuboidal masses. it is capable of being split into any required size. the larger and more regularly shaped blocks are all obtained by splitting up the huge boulders and the original rock itself by means of wedges; the smaller by lighting fires on the rock and then pouring water over the heated surface. this latter process gives every good material for rubble.

In the portfolio of Baichar I observed blocks of a size varying from 10 to 16 feet long and 3 feet deep some of which could not have weighed less than ten tons, one of which was used as a station in the railway at Ballycarry 21 feet 3 inches long by 2 feet 8 inches in depth.

The mineral products of the district are therefore of some little importance, and if only by a judicious treatment of the tariff the beautiful stone which abounds throughout the length of the Contract can be made to bear the expenses of its carriage, the Company may start a fair traffic in ornamental building stones, for which there

there is soon likely to be a great
request in Bombay.-

23. At the time of my inspection
of the contract very little work
had been done; progress had been
made in the heads but the
masonry was only just being started.

24. The gross quantity of embankment
cent in the whole work executed
to 3,295,223 cubic yard showing an
excess of 37,000 yards to the credit.

25. The gross quantity of cuttings
the price of which is included
in that for embankment, —
amounts to 484,300 cubic yards
the heads being to the cuttings
nearly as 7 to 1.—

26. The contract is divided
into 4 districts. The work on each
district and the progress made
is shown in the accompanying
table.—

Embankment

| No. of District | Embankment executed in each district | Gross quantity executed in each district | Quantity executed in each district | Cuttings executed in each district | Quantity executed in each district | Masonry executed in each district |
|---|---|---|---|---|---|---|
| | Cub. yds | Cub. yds | Cub. yds | Cub. yds | Cub. yds | Cub. yds |
| 1 | 21.68 | 967,085 | 547,200 | 419,885 | 93,282 | 58,082 |
| 2 | 44.10 | 677,790 | 187,370 | 530,420 | 113,109 | 111,509 |
| 3 | 25.5 | 526,375 | 44,693 | 481,682 | 153,000 | 153,000 |
| 4 | 38.98 | 1,123,973 | 421,900 | 701,573 | 119,905 | 31,805 |
| | | 3,295,223 | 1,161,163 | 2,134,060 | 484,300 | 77,900 |

Masonry

27. The masonry works are comparatively heavy but on the absence of detailed schedules of measurements it is difficult to speak with any certainty on this point.- Stone however is readily procurable and is easily worked. The climate is good and water is generally to be obtained close at hand- these advantages there are ground for hoping for the early completion of this portion of the Contract.-

Cuttings

28. The designs for the Cuttings
and

Viaduct

viaduct consists of 14 land arches
of 30 feet span, 7 on each bank
and

and 11-84 feet girders, the clear span between the piers being 74 feet. It is the opinion of the Resident Engineer that the water way is insufficient but the matter is left to be settled after inspection by the Company's Chief Engineer.—

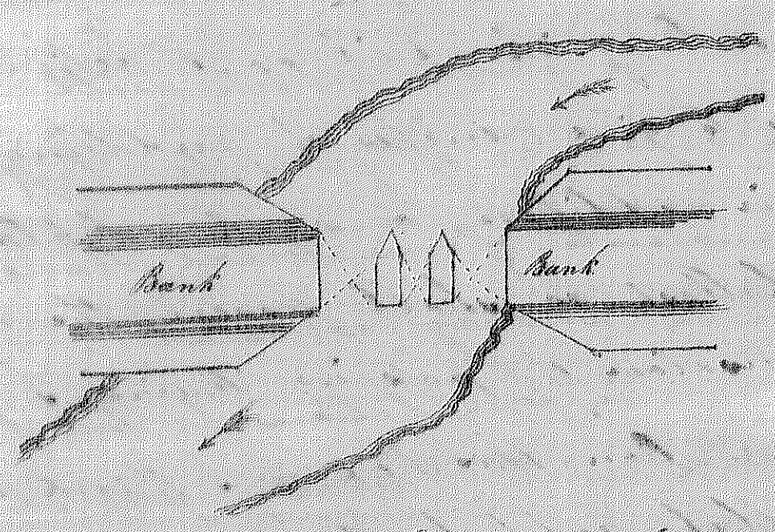
The rail level as at present designed is 40 feet above the bed of the river. The whole viaduct will be built of limestone, with the exception of the bed-plates for the girders which will probably be of granite; large amounts of material have been already collected.—

The foundations for two of the piers will probably give some trouble as water will be encountered; but beyond this there is nothing to prevent the work going on rapidly and I ante-

cipate

that the piers will be ready to receive the girders in three years & peace from this date.—

On the further side of the Lungwe there is a very long bank which has a good deal of waterway through it. I observed one bridge of fifteen feet arches the foundations of which were seven feet in and which were lined and somewhat on the following way at an angle of 120° to the run of the streams—




On the G. J. P. Railway there are no general drawings for these bridges and there is no doubt that it is very advisable not to print in

in more skew arches than is ne-
cessary: but the present case is
one where a skew bridge is strictly
necessary, and if skew arches could
not be managed it would have
been easy to substitute girder —
openings the construction of which
is simple and easy.

In the Carnginee design as
in all other G. I. P. designs 2 feet
of ballast only is allowed for over
the arches. the common practice
on English Railways, I believe
is to give 6 inches of puddling
in addition, or such a depth of
ballast as shall lessen the con-
cussion of passing trains, I
mention this here as I think the
flat bedded stone of which the
Carnginie and in fact all the
arches on this district are to be
built is a stone peculiarly —
liable to splet and means —
might

Kistna
viaduct

might be taken to protect the
work as much as possible —

In the design for the Kistna
viaduct consists of 10 192 feet girders
and 10 20 feet laced arches, 7 on each
bank. the clear space of the piers
which are 12 feet thick, is 138 feet
and the road level is 80 feet
above the bed of the river. It is
proposed to increase the water-
way of the viaduct also by —
making the 20-40 feet arches for
the 10-30 feet and raising the
level of the roads 4 to 5 feet. the
highest known flood comes to within
2 feet of the bottom of the girder
which would hardly allow of
floating materials being carried down
the stream without being entangled
in the girders: the backwater
too is not sufficiently provided
for — the viaduct would be thus

of

of grey granite; all the better
descriptions of stone will be
brought from the quarries at
Goodalecleon from 2 to 3 miles
distant whilst the rubble stone
is procurable in considerable
quantities at the site of the bridge.
From 200 to 300 stone cutters and a
large number of Quarrymen are
now employed on the aqueduct but
beyond this nothing further has
been done towards the commence-
ment of the work - The foundations
of this work will it is to be feared,
the rather difficult to get in, and
pumping power will be necessary
at the site of two of the piers
it is said that there is never
less than 10 feet of water and
most likely the contractors
will not be able to work
at them for more than a few
months

in the year - As far as I could
see however no measures have
yet been taken to push on this
difficult portion of the work and
it is probable this season will
be lost which is a matter
of regret - If is our idea of the
Resident Engineers to start -
from the Iron works of the bridge
and also portions of the permanent
way for the Delaware River -
during the favourable months, it
would be worth while to
ascertain whether the plan is
a feasible one and would not
come cheaper than carting - Frames
were made up at Deckal water
carriage would be understated for
altogether 100 miles of Railway
and 150 miles of road; the
permanent way of that portion
of the line from Jedagerry to the
Kiskeminetas

Kestra might be floated down as far as Kykulperry and then carted onwards from there and so for the Baichore portion which could be landed at Indapoor. The girders for the bridge would be landed at the very works and would I should imagine stand a less chance of injury in transit than by Carts. As the iron work of the viaduct is not a portion of the Contractors work, the Company are free to act as they like in the matter.

With reference to the time that it will take to complete this viaduct, it is difficult to arrive at any correct conclusion, so much depends on the energy with which the works are carried on. The Japtee took little more than 2 years to build, but

but there was no difficulty to speak of in getting in the foundations. On the Kestra Viaduct the head of the stone is rather less than at the Japtee and as the design at present stands there are four thousand yards less of masonry, but some of the foundations will present difficulties. Taking these points into consideration and that not a stone of the viaduct has yet been laid, I hardly think we can look for the completion of this work before the close of the Monsoon of 1870

Remainder of way

The contract for carting out the permanent way from Sholapoor to Kurkumbh was let by the Company to Messrs Calliaye Lanyee and hitherto the work has progressed very favorably. At the close of this month there will

will be about 25 miles of pot sleepers and rails stacked at Kolhurga.

The Contractors have not yet commenced carting this forward.

By. I think it would be very desirable both on this Contract and on Nº 12 to avoid the expense of the large 40 feet turntables which are so apt to get out of order, and when out of order so trouble-some to repair.— Turntable.

Quarrying triangles should be made from the first and not after the expense of the turntable has been already incurred and ground which can be obtained very cheaply here should be taken up for this purpose alone.—

By The following places have been selected as Stations.— Stations

| | at miles |
|---|---|
| Shahbad | 16 1/4 |
| Solapoor | 31 |
| Yedageery | 46 3/4 |
| Gydapoor | 60 1/4 |
| Sudapoor | 73 1/4 |
| Raichore | 88 1/4 |

I see nothing to object to in the places chosen, except that I think the site of the Raichore Station should be shifted a little to the Southwards. The present Station is too close to the fort walls and in case of any sudden outbreak could be easily fired into and rendered untenable, if shifted the site would come upon the Madras line, but I have no doubt this difficulty might be easily met; judging by the eye the ground there is as favorable for Station works as at the existing site.—

None of the Stations or Police Lodges Bungalows have been yet commenced, the Contractors not

not having had the plans given them, some arrangement ought to be made with the Contractors whereby these buildings should be completed at once and be made use of as residencies for Engineers during the progress of the works; sufficient rent might be charged to cover the cost of repairs.

33. The Telegraph from Shalapoor to Kolhapur and Raichore might with advantage be completed at an early date: the cost of the buildings minus the receipt to be borne by Capital until the line is opened.

Telegraph

There were no other works in progress during the period of my inspection.

34. The probable date of completion of the whole contract may be set down at about the close of the Monsoon of 1870, with the exception of a break at the Krishna, Conduct communication should be complete with Raichore at least a year before this date.

Railway Feeders

35. I regret that the time at my disposal was insufficient to enable me to acquaint myself thoroughly with the requirements of the Country from Shalapoor to Raichore in the matter of Railway feeders. I can only point out roughly the roads that should be first taken in hand.

36. From Shalapoor to Raichore there is little chance of much in the way of local traffic: the Country is stony and arid, the villages are small and there

is

is little trade or commerce - the Railway too for the most part does not run in British Territory, so that the difficulty of getting roads made will be increased.

The following feeders were recommended in the last inspection report of Lieut.t Sargeaunt: —

Shelapoor to Bardruch 13 miles (in Hyderabad Territory 4 in Gulburga)

Mysedurga to Bardruch — 10 —

Kurrinjee to Bardruch — 5 —

Recommended to read from Kamindal 11 miles —

Kurrinjee to Kurrudgaum 7 miles and to these should be added two short lines of 2 miles each from Chagnoor to Kurrudgaum and from Kodhenga to Kodhuga Station. The country is by no means a difficult one for road making and as the whole circle from Shelapoor

Shelapoor to Kodhuga is quite convenient of any communication, something ought to be done to improve the state of things before the Railway is complete. Even a small sum of 20,000 Rupees might be effected, and at a further time when funds were more abundant, those roads might easily be improved on which the traffic turned and to be of importance.

The great feeder however to the 40 miles of line will be the road from Hyderabad to Kodhuga, of this the portion from Hyderabad to Kamindabad along the main road to Shelapoor already exists and is by report in fair condition. The branch from Kamindal to Kodhuga I was led to understand is now being taken in hand — the opening up of communication

to

to Kaolburga will lessen the road journey from Secunderabad to Shola poor by 25 miles; the present route by road is about 900 miles along, while the Railway route will be made up of 195 miles of road and 70 of rail. If the direct road from Kaolburga to Hyderabad were carried out, the road journey would be lessened by nearly 120 miles, but as there is a likelihood of a branch line of Railway being eventually carried out along this direct route, it has been thought better to avoid the expense of a new line and make use of the road that already exists.

It is proposed to connect Kaolburga to the Jedarlad by Railway with the following short feeders to the nearest stations are directly necessary.

From

From Shahbad to Shahbad Station - 1½ miles

" Malwar to Malwar — " — 1 —

" Jedagode to Malwar — " — 3½ —

" Yedageery to Jedageery — " — 1½ —

and in addition to these the following important roads must eventually be carried out.—

From Mulkaid to Kaolburga with a branch thereon of mudwar to Shahbad.—

" Narainpet to Yedageery

" Shorapoor to Hydapoor

" Sangum to meet Shorapoor and Hydapoor road.—

From Hyderabad to Raichore a distance of 135 miles there is already a very fair line of road the whole way this will act as a feeder to the Madras line; it is the only communication at all worthy of the name of a road throughout the entire distance of 159 miles

from

from Shalapoor to Baichore.—

38. There is no reason but want of funds that these roads should not be surveyed and commenced at once, if only a grant could be procured from the Bijapore Government for the purpose, they might be carried out by the Company's Engineers without any detriment to their other duties.—

I have the honor to be Sir
Your J. H. White Captain
Dy. Executive Engr.
Railway Depart.