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1888
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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

EAST COAST RAILWAY.

STANDARD GAUGE, 5' 6".

Mileage open for traffic, including branches, 548 miles.

INSPECTION REPORT FOR THE HALF-YEAR ENDING 30TH JUNE 1898.

The inspection was made on July 5th to 10th in company with the Manager, or in his absence the Assistant Manager, heads of departments, and district officers and their assistants.

2. *Formation*.—Banks and cuttings are as a rule in good order, though they have not yet had time to settle down to the condition of stability to be found on older lines. Near Tuni in some of the cuttings very tidy dry stone ballast walls have been built costing six annas per foot run for both sides; it will be a good thing when more of these are built in the wetter cuttings. Between Yellamanchili and Anakapalle the bank requires some pitching, and the pitching should be continued, below, with an apron 10 or 12 feet wide, if it is not to be underscoured. The ballast walls in the cutting just beyond Chatrapur would be the better for raising, as the cutting is very wet; such walls ought to be up to rail level. Cuttings between Bhusandpur and Tapang are badly drained and want ballast walls.

3. *Bridges*.—The Narwa bridge has been re-sleepered and newly bed-plated, and is now in good order. Between Samalkot and Pithapuram it is proposed to spend Rs. 50,000 in raising $3\frac{1}{2}$ miles of bank, which it is feared may be overtopped, at a place where the waterway originally given has more than once been largely increased. But I learn that when the floods are rushing through the present 510 feet of waterway there is an afflux of fully 4 feet. This means that in as many separate places as there are culverts there is serious risk of their being undermined by scour, as the scour due to 4 feet of afflux is very severe. It is perfectly obvious that the present 510 feet of waterway is even still quite insufficient. The proposed raising of the bank, while allowing the water to pond up without overtopping the line, and so to get through the culvert in time, will in no way mitigate the present great risk of one or all the culverts being undermined. I therefore strongly recommend that a very much smaller sum than the proposed Rs. 50,000 be spent in inserting at this place a causeway similar to those which have been built between Ellore and Bezvada. This sort of causeway has been found to cost ten rupees per foot run. Stone is to be found not far off at Durgada station. The sum proposed to be spent would pay for nearly a mile of causeway, but I judge that if even $\frac{1}{4}$ mile were constructed the dangerous 4-foot afflux would probably be got rid of and there would be no need to raise the bank. If $\frac{1}{4}$ mile is found insufficient the railway could still afford to double it and save money while securing better engineering.

4. *Godavari bridge*.—Of the 56 well foundations required for this bridge 31 now remain to be started. The state of the 25 on which work has gone on is as follows: 14 are finished and the pier superstructure is progressing; 3 are sunk and concreted, but superstructure not yet begun; and 8 have still some short distance to sink. Both abutments have made good progress, and work through the rather heavy approaches at both ends is well forward. 1,304 lineal feet of well have been built, of which 1,244 feet have been sunk below ultimate top level of wells. 221 lineal feet of pier, or the equivalent of five piers, have been built. Of the 31 wells still to be started, 8 will be on ordinary well curbs to be laid on dry land, and 23 will require caissons to be floated in water more or less deep. The large wooden pontoons for the floating of the caissons have been built locally, as advised in my last half-year's inspection report. For building the bridge on the design which he has been ordered to adopt, Mr. Walton's arrangements are good and well thought out; but construction will take a very much longer time than would have been necessary had he not been so heavily handicapped through being prevented from starting on the deep water piers during the first working season. To begin on the easy part of a work of this sort first, for want of a suitable provision of plant, is the poorest sort of economy.

It is not yet too late to use large spans for the permanent deep river channel, as advised in my last report, instead of the 150 feet spans which, though quite suitable and economical for perhaps 36 out of the 56 spans, are uneconomical and bad, engineeringly, for use in the deep permanent channel. For not only is each deep water pier a source of risk and possible failure during construction, but if, as I now learn is intended, the base of each deep water well is to be given extra diameter for the sake of stability, they become so expensive that a larger span than 150 feet will be more economical. I would substitute perhaps six spans of 200 feet and four spans of 300 feet for 20 of the 150 feet spans in the deep water, and would thus get rid of 14 deep water piers; and even if the cost of these 14 piers thus saved were only just balanced by that of the heavier girders, the bridge would be a far better structure in every way, more easily built, easier for navigation, and less exposed to risk of accidents hereafter. Mr. Walton informs me that the deep water caissons are all Indus bridge Kotri type, 34 ft. $\times$ 20 ft. Wells of this size are most uneconomical for 150 feet spans. At Kotri they support 350 ft. spans. I do not say that the number and size of spans proposed above is the most economical: what I insist on is that the substitution of larger spans for small ones over the permanent deep channel of the river on some such system as is above suggested is the right and economical thing to do. If all the girders have already been ordered, some of them can easily be used elsewhere.

5. *Culverts*.—On the Cocanada branch some of the girder culverts whose abutments were being pushed in by the black cotton soil are being converted into smaller spans and arched, while others are being strutted with drop walls below and rail bracing above.

6. *Rails*.—These are only 5 or 6 years in the road and are practically as good as new. I was glad to see that more careful attention is now generally paid to switches and all belonging to them being kept clean and tidy.

7. *Sleepers*.—The steel sleepers are still behaving very well owing to the care with which they were located only on suitable soil. But I was shown some sleepers taken out of a wet cutting which were very badly corroded, as were the keys also; they had lost 19 pounds out of perhaps 138. I cannot be certain about the 138 because I remember that there was a considerable difference between the weights of individual sleepers when they were first received. The Loco. Superintendent started a theory, to account I believe for the wear of his wheel flanges, that some of the steel sleepers had got hogged through misuse on the unballasted road in construction days. The theory, however, is quite baseless. There were two patterns of steel sleepers; in one sort the cant at rail seat was given by bending the whole sleeper downwards at the centre, and in the other the cant was given in the press at the rail seat only, the body of the sleepers being level. Seeing these latter Mr. Morton seems to have thought they had got hogged. The wear of his wheel flanges is sufficiently accounted for by the cutting qualities of the sand with which parts of the road are ballasted; I mentioned in my last report that this sand had caused the outer dogspikes

in wooden sleepers on certain curves to be nearly beheaded. A useful lesson is to be learnt from the experience of the East Coast Railway of certain sorts of wood for sleepers; viz., that SOME or SUMI (*Soymeda Febrifuga*); PYMMA (*Lythraea Hypoleuca*?), and a wood purporting to be teak from Johore, are all quite unsuitable for Indian use as sleepers. They all go utterly in four or five years. Probably to "haskenize" them would greatly prolong their life. I saw some most excellent sāl sleepers from the forests of Ganjam, and was told that their price in Berhampur was Rs. 4-8-0. Nothing better than these could possibly be wanted if there were only enough of them. The matter is one which might with advantage attract the attention of the Forest Department. I was told that pyngadu sleepers from Burma cost Rs. 5-4-0. I here warn the East Coast Railway authorities, officially, that a pyngadu sleeper ought *always* to sink, and that if a Burma sleeper called pyngadu by dishonest suppliers is found to float, it is probably *Kya Eng* or other worthless timber, and certainly not pyngadu. I was told that 25,600 Johore teak sleepers laid in 1895 are now rotting fast. I was told in 1892 that a considerable number of them had passed on to the southern part of the North-Western Railway, through a large Karachi firm. It would be interesting to know what their life was in a dry climate.

8. *Ballast*.—Though a good deal of ballast has been put in the line since last inspection, it is still very deficient in places. From Bezwada to Ellore the upkeep of the road has fallen off very much; it is not nearly as good as it was at last inspection. Beyond Ellore it is somewhat better. Beyond Bhimadol the sand ought to be covered at once with a thin coat of broken stone. Between Rajahmundry and Samalkot the road is fairly good but still wants ballast in places, but it is kept in a slovenly state. It would be a good thing to show the gangmates a tidy bit of road as a specimen. The Cocanada branch is very much the same as the places just described. The road is pretty good between Samalkot and Pithapuram. Beyond Tuni it is better and tidier, and further on towards Waltair it is in excellent order. North of Waltair also the road is very good indeed and tidily kept too; but between Kota Bommali and Naupada it again gets rather slack. From Parlakimedi road northwards ballast is rather short, though, through the care that is evidently bestowed on it, the road is in very good running order. Beyond Ichapur ballast is short in places, but more is being put on. Beyond Berhampore a great deal of ballast has been collected, and it might as well be put in the road. Beyond Jagannadhapuram the road is better ballasted. Ballast is being spread beyond Rambha. Between Kasimkota and Balugan the road is well ballasted and very well maintained. From Kalupara Ghât to Tapang I would say the same, but beyond Tapang it is again not so good. From Chattipur to Khurda Road ballast is deficient and very irregularly laid. The Puri branch is in good order, all except the last couple of miles which is still quite new. The main line from Khurda Road up to the terminus at Barang is in very good order.

In my opinion the East Coast Railway is old enough now to be properly ballasted, once for all, up to full section. It ought to be carefully surveyed mile by mile for the purpose, and a regular estimate prepared, and proper systematic arrangements made for completing the ballast up to full section during one working season. It will probably prevent some trouble and disputes if this is done before it is handed over to be worked by the Companies to whom it is proposed to commit it for working. Once each station to station length has got its full complement of ballast, the Engineers ought to take a pride in making it of *one* tidy section. Now one finds a dozen different sections between any two stations on some parts of the line, even where ballast is full. Indeed I have nowhere seen such slovenliness as one finds for miles together on the East Coast Railway, though some men's charges are as a rule in very good order. There ought to be one section throughout the line for the ballast of steel sleepers, viz., hollow in the middle, and another for wooden sleepers. Now it seems to be left to the freak of each gangmate what section he will adopt, and some of them change their fashion every few rail lengths through sheer slovenliness.

9. *Stations*.—A typical roadside station on the East Coast Railway is that at Anaparti which takes about Rs. 200 per mensem. It has no sidings, no extra land, and no signals. The platform, which is marked by a line of cut stones, is at rail level.

The whole station including staff quarters cost about Rs. 3,000, of which Rs. 800 were for the station building consisting of a room 12' x 8', a shed 12' x 12' and a 6' verandah. Nothing better is wanted at many places, though ten or twelve thousand rupees were at first proposed to be spent, and in many places were spent, on stations which scarcely earn more than pays for their expenses. During my last inspection I personally pointed out the inconvenience and danger of the state of the platform at Kovvur. If the Manager will not extend it further to the south he should at least cut it down to rail level; at present half the train which stands on a curve has no platform at all, and at one place any one dismounting is almost certain to have a struggle to avoid falling amongst the wheels. I pointed this out again personally to the Manager. The scissors-crossing put in at the middle of the long sidings at Samalkot is a great convenience; it needs distance marks. I was told that the Cocanada Town station, which did not cost Rs. 5,000, is earning that amount per month. At Cocanada Port it seems quite necessary that a new cross-over should be put in at the east end of the platform so as to allow the train engine to get out and run round his train without risk of fouling the goods yard or being fouled by shunting going on therein. Since last inspection a scissors-crossing has been put in the long goods sidings with great advantage to working the yard. The Traffic goods office is about to be shifted into certain gate lodges down near the goods shed which are not required for their original purpose. At Samalkot an addition, 100 feet x 20 feet, has been made, for a passengers' waiting shed, and the old waiting shed has been converted into a refreshment room, a waiting room and a passage. The flags on the verandah here will soon want renewal. The Deccan Sugar and Abkari Company of Bimlipatam are running up a very important sugar factory close to Samalkot station. At Pithapuram it has been arranged to enlarge the passengers' waiting shed. I was told that a traffic in stone for building purposes in Cocanada was arising at Durgada where a siding runs into a quarry for railway purpose. The Kottapalle station ought properly to be called *Annayaram*. The latter is an important place; the former a village of huts only. I was told that considerable goods business is done at Tuni; the goods shed is not very well situated, and the Traffic Department want a loop to help to work it; the Manager might look into this. At Kottavalasa and at several other stations, the advice given in my last inspection report has been taken, and the unnecessarily long through sidings have been cut down, and dead ends in some places and in others short through loops have been provided. Chodavaram, mile 266, has been opened since the 1st June as a crossing station; I was told that it has no traffic. The lath and plaster walls of Dusi station building want repair. At Palasa a new waiting room is being built and is nearly finished, also a third-class waiting shed, and an extra room or two on the station; a new siding is also being put in for lifting wagons. At Mandasa Road and a few other places, the original mat latrines are still in use; these might now be replaced by new ones, of which ten are, I believe, ready for erection. At Ichapur the dead end has been converted into a loop since last inspection. At Berhampore a 200 ft. goods platform is being made. At Chatrapur a triangle has been put in, because a train which used to run to Barang now terminates here owing to want of traffic. At Rambha a rest-house is being built inside station limits for the Rajah of Kallikota who has deposited the price of it. Balugan is developing into a useful station doing some 10 wagons per week. A passenger shed has been lately built there, and the old passenger shed in the middle of the building has been turned into rooms. At Kalupara Ghât a couple of bays have been added to the passenger shed. Arrangements have been made for a goods shed at Khurda Road. At the new terminal station at Puri the station building is being erected, and great pens have been made for marshalling the crowds of pilgrims who are expected; but I think the pens are rather large; they ought to hold a train full at a time. The general plan of the new yard was discussed, and it was decided to considerably shorten up the sidings at the entrance end of the yard, and to put a traverser across the terminal end of all the sidings, so as to handily get out wagons from the train to the goods shed; this will involve throwing back the engine run-round cross-over a couple of rail lengths. The home signal had better go half way down the platform. The wire going to the distant signal ought to be put on special carriers; it has a long way to go. The extensive sandy yard ought to be covered over with moorum gravel.

Old Puri station has been abolished. They are putting in a new third-class crossing station at *Maltipadpur*. The edge stones of *Sakhigopal* platform ought to be packed up to rail level. At *Barang* some more temporary shelter seems to be wanted for the Puri pilgrims who come by road and river from the Cuttack side.

10. *Staff quarters*.—At Bezwada the new staff quarters are being built on the side of the hill as advised in last report. I was told that Rs. 25,000 has been sanctioned for gangmen's huts on the first division; by this time the Engineers must know pretty well where they ought to be built. It is a good rule to concentrate these men, as far as working condition will permit, at the railway stations, in order that in case of accident they may be called up by wire. I noticed that the untidy custom had been allowed to grow up of erecting unseemly verandahs and screens of matting and palmyra leaves around some of the gatekeepers' and gangmen's huts. At Duvvada new staff quarters have been built since last inspection. At Tapang new staff quarters have been built for the permanent-way inspector. At Khurda Road it was proposed to build a new house for the Assistant Traffic Superintendent and to utilize his present house, which by the way is said to be infested with red ants, as an institute and school; there are 40 men at Khurda Road and 60 children. But the Manager thinks, and I agree with him, that it will be better to build nothing more here until it is seen how the section will be worked when the railway is opened to Midnapur.

11. *Level crossings*.—At Rajahmundry they have erected a quadruple gate on Mr. Fred. Reilly's principle at the main road crossing between the town and ghât stations. Just outside Waltair station the level-crossing is being abolished and the road diverted beneath an under-bridge, which moreover is made fit for a double line, in order that there may be separate entrances to Waltair station for the Vizagapatam town branch and for the swamp line. There is a dangerous level-crossing where accidents have already occurred at mile 236 at the end of a cutting; this crossing must be either moved further away to the south or brought to an over-bridge further north; I was told that a comparative estimate showed the latter to be cheaper, as it certainly will be the more efficient. In one or two places gates, on Mr. E. H. Stone's principle showing signals when locked, had originally been erected across the line, but now have been changed to cross the cart road; but the signal discs have been left up showing danger facing the line, and have yet not been cancelled by a mark or paint. Anything of this sort which familiarises drivers with the idea of passing danger signals with impunity ought to be avoided, so the discs should at once be either removed or altered to suit the altered conditions.

12. *Water*.—Piping has been provided at Bezwada for properly utilizing the Kistna bridge abutment source of supply. But in erecting it an air chamber ought to be put on the pump and the most unsightly, useless, and unscientific stand-pipe got rid of. The boiler, too, which supplies steam to the pump, might be stowed away somewhere instead of being fixed out in the open as at present right in front of the bridge tower. Arrangements have been made for putting down a proper artesian well at Cocanada, now that the existence of artesian water there has been proved. The locomotive well at Palasa is said to be doing all right this year. As the water at Baruva has turned out to be very good and plentiful, that place is to be made a permanent watering station. When the railway engineers find a really good supply of water and decide to install water columns, tanks, &c., I cannot understand why they do not adopt Mr. G. Moyle's system, and so secure a more efficient service for their money; the nine or ten inch pipe running to the far water column is a most wasteful arrangement. The pipes and tanks are being got up for the Chatrapur water-supply from the wet cutting referred to in last report. At Khurda Road the deep well in the laterite is a failure, and a village tank has been acquired about 2,000 feet off, which will, it is said, afford a good supply.

13. *Godavari Ferry*.—Owing to the rising of the river it has been found necessary again to revert to the lower site for the ferry. The slips for working vehicles on to the pontoon have now been removed on account of the rising flood. The glass windows in the ladies' cabin on board the ferry steamers ought to be made opaque; at present there is no privacy. The lower venetian panels ought to be closed up; they are not needed for coolness and only let in rain and spray. The rail running

round on top of the stanchion round the lower or main deck forward is too low at the gangway; it ought to be cut and hinged; at present each head-load of baggage runs an imminent risk of being knocked overboard. I was told that 2,600 waggons had been passed over the ferry in 2 months, or about 43 per day.

14. *Refreshment Rooms*.—All along the line these seem to be well kept up. But I have heard complaints and would suggest the introduction of refreshment tickets as on the Madras Railway in order that the contractor may have no excuse for saying that he got no notice and was therefore unprepared. Native food-stalls seemed to be well furnished.

15. *Locomotive Department*.—I inspected the Waltair shops. All seemed in good order. The Locomotive Superintendent is badly in need of piping to carry the blast from his large new fan; at present when the cupola is working the smithies must stop. The Locomotive Superintendent asks for a new cupola, chiefly for the purpose of casting new cylinders to convert the heavy compound engines, which give great trouble, into ordinary double cylinder high pressure engines. I should say that the Waltair shops might as well get a sufficient cupola now as later on. They are turning 58 timber trucks into H. S. waggons, to tare 7^t 4^c and to carry 16^t 4^c total 23^t 8^c or 11^t 14^c on a pair of wheels. The Bezwada-Madras 6-wheel coupled engines are very well spoken of, as are also the new East Coast Railway passenger engines, 4-wheels coupled, with bogie. The Locomotive Superintendent complains that his running room at Palasa, which is an old construction bungalow, is out of repair. He also complains of having no outside examining pits for engines either at Waltair or at Khurda Road. At Khurda Road the engine shed roof at the south end needs attention. The Locomotive Superintendent asks for a piece of shafting here to enable him to run his few tools; I think he ought to get it; I believe there is plenty to be picked up on the line.

16. *The copper tube plates of the heavy compound engines*.—What I recommended in my report on this subject which is incorporated in G.O., No. 290 Ry., dated the 21st February 1898, was that (a) new tube plates should be put in as fast as the old ones begin to fail; (b) that the tubes should be given a slight upwards camber in order that part of the effect of their lengthening and shortening may take effect in bending themselves instead of in smashing the tube plates; and (c) that in order to give greater elasticity at the corner of the tube plate where the worst bending stresses occur, the front row of side stays should be omitted at both sides. I was told that 15 new plates have arrived and that they are being put in as fast as opportunity offers. I am of opinion that $\frac{7}{8}$ " is a better thickness for these plates than 1". The Locomotive Superintendent has not adopted the suggestion to bend the tubes. He has arranged to remove the front vertical row of side stays; but, arguing on some lines of his own which to me are incomprehensible, he is substituting in place of each alternate stay in the rows in question a lowmoor iron stay. I really cannot write about this any more. If Mr. Morton is right about this very curious compromise, I must have argued on utterly wrong lines. If his lowmoor compromises crack, things will from my point of view be about right. He is setting the belly palm stays further forward in the boiler to allow of their doing what they were intended to do, but could not do as built. Mr. A. Chatterton is now testing the copper of one tube plate at the Civil Engineering College, Madras. I scarcely expect to see that anything is the matter with the copper. The rivet heads of the firebox which fouled the main frames are being lowered.

17. *Stores*.—I did not look over the surplus stores as I did so in great detail last half-year. I was told that the Madras Railway had made enquiries about much of the surplus and had I believe taken a lot of things. When inspecting the Bezwada-Madras Railway a few days later I found that they had been doing without a lot of useful things which they might have picked up at Waltair if only someone had taken the trouble to go there and look about him.

18. *Kistna Bridge footways*.—One of these overhead footways is in constant use, and the other out of use. The thin plates of the one in use are corroding badly, while those of the other are quite untouched. The reason is that, on one side, the feet of passengers rub off the scale as fast as it forms, while on the other side the

Plate is protected by the paint. I advise that the footways be used alternately for say six months at a time, and that when necessary the one out of use be heavily tarred and sanded. I do not think much is to be gained by trying to work these footways commercially through departmental agency. I scarcely suppose they will pay much more than working expenses under such conditions and the boat ferry will always undersell them, whereas at least three or four thousand rupees per annum will be got if they are sold to contractors, or enough to more than keep the main bridge painted and in order. One anna per foot passenger seems to me a preposterous charge for the use of these footways. It is a very heavy sum for the poor people who use them, and they can cross by boat for half or one-third of the money.

19. *Kistna Junction arrangements.*—In paragraph 20 of last report I drew serious attention to the muddle into which all these arrangements had drifted, just for want of one comprehensive scheme to co-ordinate the requirements of the several railways which meet in the neighbourhood of Bezwada. I advised that the best way out of it now is to double the Western Kistna Canal bridge, and so to prevent the two gauges from coming into contact until they arrive at the point, close to the Kistna bridge proper, where engines come out of the Sitanagaram engine yard. I was in hopes that orders would have issued in time for the work being done during the two months during which the canals are dry. But the time was allowed to slip past and now nothing can be done until April 1899. On reconsideration of my last year's recommendation, I would build a new bridge over the canal for the standard gauge, and would run the metre gauge over the present screw pile bridge. The crowd of stations all within almost a stone's throw, are a source of danger and confusion at present, and ought to be quite unnecessary. As I know more about the locality than any one else, I would suggest that a comprehensive plan of the whole, including Tadepalli and Bezwada, be prepared, and that I be asked to sketch what ought to be done. The first mistake that was made was in going to Tadepalli at all with the tranship arrangements, all the rest of the confusion has followed from that. The present arrangement, or want of arrangement, is quite unfit for the 30 trains per day that have to run the gauntlet of the set of minor stations.

20. *The Parlakimedi Tramway.*—Although no reply has as yet been received from the Rajah of Parlakimedi about his acceptance or otherwise of the conditions laid down by Government for the issue of an order that the tramway may be made, he has already begun earthwork on several miles of the proposed alignment. The Rajah has, I suppose, a perfect right to do any earthwork he likes in his own estate. But the first $7\frac{1}{2}$ miles are on or near a District Board's road in Ganjam, and on this section, too, the earthwork is, I understand, practically finished. I presume, therefore, that the Rajah has squared matters with the Collector and that the latter has made it all right with the District Board and with the owners and occupiers of the land on which the Rajah has entered. His engineer had even gone so far as to enter on railway land and to start excavation thereon, but that was put a stop to. I am of opinion that the Parlakimedi tramway must stop at the west side of an island platform at Naupada, and that a broad gauge siding should be run down to the salt factory from the existing platform which will then become a goods platform. This siding ought, emphatically, in my opinion, to be the sole property of the East Coast Railway; private parties ought to have no ownership in it.

21. *Salt.*—I understand that a draft agreement for the approval of Government has been settled between the East Coast Railway and the Oriental Salt Company for the construction of a broad gauge salt siding on the usual siding terms from Naupada station to Naupada salt factory. To make the siding broad gauge is, in my opinion, the right thing to do, because by far the greater part of the Naupada outturn will go north along the East Coast Railway towards Cuttack, and only a comparatively small part will go towards Parlakimedi; but it ought to belong exclusively to the East Coast Railway. The tramway ought not to be allowed to cross the East Coast Railway at all. The Oriental Salt Company want to be allowed to build a salt godown, or otherwise to arrange with the railway for permanent or semi-permanent accommodation, at Vizianagram and at one other station. At the other station they have, I was told, been allotted the necessary accommodation in the goods shed. At Vizianagram I found a most

suitable piece of land, which they would be wise to buy, bounded by the railway goods shed, the turntable, the fencing and the road; it is in every way convenient for them, and if, as I believe is the case, it is not railway land and they can buy it, they can have no excuse for wanting to come inside railway land. If the Oriental Salt Company succeed in storing salt at certain railway stations touched by the petty trader's carts from the interior, the railway will not only get the freight of the salt, but will also get freight on the goods which the cartmen bring down with a view to exchanging for salt for their return journey. It is therefore in the interest of the railway to encourage the establishment of salt godowns at the places where it is crossed by roads from the interior.

At Barang I was told that it costs from one anna to one anna three pies per maund to cart salt into Cuttack. A bag is 2 maunds, and a cart carries 12 to 18 maunds according to season. It is proposed that when the Bengal-Nagpore Railway have carried their temporary lines across the rivers into Cuttack salt shall be carried over these lines at about three pies per maund.

I was given the following statistics of salt booked to Barang for Cuttack in the last three months:—

(a)	From Humma, country salt	...	...	...	62,000 maunds.
(b)	" Waltair, artificial Cheshire salt	...	...	...	8,730 "
(c)	" Naupada, country salt	...	...	...	2,368 "
(d)	" Cocanada, brown salt	...	...	...	2,967 "

The aim of the Oriental Salt Company is that (b) shall take the place of a very large proportion of the European salt which is now consumed in Bengal and Orissa. The matter is one of very high importance to the railway.

22. *The Manganese trade.*—I am told that the Vizianagram Manganese Company sold about 68,000 tons of ore last year for £54,000 making a net profit of £12,000; and that they now have got orders for 200 tons per day for the next six months. The whole of this goes over the East Coast Railway to Vizagapatam, paying one-seventh pie per maund per mile plus a two pie terminal. I was told that when the bar at Vizagapatam port is bad, 300 to 400 tons of ore per day can be got on board ship, but that 700 to 800 tons can be shipped when the bar is in good order. Freight to England rule at and around £1. Much of the ore is destined for the States. At Garividi two extra sidings and a ramp have been put in for the use of the ore. Sometimes 1,000 bullock carts come in from Gurbam quarries to Garividi in a morning. A waiting room has been arranged for at Garividi to meet the convenience of the mining men. A little manganese offers at Sigadam, and a short loop-siding is to be put in there.

23. *The junction of the Raipur line.*—It has been suggested that instead of joining the East Coast Railway at Vizianagram or at Chipurupalle, the Raipur line should pass through or close to Gurbam manganese quarries and join at Garividi, or even at Nellimarla. The objection is that the Gurbam deposits may sometime be exhausted. The question is well worth looking into.

24. *Carriage lighting.*—Everywhere on the line oil is used. It seems to be good enough oil, but the lamps only burn four or five hours as a rule. If the public convenience is to be served, a regular exchange of old lamps for new should be made from end to end of the trains at least once during the night if not twice. I was assured that this is done, but I am not satisfied. It is of course in the interest of the lamp menials not to do it and to steal the oil. The system brought into force on the South Indian Railway of colouring the oil ought to tend to stop the theft of it. Bad lighting is a serious public inconvenience; every passenger pays for light and he ought to get it. By the way I found a Nizam's Guaranteed State Railway postal van which was said to be leaking badly at all the roof lamps; it was running with a tarpaulin over it.

25. *Chicacole.*—This important town is $9\frac{1}{2}$ miles from the railway *via* the district road to Palkonda. But it is only 5 miles from Dusi station, and it could be connected therewith if the District Board could persuade themselves to face the cost of about 4 miles of new road along the bank of the river. The Palkonda traffic for and from the railway will always come to Chicacole Road station, whose name might be changed

to Palkonda Road; while the name of Dusi station might be changed to Chicacole Road if the suggested road was made. I should think it ought to be worth the money to the District to get their head-quarters so much nearer the railway.

26. *Vizagapatam Port.*—The Port authorities have offered the railway Rs. 10,000 to do a little more reclamation and get a pontoon wharf. The railway was building 100 ft. of new pucca wharf, of which 50 ft. consists of steps and 50 ft. is plumb. This, I understand, is being built at the cost of the port.

I here invite the attention of Government to my scheme, filed with the Chief Engineer, Public Works Department, Madras, for improving the bar of Vizagapatam by sluicing through a gated weir at the site of Turner's bridge. My belief is that it would have the effect of rendering Mr. Thorowgood's proposed groin unnecessary. This belief is based on experience and observation of the locality. I strongly recommend that the suggestion be duly considered.

MADRAS,
14th July 1898.

FRANCIS J. E. SPRING,
Senior Government Inspector of Railways.

ORDER—No. 981 Ry., dated 2nd August 1898.

Communicated to the Manager, East Coast Railway, for information and necessary action; also to the Engineer-in-Chief, Godavari Bridge, with special reference to paragraph 4.

2. The attention of the Revenue Department is invited to paragraphs 7, 21 and 22. A special report should be obtained in regard to paragraph 20.

3. The question of a feeder road referred to in paragraph 25 will be considered in the Local and Municipal Department.

4. The attention of the Marine Department is invited to paragraph 26.

5. A copy of these Proceedings will be forwarded to the Government of India for information; and to the Government of Bengal, Public Works Department, with reference to paragraph 9 of the report.

[Here enter No. 982 Ry., dated 2nd August 1898.]

(True Extract.)

Under Secretary.

To the Manager, East Coast Railway.
" Engineer-in-Chief, Godavari Bridge.
" Revenue Department.
" Local and Municipal Department.
" Marine Department.
" Consulting Engineer for Railways.

Ed. C. Parthasarathy.

C. No. 1009

The papers relating to the Vizagapatam Harbour improvements were put up with current number 549 (Letter from Mr. Inachak addressing on certain points in connection with the concession offered for the construction of the ^{Vizagapatam} harbour) and were sent to H. Ins (1) and (2) on the 20th June last. The usual practice is to allow 2 months before a reminder is issued.

JSK
9 Aug. 98

Notul

Notul
H. Ins
H. Ins

RAILWAY.

Government {1898} of Madras.
PUBLIC WORKS.

Recd.

Regd.

} 1898.

Enclosures

Spare copies

G.O., No. 981 Ry., 2nd August 1898.

AUGUST.

No. 690 Mar of 11 August 1898

*Recorded with the
remark that the question
of improving the bar at
Vizagapatam is engaging the
attention of Govt.*

(21) W. B. de W

The P.W.D. By Rr.

P. P. O.

Inspection Report of the East Coast Railway

The Senior Government Inspector's — for the half-year ending the 30th June 1898, communicated to the Manager of the Railway and the Engineer-in-Chief, Godavari Bridge, and copy of the Proceedings forwarded to the Governments of India and Bengal.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

EAST COAST RAILWAY.

STANDARD GAUGE, 5' 6".

Mileage open for traffic, including branches, 548 miles.

INSPECTION REPORT FOR THE HALF-YEAR ENDING 30TH JUNE 1898.

The inspection was made on July 5th to 10th in company with the Manager, or in his absence the Assistant Manager, heads of departments, and district officers and their assistants.

2. *Formation.*—Banks and cuttings are as a rule in good order, though they have not yet had time to settle down to the condition of stability to be found on older lines. Near Tuni in some of the cuttings very tidy dry stone ballast walls have been built costing six annas per foot run for both sides; it will be a good thing when more of these are built in the wetter cuttings. Between Yellamanchili and Anakapalle the bank requires some pitching, and the pitching should be continued, below, with an apron 10 or 12 feet wide, if it is not to be underscoured. The ballast walls in the cutting just beyond Chatrapur would be the better for raising, as the cutting is very wet; such walls ought to be up to rail level. Cuttings between Bhusandpur and Tapang are badly drained and want ballast walls.

3. *Bridges.*—The Narwa bridge has been re-sleepered and newly bed-plated, and is now in good order. Between Samalkot and Pithapuram it is proposed to spend Rs. 50,000 in raising $3\frac{1}{2}$ miles of bank, which it is feared may be overtopped, at a place where the waterway originally given has more than once been largely increased. But I learn that when the floods are rushing through the present 510 feet of waterway there is an afflux of fully 4 feet. This means that in as many separate places as there are culverts there is serious risk of their being undermined by scour, as the scour due to 4 feet of afflux is very severe. It is perfectly obvious that the present 510 feet of waterway is even still quite insufficient. The proposed raising of the bank, while allowing the water to pond up without overtopping the line, and so to get through the culvert in time, will in no way mitigate the present great risk of one or all the culverts being undermined. I therefore strongly recommend that a very much smaller sum than the proposed Rs. 50,000 be spent in inserting at this place a causeway similar to those which have been built between Ellore and Bezvada. This sort of causeway has been found to cost ten rupees per foot run. Stone is to be found not far off at Durgada station. The sum proposed to be spent would pay for nearly a mile of causeway, but I judge that if even $\frac{1}{4}$ mile were constructed the dangerous 4-foot afflux would probably be got rid of and there would be no need to raise the bank. If $\frac{1}{4}$ mile is found insufficient the railway could still afford to double it and save money while securing better engineering.

4. *Godavari bridge.*—Of the 56 well foundations required for this bridge 31 now remain to be started. The state of the 25 on which work has gone on is as follows: 14 are finished and the pier superstructure is progressing; 3 are sunk and concreted, but superstructure not yet begun; and 8 have still some short distance to sink. Both abutments have made good progress, and work through the rather heavy approaches at both ends is well forward. 1,304 lineal feet of well have been built, of which 1,244 feet have been sunk below ultimate top level of wells. 221 lineal feet of pier, or the equivalent of five piers, have been built. Of the 31 wells still to be started, 8 will be on ordinary well curbs to be laid on dry land, and 23 will require caissons to be floated in water more or less deep. The large wooden pontoons for the floating of the caissons have been built locally, as advised in my last half-year's inspection report. For building the bridge on the design which he has been ordered to adopt, Mr. Walton's arrangements are good and well thought out; but construction will take a very much longer time than would have been necessary had he not been so heavily handicapped through being prevented from starting on the deep water piers during the first working season. To begin on the easy part of a work of this sort first, for want of a suitable provision of plant, is the poorest sort of economy.

It is not yet too late to use large spans for the permanent deep river channel, as advised in my last report, instead of the 150 feet spans which, though quite suitable and economical for perhaps 36 out of the 56 spans, are uneconomical and bad, engineeringly, for use in the deep permanent channel. For not only is each deep water pier a source of risk and possible failure during construction, but if, as I now learn is intended, the base of each deep water well is to be given extra diameter for the sake of stability, they become so expensive that a larger span than 150 feet will be more economical. I would substitute perhaps six spans of 200 feet and four spans of 300 feet for 20 of the 150 feet spans in the deep water, and would thus get rid of 14 deep water piers; and even if the cost of these 14 piers thus saved were only just balanced by that of the heavier girders, the bridge would be a far better structure in every way, more easily built, easier for navigation, and less exposed to risk of accidents hereafter. Mr. Walton informs me that the deep water caissons are all Indus bridge Kotri type, 34 ft. $\times$ 20 ft. Wells of this size are most uneconomical for 150 feet spans. At Kotri they support 350 ft. spans. I do not say that the number and size of spans proposed above is the most economical: what I insist on is that the substitution of larger spans for small ones over the permanent deep channel of the river on some such system as is above suggested is the right and economical thing to do. If all the girders have already been ordered, some of them can easily be used elsewhere.

5. *Culverts.*—On the Cocanada branch some of the girder culverts whose abutments were being pushed in by the black cotton soil are being converted into smaller spans and arched, while others are being strutted with drop walls below and rail bracing above.

6. *Rails.*—These are only 5 or 6 years in the road and are practically as good as new. I was glad to see that more careful attention is now generally paid to switches and all belonging to them being kept clean and tidy.

7. *Sleepers.*—The steel sleepers are still behaving very well owing to the care with which they were located only on suitable soil. But I was shown some sleepers taken out of a wet cutting which were very badly corroded, as were the keys also; they had lost 19 pounds out of perhaps 138. I cannot be certain about the 138 because I remember that there was a considerable difference between the weights of individual sleepers when they were first received. The Loco. Superintendent started a theory, to account I believe for the wear of his wheel flanges, that some of the steel sleepers had got hogged through misuse on the unballasted road in construction days. The theory, however, is quite baseless. There were two patterns of steel sleepers; in one sort the cant at rail seat was given by bending the whole sleeper downwards at the centre, and in the other the cant was given in the press at the rail seat only, the body of the sleepers being level. Seeing these latter Mr. Morton seems to have thought they had got hogged. The wear of his wheel flanges is sufficiently accounted for by the cutting qualities of the sand with which parts of the road are ballasted; I mentioned in my last report that this sand had caused the outer dogspikes

in wooden sleepers on certain curves to be nearly beheaded. A useful lesson is to be learnt from the experience of the East Coast Railway of certain sorts of wood for sleepers; viz., that SOME or SUMI (*Soymeda Febrifuga*); PYMMA (*Lythraea Hypoleuca*?), and a wood purporting to be teak from Johore, are all quite unsuitable for Indian use as sleepers. They all go utterly in four or five years. Probably to "haskenize" them would greatly prolong their life. I saw some most excellent sāl sleepers from the forests of Ganjām, and was told that their price in Berhampur was Rs. 4-8-0. Nothing better than these could possibly be wanted if there were only enough of them. The matter is one which might with advantage attract the attention of the Forest Department. I was told that pyngadu sleepers from Burma cost Rs. 5-4-0. I here warn the East Coast Railway authorities, officially, that a pyngadu sleeper ought *always* to sink, and that if a Burma sleeper called pyngadu by dishonest suppliers is found to float, it is probably *Kya Eng* or other worthless timber, and certainly not pyngadu. I was told that 25,000 Johore teak sleepers laid in 1895 are now rotting fast. I was told in 1892 that a considerable number of them had passed on to the southern part of the North-Western Railway, through a large Karachi firm. It would be interesting to know what their life was in a dry climate.

8. *Ballast*.—Though a good deal of ballast has been put in the line since last inspection, it is still very deficient in places. From Bezwada to Ellore the upkeep of the road has fallen off very much; it is not nearly as good as it was at last inspection. Beyond Ellore it is somewhat better. Beyond Bhimadol the sand ought to be covered at once with a thin coat of broken stone. Between Rajahmundry and Samalkot the road is fairly good but still wants ballast in places, but it is kept in a slovenly state. It would be a good thing to show the gangmates a tidy bit of road as a specimen. The Cocanada branch is very much the same as the places just described. The road is pretty good between Samalkot and Pithapuram. Beyond Tuni it is better and tidier, and further on towards Waltair it is in excellent order. North of Waltair also the road is very good indeed and tidily kept too; but between Kota Bommali and Naupada it again gets rather slack. From Parlakimedi road northwards ballast is rather short, though, through the care that is evidently bestowed on it, the road is in very good running order. Beyond Ichapur ballast is short in places, but more is being put on. Beyond Berhampore a great deal of ballast has been collected, and it might as well be put in the road. Beyond Jagannadhapuram the road is better ballasted. Ballast is being spread beyond Rambha. Between Kasimkota and Balugan the road is well ballasted and very well maintained. From Kalupara Ghât to Tapang I would say the same, but beyond Tapang it is again not so good. From Chattipur to Khurda Road ballast is deficient and very irregularly laid. The Puri branch is in good order, all except the last couple of miles which is still quite new. The main line from Khurda Road up to the terminus at Barang is in very good order.

In my opinion the East Coast Railway is old enough now to be properly ballasted, once for all, up to full section. It ought to be carefully surveyed mile by mile for the purpose, and a regular estimate prepared, and proper systematic arrangements made for completing the ballast up to full section during one working season. It will probably prevent some trouble and disputes if this is done before it is handed over to be worked by the Companies to whom it is proposed to commit it for working. Once each station to station length has got its full complement of ballast, the Engineers ought to take a pride in making it of *one* tidy section. Now one finds a dozen different sections between any two stations on some parts of the line, even where ballast is full. Indeed I have nowhere seen such slovenliness as one finds for miles together on the East Coast Railway, though some men's charges are as a rule in very good order. There ought to be one section throughout the line for the ballast of steel sleepers, viz., hollow in the middle, and another for wooden sleepers. Now it seems to be left to the freak of each gangmate what section he will adopt, and some of them change their fashion every few rail lengths through sheer slovenliness.

9. *Stations*.—A typical roadside station on the East Coast Railway is that at Anaparti which takes about Rs. 200 per mensem. It has no sidings, no extra land, and no signals. The platform, which is marked by a line of cut stones, is at rail level.

The whole station including staff quarters cost about Rs. 3,000, of which Rs. 800 were for the station building consisting of a room 12'×8', a shed 12'×12' and a 6' verandah. Nothing better is wanted at many places, though ten or twelve thousand rupees were at first proposed to be spent, and in many places were spent, on stations which scarcely earn more than pays for their expenses. During my last inspection I personally pointed out the inconvenience and danger of the state of the platform at *Kovvur*. If the Manager will not extend it further to the south he should at least cut it down to rail level; at present half the train which stands on a curve has no platform at all, and at one place any one dismounting is almost certain to have a struggle to avoid falling amongst the wheels. I pointed this out again personally to the Manager. The scissors-crossing put in at the middle of the long sidings at *Samalkot* is a great convenience; it needs distance marks. I was told that the *Cocanada Town* station, which did not allow the train engine to get out and run round his train without risk of fouling the goods yard or being fouled by shunting going on therein. Since last inspection a scissors-crossing has been put in the long goods sidings with great advantage to working the yard. The Traffic goods office is about to be shifted into certain gate lodges down near the goods shed which are not required for their original purpose. At *Samalkot* an addition, 100 feet × 20 feet, has been made, for a passengers' waiting shed, and the old waiting shed has been converted into a refreshment room, a waiting room and a passage. The flags on the verandah here will soon want renewal. The Deccan Sugar and Abkâri Company of Bimlipatam are running up a very important sugar factory close to Samalkot station. At *Pithapuram* it has been arranged to enlarge the passengers' waiting shed. I was told that a traffic in stone for building purposes in Cocanada was arising at *Durgada* where a siding runs into a quarry for railway purpose. The *Kottapalle* station ought properly to be called *Annavaram*. The latter is an important place; the former a village of huts only. I was told that considerable goods business is done at *Tuni*; the goods shed is not very well situated, and the Traffic Department want a loop to help to work it; the Manager might look into this. At *Kottavalasa* and at several other stations, the advice given in my last inspection report has been taken, and the unnecessarily long through sidings have been provided. dead ends in some places and in others short through loops have been provided. *Chodavaramu*, mile 266, has been opened since the 1st June as a crossing station; I was told that it has no traffic. The lath and plaster walls of *Dusi* station building want repair. At *Palasa* a new waiting room is being built and is nearly finished, also a third-class waiting shed, and an extra room or two on the station; a new siding is also being put in for lifting wagons. At *Mandasa Road* and a few other places, the original mat latrines are still in use; these might now be replaced by new ones, of which ten are, I believe, ready for erection. At *Ichapur* the dead end has been converted into a loop since last inspection. At *Berhampore* a 200 ft. goods platform is being made. At *Chatrapur* a triangle has been put in, because a train which used to run to Barang now terminates here owing to want of traffic. At *Rambha* a rest-house is being built inside station limits for the Rajah of Kallikota who has deposited the price of it. *Balugan* is developing into a useful station doing some 10 wagons per week. A passenger shed has been lately built there, and the old passenger shed in the middle of the building has been turned into rooms. At *Kalupara Ghât* a couple of bays have been added to the passenger shed. Arrangements have been made for a goods shed at *Khurda Road*. At the new terminal station at *Puri* the station building is being erected, and great pens have been made for marshalling the crowds of pilgrims who are expected; but I think the pens are rather large; they ought to hold a train full at a time. The general plan of the new yard was discussed, and it was decided to considerably shorten up the sidings at the entrance end of the yard, and to put a traverser across the terminal end of all the sidings, so as to handily get out wagons from the train to the goods shed; this will involve throwing back the engine run-round cross-over a couple of rail lengths. The home signal had better go half way down the platform. The wire going to the distant signal ought to be put on special carriers; it has a long way to go. The extensive sandy yard ought to be covered over with moorum gravel.

Old Puri station has been abolished. They are putting in a new third-class crossing station at *Maltipadpur*. The edge stones of *Sakhigopal* platform ought to be packed up to rail level. At *Barang* some more temporary shelter seems to be wanted for the Puri pilgrims who come by road and river from the Cuttack side.

10. *Staff quarters*.—At Bezwada the new staff quarters are being built on the side of the hill as advised in last report. I was told that Rs. 25,000 has been sanctioned for gangmen's huts on the first division; by this time the Engineers must know pretty well where they ought to be built. It is a good rule to concentrate these men, as far as working condition will permit, at the railway stations, in order that in case of accident they may be called up by wire. I noticed that the untidy custom had been allowed to grow up of erecting unseemly verandahs and screens of matting and palmyra leaves around some of the gatekeepers' and gangmen's huts. At Duvvada new staff quarters have been built since last inspection. At Tapang new staff quarters have been built for the Assistant Traffic Superintendent and to utilize his present house, which by the way is said to be infested with red ants, as an institute and school; there are 40 men at Khurda Road and 60 children. But the Manager thinks, and I agree with him, that it will be better to build nothing more here until it is seen how the section will be worked when the railway is opened to Midnapur.

11. *Level crossings*.—At Rajahmundry they have erected a quadruple gate on Mr. Fred. Reilly's principle at the main road crossing between the town and ghât stations. Just outside Waltair station the level-crossing is being abolished and the road diverted beneath an under-bridge, which moreover is made fit for a double line, in order that there may be separate entrances to Waltair station for the Vizagapatam town branch and for the swamp line. There is a dangerous level-crossing where accidents have already occurred at mile 236 at the end of a cutting; this crossing must be either moved further away to the south or brought to an over-bridge further north; I was told that a comparative estimate showed the latter to be cheaper, as it certainly will be the more efficient. In one or two places gates, on Mr. E. H. Stone's principle showing signals when locked, had originally been erected across the line, but now have been changed to cross the cart road; but the signal discs have been left up showing danger facing the line, and have yet not been cancelled by a mark or paint. Anything of this sort which familiarises drivers with the idea of passing danger signals with impunity ought to be avoided, so the discs should at once be either removed or altered to suit the altered conditions.

12. *Water*.—Piping has been provided at Bezwada for properly utilizing the Kistna bridge abutment source of supply. But in erecting it an air chamber ought to be put on the pump and the most unsightly, useless, and unscientific stand-pipe got rid of. The boiler, too, which supplies steam to the pump, might be stowed away somewhere instead of being fixed out in the open as at present right in front of the bridge tower. Arrangements have been made for putting down a proper artesian well at Cocanada, now that the existence of artesian water there has been proved. The locomotive well at Palasa is said to be doing all right this year. As the water at Baruva has turned out to be very good and plentiful, that place is to be made a permanent watering station. When the railway engineers find a really good supply of water and decide to install water columns, tanks, &c., I cannot understand why they do not adopt Mr. G. Moyle's system, and so secure a more efficient service for their money; the nine or ten inch pipe running to the far water column is a most wasteful arrangement. The pipes and tanks are being got up for the Chatrapur water-supply from the wet cutting referred to in last report. At Khurda Road the deep well in the laterite is a failure, and a village tank has been acquired about 2,000 feet off, which will, it is said, afford a good supply.

13. *Godavari Ferry*.—Owing to the rising of the river it has been found necessary again to revert to the lower site for the ferry. The slips for working vehicles on to the pontoon have now been removed on account of the rising flood. The glass windows in the ladies' cabin on board the ferry steamers ought to be made opaque; at present there is no privacy. The lower venetian panels ought to be closed up: they are not needed for coolness and only let in rain and spray. The rail running

round on top of the stanchion round the lower or main deck forward is too low at the gangway; it ought to be cut and hinged; at present each head-load of baggage runs an imminent risk of being knocked overboard. I was told that 2,600 waggons had been passed over the ferry in 2 months, or about 43 per day.

14. *Refreshment Rooms*.—All along the line these seem to be well kept up. But I have heard complaints and would suggest the introduction of refreshment tickets as on the Madras Railway in order that the contractor may have no excuse for saying that he got no notice and was therefore unprepared. Native food-stalls seemed to be well furnished.

15. *Locomotive Department*.—I inspected the Waltair shops. All seemed in good order. The Locomotive Superintendent is badly in need of piping to carry the blast from his large new fan; at present when the cupola is working the smithies must stop. The Locomotive Superintendent asks for a new cupola, chiefly for the purpose of casting new cylinders to convert the heavy compound engines, which give great trouble, into ordinary double cylinder high pressure engines. I should say that the Waltair shops might as well get a sufficient cupola now as later on. They are turning 58 timber trucks into H. S. waggons, to tare 7° 4' and to carry 16° 4' total 23° 8' or 11° 14' on a pair of wheels. The Bezwada-Madras 6-wheel coupled engines are very well spoken of, as are also the new East Coast Railway passenger engines, 4-wheels coupled, with bogie. The Locomotive Superintendent complains that his running room at Palasa, which is an old construction bungalow, is out of repair. He also complains of having no outside examining pits for engines either at Waltair or at Khurda Road. At Khurda Road the engine shed roof at the south end needs attention. The Locomotive Superintendent asks for a piece of shafting here to enable him to run his few tools; I think he ought to get it; I believe there is plenty to be picked up on the line.

16. *The copper tube plates of the heavy compound engines*.—What I recommended in my report on this subject which is incorporated in G.O., No. 290 Ry., dated the 21st February 1898, was that (a) new tube plates should be put in as fast as the old ones begin to fail; (b) that the tubes should be given a slight upwards camber in order that part of the effect of their lengthening and shortening may take effect in bending themselves instead of in smashing the tube plates; and (c) that in order to give greater elasticity at the corner of the tube plate where the worst bending stresses occur, the front row of side stays should be omitted at both sides. I was told that 15 new plates have arrived and that they are being put in as fast as opportunity offers. I am of opinion that $\frac{7}{8}$ " is a better thickness for these plates than 1". The Locomotive Superintendent has not adopted the suggestion to bend the tubes. He has arranged to remove the front vertical row of side stays; but, arguing on some lines of his own which to me are incomprehensible, he is substituting in place of each alternate stay in the rows in question a lowmoor iron stay. I really cannot write about this any more. If Mr. Morton is right about this very curious compromise, I must have argued on utterly wrong lines. If his lowmoor compromises crack, things will from my point of view be about right. He is setting the belly palm stays further forward in the boiler to allow of their doing what they were intended to do, but could not do as built. Mr. A. Chatterton is now testing the copper of one tube plate at the Civil Engineering College, Madras. I scarcely expect to see that anything is the matter with the copper. The rivet heads of the firebox which fouled the main frames are being lowered.

17. *Stores*.—I did not look over the surplus stores as I did so in great detail last half-year. I was told that the Madras Railway had made enquiries about much of the surplus and had I believe taken a lot of things. When inspecting the Bezwada-Madras Railway a few days later I found that they had been doing without a lot of useful things which they might have picked up at Waltair if only someone had taken the trouble to go there and look about him.

18. *Kistna Bridge footways*.—One of these overhead footways is in constant use, and the other out of use. The thin plates of the one in use are corroding badly, while those of the other are quite untouched. The reason is that, on one side, the feet of passengers rub off the scale as fast as it forms, while on the other side the

plate is protected by the paint. I advise that the footways be used alternately for say six months at a time, and that when necessary the one out of use be heavily tarred and sanded. I do not think much is to be gained by trying to work these footways commercially through departmental agency. I scarcely suppose they will pay much more than working expenses under such conditions and the boat ferry will always undersell them, whereas at least three or four thousand rupees per annum will be got if they are sold to contractors, or enough to more than keep the main bridge painted and in order. One anna per foot passenger seems to me a preposterous charge for the use of these footways. It is a very heavy sum for the poor people who use them, and they can cross by boat for half or one-third of the money.

19. *Kistna Junction arrangements.*—In paragraph 20 of last report I drew serious attention to the muddle into which all these arrangements had drifted, just for want of one comprehensive scheme to co-ordinate the requirements of the several railways which meet in the neighbourhood of Bezwada. I advised that the best way out of it now is to double the Western Kistna Canal bridge, and so to prevent the two gauges from coming into contact until they arrive at the point, close to the Kistna bridge proper, where engines come out of the Sitanagaram engine yard. I was in hopes that orders would have issued in time for the work being done during the two months during which the canals are dry. But the time was allowed to slip past and now nothing can be done until April 1899. On reconsideration of my last year's recommendation, I would build a new bridge over the canal for the standard gauge, and would run the metre gauge over the present screw pile bridge. The crowd of stations all within almost a stone's throw, are a source of danger and confusion at present, and ought to be quite unnecessary. As I know more about the locality than any one else, I would suggest that a comprehensive plan of the whole, including Tadepalli and Bezwada, be prepared, and that I be asked to sketch what ought to be done. The first mistake that was made was in going to Tadepalli at all with the tranship arrangements, all the rest of the confusion has followed from that. The present arrangement, or want of arrangement, is quite unfit for the 30 trains per day that have to run the gauntlet of the set of minor stations.

20. *The Parlakimedi Tramway.*—Although no reply has as yet been received from the Rajah of Parlakimedi about his acceptance or otherwise of the conditions laid down by Government for the issue of an order that the tramway may be made, he has already begun earthwork on several miles of the proposed alignment. The Rajah has, I suppose, a perfect right to do any earthwork he likes in his own estate. But the first $7\frac{1}{2}$ miles are on or near a District Board's road in Ganjam, and on this section, too, the earthwork is, I understand, practically finished. I presume, therefore, that the Rajah has squared matters with the Collector and that the latter has made it all right with the District Board and with the owners and occupiers of the land on which the Rajah has entered. His engineer had even gone so far as to enter on railway land and to start excavation thereon, but that was put a stop to. I am of opinion that the Parlakimedi tramway must stop at the west side of an island platform at Naupada, and that a broad gauge siding should be run down to the salt factory from the existing platform which will then become a goods platform. This siding ought, emphatically, in my opinion, to be the sole property of the East Coast Railway; private parties ought to have no ownership in it.

21. *Salt.*—I understand that a draft agreement for the approval of Government has been settled between the East Coast Railway and the Oriental Salt Company for the construction of a broad gauge salt siding on the usual siding terms from Naupada station to Naupada salt factory. To make the siding broad gauge is, in my opinion, the right thing to do, because by far the greater part of the Naupada outturn will go north along the East Coast Railway towards Cuttack, and only a comparatively small part will go towards Parlakimedi; but it ought to belong exclusively to the East Coast Railway. The tramway ought not to be allowed to cross the East Coast Railway at all. The Oriental Salt Company want to be allowed to build a salt godown, or otherwise to arrange with the railway for permanent or semi-permanent accommodation, at Vizianagram and at one other station. At the other station they have, I was told, been allotted the necessary accommodation in the goods shed. At Vizianagram I found a most

suitable piece of land, which they would be wise to buy, bounded by the railway goods shed, the turntable, the fencing and the road; it is in every way convenient for them, and if, as I believe is the case, it is not railway land and they can buy it, they can have no excuse for wanting to come inside railway land. If the Oriental Salt Company succeed in storing salt at certain railway stations touched by the petty trader's carts from the interior, the railway will not only get the freight of the salt, but will also get freight on the goods which the cartmen bring down with a view to exchanging for salt for their return journey. It is therefore in the interest of the railway to encourage the establishment of salt godowns at the places where it is crossed by roads from the interior.

At Barang I was told that it costs from one anna to one anna three pies per maund to cart salt into Cuttack. A bag is 2 maunds, and a cart carries 12 to 18 maunds according to season. It is proposed that when the Bengal-Nagpore Railway have carried their temporary lines across the rivers into Cuttack salt shall be carried over these lines at about three pies per maund.

I was given the following statistics of salt booked to Barang for Cuttack in the last three months:—

(a)	From Humma, country salt	...	...	...	62,000 maunds.
(b)	" Waltair, artificial Cheshire salt	...	...	...	8,730 "
(c)	" Naupada, country salt	...	...	...	2,368 "
(d)	" Cocanada, brown salt	...	...	...	2,967 "

The aim of the Oriental Salt Company is that (b) shall take the place of a very large proportion of the European salt which is now consumed in Bengal and Orissa. The matter is one of very high importance to the railway.

22. *The Manganese trade.*—I am told that the Vizianagram Manganese Company sold about 68,000 tons of ore last year for £54,000 making a net profit of £12,000; and that they now have got orders for 200 tons per day for the next six months. The whole of this goes over the East Coast Railway to Vizagapatam, paying one-seventh pie per maund per mile plus a two pie terminal. I was told that when the bar at Vizagapatam port is bad, 300 to 400 tons of ore per day can be got on board ship, but that 700 to 800 tons can be shipped when the bar is in good order. Freights to England rule at and around £1. Much of the ore is destined for the States. At Garividi two extra sidings and a ramp have been put in for the use of the ore. Sometimes 1,000 bullock carts come in from Gurbam quarries to Garividi in a morning. A waiting room has been arranged for at Garividi to meet the convenience of the mining men. A little manganese offers at Sigadam, and a short loop-siding is to be put in there.

23. *The junction of the Raipur line.*—It has been suggested that instead of joining the East Coast Railway at Vizianagram or at Chipurupalle, the Raipur line should pass through or close to Gurbam manganese quarries and join at Garividi, or even at Nellimarla. The objection is that the Gurbam deposits may sometime be exhausted. The question is well worth looking into.

24. *Carriage lighting.*—Everywhere on the line oil is used. It seems to be good enough oil, but the lamps only burn four or five hours as a rule. If the public convenience is to be served, a regular exchange of old lamps for new should be made from end to end of the trains at least once during the night if not twice. I was assured that this is done, but I am not satisfied. It is of course in the interest of the lamp menials not to do it and to steal the oil. The system brought into force on the South Indian Railway of colouring the oil ought to tend to stop the theft of it. Bad lighting is a serious public inconvenience; every passenger pays for light and he ought to get it. By the way I found a Nizam's Guaranteed State Railway postal van which was said to be leaking badly at all the roof lamps; it was running with a tarpaulin over it.

25. *Chicacole.*—This important town is $9\frac{1}{2}$ miles from the railway *via* the district road to Palkonda. But it is only 5 miles from Dusi station, and it could be connected therewith if the District Board could persuade themselves to face the cost of about 4 miles of new road along the bank of the river. The Palkonda traffic for and from the railway will always come to Chicacole Road station, whose name might be changed

to Palkonda Road; while the name of Dusi station might be changed to Chicacole Road if the suggested road was made. I should think it ought to be worth the money to the District to get their head-quarters so much nearer the railway.

26. *Vizagapatam Port*.—The Port authorities have offered the railway Rs. 10,000 to do a little more reclamation and get a pontoon wharf. The railway was building 100 ft. of new pucca wharf, of which 50 ft. consists of steps and 50 ft. is plumb. This, I understand, is being built at the cost of the port.

I here invite the attention of Government to my scheme, filed with the Chief Engineer, Public Works Department, Madras, for improving the bar of Vizagapatam by sluicing through a gated weir at the site of Turner's bridge. My belief is that it would have the effect of rendering Mr. Thorowgood's proposed groin unnecessary. This belief is based on experience and observation of the locality. I strongly recommend that the suggestion be duly considered.

MADRAS,
14th July 1898.

FRANCIS J. E. SPRING,
Senior Government Inspector of Railways.

ORDER—No. 981 Ry., dated 2nd August 1898.

Communicated to the Manager, East Coast Railway, for information and necessary action; also to the Engineer-in-Chief, Godavari Bridge, with special reference to paragraph 4.

2. The attention of the Revenue Department is invited to paragraphs 7, 21 and 22. A special report should be obtained in regard to paragraph 20.

3. The question of a feeder road referred to in paragraph 25 will be considered in the Local and Municipal Department.

4. The attention of the Marine Department is invited to paragraph 26.

5. A copy of these Proceedings will be forwarded to the Government of India for information; and to the Government of Bengal, Public Works Department, with reference to paragraph 9 of the report.

[Here enter No. 982 Ry., dated 2nd August 1898.]

(True Extract.)

FRANCIS J. E. SPRING,
Joint Secretary.

To the Manager, East Coast Railway.
" Engineer-in-Chief, Godavari Bridge.
" Revenue Department.
" Local and Municipal Department.
" Marine Department.
" Consulting Engineer for Railways.