

Ugent
Public Works (1899) Department.

RAILWAY BRANCH.

G.O., No. 222. 33K

DATED 24-2-99.

[Despatch Abstract.]

Report of Inspection of the Madras Railway
System.

The _____ for the half-year ending the 31st
December 1898, ordered, with remarks, to be
forwarded to the Govt. of India for information.

Forwarding copy of Pro: embodying the
_____ for the half-year ending the 31st Decr.

[illegible]

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

Government {1899} of Madras.
PUBLIC WORKS.

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FEBRUARY.

Report of Inspection of the Madras Railway System

Forwarding copy of Proceedings embodying the — for the half-year ending the 31st December 1893.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

MADRAS RAILWAY.

STANDARD, 5' 6", GAUGE.

Total mileage open to traffic, 849.22 miles.

INSPECTION REPORT FOR THE HALF YEAR ENDING 31ST DECEMBER 1898.

Madras via Arkonam to Raichur. By the Senior Government Inspector.

1. *General.*—This section was inspected on the 9th, 10th and 11th of January. My inspection was made concurrently with that of the Company's Chief Engineer. The District Traffic officer was present during the greater part of the time.

2. *Formation.*—Banks and cuttings were all in their usual good order.

3. *Bridgework.*—I found no fault in the bridges which were inspected. The two northernmost spans of the bridge at mile 107 require an apron of loose heavy stone for a breadth of fully 30 feet downstream from their flooring and drop-walls. The training embankments recently made at this bridge seem a good job. The bridge at mile 142-10, 2 spans of 64 feet, has now been strengthened by the insertion of intermediate piers. The same has been done at the bridge consisting of 4 spans of 64 feet at mile 232-3. The same is about to be done at the bridge at mile 232-10, but as yet only the foundations have been laid. A breach occurred during the south-west monsoon of last year at a small culvert at mile 340-13; it seems to have been due to the heading up of the water of a certain nullah running parallel to the railway, owing to the growth of jungle in its bed and to its having become generally obstructed. I agreed with the Chief Engineer about the best means for dealing with the difficulty and proposals will doubtless be submitted in due course, in time to get things right before next flood season.

4. *Bridge strengthening scheme.*—The scheme for strengthening the weak girders throughout the whole of the Madras Railway has been matured, and will now go forward without obstruction. The building of intermediate piers above referred to is a part of the scheme.

5. *The road.*—This throughout is in a very excellent state of upkeep, allowance of course being made for the age and state of wear of the old iron rails which have been 30 or 40 years in the road. The inspection train ran at speeds of 45 to 55 miles per hour, and the road is quite fit for such speeds. I stopped at several places to examine the state of the iron rails, places stated by the Engineers to contain the worst rails they have to show. They are worn of course, and an occasional rail may have a slightly broken down place, and most of them are more or less battered at the last inch or two near the joints. But there is no wholesale break down; and, provided that ordinary renewals are systematically carried out, a good deal of work will still be got out of the old iron rails.

6. *Rail renewals.*—The old 75 lb. double-headed 20-foot iron rails are being gradually replaced by similar steel rails, the substitution being carried out on a regular system. When rails are wanted for the renewal of occasional broken down rails between stations, a continuous length of old rails is taken up, next to the neighbouring station, and the good rails picked out of this length are utilised for the renewals, while the bad ones are got rid of. The continuous length so taken up is then filled in with steel rails. Thus, throughout the section, new steel rails are gradually creeping forward from both ends of all stations, and will eventually meet throughout. The system is a well thought out and an economical one, and it ensures the maximum of use being got out of every rail.

7. *Sleepers.*—These are all iron pots, except on bridges or over the crowns of culverts where wooden sleepers are used. The system in force for the opening up of the road, whereby each gang gradually works forward, opening out every part of its section so as to expose sleepers, tie bars and cotters, ought to ensure, and judging by the state of the road does ensure, the early replacement of breakages.

8. *Ballast.*—The road throughout is sand ballasted. The sand is being gradually covered with a skin of broken stone. This is going forward at the rate of 40 to 50 miles annually, and only about 120 miles out of 308 remain to be done. It ought to pay to get it done out of hand, as experience shows that the result is a considerable saving in ballast trains and a setting free of vehicles for traffic use. The absence of dust where the road is covered makes a great difference to the public, for in the uncovered parts the dust is a great annoyance to passengers.

9. *Utilizing the old iron rails.*—I understand that the majority of the old iron rails, which are removed from the road, are but little damaged, except at the ends. They might, with great advantage, have their ends sawn off, the length of a fish-plate hole interval, or otherwise. They ought not, in my opinion, to be sold off, unless at least a very fair price is got for them. Experience on the South Indian Railway, where the old broad gauge iron rails of the 136 miles composing the Negapatam and Erode branches have been run over by metre gauge trains for the last 20 years, shows that, for metre gauge use, such rails have a long life in them and make a very excellent road. Out of the 308 miles of the North-Western section of the Madras Railway, about 113 miles have now been renewed with steel rails. The balance are iron.

10. *Line-clear ticket apparatus.*—At a number of stations where trains may run through without stopping the ticket is handed to the driver by being attached to a hoop of cane which is slung from a sort of gallows. Where the station is on the loop this is not objectionable; but where the station is on the straight the post forming the gallows stands on the platform, four feet from the edge; that is, it infringes standard dimensions. The risk of this leading to accident is really very slight, but such as it is it might, in the majority of cases, be minimized by slinging the little gallows from the projecting station roof instead of standing it on the platform. The post is thus got rid of. The Chief Engineer understands what I mean.

11. *Signal arms.*—I found in several places that signal arms though supposed to fly to danger on release did not do so, or did not quite do so. This should be everywhere seen to.

12. *Standard dimensions.*—At Kosgi, where the station is on a curve said to be of about 5,676 feet radius, the distance from centre of track to edge of platform seems excessive, even allowing for the curve. It measures 6 feet. The road should be slewed if necessary.

13. *Particular stations.*—Heretofore *Ponpadi* has had only an old wagon body for station, but a new station has been sanctioned: there is said to be some delay about obtaining the necessary land. Out of the sanctioned estimate, Rs. 8,000, about Rs. 4,500 is for goods accommodation, but at present only about 4 wagons of goods monthly are said to be dealt with. The station at *Thaduku*, which was opened about 2 years ago, in compliance with local demands, earns only about one rupee daily. It has no approach road, is in a cutting, and there is said by the stationmaster (whose salary absorbs half the earnings), to be no drinking water. It consists of only an old wagon body. It might, I think, be dismantled. At *Rárapéla*, a new entrance is

asked for to the lay-bye from the north end of the through siding to save hand shunting. *Yerragudipad* has heretofore been only an experimental station with a wagon body for accommodation. But it has justified its being converted into a permanent station, and the alterations are now nearly ready. The Company will doubtless make roads inside their boundary to connect their loading bank and booking office with the good district road at the level crossing at north end of station. The station with one lay-bye, low platform, loading bank but no goods shed, and all buildings and without distant signals will cost about Rs. 9,000. The remarks, which I have just made about *Yerragudipad*, are also applicable to *Kalamalla*, except that here the construction of the new buildings is a bit more forward. *Nanjapattanam* has recently been made into a crossing station. *Ragadapalli* is still on its trial with only an old wagon body for accommodation. It has not yet proved itself worthy of better. *Pennuru* is a new small station. *Guntakal station*.—This is worked by the Southern Mahratta Railway Company. There are some dangerous hinged wooden flaps on this platform giving access by steps to the rail level below; these ought certainly to be built up; I do not suppose that there is any particular reason to expect that the Guntakal station staff will usually be more decrepit and less able to leap up on their platform than the staff of most other stations in India. At *Molayavalli* the cheap mat structure which during the trial period has served for a station building might now very well be replaced by a permanent structure, and proper houses might be built for the staff. I was told that the traffic there sometimes comes to 20 wagons weekly, and that during last half-year Rs. 8,000 to Rs. 9,000 were received here for goods despatched. An increase in the length of the lay-bye here has already been sanctioned. *Nagarur* is still on its trial with a wagon body for all accommodation. It does not seem likely to justify its being made permanent. At *Kosgi* it would be perfectly easy, and would cost practically nothing if done by the permanent-way gangs, to so slew the approach curves at both ends of the station as to place the station on the main line instead of on the loop, and so avoid the swing of the loop facing points for all halting trains.

14. *Feeder roads*.—I was told that feeder roads to connect the district roads with the railway stations are badly wanted at *Ponpadi*, *Rajalupalli*, *Vandanur* and *Pennuru*. Local Boards cannot fairly expect railway administrations to open stations for local convenience unless approach roads are provided.

15. *Annual repairs*.—I did not take the trouble to notice the absence of petty repairs or eye-wash. Indeed, everything looks very clean and tidy. The Chief Engineer who was conducting his own inspection simultaneously with mine will doubtless attend to all that may be necessary. I need only say that I nowhere saw evidence of neglect of ordinary upkeep either of road or works; indeed quite the reverse.

16. *Distant signal arms*.—The Madras Railway is worked on the absolute block system. The Company have officially accepted the General Rules of 1895. Yet their distant semaphore arms are all forked. A perusal of the *proviso* at foot of rule 101, will show that on a line which is worked on the absolute block system a train may not, in anticipation of the lowering of the arm, avail itself of the shelter of the distant signal, a shelter permitted by rule 101 to trains running under systems other than the absolute block, but must wait till the arm is lowered before passing it. Turning back now to rule 72 (a) I find it laid down that—

"Distant signals are signals placed at a considerable distance from the station and shall, except when under the proviso of rule 101 they are used as stop signals, be distinguished by a notched arm."

This would read more clearly thus: "Distant signals may have their arms forked, except when used as stop signals under the proviso of rule 101." Or thus: "When under the proviso of rule 101 distant signals are used as stop signals, their arms must not be forked." Thus it is clear that, not having obliterated the forking of the arms of the distant signals at the time of their acceptance of the General Rules of 1895, the Madras Railway Company are contravening those rules.

17. *Dutton's trailable point lock at Puttur*.—In company with the Chief Engineer, and with Mr. Duncan the Acting Telegraph Engineer, who is thoroughly familiar with them, I tried several experiments with an engine on these points. The station facing points and the home and distant signals connected with it, are worked by wire from the station. Under no circumstances is the tongue rail held up against the stock rail by anything more than a tumbling weight. There is at no time a positive lock which would prevent the switch chattering open under a moving train, supposing it to be possible for the vibration of such a train to lift the tumbler weight, which I think extraordinarily unlikely. And yet the unlikelihood is precisely equal to that attaching to any ordinary weighted switch handle giving equal pressure on the tongue rail, no more and no less. The only sense in which the switch can be said to be locked is that when one arm of the home is "off" the stationmaster cannot reverse the switch. It is also locked against the stationmaster by the weight of the wheels of a train on the ordinary locking bar. But it is the tumbler weight, and that only, which keeps the tongue rail up to the stock rail, and at all times the switch can be opened by a crowbar innocuously if both semaphore arms are "on", but releasing one or other of the two disengagers if either arm is "off". When both home arms are "on" the stationmaster can do what he likes with the switch. If when both arms are "on" the switch is sprung over by a crowbar, or is trailed through by an engine, nothing happens; it springs back again when released. But if when one arm is "off", that is, when a train is about to be admitted to the yard, say on the through straight, a shunting engine has the mishap to trail through from the loop, the disengager comes into action, and the switch springs open for the loop, while the arm that was "off" flies to "on". But the station is still safe, for the in-coming train will not enter against signals and the engine which has caused the mischance can only re-enter the yard *via* the straight line; the stationmaster is thus apprised of what has happened and goes to set it right before admitting the train. If on the other hand the driver of the shunting engine finds out his mistake before he has got all his wheels off the switch, and tries to back, he may get derailed; but this I take it must happen with any trailable switch. If, however, he should not get derailed and says nothing about it, still all is safe because the in-coming train cannot enter against signals. There is just the chance that the stationmaster, if a fool, may try to remedy things without re-setting the disengager, by pulling off the arm for the loop, which he can do, and so letting the train into the loop and colliding it with the shunting engine. But no system can provide against that sort of thing. I consider that Dutton's system with the trailable lock is just as safe as, and no safer than, any other system for holding a tongue rail up against a stock rail by a weighted lever. Though the weight of the tumbler may most times be practically sufficient against chattering, it may fail one time, for it is not a positive lock of the sort considered sufficient to permit through running at speed. The speed of through trains over the points at Puttur must therefore be limited, whether over the straight or the loop, to 15 miles per hour in the facing direction.

18. *The Vandalur installation, South Indian Railway*.—I may add here that since the date of the inspection I carefully examined another instalment of Dutton's trailable switch at Vandalur on the South Indian Railway in company with the chief officials of that Railway. Mr. Stoney also was present. The Vandalur installation differs somewhat from that at Puttur. The points are worked by hand at site instead of by wires from the station, the stationmaster retaining the switch handle until it is necessary to use it. Here too there is no positive lock, the switch being merely held by a weighted lever. There is of course no reason why a sufficiently weighted lever should not bring a pressure to bear on the tongue rail equal to that which would suffice to burst open the ordinary hand-locked bolt. Messrs. Stoney and Winter have invented a most ingenious positive lock which nevertheless can be trailed, at a price of Rs. 80 to Rs. 100; the problem therefore is not insoluble. I agree, however, with Sir A. Rendel that the right way to deal with the very improper practice of trailing through switches is, not to render it innocuous but, to absolutely prohibit it. I therefore do not recommend any further installations in this circle of Dutton & Co.'s trailable switch arrangement.

19. *Saxby and Farmer's hydraulic system at Nagari.*—This refuses to work satisfactorily, doubtless the result of climatic and other local conditions. There is no use in leaving the valuable installation lying around in the yard. It may as well be removed. The points, signals, &c., here are hand-worked. Perhaps, the hydraulic system may be found useful somewhere else under the eye of one of the engineers.

20. *Stoney's system.*—From what I have seen of Mr. E. W. Stoney's, the Company's present Chief Engineer's, very ingenious mechanical devices, I am quite satisfied that what with his "drum" switch handle; his combined rocking lever, switch lock and indicator, price about Rs. 50; his and the late Mr. Winter's positive, but trailable, switch lock, and his improved locking bar,—Mr. Stoney will be able to devise safety appliances which will be not only cheaper but better adapted to the local conditions than, and which will at the same time give all the safety of, better known systems. Mr. Stoney is naturally somewhat reluctant to appear to avail himself of his present position to bring his clever inventions into use. Some of them, however, have long been in use at isolated places on the system and have proved themselves entirely satisfactory. The Company cannot do better than put themselves into Mr. Stoney's hands in this matter. I have little doubt that he can produce a design and an estimate for an installation of safety appliances, at the minor stations particularly where cheapness is a consideration, which will be more satisfactory than most of the numerous systems which for years back have been given an experimental trial on the North-West Section of the Madras Railway.

21. *Engine tires.*—I have frequently been told of difference of opinion between officers of the Engineering and of the Locomotive Departments about the incidence of responsibility for derailments at switches and crossings. The Locomotive Department naturally tries to put the blame on the state of the road, while the Engineers blame the engine tire section. I shall have more to say later on about the design of the switches and crossings. It is obvious that, whether new from store, or newly turned down in the repair lathes, the working side of the engine tires ought always to be identical in section. I examined the system in force at the Locomotive shops at Perambore and feel assured that when tires are sent out of the shops they are to proper section. But it is a question whether they are not sometimes neglected too long. The rule is that they must come into the shops when the flange is reduced to $\frac{3}{4}$ inch thick. But more than this is wanted, for long before that time the flange may be in a most dangerous condition and its sharp edge may at any moment mount a facing switch. The orders issued by the Locomotive Superintendent are that, as fast as a knife-edge forms, the engine is to be pinched round at the running sheds, and the edge rounded off by a proper tool. But I saw tires in the shops which had certainly not been so treated, and had I found such a tire implicated in a derailment at a switch, the incidence of responsibility would, in the absence of evidence to the contrary, to my mind have been clear.

22. *Facing points.*—Whether small roadside stations are on the straight or on the loop, fast trains running *through* them will of course keep on the straight. (Indeed I notice that the line-clear-pick-up gallows are always on the straight.) For fast through trains, therefore, the angle of crossing at the facing points of stations is a matter of minor moment. But when a train has to stop at a loop platform, and therefore to get slewed over at the points, it is important that the design of the switches and crossings should be suitable to the speed and to the class of engine in use. The current orders on the Madras Railway are that facing points are not to be run over at a higher speed than 12 miles per hour. But if this order is good for facing points open for the straight, it is certainly not suitable for facing points open for the loop, especially for the 6-wheel-coupled 18-foot-wheelbase engines. Whatever the rules are, engines habitually go over the facing points at considerably higher speeds than 12 miles per hour, as I can vouch for, having often checked it. When entering the loop at this speed the jerk is undoubtedly dangerous. The Company will therefore be well advised to at once arrange to get out all new switches and crossings for a sharper angle, say 1 in 12, and with a longer tongue rail, say 15 feet, and to lay them first in place of all entrance points at stations where the platform is on the loop. One bad smash would pay for most of them. This matter has been brought to a head by the use of vacuum

brakes; once in a thousand times it may happen that the brake may fail, and, as happened during the inspection, that the driver may be unable to reduce his speed in time. If this should happen in combination with knife edge wheel flanges, the result would probably be very disastrous. There is a practice in force, so I was told, of inserting a few feet of straight at each crossing, thereby of course sharpening the curve connecting the heel of tongue rail with line of crossing. I do not consider this to be good practice; the use of a smaller crossing angle would be better, for all the radius that can be got is wanted for the 6-wheel coupled engines.

23. *Nandalur Engine Station.*—The substitution of this for Cuddapah is going on as fast as can be arranged. Nandalur works on the one side to Gooty and on the other to Madras. The ghat pusher engines home at Nandalur and turn at Cuddapah. But there are still a few engines homed both at Cuddapah and at Renigunta.

24. *The remodelling of yards.*—The Company are now in possession of a carefully considered set of designs for many stations considered to be in need of remodelling sooner or later. These will form a standard to be gradually worked up to as opportunity offers. But meanwhile much might, I think, be done without extra expense by an organized system of utilizing the permanent-way gangs when ordinary work is slack.

25. *Perambore Locomotive Workshops.*—I inspected this on January 23rd. There is little to notice except, as already complained of, that they are a good deal cramped and will need extensive enlargement unless it is decided to build supplementary shops for the western sections of the system at Podanur. I went carefully into the system in force for the recall from the line of engines and vehicles, and for their partial or full overhaul. The system seemed well designed, and it was, I was assured, being worked up to.

26. *Stores.*—I went into the subject of store balances with the Chief Auditor and Chief Storekeeper, and am of opinion that a special effort might be successfully made to reduce the very heavy balance, Rs. 26 lakhs. The Cannanore extension would appear to afford the opportunity.

Arkonam to Calicut with Bangalore, Kolar, Palghat and Nilgiri Branches.
By Mr. J. C. Lyle, Government Inspector.

27. The inspection was made between the 26th January and the 1st February. The inspection was made concurrently with that of the Company's Chief Engineer. The Resident Engineers and District Traffic Superintendents were present over their respective sections.

28. *Formation.*—Banks and cuttings are well maintained throughout.

29. *Bridges and Culverts.*—The work of strengthening the bridges on the Nilgiri branch by putting in intermediate piers has not been completed yet; the piers are built, but the bedstones have not all been set.

30. *Ballast.*—The work of blinding the sand ballast with stone on the Bangalore branch is progressing. Between Krishnarajapuram and Tyakal a sufficient quantity of stone did not appear to have been collected for this work, the road even where the stone was laid was dusty. Between Malur and Bowringpet on the contrary the sand was well covered and the running in consequence much pleasanter. On the Kolar Gold Fields the sand ballast is in places deficient. Near the west coast where the ballast is sand, the dust at high speeds is very unpleasant.

31. *Rails.*—Most of the steel rails with a large radius of top which gave such bad results in the main line between Jalarpet and Katpadi when run over at high speeds by wheel tires worn by use on the old pattern rail, have been removed and relaid on the Calicut ghat where there is a restriction of speed. The running on these rails appears quite satisfactory so long as the speed does not exceed 40 miles an hour. The running is rough on the old 65 lb. iron rails, owing apparently to the sag which has occurred at the rail joints. Very great care appears to be taken to remove these rails as soon as signs of wearing are observed; many rails which I noticed as marked for removal appeared to have still some months good work in them. As usual the

running on the 84 lb. iron rails between Podanur and Mettuppalaiyam and on the old pattern steel rails was excellent.

32. *Sleepers.*—The road was opened out and examined at several places; both sleepers and fastenings were everywhere found to be in good order. The cast iron pot sleepers, I was informed, corrode much quicker when under cover and generally go first in the goods sheds, the weak point being where the jaw joins the bowl. It also appears that wood ashes affect cast iron sleepers. Steel sleepers appear to corrode quickly wherever they are buried irrespective of the constituents of the covering matter. At Ottapalem station I was shown some iron rails which had been taken out of the line in the goods shed a short time ago, they were completely rusted away.

33. *Fencing.*—Gaps were noticeable in places in the aloe fence where plants had died; the worst section I saw was between miles 220 and 230 where numerous gaps were evidently made use of by the villagers to cross the line.

34. *Stations generally.*—These are clean and well kept all through the line; the convenience and comfort of 3rd class passengers is exceptionally well looked after.

35. *Individual stations—Bangalore City.*—The verandahs have been roofed in, the roof trusses require painting. The platform has now been flagged and a very good job made of it. A tank has been placed on the top of the station, but apparently arrangements for the supply of water have not been made. The new latrine at the west end of the platform has been built up to ground level and houses for subordinate staff had been commenced, but the recent outbreak of plague had completely stopped all work. *Krishnarajapuram.* An aloe fence in the middle of the station yard should be removed. *Tykal.* Assistant stationmaster's quarters have been sanctioned; but are not yet begun. *Balaghat.* A new loading bank is being built and a siding put in. *Oorgaum.* A level-crossing is stated to be required here. The station running as it does right through a mining property is very cramped for room. Additional waiting accommodation has been given. More quarters are required but work is always slow on account of the difficulty in procuring labour. *Champion.* Here again, the line runs through a mining property and applications for a level-crossing within the station limits have been received. An extra siding is being put in. I noticed the wall of the unloading bank was in a very critical state, also the walls of the 3rd class waiting-room were cracked. These gold field stations are instances of how very expensive in the end it is to do cheap masonry work in the beginning. *Lokur.* The Engineers have not been successful in obtaining a supply of water here. It might be possible to build a reservoir above the station to intercept the drainage from the hills. *Culicut.* An extra room is being added to the stationmaster's quarters which were reported on the last inspection as being small.

36. *Watering arrangements.*—Naturally the present season of the year is not a suitable time for noting the weak points in the water-supply, especially after an excessive monsoon, at all watering stations an abundant supply of water was available. At Whitefield tanks have been erected on a staging of five old screw piles and rails since the last inspection and the water is pumped a distance of about one mile. At Bowringpet the tankhouse has been enlarged.

37. *General.*—The effects of plague and plague restrictions have been to considerably reduce the passenger traffic and to make the punctual running of trains an impossibility.

Remarks by the Senior Government Inspector.

I need add nothing to my own remarks which occupy paragraphs 1 to 26. The attention of the Agent, Madras Railway Company, is invited to the points brought to notice throughout the report, and especially to paragraph 16. The mileage inspected, 849.22 miles, includes the Kolar Gold Fields Railway, 10.00 miles, but excludes the Ennore branch whose inspection will be carried out with that of the East Coast Railway.

MADRAS,
8th February 1899.

FRANCIS J. E. SPRING,
Senior Government Inspector.

ORDER—No. 232 Ry., dated 24th February 1899.

The report will be forwarded to the Government of India for information. The attention of the Consulting Engineer, Bombay, will be invited to the remarks about Guntakal station in paragraph 13. Paragraphs 17 and 18 will be brought by the Consulting Engineer to the notice of the authorities of the South Indian and His Highness the Nizam's Railways. Orders will issue in the Local and Municipal Department on the remarks made in paragraph 14.

[Here enter No. 233 Ry., dated 24th February 1899.]

(True Extract.)

FRANCIS J. E. SPRING,
Joint Secretary.

To the Agent and Manager, Madras Railway.
" Local and Municipal Department.
" Consulting Engineer for Railways, Madras.

ENDORSEMENT—No. 233 Ry., dated 24th February 1899.

Forwarded.

(By order.)

FRANCIS J. E. SPRING,
Joint Secretary.

L. & M.
200-8-11-98.

Local and Municipal Dep.

NOTE FOR THE Secretary.

This submitted that the last sentence of the draft order may be modified as follows:-

"Orders will issue in the Local and Municipal Departments on the remarks made in paragraph 14

V.M.
14/2/99

Yes - that is the usual & a better form

To Pro Tem. and



M.T.
14 299

Get a final clean proof from the Press. as the ~~press~~ wants, getting L & M's initials.

Wright

W.M.
16/4/99

C. No.



SUBJECT.

~~HIS EXCELLENCY THE GOVERNOR.~~

THE HON'BLE MR. ARUNDEL I.C.S., C.S.I.

THE HON'BLE MR. H. M. WINTERBOTHAM, I.C.S.

*Inspection Report
of the Madras Railway*

FOR ORDERS.

*Circulates for
the perusal of Honorable
Members. after counter initials
in L & M. Dept.*

*F.H.S.
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RAILWAY.

Government (1899) of Madras.
PUBLIC WORKS.

[Handwritten signature]

Recd.

Regd.

} 1899.

Enclosures

Spare copies

G.O., Nos. 232 , 233. Ry., 24th February 1899.

FEBRUARY.

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2. *Formation.*—Banks and cuttings were all in their usual good order.

3. *Bridgework.*—I found no fault in the bridges which were inspected. The two northernmost spans of the bridge at mile 107 require an apron of loose heavy stone for a breadth of fully 30 feet downstream from their flooring and drop-walls. The training embankments recently made at this bridge seem a good job. The bridge at mile 142-10, 2 spans of 64 feet, has now been strengthened by the insertion of intermediate piers. The same has been done at the bridge consisting of 4 spans of 64 feet at mile 232-3. The same is about to be done at the bridge at mile 232-10, but as yet only the foundations have been laid. A breach occurred during the south-west monsoon of last year at a small culvert at mile 340-13; it seems to have been due to the heading up of the water of a certain nullah running parallel to the railway, owing to the growth of jungle in its bed and to its having become generally obstructed. I agreed with the Chief Engineer about the best means for dealing with the difficulty and proposals will doubtless be submitted in due course, in time to get things right before next flood season.

4. *Bridge strengthening scheme.*—The scheme for strengthening the weak girders throughout the whole of the Madras Railway has been matured, and will now go forward without obstruction. The building of intermediate piers above referred to is a part of the scheme.

5. *The road.*—This throughout is in a very excellent state of upkeep, allowance of course being made for the age and state of wear of the old iron rails which have been 30 or 40 years in the road. The inspection train ran at speeds of 45 to 55 miles per hour, and the road is quite fit for such speeds. I stopped at several places to examine the state of the iron rails, places stated by the Engineers to contain the worst rails they have to show. They are worn of course, and an occasional rail may have a slightly broken down place, and most of them are more or less battered at the last inch or two near the joints. But there is no wholesale break down; and, provided that ordinary renewals are systematically carried out, a good deal of work will still be got out of the old iron rails.

6. *Rail renewals.*—The old 75 lb. double-headed 20-foot iron rails are being gradually replaced by similar steel rails, the substitution being carried out on a regular system. When rails are wanted for the renewal of occasional broken down rails between stations, a continuous length of old rails is taken up, next to the neighbouring station, and the good rails picked out of this length are utilised for the renewals, while the bad ones are got rid of. The continuous length so taken up is then filled in with steel rails. Thus, throughout the section, new steel rails are gradually creeping forward from both ends of all stations, and will eventually meet throughout. The system is a well thought out and an economical one, and it ensures the maximum of use being got out of every rail.

7. *Sleepers.*—These are all iron pots, except on bridges or over the crowns of culverts where wooden sleepers are used. The system in force for the opening up of the road, whereby each gang gradually works forward, opening out every part of its section so as to expose sleepers, tie bars and cotters, ought to ensure, and judging by the state of the road does ensure, the early replacement of breakages.

8. *Ballast.*—The road throughout is sand ballasted. The sand is being gradually covered with a skin of broken stone. This is going forward at the rate of 40 to 50 miles annually, and only about 120 miles out of 308 remain to be done. It ought to pay to get it done out of hand, as experience shows that the result is a considerable saving in ballast trains and a setting free of vehicles for traffic use. The absence of dust where the road is covered makes a great difference to the public, for in the uncovered parts the dust is a great annoyance to passengers.

9. *Utilizing the old iron rails.*—I understand that the majority of the old iron rails, which are removed from the road, are but little damaged, except at the ends. They might, with great advantage, have their ends sawn off, the length of a fish-plate hole interval, or otherwise. They ought not, in my opinion, to be sold off, unless at least a very fair price is got for them. Experience on the South Indian Railway, where the old broad gauge iron rails of the 136 miles composing the Negapatnam and Erode branches have been run over by metre gauge trains for the last 20 years, shows that, for metre gauge use, such rails have a long life in them and make a very excellent road. Out of the 308 miles of the North-Western section of the Madras Railway, about 113 miles have now been renewed with steel rails. The balance are iron.

10. *Line-clear ticket apparatus.*—At a number of stations where trains may run through without stopping the ticket is handed to the driver by being attached to a hoop of cane which is slung from a sort of gallows. Where the station is on the loop this is not objectionable; but where the station is on the straight the post forming the gallows stands on the platform, four feet from the edge; that is, it infringes standard dimensions. The risk of this leading to accident is really very slight, but such as it is it might, in the majority of cases, be minimized by slinging the little gallows from the projecting station roof instead of standing it on the platform. The post is thus got rid of. The Chief Engineer understands what I mean.

11. *Signal arms.*—I found in several places that signal arms though supposed to fly to danger on release did not do so, or did not quite do so. This should be everywhere seen to.

12. *Standard dimensions.*—At Kosgi, where the station is on a curve said to be of about 5,676 feet radius, the distance from centre of track to edge of platform seems excessive, even allowing for the curve. It measures 6 feet. The road should be slewed if necessary.

13. *Particular stations.*—Heretofore Ponpadi has had only an old wagon body for station, but a new station has been sanctioned: there is said to be some delay about obtaining the necessary land. Out of the sanctioned estimate, Rs. 8,000, about Rs. 4,500 is for goods accommodation, but at present only about 4 wagons of goods monthly are said to be dealt with. The station at Thaduka, which was opened about 2 years ago, in compliance with local demands, earns only about one rupee daily. It has no approach road, is in a cutting, and there is said by the stationmaster (whose salary absorbs half the earnings), to be no drinking water. It consists of only an old wagon body. It might, I think, be dismantled. At Rārampēta, a new entrance is

asked for to the lay-bye from the north end of the through siding to save hand shunting. Yerragudipad has heretofore been only an experimental station with a wagon body for accommodation. But it has justified its being converted into a permanent station, and the alterations are now nearly ready. The Company will doubtless make roads inside their boundary to connect their loading bank and booking office with the good district road at the level crossing at north end of station. The station with one lay-bye, low platform, loading bank but no goods shed, and all buildings and without distant signals will cost about Rs. 9,000. The remarks, which I have just made about Yerragudipad, are also applicable to Kalamalla, except that here the construction of the new buildings is a bit more forward. Nangapatnam has recently been made into a crossing station. Ragadapalli is still on its trial with only an old wagon body for accommodation. It has not yet proved itself worthy of better. Penneru is a new small station. Guntakal station.—This is worked by the Southern Mahratta Railway Company. There are some dangerous hinged wooden flaps on this platform giving access by steps to the rail level below; these ought certainly to be built up; I do not suppose that there is any particular reason to expect that the Guntakal station staff will usually be more decrepit and less able to leap up on their platform than the staff of most other stations in India. At Molagavalli the cheap mat structure which during the trial period has served for a station building might now very well be replaced by a permanent structure, and proper houses might be built for the staff. I was told that the traffic there sometimes comes to 20 wagons weekly, and that during last half-year Rs. 8,000 to Rs. 9,000 were received here for goods despatched. An increase in the length of the lay-bye here has already been sanctioned. Nagarur is still on its trial with a wagon body for all accommodation. It does not seem likely to justify its being made permanent. At Kosgi it would be perfectly easy, and would cost practically nothing if done by the permanent-way gangs, to so slew the approach curves at both ends of the station as to place the station on the main line instead of on the loop, and so avoid the swing of the loop facing points for all halting trains.

14. *Feeder roads*.—I was told that feeder roads to connect the district roads with the railway stations are badly wanted at Ponpadi, Ragadapalli, Vandanur and Penneru. Local Boards cannot fairly expect railway administrations to open stations for local convenience unless approach roads are provided.

15. *Annual repairs*.—I did not take the trouble to notice the absence of petty repairs or eye-wash. Indeed, everything looks very clean and tidy. The Chief Engineer who was conducting his own inspection simultaneously with mine will doubtless attend to all that may be necessary. I need only say that I nowhere saw evidence of neglect of ordinary upkeep either of road or works; indeed quite the reverse.

16. *Distant signal arms*.—The Madras Railway is worked on the absolute block system. The Company have officially accepted the General Rules of 1895. Yet their distant semaphore arms are all forked. A perusal of the proviso at foot of rule 101, will show that on a line which is worked on the absolute block system a train may not, in anticipation of the lowering of the arm, avail itself of the shelter of the distant signal, a shelter permitted by rule 101 to trains running under systems other than the absolute block, but must wait till the arm is lowered before passing it. Turning back now to rule 72 (a) I find it laid down that—

“Distant signals are signals placed at a considerable distance from the station and shall, except when under the proviso of rule 101 they are used as stop signals, be distinguished by a notched arm.”

This would read more clearly thus: “Distant signals may have their arms forked, except when used as stop signals under the proviso of rule 101.” Or thus: “When under the proviso of rule 101 distant signals are used as stop signals, their arms must not be forked.” Thus it is clear that, not having obliterated the forking of the arms of the distant signals at the time of their acceptance of the General Rules of 1895, the Madras Railway Company are contravening those rules.

17. *Dutton's trailable point lock at Puttur*.—In company with the Chief Engineer, and with Mr. Duncan the Acting Telegraph Engineer, who is thoroughly familiar with them, I tried several experiments with an engine on these points. The station facing points and the home and distant signals connected with it, are worked by wire from the station. Under no circumstances is the tongue rail held up against the stock rail by anything more than a tumbling weight. There is at no time a positive lock which would prevent the switch chattering open under a moving train, supposing it to be possible for the vibration of such a train to lift the tumbler weight, which I think extraordinarily unlikely. And yet the unlikelihood is precisely equal to that attaching to any ordinary weighted switch handle giving equal pressure on the tongue rail, no more and no less. The only sense in which the switch can be said to be locked is that when one arm of the home is “off” the stationmaster cannot reverse the switch. It is also locked against the stationmaster by the weight of the wheels of a train on the ordinary locking bar. But it is the tumbler weight, and that only, which keeps the tongue rail up to the stock rail, and at all times the switch can be opened by a crowbar innocuously if both semaphore arms are “on”, but releasing one or other of the two disengagers if either arm is “off”. When both home arms are “on” the stationmaster can do what he likes with the switch. If when both arms are “on” the switch is sprung over by a crowbar, or is trailed through by an engine, nothing happens; it springs back again when released. But if when one arm is “off”, that is, when a train is about to be admitted to the yard, say on the through straight, a shunting engine has the mishap to trail through from the loop, the disengager comes into action, and the switch springs open for the loop, while the arm that was “off” flies to “on”. But the station is still safe, for the in-coming train will not enter against signals and the engine which has caused the mischance can only re-enter the yard via the straight line; the stationmaster is thus apprised of what has happened and goes to set it right before admitting the train. If on the other hand the driver of the shunting engine finds out his mistake before he has got all his wheels off the switch, and tries to back, he may get derailed; but this I take it must happen with any trailable switch. If, however, he should not get derailed and says nothing about it, still all is safe because the in-coming train cannot enter against signals. There is just the chance that the stationmaster, if a fool, may try to remedy things without re-setting the disengager, by pulling off the arm for the loop, which he can do, and so letting the train into the loop and colliding it with the shunting engine. But no system can provide against that sort of thing. I consider that Dutton's system with the trailable lock is just as safe as, and no safer than, any other system for holding a tongue rail up against a stock rail by a weighted lever. Though the weight of the tumbler may most times be practically sufficient against chattering, it may fail one time, for it is not a positive lock of the sort considered sufficient to permit through running at speed. The speed of through trains over the points at Puttur must therefore be limited, whether over the straight or the loop, to 15 miles per hour in the facing direction.

18. *The Vandalur installation, South Indian Railway*.—I may add here that, since the date of the inspection I carefully examined another instalment of Dutton's trailable switch at Vandalur on the South Indian Railway in company with the chief officials of that Railway. Mr. Stoney also was present. The Vandalur installation differs somewhat from that at Puttur. The points are worked by hand at site instead of by wires from the station, the stationmaster retaining the switch handle until it is necessary to use it. Here too there is no positive lock, the switch being merely held by a weighted lever. There is of course no reason why a sufficiently weighted lever should not bring a pressure to bear on the tongue rail equal to that which would suffice to burst open the ordinary hand-locked bolt. Messrs. Stoney and Winter have invented a most ingenious positive lock which nevertheless can be trailed, at a price of Rs. 80 to Rs. 100; the problem therefore is not insoluble. I agree, however, with Sir A. Rendel that the right way to deal with the very improper practice of trailing through switches is, not to render it innocuous but, to absolutely prohibit it. I therefore do not recommend any further installations in this circle of Dutton & Co.'s trailable switch arrangement.

19. *Saxby and Farmer's hydraulic system at Nagari.*—This refuses to work satisfactorily, doubtless the result of climatic and other local conditions. There is no use in leaving the valuable installation lying around in the yard. It may as well be removed. The points, signals, &c., here are hand-worked. Perhaps, the hydraulic system may be found useful somewhere else under the eye of one of the engineers.

20. *Stoney's system.*—From what I have seen of Mr. E. W. Stoney's, the Company's present Chief Engineer's, very ingenious mechanical devices, I am quite satisfied that what with his "drum" switch handle; his combined rocking lever, switch lock and indicator, price about Rs. 50; his and the late Mr. Winter's positive, but trailable, switch lock, and his improved locking bar,—Mr. Stoney will be able to devise safety appliances which will be not only cheaper but better adapted to the local conditions than, and which will at the same time give all the safety of, better known systems. Mr. Stoney is naturally somewhat reluctant to appear to avail himself of his present position to bring his clever inventions into use. Some of them, however, have long been in use at isolated places on the system and have proved themselves entirely satisfactory. The Company cannot do better than put themselves into Mr. Stoney's hands in this matter. I have little doubt that he can produce a design and an estimate for an installation of safety appliances, at the minor stations particularly where cheapness is a consideration, which will be more satisfactory than most of the numerous systems which for years back have been given an experimental trial on the North-West Section of the Madras Railway.

21. *Engine tires.*—I have frequently been told of difference of opinion between officers of the Engineering and of the Locomotive Departments about the incidence of responsibility for derailments at switches and crossings. The Locomotive Department naturally tries to put the blame on the state of the road, while the Engineers blame the engine tire section. I shall have more to say later on about the design of the switches and crossings. It is obvious that, whether new from store, or newly turned down in the repair lathes, the working side of the engine tires ought always to be identical in section. I examined the system in force at the Locomotive shops at Perambore and feel assured that when tires are sent out of the shops they are to proper section. But it is a question whether they are not sometimes neglected too long. The rule is that they must come into the shops when the flange is reduced to $\frac{3}{4}$ inch thick. But more than this is wanted, for long before that time the flange may be in a most dangerous condition and its sharp edge may at any moment mount a facing switch. The orders issued by the Locomotive Superintendent are that, as fast as a knife-edge forms, the engine is to be pinched round at the running sheds, and the edge rounded off by a proper tool. But I saw tires in the shops which had certainly not been so treated, and had I found such a tire implicated in a derailment at a switch, the incidence of responsibility would, in the absence of evidence to the contrary, to my mind have been clear.

22. *Facing points.*—Whether small roadside stations are on the straight or on the loop, fast trains running through them will of course keep on the straight. (Indeed I notice that the line-clear-pick-up gallows are always on the straight.) For fast through trains, therefore, the angle of crossing at the facing points of stations is a matter of minor moment. But when a train has to stop at a loop platform, and therefore to get slewed over at the points, it is important that the design of the switches and crossings should be suitable to the speed and to the class of engine in use. The current orders on the Madras Railway are that facing points are not to be run over at a higher speed than 12 miles per hour. But if this order is good for facing points open for the straight, it is certainly not suitable for facing points open for the loop, especially for the 6-wheel-coupled 18-foot-wheelbase engines. Whatever the rules are, engines habitually go over the facing points at considerably higher speeds than 12 miles per hour, as I can vouch for, having often checked it. When entering the loop at this speed the jerk is undoubtedly dangerous. The Company will therefore be well advised to at once arrange to get out all new switches and crossings for a sharper angle, say 1 in 12, and with a longer tongue rail, say 15 feet, and to lay them first in place of all entrance points at stations where the platform is on the loop. One bad smash would pay for most of them. This matter has been brought to a head by the use of vacuum brakes; once in a thousand times it may happen that the brake may fail, and, as

happened during the inspection, that the driver may be unable to reduce his speed in time. If this should happen in combination with knife edge wheel flanges, the result would probably be very disastrous. There is a practice in force, so I was told, of inserting a few feet of straight at each crossing, thereby of course sharpening the curve connecting the heel of tongue rail with line of crossing. I do not consider this to be good practice; the use of a smaller crossing angle would be better, for all the radius that can be got is wanted for the 6-wheel coupled engines.

23. *Nandalur Engine Station.*—The substitution of this for Cuddapah is going on as fast as can be arranged. Nandalur works on the one side to Gooty and on the other to Madras. The ghat pusher engines home at Nandalur and turn at Cuddapah. But there are still a few engines homed both at Cuddapah and at Renigunta.

24. *The remodelling of yards.*—The Company are now in possession of a very & carefully considered set of designs for all stations considered to be in need of remodeling sooner or later. These will form a standard to be gradually worked up to as opportunity offers. But meanwhile much might, I think, be done without extra expense by an organized system of utilizing the permanent-way gangs when ordinary work is slack.

25. *Perambore Locomotive Workshops.*—I inspected this on January 23rd. There is little to notice except, as already complained of, that they are a good deal cramped and will need extensive enlargement unless it is decided to build supplementary shops for the western sections of the system at Podanur. I went carefully into the system in force for the recall from the line of engines and vehicles, and for their partial or full overhaul. The system seemed well designed, and it was, I was assured, being worked up to.

26. *Stores.*—I went into the subject of store balances with the Chief Auditor and Chief Storekeeper, and am of opinion that a special effort might be successfully made to reduce the very heavy balance, Rs. 26 lakhs. The Cannanore extension would appear to afford the opportunity.

Arkonam to Calicut with Bangalore, Kolar, Palghat and Nilgiri Branches.
By Mr. J. C. Lyle, Government Inspector.

27. The inspection was made between the 26th January and the 1st February. The inspection was made concurrently with that of the Company's Chief Engineer. The Resident Engineers and District Traffic Superintendents were present over their respective sections.

28. *Formation.*—Banks and cuttings are well maintained throughout.

29. *Bridges and Culverts.*—The work of strengthening the bridges on the Nilgiri branch by putting in intermediate piers has not been completed yet; the piers are built, but the bedstones have not all been set.

30. *Ballast.*—The work of blinding the sand ballast with stone on the Bangalore branch is progressing. Between Krishnarajapuram and Tyakal a sufficient quantity of stone did not appear to have been collected for this work, the road even where the stone was laid was dusty. Between Malur and Bowringpet on the contrary the sand was well covered and the running in consequence much pleasanter. (On the Kolar Gold Fields the sand ballast is in places deficient. Near the west coast where the ballast is sand, the dust at high speeds is very unpleasant.)

31. *Rails.*—Most of the steel rails with a large radius of top which gave such bad results in the main line between Jalarpet and Katpadi when run over at high speeds by wheel tires worn by use on the old pattern rail, have been removed and relaid on the Calicut ghat where there is a restriction of speed. The running on these rails appears quite satisfactory so long as the speed does not exceed 40 miles an hour. The running is rough on the old 65 lb. iron rails, owing apparently to the sag which has occurred at the rail joints. Very great care appears to be taken to remove these rails as soon as signs of wearing are observed; many rails which I noticed as marked for removal appeared to have still some months good work in them. As usual the

running on the 84 lb. iron rails between Podanur and Mettupalaiyam and on the old pattern steel rails was excellent.

32. *Sleepers.*—The road was opened out and examined at several places; both sleepers and fastenings were everywhere found to be in good order. The cast iron pot sleepers, I was informed, corrode much quicker when under cover and generally go first in the goods sheds, the weak point being where the jaw joins the bowl. It also appears that wood ashes affect cast iron sleepers. Steel sleepers appear to corrode quickly wherever they are buried irrespective of the constituents of the covering matter. At Ottapalem station I was shown some iron rails which had been taken out of the line in the goods shed a short time ago, they were completely rusted away.

33. *Fencing.*—Gaps were noticeable in places in the aloe fence where plants had died; the worst section I saw was between miles 220 and 230 where numerous gaps were evidently made use of by the villagers to cross the line.

34. *Stations generally.*—These are clean and well kept all through the line; the convenience and comfort of 3rd class passengers is exceptionally well looked after.

35. *Individual stations—Bengalore City.*—The verandahs have been roofed in, the roof trusses require painting. The platform has now been flagged and a very good job made of it. A tank has been placed on the top of the station, but apparently arrangements for the supply of water have not been made. The new latrine at the west end of the platform has been built up to ground level and houses for subordinate staff had been commenced, but the recent outbreak of plague had completely stopped all work. *Krishnarajapuram.* An aloe fence in the middle of the station yard should be removed. *Tyakot.* Assistant stationmaster's quarters have been sanctioned; but are not yet begun. *Balaghat.* A new loading bank is being built and a siding put in. *Oorgaum.* A level-crossing is stated to be required here. The station running as it does right through a mining property is very cramped for room. Additional waiting accommodation has been given. More quarters are required but work is always slow on account of the difficulty in procuring labour. *Champion.* Here again, the line runs through a mining property and applications for a level-crossing within the station limits have been received. An extra siding is being put in. I noticed the wall of the unloading bank was in a very critical state, also the walls of the 3rd class waiting-room were cracked. These gold field stations are instances of how very expensive in the end it is to do cheap masonry work in the beginning. *Lokur.* The Engineers have not been successful in obtaining a supply of water here. It might be possible to build a reservoir above the station to intercept the drainage from the hills. *Calicut.* An extra room is being added to the stationmaster's quarters which were reported on the last inspection as being small.

36. *Watering arrangements.*—Naturally the present season of the year is not a suitable time for noting the weak points in the water-supply, especially after an excessive monsoon, at all watering stations an abundant supply of water was available. At Whitefield tanks have been erected on a staging of five old screw piles and rails since the last inspection and the water is pumped a distance of about one mile. At Bowringpet the tankhouse has been enlarged.

37. *General.*—The effects of plague and plague restrictions have been to considerably reduce the passenger traffic and to make the punctual running of trains an impossibility.

Remarks by the Senior Government Inspector.

I need add nothing to my own remarks which occupy paragraphs 1 to 26. The attention of the Agent, Madras Railway Company, is invited to the points brought to notice throughout the report, and especially to paragraph 16. The mileage inspected, 819.22 miles, includes the Kolar Gold Fields Railway, 10.00 miles, but excludes the Ennore branch whose inspection will be carried out with that of the East Coast Railway.

MADRAS,
8th February 1899.

FRANCIS J. E. SPRING,
Senior Government Inspector.

ORDER—No. 232 Ry., dated 24th February 1899.

The report will be forwarded to the Government of India for information. The attention of the Consulting Engineer, Bombay, will be invited to the remarks about Guntakal station in paragraph 13. Paragraphs 17 and 18 will be brought by the Consulting Engineer to the notice of the authorities of the South Indian and His Highness the Nizam's Railways. Orders will issue in the Local and Municipal Department on the remarks made in paragraph 14.

[Here enter No. 233 Ry., dated 24th February 1899.]

(True Extract.)

FRANCIS J. E. SPRING,
Joint Secretary.

To the Agent and Manager, Madras Railway.
" Local and Municipal Department.
" Consulting Engineer for Railways, Madras.

ENDORSEMENT—No. 233 Ry., dated 24th February 1899.

Forwarded.

(By order.)

Joint Secretary.

Despatched on 24.2.99

Take for the Secretary the Sec L & M Dept
for C. I.
F. J. E. Spring
18/2/99 20 200

Exd. W. D' Moss.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

MADRAS RAILWAY.

~~849.22~~ MILES.

STANDARD, 5' 6", GAUGE.

Total miles from the hills 849.22 m.

INSPECTION REPORT FOR THE HALF YEAR ENDING 31ST DECEMBER 1898.

Madras via Arkonam to Raichur. By the Senior Government Inspector.

1. *General.*—This section was inspected on the 9th, 10th and 11th of January. My inspection was made concurrently with that of the Company's Chief Engineer. The District Traffic officer was present during the greater part of the time.
2. *Formation.*—Banks and cuttings were all in their usual good order.
3. *Bridgework.*—I found no fault in the bridges which were inspected. The two northernmost spans of the bridge at mile 107 require an apron of loose heavy stone for a breadth of fully 30 feet downstream from their flooring and drop-walls. The training embankments recently made at this bridge seem a good job. The bridge at mile 142-10, 2 spans of 64 feet, has now been strengthened by the insertion of intermediate piers. The same has been done at the bridge consisting of 4 spans of 64 feet at mile 232-3. The same is about to be done at the bridge at mile 232-10, but as yet only the foundations have been laid. A breach occurred during the south-west monsoon of last year at a small culvert at mile 340-13; it seems to have been due to the heading up of the water of a certain nullah running parallel to the railway, owing to the growth of jungle in its bed and to its having become generally obstructed. I agreed with the Chief Engineer about the best means for dealing with the difficulty and proposals will doubtless be submitted in due course, in time to get things right before next flood season.
4. *Bridge strengthening scheme.*—The scheme for strengthening the weak girders throughout the whole of the Madras Railway has been matured, and will now go forward without obstruction. The building of intermediate piers above referred to is a part of the scheme.
5. *The road.*—This throughout is in a very excellent state of upkeep, allowance of course being made for the age and state of wear of the old iron rails which have been 30 or 40 years in the road. The inspection train ran at speeds of 45 to 55 miles per hour, and the road is quite fit for such speeds. I stopped at several places to examine the state of the iron rails, places stated by the Engineers to contain the worst rails they have to show. They are worn of course, and an occasional rail may have a slightly broken down place, and most of them are more or less battered at the last inch or two near the joints. But there is no wholesale break down; and, provided that ordinary renewals are systematically carried out, a good deal of work will still be got out of the old iron rails.

6. *Rail renewals.*—The old 75 lb. double-headed 20-foot iron rails are being gradually replaced by similar steel rails, the substitution being carried out on a regular system. When rails are wanted for the renewal of occasional broken down rails between stations, a continuous length of old rails is taken up, next to the neighbouring station, and the good rails picked out of this length are utilised for the renewals, while the bad ones are got rid of. The continuous length so taken up is then filled in with steel rails. Thus, throughout the section, new steel rails are gradually creeping forward from both ends of all stations, and will eventually meet throughout. The system is a well thought out and an economical one, and it ensures the maximum of use being got out of every rail.

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8. *Ballast.*—The road throughout is sand ballasted. The sand is being gradually covered with a skin of broken stone. This is going forward at the rate of 40 to 50 miles annually, and only about 120 miles out of 308 remain to be done. It ought to pay to get it done out of hand, as experience shows that the result is a considerable saving in ballast trains and a setting free of vehicles for traffic use. The absence of dust where the road is covered makes a great difference to the public, for in the uncovered parts the dust is a great annoyance to passengers.

9. *Utilizing the old iron rails.*—I understand that the majority of the old iron rails, which are removed from the road, are but little damaged, except at the ends. They might, with great advantage, have their ends sawn off, the length of a fish-plate hole interval, or otherwise. They ought not, in my opinion, to be sold off, unless at least a very fair price is got for them. Experience on the South Indian Railway, where the old broad gauge iron rails of the 136 miles composing the Negapatnam and Erode branches have been run over by metre gauge trains for the last 20 years, shows that, for metre gauge use, such rails have a long life in them and make a very excellent road. Out of the 308 miles of the North-Western section of the Madras Railway, about 113 miles have now been renewed with steel rails. The balance are iron.

10. *Line-clear ticket apparatus.*—At a number of stations where trains may run through without stopping the ticket is handed to the driver by being attached to a hoop of cane which is slung from a sort of gallows. Where the station is on the loop this is not objectionable; but where the station is on the straight the post forming the gallows stands on the platform, four feet from the edge; that is, it infringes standard dimensions. The risk of this leading to accident is really very slight, but such as it is it might, in the majority of cases, be minimized by slinging the little gallows from the projecting station roof instead of standing it on the platform. The post is thus got rid of. The Chief Engineer understands what I mean.

11. *Signal arms.*—I found in several places that signal arms though supposed to fly to danger on release did not do so, or did not quite do so. This should be everywhere seen to.

12. *Standard dimensions.*—At Kosgi, where the station is on a curve said to be of about 5,676 feet radius, the distance from centre of track to edge of platform seems excessive, even allowing for the curve. It measures 6 feet. The road should be slewed if necessary.

13. *Particular stations.*—Heretofore *Ponpadi* has had only an old wagon body for station; but a new station has been sanctioned: there is said to be some delay about obtaining the necessary land. Out of the sanctioned estimate, Rs. 8,000, about Rs. 4,500 is for goods accommodation, but at present only about 4 wagons of goods monthly are said to be dealt with. The station at *Thaduku*, which was opened about 2 years ago, in compliance with local demands, earns only about one rupee daily. It has no approach road, is in a cutting, and there is said by the stationmaster (whose salary absorbs half the earnings), to be no drinking water. It consists of only an old wagon body. It might, I think, be dismantled. At *Rárampéta*, a new entrance is

asked for to the lay-bye from the north end of the through siding to save hand shunting *Yerragudipad* has heretofore been only an experimental station with a wagon body for accommodation. But it has justified its being converted into a permanent station, and the alterations are now nearly ready. The Company will doubtless make roads inside their boundary to connect their loading bank and booking office with the good district road at the level crossing at north end of station. The station with one lay-bye, low platform, loading bank but no goods shed, and all buildings and without distant signals will cost about Rs. 9,000. The remarks, which I have just made about *Yerragudipad*, are also applicable to *Kalumalla*, except that here the construction of the new buildings is a bit more forward. *Nangapatnam* has recently been made into a crossing station. *Ragadapalli* is still on its trial with only an old wagon body for accommodation. It has not yet proved itself worthy of better. *Penneru* is a new small station. *Guntakal station.*—This is worked by the Southern Mahratta Railway Company. There are some dangerous hinged wooden flaps on this platform giving access by steps to the rail level below; these ought certainly to be built up; I do not suppose that there is any particular reason to expect that the *Guntakal* station staff will usually be more decrepit and less able to leap up on their mat structure which during the trial period has served for a station building might now very well be replaced by a permanent structure, and proper houses might be built for the staff. I was told that the traffic there sometimes comes to 20 wagons weekly, and that during last half-year Rs. 8,000 to Rs. 9,000 were received here for goods despatched. An increase in the length of the lay-bye here has already been sanctioned. *Nagarur* is still on its trial with a wagon body for all accommodation. It does not seem likely to justify its being made permanent. At *Kosgi* it would be perfectly easy, and would cost practically nothing if done by the permanent-way gangs, to so slew the approach curves at both ends of the station as to place the station on the main line instead of on the loop, and so avoid the swing of the loop facing points for all halting trains.

14. *Feeder roads.*—I was told that feeder roads to connect the district roads with the railway stations are badly wanted at *Ponpadi*, *Ragadapalli*, *Vandunur* and *Penneru*. Local Boards cannot fairly expect railway administrations to open stations for local convenience unless approach roads are provided.

15. *Annual repairs.*—I did not take the trouble to notice the absence of petty repairs or eye-wash. Indeed, everything looks very clean and tidy. The Chief Engineer who was conducting his own inspection simultaneously with mine will doubtless attend to all that may be necessary. I need only say that I nowhere saw evidence of neglect of ordinary upkeep either of road or works; indeed quite the reverse.

16. *Distant signal arms.*—The Madras Railway is worked on the absolute block system. The Company have officially accepted the General Rules of 1895. Yet their distant semaphore arms are all forked. A perusal of the proviso at foot of rule 101, will show that on a line which is worked on the absolute block system a train may not, in anticipation of the lowering of the arm, avail itself of the shelter of the distant signal, a shelter permitted by rule 101 to trains running under systems other than the absolute block, but must wait till the arm is lowered before passing it. Turning back now to rule 72 (a) I find it laid down that—

“Distant signals are signals placed at a considerable distance from the station and shall, except when under the proviso of rule 101 they are used as stop signals, be distinguished by a notched arm.”

This would read more clearly thus: “Distant signals may have their arms forked, except when used as stop signals under the proviso of rule 101.” Or thus: “When under the proviso of rule 101 distant signals are used as stop signals, their arms must not be forked.” Thus it is clear that, not having obliterated the forking of the arms of the distant signals at the time of their acceptance of the General Rules of 1895, the Madras Railway Company are contravening those rules.

17. *Dutton's trailable point lock at Puttur.*—In company with the Chief Engineer, and with Mr. Duncan the Acting Telegraph Engineer, who is thoroughly familiar with them, I tried several experiments with an engine on these points. The station facing points and the home and distant signals connected with it, are worked by wire from the station. Under no circumstances is the tongue rail held up against the stock rail by anything more than a tumbling weight. There is at no time a positive lock which would prevent the switch chattering open under a moving train, supposing it to be possible for the vibration of such a train to lift the tumbler weight, which I think extraordinarily unlikely. And yet the unlikelihood is precisely equal to that attaching to any ordinary weighted switch handle giving equal pressure on the tongue rail, no more and no less. The only sense in which the switch can be said to be locked is that when one arm of the home is "off" the stationmaster cannot reverse the switch. It is also locked against the stationmaster by the weight of the wheels of a train on the ordinary locking bar. But it is the tumbler weight, and that only, which keeps the tongue rail up to the stock rail, and at all times the switch can be opened by a crowbar innocuously if both semaphore arms are "on", but releasing one or other of the two disengagers if either arm is "off". When both home arms are "on" the stationmaster can do what he likes with the switch. If when both arms are "on" the switch is sprung over by a crowbar, or is trailed through by an engine, nothing happens; it springs back again when released. But if when one arm is "off", that is, when a train is about to be admitted to the yard, say on the through straight, a shunting engine has the mishap to trail through from the loop, the disengager comes into action, and the switch springs open for the loop, while the arm that was "off" flies to "on". But the station is still safe, for the in-coming train will not enter against signals and the engine which has caused the mischance can only re-enter the yard *via* the straight line; the stationmaster is thus apprised of what has happened and goes to set it right before admitting the train. If on the other hand the driver of the shunting engine finds out his mistake before he has got all his wheels off the switch, and tries to back, he *may* get derailed; but this I take it must happen with *any* trailable switch. If, however, he should *not* get derailed and says nothing about it, still all is safe because the in-coming train cannot enter against signals. There is just the chance that the stationmaster, if a fool, may try to remedy things without re-setting the disengager, by pulling off the arm for the loop, which he can do, and so letting the train into the loop and colliding it with the shunting engine. But no system can provide against that sort of thing. I consider that Dutton's system with the trailable lock is just as safe as, and no safer than, any other system for holding a tongue rail up against a stock rail by a weighted lever. Though the weight of the tumbler may most times be practically sufficient against chattering, it *may* fail one time, for it is not a positive lock of the sort considered sufficient to permit through running at speed. The speed of through trains over the points at Puttur must therefore be limited, whether over the straight or the loop, to 15 miles per hour in the facing direction.

18. *The Vandalur installation, South Indian Railway.*—I may add here that since the date of the inspection I carefully examined another instalment of Dutton's trailable switch at Vandalur on the South Indian Railway in company with the chief officials of that Railway. Mr. Stoney also was present. The Vandalur installation differs somewhat from that at Puttur. The points are worked by hand at site instead of by wires from the station, the stationmaster retaining the switch handle until it is necessary to use it. Here too there is no positive lock, the switch being merely held by a weighted lever. There is of course no reason why a sufficiently weighted lever should not bring a pressure to bear on the tongue rail equal to that which would suffice to burst open the ordinary hand-locked bolt. Messrs. Stoney and Winter have invented a most ingenious positive lock which nevertheless can be trailed, at a price of Rs. 80 to Rs. 100; the problem therefore is not insoluble. I agree, however, with Sir A. Rendel that the right way to deal with the very improper practice of trailing through switches is, not to render it innocuous but, to absolutely prohibit it. I therefore do not recommend any further installations in this circle of Dutton & Co.'s trailable switch arrangement.

19. *Saxby and Farmer's hydraulic system at Nagari.*—This refuses to work satisfactorily, doubtless the result of climatic and other local conditions. There is no use in leaving the valuable installation lying around in the yard. It may as well be removed. The points, signals, &c., here are hand-worked. Perhaps, the hydraulic system may be found useful somewhere else under the eye of one of the engineers.

20. *Stoney's system.*—From what I have seen of Mr. E. W. Stoney's, the Company's present Chief Engineer's, very ingenious mechanical devices, I am quite satisfied that what with his "drum" switch handle; his combined rocking lever, switch lock and indicator, price about Rs. 50; his and the late Mr. Winter's positive, but trailable, switch lock, and his improved locking bar.—Mr. Stoney will be able to devise safety appliances which will be not only cheaper but better adapted to the local conditions than, and which will at the same time give all the safety of, better known systems. Mr. Stoney is naturally somewhat reluctant to appear to avail himself of his present position to bring his clever inventions into use. Some of them, however, have long been in use at isolated places on the system and have proved themselves entirely satisfactory. The Company cannot do better than put themselves into Mr. Stoney's hands in this matter. I have little doubt that he can produce a design and an estimate for an installation of safety appliances, at the minor stations particularly where cheapness is a consideration, which will be more satisfactory than most of the numerous systems which for years back have been given an experimental trial on the North-West Section of the Madras Railway.

21. *Engine tires.*—I have frequently been told of difference of opinion between officers of the Engineering and of the Locomotive Departments about the incidence of responsibility for derailments at switches and crossings. The Locomotive Department naturally tries to put the blame on the state of the road, while the Engineers blame the engine tire section. I shall have more to say later on about the design of the switches and crossings. It is obvious that whether new from store, or newly turned down in the repair lathes, the working side of the engine tires ought always to be identical in section. I examined the system in force at the Locomotive shops at Perambore and feel assured that when tires are sent out of the shops they *are* to proper section. But it is a question whether they are not sometimes neglected too long. The rule is that they must come into the shops when the flange is reduced to $\frac{3}{4}$ inch thick. But more than this is wanted, for long before that time the flange may be in a most dangerous condition and its sharp edge may at any moment mount a facing switch. The orders issued by the Locomotive Superintendent are that, as fast as a knife-edge forms, the engine is to be pinched round at the running sheds, and the edge rounded off by a proper tool. But I saw tires in the shops which had certainly not been so treated, and had I found such a tire implicated in a derailment at a switch, the incidence of responsibility would, in the absence of evidence to the contrary, to my mind have been clear.

22. *Facing points.*—Whether small roadside stations are on the straight or on the loop, fast trains running through them will of course keep on the straight. (Indeed I notice that the line-clear-pick-up gallows are always on the straight.) For fast through trains, therefore, the angle of crossing at the facing points of stations is a matter of minor moment. But when a train has to stop at a loop platform, and therefore to get slewed over at the points, it is important that the design of the switches and crossings should be suitable to the speed and to the class of engine in use. The current orders on the Madras Railway are that facing points are not to be run over at a higher speed than 12 miles per hour. But if this order is good for facing points open for the straight, it is certainly not suitable for facing points open for the loop, especially for the 6-wheel-coupled 18-foot-wheelbase engines. Whatever the rules are, engines habitually go over the facing points at considerably higher speeds than 12 miles per hour, as I can vouch for, having often checked it. When entering the loop at this speed the jerk is undoubtedly dangerous. The Company will therefore be well advised to at once arrange to get out all new switches and crossings for a sharper angle, say 1 in 12, and with a longer tongue rail, say 15 feet, and to lay them first in place of all entrance points at stations where the platform is on the loop. One bad smash would pay for most of them. This matter has been brought to a head by the use of vacuum brakes; once in a thousand times it may happen that the brake may fail, and, as

happened during the inspection, that the driver may be unable to reduce his speed in time. If this should happen in combination with knife edge wheel flanges, the result would probably be very disastrous. There is a practice in force, so I was told, of inserting a few feet of straight at each crossing, thereby of course sharpening the curve connecting the heel of tongue rail with line of crossing. I do not consider this to be good practice; the use of a smaller crossing angle would be better, for all the radius that can be got is wanted for the 6-wheel coupled engines.

23. *Nandalur Engine Station.*—The substitution of this for Cuddapah is going on as fast as can be arranged. Nandalur works on the one side to Gooty and on the other to Madras. The ghat pusher engines home at Nandalur and turn at Cuddapah. But there are still a few engines homed both at Cuddapah and at Renigunta.

24. *The remodelling of yards.*—The Company are now in possession of a very carefully considered set of designs for all stations considered to be in need of remodeling sooner or later. These will form a standard to be gradually worked up to as opportunity offers. But meanwhile much might, I think, be done without extra expense by an organized system of utilizing the permanent-way gangs when ordinary work is slack.

25. *Perambore Locomotive Workshops.*—I inspected this on January 23rd. There is little to notice except, as already complained of, that they are a good deal cramped and will need extensive enlargement unless it is decided to build supplementary shops for the western sections of the system at Podanur. I went carefully into the system in force for the recall from the line of engines and vehicles, and for their partial or full overhaul. The system seemed well designed, and it was, I was assured, being worked up to.

26. *Stores.*—I went into the subject of store balances with the Chief Auditor and Chief Storekeeper, and am of opinion that a special effort might be successfully made to reduce the very heavy balance, Rs. 26 lakhs. The Cannanore extension would appear to afford the opportunity.

Arkonam to Calicut with Bangalore, Kolar, Palghat and Nilgiri Branches.
By Mr. J. C. Lyle, Government Inspector.

27. The inspection was made between the 26th January and the 1st February. The inspection was made concurrently with that of the Company's Chief Engineer. The Resident Engineers and District Traffic Superintendents were present over their respective sections.

28. *Formation.*—Banks and cuttings are well maintained throughout.

29. *Bridges and Culverts.*—The work of strengthening the bridges on the Nilgiri branch by putting in intermediate piers has not been completed yet; the piers are built, but the bedstones have not all been set.

30. *Ballast.*—The work of blinding the sand ballast with stone on the Bangalore branch is progressing. Between Krishnarajapuram and Tyakal a sufficient quantity of stone did not appear to have been collected for this work, the road even where the stone was laid was dusty. Between Malur and Bowringpet on the contrary the sand was well covered and the running in consequence much pleasanter. On the Kolar Gold Fields the sand ballast is in places deficient. Near the west coast where the ballast is sand, the dust at high speeds is very unpleasant.

31. *Rails.*—Most of the steel rails with a large radius of top which gave such bad results in the main line between Jalarpet and Katpadi when run over at high speeds by wheel tires worn by use on the old pattern rail, have been removed and relaid on the Calicut ghat where there is a restriction of speed. The running on these rails appears quite satisfactory so long as the speed does not exceed 40 miles an hour. The running is rough on the old 65 lb. iron rails, owing apparently to the sag which has occurred at the rail joints. Very great care appears to be taken to remove these rails as soon as signs of wearing are observed; many rails which I noticed as marked for removal appeared to have still some months good work in them. As usual the

running on the 84 lb. iron rails between Podanur and Mettuppalaiyam and on the old pattern steel rails was excellent.

32. *Sleepers.*—The road was opened out and examined at several places; both sleepers and fastenings were everywhere found to be in good order. The cast iron pot sleepers, I was informed, corrode much quicker when under cover and generally go first in the goods sheds, the weak point being where the jaw joins the bowl. It also appears that wood ashes affect cast iron sleepers. Steel sleepers appear to corrode quickly wherever they are buried irrespective of the constituents of the covering matter. At Ottapalem station I was shown some iron rails which had been taken out of the line in the goods shed a short time ago, they were completely rusted away.

33. *Fencing.*—Gaps were noticeable in places in the aloe fence where plants had died; the worst section I saw was between miles 220 and 230 where numerous gaps were evidently made use of by the villagers to cross the line.

34. *Stations generally.*—These are clean and well kept all through the line; the convenience and comfort of 3rd class passengers is exceptionally well looked after.

35. *Individual stations—Bangalore City.*—The verandahs have been roofed in, the roof trusses require painting. The platform has now been flagged and a very good job made of it. A tank has been placed on the top of the station, but apparently arrangements for the supply of water have not been made. The new latrine at the west end of the platform has been built up to ground level and houses for subordinate staff had been commenced, but the recent outbreak of plague had completely stopped all work. *Krishnarajapuram.* An aloe fence in the middle of the station yard should be removed. *Tyakal.* Assistant stationmaster's quarters have been sanctioned; but are not yet begun. *Balaghat.* A new loading bank is being built and a siding put in. *Oorgaum.* A level-crossing is stated to be required here. The station running as it does right through a mining property is very cramped for room. Additional waiting accommodation has been given. More quarters are required but work is always slow on account of the difficulty in procuring labour. *Champion.* Here again, the line runs through a mining property and applications for a level-crossing within the station limits have been received. An extra siding is being put in. I noticed the wall of the unloading bank was in a very critical state, also the walls of the 3rd class waiting-room were cracked. These gold field stations are instances of how very expensive in the end it is to do cheap masonry work in the beginning. *Lokur.* The Engineers have not been successful in obtaining a supply of water here. It might be possible to build a reservoir above the station to intercept the drainage from the hills. *Calicut.* An extra room is being added to the stationmaster's quarters which were reported on the last inspection as being small.

36. *Watering arrangements.*—Naturally the present season of the year is not a suitable time for noting the weak points in the water-supply, especially after an excessive monsoon, at all watering stations an abundant supply of water was available. At Whitefield tanks have been erected on a staging of five old screw piles and rails since the last inspection and the water is pumped a distance of about one mile. At Bowringpet the tankhouse has been enlarged.

37. *General.*—The effects of plague and plague restrictions have been to considerably reduce the passenger traffic and to make the punctual running of trains an impossibility.

Remarks by the Senior Government Inspector.

I need add nothing to my own remarks which occupy paragraphs 1 to 26. The attention of the Agent, Madras Railway Company, is invited to the points brought to notice throughout the report, and especially to paragraph 16. The mileage inspected, 849.22 miles, includes the Kolar Gold Fields Railway, 10.00 miles, but excludes the Ennore branch whose inspection will be carried out with that of the East Coast Railway.

MADRAS,
8th February 1899.

FRANCIS J. E. SPRING,
Senior Government Inspector.

8

No.

Ry.,

FEBRUARY 1899.

ORDER—No. 232 Ry., dated 24 February 1899.

attention of the
authorities of the
Order will have to be

The report will be forwarded to the Government of India for information. The Consulting Engineer, Bombay's attention, will be invited to the remarks about Guntakal station in paragraph 13. Paragraphs 17 and 18 will be brought by the Consulting Engineer to the notice of the South Indian and Nizam's Guaranteed State Railways. The Local and Municipal Department should take note of the remarks made in paragraph 14.

[Here enter No. Ry., dated February 1899.]

(True Extract.)

FRANCIS J. E. SPRING,
Joint Secretary.

To the Agent and Manager, Madras Railway.
 " Local and Municipal Department.
 " Consulting Engineer for Railways, Madras.

ENDORSEMENT—No. 233 Ry., dated 24 February 1899.

Forwarded.

(By order.)

F.H.S.
 Joint Secretary.

13/1/11

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FEBRUARY.
