Public Works (1897) Department.

No Book

G.O., No. 691-R

DATED 20. September 1897

Proof

120 22/9/97 Book

H.C. 13/2 etc. Letter

[Despatch Abstract.]

Madras Railway: Passing orders on the Senior Government Inspector's report of inspection of the — for the half year ended the 30th June 1897.

Madras Railway: Forwarding copy of Proc. embodying the Senior Government Inspector's report of inspection of the — for the half year ended the 30th June 1897.

[P.W. 56. 1,809—29-11-96.]

Indexed. 22/9/97

BACK PAPERS.

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RAILWAY.

Government {1897} of Madras.

PUBLIC WORKS.

Recd. } 1897. *Enclosures*

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G.O., No. 691 R., 20th September 1897.

SEPTEMBER.

Madras Railway

Passing orders on the Senior Government Inspector's report of inspection of the — for the half-year ended the 30th June 1897.

8. Fencing.—Practically the whole of the section is fenced with aloe of sorts. This is very unsatisfactory, as a certain number of individual plants die off and great gaps occur. In places there is dry stone fencing, and in places wire, but it is mostly aloe.

9. *Stations generally.*—It would be easy to pick out small faults everywhere, occasional broken glass, or worn flags, misplaced tiles, want of whitewash, &c. But taking them all round the stations are in very good order and everything very neat, and I would not encourage the spending of money on making such things better than the actual demand for public safety and convenience necessitates. Indeed in the past, on this as on other old guaranteed lines, far too much has been spent upon such non-essentials. Everywhere I found the convenience and comfort of passengers, European and Native, well provided for: latrines, water filters, &c., were all as they ought to be. The half-yearly inspection seems to be the great occasion for a coat of "eye-wash" all round, but that is no harm.

10. *Particular stations*—(*a*) *Arkonam.*—There is a very extensive proposal for the remodelling of this station yard. I think the modification, to allow of accommodation for more goods trains and better shunting, might be done more economically. A plan suggesting the approved modification has been sent to the Agent. (*b*) *Ponpadi.*—This trial station has for the present only a couple of waggon bodies for all its accommodation, when it finds itself deserving of more it will doubtless get it. (*c*) *Rénigunta.*—This is where the Madras Railway is crossed by the South Indian, and is an engine station. It is one of the three regular engine stations—Gooty, Cuddapah and Rénigunta—between Ráichúr and Madras. But for fast trains one new changing station, Nandalúr, is being inserted so as to have two runs instead of three between Gooty and Madras. (*d*) *Mámandúru, Peddapádu and Úrampádu* have their station buildings down below on the ground on a low level, this is said to be unsatisfactory. (*e*) *Nandalúr.*—Here the new locomotive arrangements and quarters are all but ready. (*f*) *Vontimitta.*—Here the Traffic are asking for an oil room, which seems to be wanted. (*g*) *Siddhavattam.*—I was told that a feeder road to a large village about four miles out is badly wanted here. (*h*) *Cuddapah.*—This is an engine station. It is well found and well laid out in every respect. (*i*) *Kamalápuram.*—The plan which was shown me, for certain alterations of both ends of the platform to allow of vacuum brake trains pulling up at the platform and watering their engines without uncoupling, was not suitable. It was agreed that another plan was to be submitted for sanction upon the lines agreed to during the inspection. (*j*) *Yerragudipád and Kalamalla.*—These are very cheap trial stations, they are apparently going to justify their opening. (*k*) *Muddanúru.*—Certain of the inhabitants of this place object to the mail train under the new timing not stopping here. This cannot be helped. (*l*) *Mangapatnam.*—This is a new crossing station, it is still on trial. (*m*) *Kondápuram.*—The European waiting room here may be converted into an oil room. (*n*) *Jootoor.*—This is not a station yet. It is a place about a mile from the Penner river, on a very high bank, where a trial station is asked for, mile 232/10. If opened it ought at first to be on the cheapest scale with a rail level platform and a couple of huts or waggon bodies. (*n*) *Jakkalacheruvu.*—The corrugated iron goods shed from here is to go to Molagavalli. (*o*) *Gooty.*—The re-arrangement of the Bombay-Madras mail trains undoubtedly necessitates a refreshment room here. At present the Company's staff quarters upstairs are used for the purpose. Anything built ought to be cheap and temporary, because within a year or two it is quite probable that the timing of the mail may be again altered, and the Guntakal refreshment room may have again to be brought into use for mail trains. (*p*) *Guntakal.*—Here the inspection party was met by the Agent, Southern Mahratta Railway, and it was agreed that the Madras Railway Company should put forward regular proposals for modifying certain schemes proposed by the Southern Mahratta Railway for enlarging the station building, schemes not acceptable to the Madras Railway Company. The south distant signal of this station was not properly visible to the man at the winch. (*q*) *Adoni.*—The south entrance of the yard is not well-arranged. A set of points from the goods yard are facing points for main line trains a long way outside the regular entrance facing points of the station, and goods trains have to shunt out on the main line when making up. These points should be removed and a dead end laid as personally explained during inspection. The Agent has promised to submit plans. (*r*) Just beyond the Tungabhadra bridge the villagers are anxious to get a trial station at mile 335. (*s*) *Ráichúr terminus.*—This is the junction with the Great Indian Peninsula Railway. The station belongs to and is controlled by the Madras Railway Company, as far as the north distant signal on the Bombay side. At both ends of this station are very objectionable facing points far outside station limits, the north ones being, perhaps, 400 yards and the south ones 600 yards outside the regular station facing points. The northern ones are of no real use and need only be removed, and to this the Agent agrees. The southern ones must also be removed and a shunting dead end substituted. For this the Agent promised to send in a plan. At Ráichúr station an open cotton shed wants walls between its pillars to keep out the rains; a chattram for native firemen is also wanted in connection with the new mail service. There is a certain run-round at the back of the engine shed which, whenever it is is used by the Locomotive Department, causes the main line to be fouled. Plans should be submitted for altering this, as talked over during the inspection, or otherwise.

11. *Watering arrangements.*—These are giving some trouble during the present dry season. The *Rénigunta* water has been pumped heretofore from a well close to a small river Thokak about a mile and a half away, but the supply has almost entirely failed, and there has been a delay of many months in giving the Company possession of a few yards of land to allow of their tapping the sand of the Thokak. The Madras Railway have, therefore, been obliged to refuse water at Rénigunta to the South Indian Railway who have had to train their water from a distance. There is thus a risk of the train service being disorganised, unless either the civil authorities soon make over the little strip of land or the well fills up again. At *Kódúru* the tank is being raised. At *Nandalúr* there is a scheme for supplying water for the new engine-station by pumping it from the Cheyar river. They now water engines $\frac{3}{4}$ mile north of *Cuddapáh* engine-station at the Buga river; here a hand-pump is wanted to replace the present bucket. The well at *Kondápuram* is nearly dry and water will probably have to be got from the Chitravati river over a mile away. There are arrangements for watering just at the Penner bridge north abutment. The Agent desires to make temporary use at *Gooty* of a steam-pump in lieu of the insufficient hand-pump now in use, pending the completion of a large scheme for bringing in water from a river a mile to the north by the steam-pump in question. This may be done. At *Guntakal* the Southern Mahratta Railway have a large watering scheme, but owing to the dry weather it has just now broken down completely, which makes it necessary for the Madras Railway to water up at Timmanacherla, thereby delaying the mail train. Between Áspari and Adóni are two temporary watering stations. I think that whenever it is possible and justifiable to do so a railway ought to try and get its water from the inexhaustible supplies in the large sandy-bedded rivers, even if it has to be pumped some distance, in such countries as those traversed by this section of the Madras Railway, where the always scanty supply in the wells is dependent upon the rainfall. Lack of water might easily prove a source of embarrassment during a heavy famine year with much extra grain traffic.

12. *Signals.*—Through the section the system in force is that the home bracket signals are at facing points and are worked from the station; the facing pointsman works the distant signal, the lever being alongside of him. Just beyond the facing points is a small starting signal for the outgoing train, worked in connection with Winter's electric block system which is in use throughout the line. But between Arkonam and Rénigunta is a regular museum of various systems of interlocking, all on their trial to see which is the best. At *Tiruttani* is Saxby and Farmer's system, pure and simple, with train protecting bar, applied to nine points, at a cost of about Rs. 8,000. *Nagari* station is fitted with a very neat instalment of Saxby and Farmer's hydraulic system; this is not quite ready yet, but looks business-like; the water is clean. *Puttúr* is fitted with Dutton's interlocking system at a cost of Rs. 5,000; when an engine runs through trailing points nothing breaks but the replacement is troublesome; this system strikes me as not too well adapted for local conditions. At *Púdi* is a modification of Anderson's system; the detectors are worked by wire, and the points are rodded. At *Mámandúru* station Stoney's interlocking system is in use. I was told that it has certain drawbacks in the wear of the selecting plate, but wear

must be more or less common to all systems. At *Peddapádu* the points are man-worked but are detected, the detectors being wired from the signals. At *Guntakal* the entrance points to the yard are guarded, but there is no interlocking or rodding. It is very desirable that, after a year or two of trial of so many different systems, the Company should make up their mind which one or two of the types are best suited to one or two types of station. I am disposed to think that for ordinary minor stations the cheap Peddapádu system is a good one, and for the large stations the Saxby and Farmer hydraulic; provided the water, when not good, is filtered; but there is a great risk of the copper pipes and fittings all over the yard being stolen.

13. *Schools, Institutes, Volunteering, &c.*—At *Rénigunta* I was shown the school and the running room; at *Cuddapah* the swimming bath and the institute; at *Gooty* the school, armoury and institute; and at *Ráichúr* the joint school and the institute. All seemed very satisfactory. The schools are under the control of the Madras Educational Department and receive regular grants-in-aid.

South-west Line 531·22 miles, Kolar Gold Fields 10 miles, and Madras-Ennúr Branch 8·45 miles.

Inspection Report by Mr. F. D. Fowler, Government Inspector of Railways, Madras, for the half-year ending 30th June 1897.

The inspection was made between the 22nd and 30th August. The Acting Agent, Chief Engineer, Traffic Manager and Locomotive Superintendent accompanied me throughout the inspection, and the district officers over their respective divisions.

2. **Miscellaneous.**—The line generally is well maintained, but the oscillation at speeds over 40 miles an hour is considerable.

The speed indicator suggested in a previous inspection report has been obtained, but was not ready for the inspection; the Chief Engineer reports favourably of Golightly's patent rail lifter suggested in a previous report, its use might now be extended.

A trolly with rubber tyres has been working satisfactorily for a year at Central Station; these might now be supplied at the larger stations.

The condition of the notice-boards is improved, but the fare-boards in vernacular need renewal at many stations: the use of glass covers for those which have been put up for experiment at a few stations should now be extended.

The strength of maintenance gangs on the Ennur branch has been reduced, but further reductions should be made; the Chief Engineer proposes to wait till December, the end of the present wet season, and then to reduce the gangs to the same strength as on the rest of the line. This may be accepted.

The District Engineers are not provided with inspection carriages which are only supplied to heads of departments. This is, I consider, a mistaken policy; for, without an inspection carriage, it is impossible for the Engineer to personally supervise a work (say bridge renewal) at a distance from a large station.

3. **Traffic.**—A revised time-table was introduced provisionally on 1st July giving a better service between Madras and Méttupálaiyam; it is defective in not giving a through train between Calicut and Méttupálaiyam and *vice versâ*. It seems difficult to imagine that the service between Calicut and Pódanúr, which gives two day trains each way within a few hours of each other all the way, can best meet the wants of the public. I understand that the time-table on this section is thus arranged in order to avoid the expense of additional staff which would be required by night running. In the next revision of the time-table this expense should be faced and more convenient trains run connecting with the Pódanúr-Méttupálaiyam as well as the Pódanúr-Madras service.

4. **Bridges (strengthening).**—Out of four spans of 50 feet remaining to be done, one was completed during the past half-year at 1/14 mile over Cochrane's canal; and one span is in progress at 175/8 miles on Bangalore branch, girders have been received; two spans remain to be done at 175/16 miles Bangalore branch.

The programme of strengthening the weak 64 feet girders appears to be waiting for decision of the Board on the manner of treating the Tungabhadra bridge, but there seems no reason why work should be delayed on those bridges which it has been decided to strengthen by adding an intermediate pier, *e.g.*, girders on Nilgiri branch and near Calicut, the designs for which have been prepared.

The abutments of the nine feet girder opening at mile 6/17 have bulged and the bridge will be rebuilt, segmental arch being used instead of the girder. The diversion has been put in.

An arch of 30 feet span at mile 168/9-10, Bangalore branch, is being replaced by a girder in order to give more headway.

Thin pieces of wood are frequently used for packing under the chairs; where packing pieces of a less thickness than one inch are required, wood should not be used.

5. **Ballast and Permanent-way.**—The progress of ballast covering has been as under:—

Section.	Covered.	Not covered.
Madras to Méttupálaiyam	327	...
Pódanúr to Calicut	...	111
Jalarpet to Bangalore	42¾	44¼

Mention has been made in previous reports of the condition of the old iron rails which have been in the road twenty to thirty years. Examination of the road at a few points showed that many of them are approaching their limit of life and that heavy renewals will be necessary in the near future. To provide the necessary material, and at the same time to secure continuity, 30 miles, single track, of 30-feet steel bull-headed rails are, I understand, being laid down annually on the South-west line to release 20-feet steel double-headed rails, which, in their turn, will replace old iron rails as they become worn out.

The oscillation referred to in paragraph 2 was most noticeable between the following points: Bowringpet—Malur, Whitefield—Krishnarájapuram, 15th mile —Tinnanúr, Virinchipuram—Gudiyáttam, Tirupati—Jalarpet.

And was least between Kullavi—Morapur, Tiruvallúr—Manur.

It is probably due to a variety of causes: to the respacing of the sleepers where 30-feet have replaced 20-feet rails; to the fact that the same section of tyre has to run on rails of two different sections; to the gauge for double-headed being unsuitable for bull-headed rails and, on the Bangalore branch, to settlement of the banks after heavy rains. As regards the gauge, experiments which have been made seem to show that a gauge of $\frac{1}{8}$th inch slack best suits the 30 feet bull-headed rail, the old gauge on the double-headed rail being $\frac{3}{8}$ths of an inch slack.

A statement of renewals of permanent-way is given in the appendix.

6. **Level Crossings.**—The Madras Municipality have agreed to pay half the cost of a foot-bridge at Elephant Gate crossing, where the traffic is very heavy.

A gateman's hut is wanted inside the distant signal at Washermanpet.

The interlocking of gates with signals at level crossings between Bangalore Cantonment and the City station is in progress, distant signals, which cannot be pulled off unless the gate is closed to the road, are to be put up for each gate.

7. **Stations and Buildings.**—It is proposed to light the *Central Station* with gas from the works which are close to it: to do this the gas works will require to be enlarged, but no estimate can be submitted until it is decided whether the East Coast Railway will draw their supplies from this source. The system of grouping points has been improved at this station by substituting spring catch levers for the ordinary pattern and fitting adjusting screws to the rodding. Additional accommodation for clerks in Traffic Manager's office is asked for.

The Agent proposes to build quarters at Elephant Gate for the Permanent-way Inspector, the Stationmaster and the Assistant Stationmaster of the *Salt Cottars* Station who now live in the town: the quarters will be expensive owing to the filling required, but no other site seems feasible.

The addition of another upper room to the Apothecary's house at *Perambur* is recommended.

The present arrangements of points and signals at *Ráyapuram* has long been recognised to be very inconvenient, and several derailments have occurred. It is proposed to abolish the block cabin and hydraulic signalling arrangement, bring the goods and locomotive sidings to a shunting neck, and the main points up to the south engine shed; the points to be grouped and worked from opposite south engine shed; the block cabin will be removed to the end of platform where all signal levers will be grouped; the signal wires will be fitted with detectors and detect all main line points. A cross-over road will be wanted at south end of *Washermanpet* station. A revised plan is under preparation. Estimated cost Rs. 8,000. An extension of the Audit office is proposed to accommodate the extra staff required for the Calicut-Cannanore Railway by adding an upper story to the present printing office, estimated cost Rs. 10,000.

8. **Bezwada-Madras Railway**, *Washermanpet.*—Platform needs lengthening another 300 feet, as it is much too short for feast traffic.

Approach road to *Tondaiyarpettai* completed, estimate for raising platform sanctioned for this and other stations on Ennúr line.

The Municipality have made their portion of the approach road to *Tiruvottiyúr*, a gate and metalled road up to station required.

Land for approach road to *Eranávúr* has been acquired; the road should be made and metalled and gates to station provided.

The approach road at *Ennúr* has been finished.

9. **Bangalore Branch.**—More siding accommodation is asked for at *Múlánúr* but must be deferred until new turn-table is put in.

It is proposed to put in a platform and station building at *Bisánattam*; the increased traffic appears to justify the expenditure.

The foot-bridge at *Bowringpet* has been completed and palisading is in hand, the turn-table has been shifted, but the sorting sidings are still not used. I understand that the Traffic Department are waiting for the return of the Traffic Manager before issuing orders.

At *Malur* the points for the horse-siding have been shifted to take off inside the main facing points as requested in a previous report. The walls of the ashpit need repair.

Materials for the new water-supply scheme at *Whitefield* are under supply.

The lay-bye points at *Krishnarájapuram* which are weighted for the dead-end should be fitted with treadle-bars.

The new 50-feet turn-table at *Bangalore cantonment* is in progress.

10. **Main Line.**—Increased accommodation in the third-class waiting-room is required at *Tinnanúr*, and this can easily be given as agreed to on inspection.

More accommodation in third-class waiting-room is required at *Chinnammápet* to be treated in the same way as Tinnanúr.

A trial refreshment-room in which cooked food is supplied to caste-natives has been in use for seven months at *Arkonam* and has paid its way.

It was suggested in a previous report that the electrical shops should be moved up to the engineering shops and the building thereby released be used for quarters for the staff. No decision has been arrived at in this, or in the matter of improvements to the engineering shops. The plant for electrical lighting of the station and yard has been received, but the whole scheme is in abeyance pending the selection of a site for the power-house, which in its turn has to wait till the scheme for re-arrangement of the yard is settled.

A fruit-stall should be provided at *Vániyambádi and Erode.*

The turn-table has been shifted and the re-arrangement of sidings is in progress at *Olavakkót*. The station building is very old and should be replaced by a more modern building.

A bath-room wanted for the ladies' waiting-room at *Palghat* and pucca doors for the rooms.

A latrine is wanted at *Kéttándapatti.*

Spring-catch levers should be substituted at the grouped points for the ordinary levers at *Jalarpet* as has been done at Central Station.

An overbridge for local passengers will be required at *Méttupálaiyam* when the Nilgiri Railway starts work; the bufferstops at end of yard require shifting to make room for a road to Nilgiri goods-shed. The waiting room accommodation is inadequate, but improvements should remain in abeyance until the effect of the Nilgiri Railway is seen.

There is no fare-board in the third-class waiting-room at *Calicut.*

An extension of the refreshment room has been asked for at *Salem* as well as at *Pódanúr*; the breakfast and dining stations will probably be altered soon by a new time-table. Meantime more space can be got by using a number of small tables instead of the present unnecessarily wide one.

The signals at *Washermanpet* are badly arranged; a scheme is ready for submission providing bracket signals at main line points to be worked from platform.

Plans have been prepared for moving the station signals of *Bowringpet Junction* up to the points and for detecting all points.

APPENDIX A.

MADRAS RAILWAY.

Renewals of permanent-way during the half-year ending 30th June 1897 as furnished by the Company's Chief Engineer.

South-West Line.

2,738	Bull-headed 30-feet steel rails	(= 7·78 miles) laid.
3,661	New and second hand double-headed 20-feet steel rails	(= 6·93 „) „
113	New and second hand flat bottom 20-feet steel rails	(= 0·22 „) „
4,526	Second hand double-headed 20-feet iron rails.	(= 8·57 „) „
11,038 rails.		= 23·50 miles.
5,443	Pot sleepers	(= 1·72 miles) renewed.

North-West Line.

1,002	Second hand double-headed 20-feet iron rails...	(= 1·90 miles) laid.
1,136	Do. 20-feet steel rails.	(= 2·15 „) „
19	Second hand flat bottom 20-feet steel rails ...	(= 0·03 „) „
2,157 rails.		= 4·08 miles.
2,114	Pot sleepers	(= 0·67 miles) renewed.

Remarks by the Senior Government Inspector of Railways, Madras.

1. I inspected the North-west line myself, so need say no more than I have already said at pages 2 to 6 of this report. Since Mr. Fowler's inspection of the South-west line and its branches I have myself gone over it with the Acting Chief Engineer, and now have the following remarks to offer.

2. *Permanent Way.*—The oscillation at high speed over the new rails is undoubtedly very pronounced. It is rather a *swaying* in a horizontal plane than an oscillation in a vertical plane, and is ascribed, I understand, by the Company's Engineers less to the respacing of the pot-sleepers than to the fact that the groove worn in the wheel tyres by the old rail, the radius of whose head was small, does not fit the broader, flatter head of the new rail. A different explanation is offered by the Locomotive Superintendent, viz., that the small curve at the shoulder of the new rails does not fit the curve of the wheel flange which best suits the old rail. But, whatever may be the true explanation of the swaying, it will doubtless in due course disappear when the length of line provided with new rails so considerably exceeds that provided with the

old that the tyre section can be reconsidered, and the gauge of the new rails perhaps slightly altered. Mr. Stoney, the Company's Chief Engineer, has invented a large double pot-sleeper for joints; my opinion of it is very favourable. The Company might with advantage, in the ordinary course of renewals, replace, for a couple of miles, the ordinary pots at the joints by Stoney's double pots, so that a fair trial of them may be made. If not already done the jaws on each double pot ought to be right and left handed to prevent creep. Mr. Winter's cotter to allow of a key being driven the reverse way at each joint is a good contrivance, but to keep a few reverse chairs, say, one-eighth of the whole, in stock would be better. The Company rigorously adhere to their practice of using wooden sleepers over all culverts. This is all very well, but may be carried too far as when two wooden sleepers are found over a petty 3-foot arch, even though there is a good cushion of earth below. This custom might well be relaxed in the case of all arches below, say, 10-foot span.

3. *Bridges.*—I agree with Mr. Fowler that no further delay should take place in the strengthening of those bridges where it has been decided that the strengthening shall be done by the building of intermediate piers. I noticed on the Bangalore City extension that paltry packing-pieces of wood had been used to give camber at some of the culverts on curves. This should be put a stop to and the sleepers or the bearing plates properly carpentered. The Ferok bridge, 850 feet in length, is used entirely successfully as a level crossing for road traffic, and so also is a large bridge near Olavakkót on the Palghat branch. The arrangement is said to be quite satisfactory to the railway men. This system might with great advantage be far more widely used throughout India, and especially where such a bridge is in the immediate neighbourhood of a large town on the banks of a river not otherwise bridged.

4. *Water-supply.*—There is an old-established practice throughout the Madras Railway—a practice, however, which seems to have no scientific basis—of erecting an expensive standpipe, ending either in a very diminutive tank on top or, as often as not, with no tank at all, whenever water has to be pumped any considerable distance from a well or river to the station tank. The idea seems to be (but it may be only "*mamool*") that the pump has less work to do when pumping against a standpipe than if it pumped direct through the horizontal pipe; as if the extra height to be given to the standpipe had not to be just the equivalent of that due to the friction in the long supply pipe. If this extra height were cut off, and if the standpipe were caused to discharge into a tank of sufficiently large relative volume to allow of the water slowly passing at leisure through a very much smaller, and therefore cheaper, supply pipe to the main tank at the station, there might be something to be said for the arrangement. But the present system seems to me to be quite without justification, and future installations of the sort should not be sanctioned unless the Engineers of the railway can justify them by some argument of which I have at present no knowledge.

5. At Bangalore Cantonment station, the water-supply arrangements are crude and unscientific. Half a mile off from the station supply tank there are three not very satisfactory wells down in a valley. They are in rock near the bottom and do not give much of a supply in dry weather. The crudeness lies in the pumping arrangements. Besides the three wells, which lie more or less in a line within 100 yards, there is a sumph, and at the sumph is a steam pump. All these wells are hand-pumped or baled *up* 20 or 30 feet and then *down* again into the sumph, and the water is thence steam-pumped half-a-mile to the station (curiously enough in this case *without* a stand pipe). It could apparently be easily arranged that the steam pump should draw direct from all three wells, and it might be found possible to connect them by pipes driven by jacks horizontally from well to well. If the pump barrels are so small in volume as compared with the volumes of the section pipes that they "suck air" for a while, the obvious remedy, as is done with a donkey engine that cannot conveniently be fixed close to the surface of the water, is to reduce the diameter of the suction pipes, and add non-return valves. The object is to get rid of the labour now employed on the three wells. I am informed, however, by the Superintending Engineer, Military Works, that when the new Bangalore water-supply arrangements are complete, it will probably be found possible to give the railway all the water it requires.

6. There is a large sanctioned estimate for a well and pumping arrangements at the south of the line at Jallarpet junction. This is said not to be wanted now, or to have been a failure, so the unexpended part of the estimate must in that case be cancelled, and the unused piping and other material put into store. At Buddireddippatti a larger tank is wanted, because the water at Mallápuram fails in the dry season.

7. *Catch Sidings.*—It seems necessary that some general principles should be laid down about the instalment of catch sidings on the Madras and other railways in this circle, because so far they seem to have been put in upon no discoverable principle. I have already referred to this subject in my inspection report on the Nizam's Guaranteed State Railway, and in my comments on Mr. Scovell's report on the South Indian Railway.

(*a*) The first principle which I would like to see laid down is that catch sidings must be presumed to be ordinarily unnecessary for runaway *engined trains*, and that they must be considered as intended primarily and usually for the purpose of stopping the career of vehicles or trains uncontrolled by an engine. An engined train *ought* to be braked sufficiently to make it all but impossible for it to get out of control, especially on such grades as 1 in 100 and 1 in 150, where the Madras Railway think it necessary—capriciously as it seems to me—to occasionally put in catch sidings.

(*b*) A catch siding off a main line is an ever present source of danger, whereas a runaway train is only a very occasional source of danger. To lay in a catch siding, therefore, which is always open for the main line is to arrange for a possible accident to every train which passes it. This is confirmed by the fact that numerous instances have actually occurred in this circle, so I am informed, of ordinary trains not runaways, and sometimes also runaways, getting themselves into the so-called catch sidings.

(*c*) The only circumstances under which it is permissible for a catch siding to be open to the main line for all trains is when the line is on a continuous and very stiff (relative to brake power) grade, and when the stations are either not on the level at all or on only very short bits of level, and especially at recognized and standard crossing places on short lines where such crossing places are limited in number and are on dangerous grades. The object in view in such a case is to make the driver feel that he *must* pull up dead. Under such circumstances as these the catch siding ought actually to be what it purports to be, and not merely a short derailing siding where a runaway train, perhaps full of passengers, has no alternative but total destruction. The catch sidings shown to me on the Madras Railway are smashing sidings not catch sidings, for full runaway trains. It is only a vehicle or two or a stray light engine that could hope to run full into them at any speed without going over the end to certain smash.

(*d*) At short level stations amidst heavy grades, or at stations *on* a grade, catch sidings are undoubtedly necessary to prevent vehicles from breaking loose and running down the main line while being hand shunted. But in such cases as these it is obviously better, if possible, to altogether prohibit hand shunting on the main line and to provide long shunting dead ends. Where it is not possible to absolutely prohibit it, and a catch siding off the main line is thought necessary, such catch siding ought to be as near to the outer facing-points as possible, and to be normally locked against main line trains, and only opened, and that invariably under the strictest rules, when hand shunting is in progress.

8. At Jallarpet there is a catch siding a full quarter mile outside the down grade end of the station, off grades of 1 in 213 and 159, so that it is obviously intended only for uncontrolled vehicles, and need not therefore be so far outside the facing-points, nor ought it to be normally set open for the main line, to the imminent danger of all trains.

9. At Mallápuram and at Wálayár the catch sidings have been arranged on conflicting principles. Mallápuram station is itself on a grade of 1 in 220 and at both sides of it are grades of 1 in 120 in the same direction as the station grade. Here there is a siding *between* the main line and the platform siding so that a satisfactory arrangement of a catch siding is not easily practicable. It is worth considering whether *all* the shunting sidings at Mallápuram had not better be moved off to one side, and none left between the main line and the station platform, and they could

then be properly trapped. It is here that the loads are made up for the ghât and hence the necessity for a good deal of shunting. It is worth considering whether Lokúr station at mile 186½ would not be a better place than Mallápuram for making up the ghât loads.

10. *Engine tire sections.*—There is, I learn, a long-standing source of difference between the Engineers of the road and the Locomotive Engineers about the minimum permissible tire flange section. The former ascribe many derailments at switches to the thinness of the flanges of engine leading-wheels, whereas the latter ascribe these derailments to the use by the Company of a pattern of tongue rail which I understand is not considered the most suitable, inasmuch as it is not sufficiently housed within the stock rail. The question in dispute might with advantage be handed up, with full details, by the Agent for the Consulting Engineer's consideration.

11. *Ballast.*—I frequently noticed that drains in the ballast had been cut at the rail joints. This is wrong: the drains usually two per rail, ought to be cut anywhere but at the rail joint. I was told that since the sand ballast, all but universally used on the Madras Railway, has been to a great extent covered with a thin layer of broken stone, quite a large number of ballast waggons have become available for traffic purposes, as so much less sand than formerly is now blown away by the wind.

12. *Bowringpet Junction.*—Here a consistent system of detected switches and signals is badly wanted for the heavy traffic to the gold fields. The shunting gridiron which has been laid in here does not work satisfactorily.

13. *Jalarpet Junction.*—The platform wants a better surface put on it. The locomotive yard wants draining. The arrangement of rodded points at this station in connection with what are called the "famine sidings" is susceptible of great improvement as talked over on the ground; for this estimates should be submitted. The facing-points leading from the "famine sidings" on to the main line far outside station limits ought to come out at once, unless very good reasons—unapparent at present to me—can be shown for retaining them. These sidings are quite long enough to render shunting out on the main line unnecessary, and a train made up in them had better come in to the station in the usual manner before starting instead of taking a short cut *viâ* these objectionable points on to the main line. The arrangement at present in use necessitates two distant signals at the west end of the junction, one of them being auxiliary.

14. *Salem Station.*—At this important station everything about the sidings seems right, except that the line from the engine-shed runs direct through trailing points on to the passenger lines. But this defect is shared by all, or nearly all, the engine stations on the Madras Railway. As opportunity offers this should be set right. A good deal of tidying up and re-arranging of station sidings, and straightening out of the serpentine gathering lines which are so common on this railway, might be gradually done during the slack season, by concentrating the road gangs for this special work for a few days occasionally, without appreciable extra expense to revenue. The gathering lines and general siding arrangements on the South Indian Railway are a marked contrast to those on the Madras Railway.

15. *Erode Station.*—It seems likely that in the near future, when the Company can bring themselves to recognize the desirability of smartening up the time-tables of the South-west line, Erode will need a larger refreshment room. It is proposed, therefore, to turn the present third-class waiting-room into a refreshment room, and to build a new waiting shed. Of the several schemes proposed for this latter, the preferable one seems to be to build the new third class waiting shed at the east end, near the over-bridge and the latrine.

16. *Tiruppúr Station.*—Here I ascertained that a very considerable export comes on the line from Dharmapuram and Udamalpet chiefly for the Bellary side. The imports are chiefly iron and twist. This fact about the origin of the outward traffic has an important bearing upon the question of the agency by which the proposed Dindigul branch should be constructed.

17. *Bangalore Cantonment Yard.*—This is a very unsatisfactory yard. It is approached from the south by a curve of 1,188 feet radius and it is only 800 or 900 feet from the end of this curve to the beginning of the platform. But entering trains have to pass over no less than four facing-points before reaching the platform,

and the first of these is a very dangerous and ugly one out on the curve. Two of these—the two outer ones—could, apparently, be got rid of—one, that leading to the goods yard, and the other leading direct to the locomotive yard. It appears, from such a study of the plan and of the ground as was feasible, that both the switches might be made trailing. It seems also that the remaining points might come off the straight instead of off the curve. Plans should be sent in for the improvement of this yard upon the general lines referred to above and discussed on the ground.

18. *Bangalore City Station.*—The few miles of road between the Cantonment and City station are very cramped, with curves of too tight a radius to allow of heavy engines working up from Jalarpet; though, in view of the heavy coal and timber traffic for the gold fields and of the heavy gradients, it would be very advisable that heavy engines should be used. It may turn out to be worth while to see what can be done to effect an improvement in these curves; though, owing to the existence of many private residences as well as of a palace of His Highness the Maharajah of Mysore close to the line, improvement will be difficult. The actual entrance to the City station yard is very cramped, being on a tight curve. It seems as if this might be easily improved. Very heavy business is done at this station, which is a joint station worked by the Southern Mahratta Railway.

19. *Joint Stations.*—Both at Erode and Arkonam, where the Madras and South Indian Railways join, the separate Companies keep separate station masters. This arrangement seems susceptible of improvement with advantage in economy and in smoothness of working.

20. *The Ennúr Branch.*—On August 11th I inspected this short section of the East Coast Railway which is worked by the Madras Railway Company. I was accompanied by the Chief Engineer of the Bezwada-Madras Railway, Mr. Moore, and by Mr. Strange, Resident Engineer of the Madras Railway. The road was inspected from a trolly; and here I may refer to the most inconvenient riding trollies of the Madras Railway Company, which weigh 6½ cwt., viz., 3¼ cwt. for the bodies and 2¼ cwt. for the wheels. They would in other parts of India be called heavy lorries, and as a fact they are so difficult to lift off the line that they are treated as heavy lorries and are always preceded and followed by men running with red flags. Naturally it is practically impossible to put them into or take them out of a break van, so that an inspecting or maintenance officer or subordinate is very heavily handicapped in getting about. To make matters worse, they keep no regular trollymen, but pick up men from the gangs, or not, as they go along at a snail's pace. The pattern of light trolly almost universally used in Northern India might be introduced on the Madras Railway with great advantage to their maintenance officers' powers of getting about. The road on the Ennúr branch is in a very slovenly condition in spite of an unusually strong force of men. I could see that the packing of the road had been utterly neglected, and if this goes on the rails will get hogged beyond repair.

21. *Workshops.*—On August 10th, I inspected the Perambúr locomotive, carriage and waggon shops in company with the Locomotive Superintendent, Mr. Phipps. On the 13th, I inspected the Electrical and Engineering shops at Arkonam in company with Mr. Pigott, Officiating Telegraph Engineer. Everything at Perambúr seemed to be in excellent order, though a bit cramped in places. If the Madras Railway Company get the working of the East Coast Railway, more accommodation will undoubtedly be necessary at Perambúr. The Arkonam electrical work was much of it beyond me, but none the less interesting for all that, and the workshops in very good order. At Arkonam, too, the Electrical Engineer makes all the aërated waters for the refreshment rooms throughout the line which are worked direct by the Company. All seemed wholesomely and cleanly managed.

22. *General.*—The attention of the Agent is invited to the several matters brought to his notice throughout this inspection report, whether my own or Mr. Fowler's, and he is requested to report in detail what he proposes to do in the way of remedying such defects as have come to notice during the inspection.

F. J. E. SPRING,
Senior Govt. Inspector of Rys., Madras.

OOTACAMUND,
28th August 1897.

ORDER—No. 691 R., dated 20th September 1897.

Communicated to the Agent and Manager, Madras Railway, for information and necessary action.

2. The attention of the Revenue Department is drawn to paragraph 5 of the report regarding the collection of ballast by famine labour.

3. The want of a feeder road at Siddhavattam referred to in paragraph 10 is brought to the notice of the Local and Municipal department.

4. A copy of these Proceedings will be forwarded for the information of the Government of India.

[Here enter No. 692 R., dated 20th September 1897.]

(True Extract.)

(Signed) F. J. E. SPRING,
Offg. Joint Secy. to Govt.,
Railway Branch.

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

Exd. Shaik Karim.

MADRAS RAILWAY.

STANDARD 5′ 6″ GAUGE.

Total mileage open for traffic, 857·67 miles including Kolar Gold Fields Railway and Madras-Ennur Section of the Bezwada-Madras Railway.

North-West Line, 308 miles.

Inspection report by Mr. F. J. E. Spring, Senior Government Inspector of Railways, Madras, for the half-year ending 30th June 1897.

1. The inspection was made on the 5th, 6th and 7th of July in company with the Acting Agent, the Locomotive Superintendent, the Traffic Superintendent, the Acting Chief Engineer and, in their several sections, the junior officers of the various departments.

2. *General.*—The running throughout is ~~excellent~~. The double-headed rail on heavy pot sleepers, of which practically the whole of the branch consists, makes an excellent road in spite of the shortness, 20 feet, of the rails. Joints are stiff and as a rule well packed, and the road is fit for any speed likely to be asked for.

3. *Banks and Cuttings.*—These throughout are in ~~excellent~~ order.

4. *Bridges and Culverts.*—The masonry of practically all the bridging on the section has been built for a double line.

(*a*) The culvert of three 12-foot arches at mile 87¼, No. 210, needs flooring. The 4 twenties, No. 211, close by, wants its river-bed attended to.

(*b*) The bridge near mile 95 was finished but the line was still on a diversion. I told the Agent that the line might be shifted on to the bridge as soon as his Chief Engineer could assure me that the approaches were safe.

(*c*) The bridge over the Madura river, mile 107, had had an abutment and a pier washed away, and the road was carried over the gap by strong but temporary supports. The river requires an important diversion up-stream, and well pitched training bunds. Though some stone has been collected the bridge and the diversion will certainly not be ready this season. No stones of less than 80 lb. weight ought to be used on the slope and apron of the training bund.

(*d*) *The Cheyar bridge.*—This is 50 spans of 70 feet girders, each girder being the half of a continuous girder of 140 feet. The problem now is to strengthen the old girders. Twenty-eight of the spans were doubled years ago, two girders being placed beneath each rail; eighteen of the spans have now to be doubled, girders taken out of the old Tungabadra bridge of the Madras Railway being used for the purpose. It is proposed to strengthen the remaining four spans, which are land spans, by putting central piers beneath them. These proposals seem satisfactory.

(*e*) *Ralavalka, Papaghni and Chitravati bridges.*—On these long bridges no provision has been made to prevent the undue pulling about of rails and longitudinal sleepers at the places where two contiguous girders are allowed to expand and contract. And to make this trouble more pronounced two roller ends have been arranged on one pier and two fixed ends on the next, instead of a fixed and a rolling end on each pier. Thus, while the rolling ends of two contiguous girders are pulling and pushing through a space of two or three inches with an almost irresistible force, they are connected together, in the rail troughs, by continuous timbers; and when the timbers have in some instances been intelligently cut over the pier, no corresponding precaution has been taken with the rails, which are coach-screwed down to the timber without a chance of sliding. The natural result was found to occur, viz., that, in the neighbourhood of the piers where rolling ends meet, coach screws, bolts, nuts and fastenings are to be found loose or bent or broken, and the road at these places cannot be said to be likely to remain long in a safe condition. The remedy is to cut all longitudinal sleepers, leaving a space of fully three inches for expansion over the piers where the rolling ends are located. Then

the rails, instead of being coach-screwed down through round tight holes in the foot as at present, should either have these holes made oval for at least a rail length at each side of the pier, and the coach screws not driven too tight, or else they should be merely dogspiked down, as on most State Railways, so that the girders together with their timbers may expand and contract freely without pulling the rails about. A few tie bars across from rail to rail near the expansion places would be desirable to prevent spreading, and a joint or too of fishbolts might be left not too tight. A better remedy than anything else is the rail expansion joint as used on the Bezwada-Kistna bridge.

(*f*) There is a very skew bridge of very light 20 feet girders between Kamalápuram and Yerragudipad stations; so skew that the centre of the down-stream girder comes opposite the pier end of its up-stream fellow. The result is so dangerous an oscillation under trains at speed that it is proposed to substitute arches in short square sections for the girders. The proposal is a good one, and meanwhile speed is limited to five miles per hour.

(*g*) *Tungabhadra bridge.*—There is a large question, involving lakhs, for replacing the girders of this bridge by stronger ones, and the Company have accepted the necessity for the replacement, but it is not yet settled how it shall be done. Of the 58 spans of old 70 feet girders of which this bridge consists, I would unhesitatingly recommend the filling in of 6 or 8 spans at the south end and perhaps the same at the north end. The spans in question carry no flood worth considering; they are simply land spans over jungle country and rice fields, and if a few feet of water runs over this land for a few days every few years, it runs at so slight a velocity, probably not more than 4 ft. per second, that the volume so carried might well be allowed to find its way through the remaining openings. The resulting afflux will probably not be more than a few inches with no extra velocity likely to give trouble. The beds of the middle spans are rock, and even if the waterway were so restricted that an afflux of two feet resulted instead of five or six inches, no harm would be done. I have asked the Agent and his Chief Engineer to bear these considerations in mind when sending up their scheme for the replacement of the old girders by new ones.

5. *Ballast.*—The whole, or practically the whole, of the ballast is sand or fine gravel. This is very dusty in dry weather, and it is being gradually covered with a thin coating of broken stone. This broken stone might very well be collected all along by famine labour, if any such is available, as is being extensively done on the East Coast Railway. The work might with advantage be expedited.

6. *Rails.*—The old iron 20-foot rails are being gradually replaced by new steel rails. The road is throughout in excellent order. I was shown places said to be in very urgent need of renewals, as the top table of some of the rails showed signs of splitting. But I am of opinion that rail renewals need not be pushed very vigorously if the undoubtedly bad rails are carefully taken out and replaced; a large number of sufficiently good ones have still a life of many years in them.

7. *Sleepers.*—These are everywhere cast-iron pots, except in cuttings with hard bottoms and over all culverts and bridges where they are teak. The road is said to be opened out twice a year and all cracked sleepers and corroded ties and fastenings attended to. All seemed in very good order.

8. *Fencing.*—Practically the whole of the section is fenced with aloe of sorts. This is very unsatisfactory, as a certain number of individual plants die off and great gaps occur. In places there is dry stone fencing, and in places wire, but it is mostly aloe.

9. *Stations generally.*—It would be easy to pick out small faults everywhere, occasional broken glass, or worn flags, misplaced tiles, want of whitewash, &c. But taking them all round the stations are in very good order and everything very neat, and I would not encourage the spending of money on making such things better than the actual demand for public safety and convenience necessitates. Indeed in the past, on this as on other old guaranteed lines, far too much has been spent upon such non-essentials. Everywhere I found the convenience and comfort of passengers, European and Native, well provided for: latrines, water filters, &c., were all as they ought to be. The half-yearly inspection seems to be the great occasion for a coat of "eye-wash" all round, but that is no harm.

10. *Particular stations*—(*a*) *Arkonam.*—There is a very extensive proposal for the remodelling of this station yard. I think the modification, to allow of accommodation for more goods trains and better shunting, might be done more economically. A plan suggesting the approved modification has been sent to the Agent. (*b*) *Ponpadi.*—This trial station has for the present only a couple of waggon bodies for all its accommodation, when it finds itself deserving of more it will doubtless get it. (*c*) *Rénigunta.*—This is where the Madras Railway is crossed by the South Indian, and is an engine station. It is one of the three regular engine stations—Gooty, Cuddapah and Rénigunta—between Ráichúr and Madras. But for fast trains one new changing station, Nandalúr, is being inserted so as to have two runs instead of three between Gooty and Madras. (*d*) *Mámandúru, Peddapádu and Úrampádu* have their station buildings down below on the ground on a low level, this is said to be unsatisfactory. (*e*) *Nandalúr.*—Here the new locomotive arrangements and quarters are all but ready. (*f*) *Vontimitta.*—Here the Traffic are asking for an oil room, which seems to be wanted. (*g*) *Siddhavattam.*—I was told that a feeder road to a large village about four miles out is badly wanted here. (*h*) *Cuddapah.*—This is an engine station. It is well found and well laid out in every respect. (*i*) *Kamalápuram.*—The plan which was shown me, for certain alterations of both ends of the platform to allow of vacuum brake trains pulling up at the platform and watering their engines without uncoupling, was not suitable. It was agreed that another plan was to be submitted for sanction upon the lines agreed to during the inspection. (*j*) *Yerragudipád and Kalamalla.*—These are very cheap trial stations, they are apparently going to justify their opening. (*k*) *Muddanúru.*—Certain of the inhabitants of this place object to the mail train under the new timing not stopping here. This cannot be helped. (*l*) *Mangapatnam.*—This is a new crossing station, it is still on trial. (*m*) *Kondápuram.*—The European waiting room here may be converted into an oil room. (*n*) *Jootoor.*—This is not a station yet. It is a place about a mile from the Penner river, on a very high bank, where a trial station is asked for, mile 232/10. If opened it ought at first to be on the cheapest scale with a rail level platform and a couple of huts or waggon bodies. (*n*) *Jakkalacheruvu.*—The corrugated iron goods shed from here is to go to Molagavalli. (*o*) *Gooty.*—The re-arrangement of the Bombay-Madras mail trains undoubtedly necessitates a refreshment room here. At present the Company's staff quarters upstairs are used for the purpose. Anything built ought to be cheap and temporary, because within a year or two it is quite probable that the timing of the mail may be again altered, and the Guntakal refreshment room may have again to be brought into use for mail trains. (*p*) *Guntakal.*—Here the inspection party was met by the Agent, Southern Mahratta Railway, and it was agreed that the Madras Railway Company should put forward regular proposals for modifying certain schemes proposed by the Southern Mahratta Railway for enlarging the station building, schemes not acceptable to the Madras Railway Company. The south distant signal of this station was not properly visible to the man at the winch. (*q*) *Adoni.*—The south entrance of the yard is not well-arranged. A set of points from the goods yard are facing points for main line trains a long way outside the regular entrance facing points of the station, and goods trains have to shunt out on the main line when making up. These points should be removed and a dead end laid as personally explained during inspection. The Agent has promised to submit plans. (*r*) Just beyond the Tungabhadra bridge the villagers are anxious to get a trial station at mile 335. (*s*) *Ráichúr terminus.*—This is the junction with the Great Indian Peninsula Railway. The station belongs to and is controlled by the Madras Railway Company, as far as the north distant signal on the Bombay side. At both ends of this station are very objectionable facing points far outside station limits, the north ones being, perhaps, 400 yards and the south ones 600 yards outside the regular station facing points. The northern ones are of no real use and need only be removed, and to this the Agent agrees. The southern ones must also be removed and a shunting dead end substituted. For this the Agent promised to send in a plan. At Ráichúr station an open cotton shed wants walls between its pillars to keep out the rains; a chattram for native firemen is also wanted in connection with the new mail service. There is a certain run-round at the back of the engine shed which, whenever it is is used by the Locomotive Department, causes the main line to be fouled. Plans should be submitted for altering this, as talked over during the inspection, or otherwise.

11. *Watering arrangements.*—These are giving some trouble during the present dry season. The *Rénigunta* water has been pumped heretofore from a well close to a small river Thokak about a mile and a half away, but the supply has almost entirely failed, and there has been a delay of many months in giving the Company possession of a few yards of land to allow of their tapping the sand of the Thokak. The Madras Railway have, therefore, been obliged to refuse water at Rénigunta to the South Indian Railway who have had to train their water from a distance. There is thus a risk of the train service being disorganised, unless either the civil authorities soon make over the little strip of land or the well fills up again. At *Kódúru* the tank is being raised. At *Nandalúr* there is a scheme for supplying water for the new engine-station by pumping it from the Cheyar river. They now water engines $\frac{3}{4}$ mile north of *Cuddapah* engine-station at the Búga river; here a hand-pump is wanted to replace the present bucket. The well at *Kondápuram* is nearly dry and water will probably have to be got from the Chitravati river over a mile away. There are arrangements for watering just at the Penner bridge north abutment. The Agent desires to make temporary use at *Gooty* of a steam-pump in lieu of the insufficient hand-pump now in use, pending the completion of a large scheme for bringing in water from a river a mile to the north by the steam-pump in question. This may be done. At *Guntakal* the Southern Mahratta Railway have a large watering scheme, but owing to the dry weather it has just now broken down completely, which makes it necessary for the Madras Railway to water up at Timmanacherla, thereby delaying the mail train. Between Áspari and Adóni are two temporary watering stations. I think that whenever it is possible and justifiable to do so a railway ought to try and get its water from the inexhaustible supplies in the large sandy-bedded rivers, even if it has to be pumped some distance, in such countries as those traversed by this section of the Madras Railway where the always scanty supply in the wells is dependent upon the rainfall. Lack of water might easily prove a source of embarrassment during a heavy famine year with much extra grain traffic.

12. *Signals.*—Through the section the system in force is that the home bracket signals are at facing points and are worked from the station; the facing pointsman works the distant signal, the lever being alongside of him. Just beyond the facing points is a small starting signal for the outgoing train, worked in connection with Winter's electric block system which is in use throughout the line. But between Arkonam and Rénigunta is a regular museum of various systems of interlocking, all on their trial to see which is the best. At *Tiruttani* is Saxby and Farmer's system, pure and simple, with train protecting bar, applied to nine points, at a cost of about Rs. 8,000. *Nagari* station is fitted with a very neat instalment of Saxby and Farmer's hydraulic system; this is not quite ready yet, but looks business-like; the water is clean. *Puttúr* is fitted with Dutton's interlocking system at a cost of Rs. 5,000; when an engine runs through trailing points nothing breaks but the replacement is troublesome; this system strikes me as not too well adapted for local conditions. At *Púdi* is a modification of Anderson's system; the detectors are worked by wire, and the points are rodded. At *Mámandúru* station Stoney's interlocking system is in use. I was told that it has certain drawbacks in the wear of the selecting plate, but wear must be more or less common to all systems. At *Peddapádu* the points are man-worked but are detected, the detectors being wired from the signals. At *Guntakal* the entrance points to the yard are guarded, but there is no interlocking or rodding. It is very desirable that, after a year or two of trial of so many different systems, the Company should make up their mind which one or two of the types are best suited to one or two types of station. I am disposed to think that for ordinary minor stations the cheap Peddapádu system is a good one, and for the large stations the Saxby and Farmer hydraulic; provided the water, when not good, is filtered; but there is a great risk of the copper pipes and fittings all over the yard being stolen.

13. *Schools, Institutes, Volunteering, &c.*—At *Rénigunta* I was shown the school and the running room; at *Cuddapah* the swimming bath and the institute; at *Gooty* the school, armoury and institute; and at *Ráichúr* the joint school and the institute. All seemed very satisfactory. The schools are under the control of the Madras Educational Department and receive regular grants-in-aid.

South-west Line 531·22 miles, Kolar Gold Fields 10 miles, and Madras-Ennur Branch 8·55 miles.

Inspection Report by Mr. F. D. Fowler, Government Inspector of Railways, Madras, for the half-year ending 30th June 1897.

The inspection was made between the 22nd and 30th August. The Acting Agent, Chief Engineer, Traffic Manager and Locomotive Superintendent accompanied me throughout the inspection, and the district officers over their respective divisions.

2. **Miscellaneous.**—The line generally is well maintained, but the oscillation at speeds over 40 miles an hour is considerable.

The speed indicator suggested in a previous inspection report has been obtained, but was not ready for the inspection; the Chief Engineer reports favourably of Golightly's patent rail lifter suggested in a previous report, its use might now be extended.

A trolly with rubber tyres has been working satisfactorily for a year at Central Station; these might now be supplied at the larger stations.

The condition of the notice-boards is improved, but the fare-boards in vernacular need renewal at many stations: the use of glass covers for those which have been put up for experiment at a few stations should now be extended.

The strength of maintenance gangs on the Ennur branch has been reduced, but further reductions should be made; the Chief Engineer proposes to wait till December, the end of the present wet season, and then to reduce the gangs to the same strength as on the rest of the line. This may be accepted.

The District Engineers are not provided with inspection carriages which are only supplied to heads of departments. This is, I consider, a mistaken policy; for, without an inspection carriage, it is impossible for the Engineer to personally supervise a work (say bridge renewal) at a distance from a large station.

3. **Traffic.**—A revised time-table was introduced provisionally on 1st July giving a better service between Madras and Méttupálaiyam; it is defective in not giving a through train between Calicut and Méttupálaiyam and *vice versâ*. It seems difficult to imagine that the service between Calicut and Pódanúr, which gives two day trains each way within a few hours of each other all the way, can best meet the wants of the public. I understand that the time-table on this section is thus arranged in order to avoid the expense of additional staff which would be required by night running. In the next revision of the time-table this expense should be faced and more convenient trains run connecting with the Pódanúr-Méttupálaiyam as well as the Pódanúr-Madras service.

4. **Bridges.**—Out of four spans of 50 feet remaining to be done, one was completed during the past half-year at 1/14 mile over Cochrane's canal; and one span is in progress at 175/8 miles on Bangalore branch, girders have been received; two spans remain to be done at 175/16 miles Bangalore branch.

The programme of strengthening the weak 64 feet girders appears to be waiting for decision of the Board on the manner of treating the Tungabhadra bridge, but there seems no reason why work should be delayed on those bridges which it has been decided to strengthen by adding an intermediate pier, *e.g.*, girders on Nilgiri branch and near Calicut, the designs for which have been prepared.

The abutments of the nine feet girder opening at mile 6/17 have bulged and the bridge will be rebuilt, segmental arch being used instead of the girder. The diversion has been put in.

An arch of 30 feet span at mile 168/9-10, Bangalore branch, is being replaced by a girder in order to give more headway.

Thin pieces of wood are frequently used for packing under the chairs; where packing pieces of a less thickness than one inch are required, wood should not be used.

5. **Ballast and Permanent-way.**—The progress of ballast covering has been as under :—

Section.	Covered.	Not covered.
Madras to Méttupálaiyam	327	...
Pódanúr to Calicut	...	111
Jalarpet to Bangalore	42¾	44¼

Mention has been made in previous reports of the condition of the old iron rails which have been in the road twenty to thirty years. Examination of the road at a few points showed that many of them are approaching their limit of life and that heavy renewals will be necessary in the near future. To provide the necessary material, and at the same time to secure continuity, 30 miles, single track, of 30-feet steel bull-headed rails are, I understand, being laid down annually on the South-west line to release 20-feet steel double-headed rails, which, in their turn, will replace old iron rails as they become worn out.

The oscillation referred to in paragraph 2 was most noticeable between the following points: Bowringpet--Malur, Whitefield—Krishnarajapuram, 15th mile —Tinnanur, Virumchapuram—Gudiyáttam, Tirupati—Jalarpet.

And was least between Kullavi--Morapur, Tiruvalur—Manur.

It is probably due to a variety of causes: to the respacing of the sleepers where 30-feet have replaced 20-feet rails; to the fact that the same section of tyre has to run on rails of two different sections; to the gauge for double-headed being unsuitable for bull-headed rails and, on the Bangalore branch, to settlement of the banks after heavy rains. As regards the gauge, experiments which have been made seem to show that a gauge of $\frac{1}{8}$th inch slack best suits the 30-feet bull-headed rail, the old gauge on the double-headed rail being $\frac{3}{8}$ths of an inch slack.

A statement of renewals of permanent-way is given in the appendix.

6. **Level Crossings.**—The Madras Municipality have agreed to pay half the cost of a foot-bridge at Elephant Gate crossing, where the traffic is very heavy.

A gateman's hut is wanted inside the distant signal at Washermanpet.

The interlocking of gates with signals at level crossings between Bangalore Contonment and the City station is in progress, distant signals, which cannot be pulled off unless the gate is closed to the road, are to be put up for each gate.

7. **Stations and Buildings.**—It is proposed to light the *Central Station* with gas from the works which are close to it: to do this the gas works will require to be enlarged, but no estimate can be submitted until it is decided whether the East Coast Railway will draw their supplies from this source. The system of grouping points has been improved at this station by substituting spring catch levers for the ordinary pattern and fitting adjusting screws to the rodding. Additional accommodation for clerks in Traffic Manager's office is asked for.

The Agent proposes to build quarters at Elephant Gate for the Permanent-way Inspector, the Stationmaster and the Assistant Stationmaster of the *Salt Cottars* Station who now live in the town: the quarters will be expensive owing to the filling required, but no other site seems feasible.

The addition of another upper room to the Apothecary's house at *Perambur* is recommended.

The present arrangements of points and signals at *Ráyapuram* has long been recognised to be very inconvenient, and several derailments have occurred. It is proposed to abolish the block cabin and hydraulic signalling arrangement, bring the goods and locomotive sidings to a shunting neck, and the main points up to the S. engine

shed; the points to be grouped and worked from opposite S. engine shed; the block cabin will be removed to the end of platform where all signal levers will be grouped; the signal wires will be fitted with detectors and detect all main line points. A cross-over road will be wanted at south end of *Washermanpet* station. A revised plan is under preparation. Estimated cost Rs. 8,000. An extension of the Audit office is proposed to accommodate the extra staff required for the Calicut-Cannanore Railway by adding an upper story to the present printing office, estimated cost Rs. 10,000.

8. Bezwada-Madras Railway, *Washermanpet.*—Platform needs lengthening another 300 feet, as it is much too short for feast traffic.

Approach road to *Tondiarpet* completed, estimate for raising platform sanctioned for this and other stations on Ennur line.

The Municipality have made their portion of the approach road to *Tiruvattiyur*, a gate and metalled road up to station required.

Land for approach road to *Eranavur* has been acquired; the road should be made and metalled and gates to station provided.

The approach road at *Ennur* has been finished.

Bangalore Branch.—More siding accommodation is asked for at *Mulanur* but must be deferred until new turn-table is put in.

It is proposed to put in a platform and station building at *Bisanattam*; the increased traffic appears to justify the expenditure.

The foot-bridge at *Bowringpet* has been completed and palisading is in hand, the turn-table has been shifted, but the sorting sidings are still not used. I understand that the Traffic Department are waiting for the return of the Traffic Manager before issuing orders.

At *Malur* the points for the horse-siding have been shifted to take off inside the main facing points as requested in a previous report. The walls of the ashpit need repair.

Materials for the new water-supply scheme at *Whitefield* are under supply.

The lay-bye points at *Krishnarajapuram* which are weighted for the dead-end should be fitted with treadle-bars.

The new 50-feet turn-table at *Bangalore cantonment* is in progress.

10. Main Line.—Increased accommodation in the third-class waiting-room is required at *Tinnanur*, and this can easily be given as agreed to on inspection.

More accommodation in third-class waiting-room is required at *Chinnampet* to be treated in the same way as Tinnanur.

A trial refreshment-room in which cooked food is supplied to caste-natives has been in use for seven months at *Arkonam* and has paid its way.

It was suggested in a previous report that the electrical shops should be moved up to the engineering shops and the building thereby released be used for quarters for the staff. No decision has been arrived at in this, or in the matter of improvements to the engineering shops. The plant for electrical lighting of the station and yard has been received, but the whole scheme is in abeyance pending the selection of a site for the power-house, which in its turn has to wait till the scheme for re-arrangement of the yard is settled.

A fruit-stall should be provided at *Vániyambádi and Erode.*

The turn-table has been shifted and the re-arrangement of sidings is in progress at *Olavakot.* The station building is very old and should be replaced by a more modern building.

A bath-room wanted for the ladies' waiting-room at *Palghat* and pucca doors for the rooms.

A latrine is wanted at *Kalandapatti.*

Spring-catch levers should be substituted at the grouped points for the ordinary levers at *Jalarpet* as has been done at Central Station.

An overbridge for local passengers will be required at *Méttupálaiyam* when the Nilgiri Railway starts work; the bufferstops at end of yard require shifting to make room for a road to Nilgiri goods-shed. The waiting room accommodation is inadequate, but improvements should remain in abeyance until the effect of the Nilgiri Railway is seen.

There is no fare-board in the third-class waiting-room at *Calicut.*

An extension of the refreshment room has been asked for at *Salem* as well as at *Pódanúr*; the breakfast and dining stations will probably be altered soon by a new time-table. Meantime more space can be got by using a number of small tables instead of the present unnecessarily wide one.

The signals at *Washermanpet* are badly arranged; a scheme is ready for submission providing bracket signals at main line points to be worked from platform.

Plans have been prepared for moving the station signals of *Bowringpet Junction* up to the points and for detecting all points.

APPENDIX A.

Madras Railway.

Renewals of permanent-way during the half-year ending 30th June 1897 as furnished by the Company's Chief Engineer.

South-West Line.

2,738	Bull-headed 30-feet steel rails	(= 7·78 miles) laid.
3,661	New and second hand double-headed 20-feet steel rails	(= 6·93 „) „
113	New and second hand flat bottom 20-feet steel rails	(= 0·22 „) „
4,526	Second hand double-headed 20-feet iron rails.	(= 8·57 „) „
11,038	rails.	= 23·50 miles.
5,443	Pot sleepers	(= 1·72 miles) renewed.

North-West Line.

1,002	Second hand double-headed 20-feet iron rails...	(= 1·90 miles) laid.
1,136	Do. 20-feet steel rails.	(= 2·15 „) „
19	Second hand flat bottom 20-feet steel rails ...	(= 0 03 „) „
2,157	rails.	= 4·08 miles.
2,114	Pot sleepers	(= 0·67 miles) renewed.

Remarks by the Senior Government Inspector of Railways, Madras.

1. I inspected the North-west line myself, so need say no more than I have already said at pages 1 to 4 of this report. Since Mr. Fowler's inspection of the South-west line and its branches I have myself gone over it with the Acting Chief Engineer, and now have the following remarks to offer.

2. *Permanent Way.*—The oscillation at high speed over the new rails is undoubtedly very pronounced. It is rather a *swaying* in a horizontal plane than an oscillation in a vertical plane, and is ascribed, I understand, by the Company's Engineers less to the respacing of the pot-sleepers than to the fact that the groove worn in the wheel tyres by the old rail, the radius of whose head was small, does not fit the broader, flatter head of the new rail. A different explanation is offered by the Locomotive Superintendent, viz., that small curve at the shoulder of the new rails does not fit the curve of the wheel flange which best suits the old rail. But, whatever may be the true explanation of the swaying, it will doubtless in due course disappear when the length of line provided with new rails so considerably exceeds that provided with the old that the tyre section can be reconsidered, and the gangs of the new rails perhaps slightly altered. Mr. Stoney, the Company's Chief Engineer, has invented a large double pot-sleeper for joints; my opinion of it is very favourable. The Company might with advantage, in the ordinary course of renewals, replace, for a couple of miles, the ordinary pots at the joints by Stoney's double pots, so that a fair trial of them may be made. If not already done the jaws on each double pot ought to be right and left handed to prevent creep. Mr. Winter's cotter to allow of a key being driven the reverse way at each joint is a good contrivance, but to keep a few reverse chairs, say, one-eighth of the whole, in stock would be better. The Company rigorously adhere to their practice of using wooden sleepers over all culverts. This is all very well, but may be carried too far as when two wooden sleepers are found over a petty 3-foot arch, even though there is a good cushion of earth below. This custom might well be relaxed in the case of all arches below, say, 10-foot span.

3. *Bridges.*—I agree with Mr. Fowler that no further delay should take place in the strengthening of those bridges where it has been decided that the strengthening shall be done by the building of intermediate piers. I noticed on the Bangalore City extension that paltry packing-pieces of wood had been used to give camber at some of the culverts on curves. This should be put a stop to and the sleepers or the bearing plates properly carpentered. The Ferok bridge, 850 feet in length, is used entirely successfully as a level crossing for road traffic, and so also is a large bridge near Olavakot on the Palghat branch. The arrangement is said to be quite satisfactory to the railway men. This system might with great advantage be far more widely used throughout India, and especially where such a bridge is in the immediate neighbourhood of a large town on the banks of a river not otherwise bridged.

4. *Water-supply.*—There is an old-established practice throughout the Madras Railway—a practice, however, which seems to have no scientific basis—of erecting an expensive standpipe, ending either in a very diminutive tank on top or, as often as not, with no tank at all, whenever water has to be pumped any considerable distance from a well or river to the station tank. The idea seems to be (but it may be only "*mamool*") that the pump has less work to do when pumping against a standpipe than if it pumped direct through the horizontal pipe; as if the extra height to be given to the standpipe had not to be just the equivalent of that due to the friction in the long supply pipe. If this extra height were cut off, and if the standpipe were caused to discharge into a tank of sufficiently large relative volume to allow of the water slowly passing at leisure through a very much smaller, and therefore cheaper, supply pipe to the main tank at the station, there might be something to be said for the arrangement. But the present system seems to me to be quite without justification, and future installations of the sort should not be sanctioned unless the Engineers of the railway can justify them by some argument of which I have at present no knowledge.

5. At Bangalore Cantonment station, the water-supply arrangements are crude and unscientific. Half a mile off from the station supply tank there are three not very satisfactory wells down in a valley. They are in rock near the bottom and do not give much of a supply in dry weather. The crudeness lies in the pumping arrangements. Besides the three wells, which lie more or less in a line within 100 yards, there is a sumph, and at the sumph is a steam pump. All these wells are hand-pumped or baled *up* 20 or 30 feet and then *down* again into the sumph, and the water is thence steam-pumped half-a-mile to the station (curiously enough in this case *without* a stand pipe). It could apparently be easily arranged that the steam pump should draw direct from all three wells, and it might be found possible to connect them by pipes driven by jacks horizontally from well to well. If the pump barrels are so small in volume as compared with the volumes of the section pipes that they "suck air" for a while, the obvious remedy, as is done with a donkey engine that cannot conveniently be fixed close to the surface of the water, is to reduce the diameter of the suction pipes, and add non-return valves. The object is to get rid of the labour now employed on the three wells. *I am informed, however, by the Superintending Engineer, Building Works, that when the new Bangalore water supply arrangements are complete it will probably be found possible to give the railway all the water it requires.*

6. There is a large sanctioned estimate for a well and pumping arrangements at the south of the line at Jallarpet junction. This is said not to be wanted now or to have been a failure, so the unexpended part of the estimate must in that case be cancelled, and the unused piping and other material put into store. At Budireddipet a larger tank is wanted, because the water at Malapuram fails in the dry season.

7. *Catch Sidings.*—It seems necessary that some general principles should be laid down about the instalment of catch sidings on the Madras and other railways in this circle, because so far they seem to have been put in upon no discoverable principle. I have already referred to this subject in my inspection report on the Nizam's Guaranteed State Railway, and in my comments on Mr. Scovell's report on the South Indian Railway.

(*a*) The first principle which I would like to see laid down is that catch sidings must be presumed to be ordinarily unnecessary for runaway *engined trains*, and that they must be considered as intended primarily and usually for the purpose of stopping the career of vehicles or trains uncontrolled by an engine. An

engined train *ought* to be braked sufficiently to make it all but impossible for it to get out of control, especially on such grades as 1 in 100 and 1 in 150, where the Madras Railway think it necessary—capriciously as it seems to me—to occasionally put in catch sidings.

(*b*) A catch siding off a main line is an ever present source of danger, whereas a runaway train is only a very occasional source of danger. To lay in a catch siding, therefore, which is always open for the main line is to arrange for a possible accident to every train which passes it. This is confirmed by the fact that numerous instances have actually occurred in this circle, so I am informed, of ordinary trains not runaways, and sometimes also runaways, getting themselves into the so-called catch sidings.

(*c*) The only circumstances under which it is permissible for a catch siding to be open to the main line for all trains is when the line is on a continuous and very stiff (relative to brake power) grade, and when the stations are either not on the level at all or on only very short bits of level, and especially at recognized and standard crossing places on short lines where such crossing places are limited in number and are on dangerous grades. The object in view in such a case is to make the driver feel that he *must* pull up dead. Under such circumstances as these the catch siding ought actually to be what it purports to be, and not merely a short derailing siding where a runaway train, perhaps full of passengers, has no alternative but total destruction. The catch sidings shown to me on the Madras Railway are smashing sidings not catch sidings, for full runaway trains. It is only a vehicle or two or a stray light engine that could hope to run full into them at any speed without going over the end to certain smash.

(*d*) At short level stations amidst heavy grades, or at stations *on* a grade, catch sidings are undoubtedly necessary to prevent vehicles from breaking loose and running down the main line while being hand shunted. But in such cases as these it is obviously better, if possible, to altogether prohibit hand shunting on the main line and to provide long shunting dead ends. Where it is not possible to absolutely prohibit it, and a catch siding off the main line is thought necessary, such catch siding ought to be as near to the outer facing-points as possible, and to be normally locked against main lines train, and only opened, and that invariably under the strictest rules, when hand shunting is in progress.

8. At Jallarpet there is a catch siding a full quarter mile outside the down grade end of the station, off grades of 1 in 213 and 159, so that it is obviously intended only for uncontrolled vehicles, and need not therefore be so far outside the facing-points, nor ought it to be normally set open for the main line, to the imminent danger of all trains.

9. At Mallapuram and at Walyar the catch sidings have been arranged on conflicting principles. Mallapuram station is itself on a grade of 1 in 220 and at both sides of it are grades of 1 in 120 in the same direction as the station grade. Here there is a siding *between* the main line and the platform siding so that a satisfactory arrangement of a catch siding is not easily practicable. It is worth considering whether *all* the shunting sidings at Mallapuram had not better be moved off to one side, and none left between the main line and the station platform, and they could then be properly trapped. It is here that the loads are made up for the ghât and hence the necessity for a good deal of shunting. It is worth considering whether Sohur station at mile 186½ would not be a better place than Mallapuram for making up the ghât load.

10. *Engine tire sections.*—There is, I learn, a long-standing source of difference between the Engineers of the road and the Locomotive Engineers about the minima permissible tire flange section. The former ascribe many derailments at switches to the thinness of the flanges of engine leading-wheels, whereas the latter ascribe these derailments to the use by the Company of a pattern of tongue rail which I understand is not considered the most suitable, inasmuch as they are not sufficiently housed within the stock rail. The question in dispute might with advantage be handed up, with full details, by the Agent for the Consulting Engineer's consideration.

11. *Ballast.*—I frequently noticed that drains in the ballast had been cut at the rail joints. This is wrong: the drains usually two per rail, ought to be cut anywhere but at the rail joint. I was told that since the sand ballast, all but universally used on the Madras Railway, has been to a great extent covered with a thin layer of broken stone, quite a large number of ballast waggons have become available for traffic purposes, as so much less sand than formerly is now blown away by the wind.

12. *Bowringpet Junction.*—Here a consistent system of detected switches and signals is badly wanted for the heavy traffic to the gold fields. The shunting gridiron which has been laid in here does not work satisfactorily.

13. *Jallarpet Junction.*—The platform wants a better top put on it. The locomotive yard wants draining. The arrangement of rodded points at this station in connection with what are called the "famine sidings" is susceptible of great improvement as talked over on the ground; for this estimates should be submitted. The facing-points leading from the "famine sidings" on to the main line from outside station limits ought to come out at once, unless very good reasons—unapparent at present to me—can be shown for retaining them. These sidings are quite long enough to render shunting out on the main line unnecessary, and a train made up in them had better come in to the station in the usual manner before starting instead of taking a short cut *viâ* these objectionable points on to the main line. The arrangement at present in use necessitates two distant signals at the west end of the junction, one of them being auxiliary.

14. *Salem Station.*—At this important station everything about the sidings seems right, except that the line from the engine-shed runs direct through trailing points on to the passenger lines. But this defect is shared by all, or nearly all, the engine stations on the Madras Railway. As opportunity offers this should be set right. A good deal of tidying up and re-arranging of station sidings, and straightening out of the serpentine gathering lines which are so common on this railway, might be gradually done during the slack season, by concentrating the road gangs for this special work for a few days occasionally, without appreciable extra expense to revenue. The gathering lines and general siding arrangements on the South Indian Railway are a marked contrast to those on the Madras Railway.

15. *Erode Station.*—It seems likely that in the near future, when the Company can bring themselves to recognize the desirability of smartening up the time-tables of the South-west line, Erode will need a larger refreshment room. It is proposed, therefore, to turn the present third-class waiting-room into a refreshment room, and to build a new waiting shed. Of the several schemes proposed for this latter, the preferable one seems to be to build the new waiting shed at the east end, near the over-bridge and the latrine.

16. *Tirrupur Station.*—Here I ascertained that a very considerable export comes on the line from Dharmapuram and Udamalpet chiefly for the Bellary side. The imports are chiefly iron and twist. This fact about the origin of the outward traffic has an important bearing upon the question of the agency by which the proposed Dindigul branch should be constructed.

17. *Bangalore Cantonment Yard.*—This is a very unsatisfactory yard. It is approached from the south by a curve of 1,188 feet radius and there are 800 or 900 feet from the end of this curve to the beginning of the platform. But entering trains have to pass over no less than four facing-points before reaching the platform, and the first of these is a very dangerous and ugly one out on the curve. Two of these—the two outer ones—could, apparently, be got rid of—one that leading to the goods yard and the other leading direct to the locomotive yard. It appears, from such a study of the plan and of the ground as was feasible, that both the switches might be made trailing. It seems also that the remaining points might come off the straight instead of off the curve. Plans should be sent in for the improvement of this yard upon the general lines referred to above and discussed on the ground.

18. *Bangalore City Station.*—The few miles of road between the Cantonment and City station are very cramped, with curves of too tight a radius to allow of heavy engines working up from Jallarpet; though, in view of the heavy coal and timber traffic for the gold fields and of the heavy gradients, it would be very advisable that

heavy engines should be used. It may turn out to be worth while to see what can be done to effect an improvement in these curves; though, owing to the existence of many private residences as well as of a palace of His Highness the Maharajah of Mysore close to the line, improvement will be difficult. The actual entrance to the City station yard is very cramped, being on a tight curve. It seems as if this might be easily improved. Very heavy business is done at this station, which is a joint station worked by the Southern Mahratta Railway.

19. *Joint Stations.*—Both at Erode and Arkonam, where the Madras and South Indian Railways join, the separate Companies keep separate station masters. This arrangement seems susceptible of improvement with advantage in economy and in smoothness of working.

20. *The Ennore Branch.*—On August 11th I inspected this short section of the East Coast Railway which is worked by the Madras Railway Company. I was accompanied by the Chief Engineer of the Bezwada-Madras Railway, Mr. Moore, and by Mr. Strange, Resident Engineer of the Madras Railway. The road was inspected from a trolly, and here I may refer to the most inconvenient riding trollies of the Madras Railway Company, which weigh $6\frac{1}{2}$ cwt., viz., $3\frac{1}{4}$ cwt. for the bodies and $2\frac{1}{4}$ cwt. for the wheels. They would in other parts of India be called heavy lorries, and as a fact they are so difficult to lift off the line that they are treated as heavy lorries and are always preceded and followed by men running with red flags. Naturally it is practically impossible to put them in or take them out of a break van, so that an inspecting or maintenance officer or subordinate is very heavily handicapped in getting about. To make matters worse, they keep no regular trollymen, but pick up men from the gangs, or not, as they go along at a snail's pace. The pattern of light trolly almost universally used in Northern India might be introduced on the Madras Railway with great advantage to their maintenance officers' powers of getting about. The road on the Ennore branch is in a very slovenly condition in spite of an unusually strong force of men. I could see that the packing of the road had been utterly neglected, and if this goes on the rails will get hogged beyond repair. I judge that the platelayer in charge must be a very inferior workman.

21. *Workshops.*—On August 10th, I inspected the Perambore locomotive, carriage and waggon shops in company with the Locomotive Superintendent, Mr. Phipps. On the 13th, I inspected the Electrical and Engineering shops at Arkonam in company with Mr. Pigott, Officiating Telegraph Engineer. Everything at Perambore seemed to be in excellent order, though a bit cramped in places. If the Madras Railway Company get the working of the East Coast Railway, more accommodation will undoubtedly be necessary at Perambore. The Arkonam work was much of it beyond me, but none the less interesting for all that, and the workshops in very good order. At Arkonam, too, the Electrical Engineer makes all the aërated waters for the refreshment rooms throughout the line which are worked direct by the Company. All seemed wholesomely and cleanly managed.

22. *General.*—The attention of the Agent is invited to the several matters brought to his notice throughout this inspection report, whether my own or Mr. Fowler's, and he is requested to report in detail what he proposes to do in the way of remedying such defects as have come to notice during the inspection.

OOTACAMUND.
28th August 1897.

F. J. E. SPRING,
Senior Govt. Inspector of Rys., Madras.

(R.) Form No. 3.

No. 691 A. dated 20/9/97

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

Urgent.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

H.E. the Governor
Hon: Sir Henry Wilson K.C.S.I.
Hon: Mr J. Gardner C.S.I.

READ the following

Inspection report of the Madras Railway for the half year ending 30th June 1897.

Communicated to the Agent & Manager, Madras Railway, for information and necessary action..

A.S.H. 16.9.97

2. The attention of the Revenue Department is to be drawn to para 5 of the Report regarding the collection of ballast by famine labour.

18/9/97

3. The want of a feeder road at Siddhavattam referred to in para 10 is brought to the notice of the L & M Dept..

Copies not to be taken any article of this Blue printed matter within Permit 11

20/9/97

Cert 15/9/97 Rec'd 19/9/97

4. A copy of these Progs: will be forwarded for the information of the Government of India --

H.E. No 692 R 20th Sept 97
Forwarded.
F.H.S.
15/9/97

R

To
The Agent S. Mahr: Ry
4 - Comptroller for Rys
4 - Resume keepers
4 - Local & Mund Agents

1/10/97.

No. 4 R. Rs.

Government of Madras.

PUBLIC WORKS DEPARTMENT,
RAILWAY BRANCH.

To Resident in Mysore
THE ~~SECY. TO THE GOVT. OF INDIA~~,
~~P. W. DEPARTMENT.~~
Bangalore

3 - 11 - 1897.

SIR,

I am directed to forward herewith a copy G.O.No: 691 R, 20th Sept 1897, embodying the inspection report of the M R for the half year ended the 30th June

Documents:-
1 Copy of G.O. 691 R
dated 20/9/97.

Despatched on 3/11/97

Indexed.

A.C.

Instruct that Copy of the Report inspection upon Mahr Railway between Conod & the Residency Mysore

Send a copy with letter -

1/11

DR
2-11-97

2/11/97