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MADRAS RECORD OFFICE

Government of Madras

Public works DEPARTMENT

G.O. No.	1644	Press
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Dated	24.6.	1872.

Not to be folded or roughly handled

*Proceedings of the Madras Government. Public Works Department,
24th June 1873.*

No. 356. Read the following letter from Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 30th May 1873, No. 299 :—

I HAVE the honour to enclose, for the information of Government, a report by Captain Ross Thompson upon an inspection made lately by him of the North-West Line of the Madras Railway.

2. I have drawn the attention of the Agent to several portions of the report. Paragraph 12 has been communicated for the information of the Telegraph Department.

3. With reference to paragraph 47 of the report, and to the Proceedings of Government, dated the 28th June and 12th August 1872, Nos. 1,566 and 1,914, it may be mentioned that the Board of Directors lately approved of the construction of one additional inspection carriage for the use either of this department or of the Company's Officers, as might be required. The estimate of the cost has not, however, been yet received in this office for submission to Government.

No. 357. *Note on the North-West Line and Bellary Branch, Madras Railway, inspected on the 13th, 14th, 15th, 16th, 17th, 18th, and 19th of May 1873.*

I HAVE the honour to submit the following report upon the North-West Line of the Madras Railway, viz., from Arcunum to Raichore and the Bellary Branch between Goondacul and Bellary.

2. FENCING.—The fencing appears to be in good and efficient condition throughout.

3. In places where scrub and grass on the slopes of the line have been burned, some of the aloe forming the fence have been scorched and the leaves have withered and drooped in consequence; but as this has only happened on the inner side of the fence, it is not of so much consequence. The aloe fencing has suffered chiefly in this way between Tirupetty and Reddipully.

4. In many places between Ghooty and Raichore there appears to be no hope of ever growing good aloe fences. The plants have increased but little in size since they were put down some years ago. They look weak and stunted, and it is evident that either the soil or the climate is unsuited to them.

5. In all places along the line wherever the vegetable fences are of doubtful efficiency they are supplemented with either stone walls or wire fencing.

6. I observed on the *South-West Line*, when going from Madras to Arcunum on the morning of the 13th instant, that three buffaloes had forced their way through the "Corkapullay" fence on the south side of the line near the 20th mile, 17th telegraph post, and were grazing on the south slope of the embankment. Buffaloes are attracted to this spot by the side ditch of the railway being full of water; they bathe in it and then force their way through the fence to get at the grass on the embankment slope, which is more abundant and better than what they find in the fields.

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24th June 1873.*

7. ROADWAY.—The road appears to be in excellent order and well attended to. I observed working parties in the following miles, lifting, packing, trimming sides of road, etc:—

46th Mile	97th Mile	171st Mile	222nd Mile	268th Mile	316th Mile
53rd ..	122nd ..	172nd ..	224th ..	273rd ..	319th ..
54th ..	129th ..	179th ..	235th ..	281st ..	323rd ..
60th ..	135th ..	199th ..	239th ..	289th ..	325th ..
66th ..	139th ..	201st ..	240th ..	293rd ..	328th ..
68th ..	146th ..	202nd ..	246th ..	294th ..	335th ..
73rd ..	147th ..	207th ..	249th ..	297th ..	336th ..
75th ..	157th ..	210th ..	251st ..	299th ..	342nd ..
78th ..	159th ..	212th ..	253rd ..	301st ..	343rd ..
89th ..	161st ..	215th ..	259th ..	308th ..	345th ..
91st ..	164th ..	216th ..	262nd ..	309th ..	347th ..
95th ..	167th ..	220th ..	267th ..	314th ..	

8. The ballasting of the following miles appears a little thin in places, viz:—
95th Mile 200th Mile 213th Mile 278th Mile 290th Mile 294th Mile 297th Mile
192nd .. 207th .. 214th .. 288th .. 292nd .. 295th .. 301st ..
also on the 277th, 284th, and 285th miles of the Bellary Branch. It will be observed that it is chiefly between the 200th and 300th miles, or between Kondipooram and Adoni, that this want is noticeable. The line between these two stations runs over a great deal of black cotton country, and the embankments still require very constant attention.

9. I understand that owing to the number of special trains employed in conveying permanent-way materials for His Highness the Nizam's State Railway during the past few months, engines have not at all times been available for ballast trains. A ballast train is, however, working between the ballast pits south of Nuncherla and the 283rd mile. Portions of the 284th mile have been freshly ballasted, as have also the 276th, 279th, and 286th miles on the Bellary branch.

10. TELEGRAPHS.—The telegraph posts, wires, etc., appear to be in a good and efficient condition throughout the line.

11. On many of the telegraph posts between Arconum and Codoor the numbers have been almost obliterated. In some places it is very difficult to read them from the train.

12. I noticed, on the 19th instant, that a tall stem of one of the fence aloes had fallen over in the direction of, and was resting on, the wires of the Government line of telegraph between Puttoor and Poody, near the 75th mile, 12th telegraph post.

13. BRIDGES.—The diversion of the line between Poody and Tirupetty at the 79th mile, 13th and 14th telegraph posts, to admit of the re-construction of the bridge at that point, is almost completed. A single 50 feet girder bridge is to be substituted for the existing double 20 feet one.

14. The protective works at the Booga bridge near Cuddapah are in progress. This bridge consists of eight spans of 59½ feet each. The southern half of the flooring is now being put in.

15. At the 286th mile, 14th telegraph post, on the Bellary branch, a bridge of two girder openings of 65 and 63 feet span respectively has been substituted for one of two 30 feet spans. This work was sanctioned in G. O., No. 519, of 26th

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February 1872, its completion being reported on the 15th instant it was tested on that date in the presence of Mr. Smith, the Resident Engineer of the 3rd Division, North-West Line, Lieutenant Coaker, R.E., Deputy Consulting Engineer, and myself.

16. The deflections of the girders on the two spans were as follow:—

<i>Eastern Span.</i>							
Clear span	...	...	...	...	...	...	63 feet.
Amount of load	...	...	...	...	...	...	Two locomotives with tenders. Rather more than 60 tons.
Deflection with load at rest	...	...	...	...	...	...	1½ inch.
Deflection with rolling load.	...	...	...	...	...	...	1½ inch. Speed about 25 miles per hour
<i>Western Span.</i>							
Clear span	...	...	...	...	...	...	65 feet.
Deflection with load at rest	...	...	...	...	...	...	1½ inch.
Deflection with rolling load.	...	...	...	...	...	...	1½ inch. Speed about 25 miles per hour

Which shows the amount of deflection in the smaller of the two spans to be ½ of an inch less in each of the two tests than in the larger span.*

17. HUGGRY CROSSING.—The temporary road across the bed of the Huggry river, which was washed away on the 16th of last month, has been restored and through communication with Bellary has been re-established.

18. CHEYAU BRIDGE.—At the Cheyaur bridge the state of progress is as follows:—The southern masonry abutment and ten piers next it have been completed. The excavation for the foundation of the 11th pier is in progress. The 12th pier has not yet been commenced; and the 13th pier is almost completed, only two or three more courses of stone being required to bring it up to its full height.

19. A good deal of difficulty is experienced in getting the excavation made for the foundation of the 11th pier. Two of Swynn's centrifugal pumps are employed in keeping the coffer dam free from water. They are capable of throwing out more than 1,800 gallons each per minute, but the average amount of work performed is about 1,500 gallons, or 3,000 gallons per minute for the two.

20. The coffer dam consists of piles at certain distances apart with stout horizontal planking behind, the whole being strutted out from piles in the centre of the dam; the joints in the planking are rendered as watertight as possible with tar and brick-dust, etc., but water does not find its way into the coffer dam so much through these joints as by getting in between the edges of the lowest planks in the sides of the dam and the uneven surface of the rock on which they rest. Mr. Stoney (the Resident Engineer) informs me that the lower or rocky bed of the river, on which all the piers are to rest, is as rugged and water-worn as if the enormous bed or cushion of sand between it and the water had never existed.

21. It is impossible to get the plank edges down on the rock so as to keep the water from getting into the dam from below, as much as possible is done to keep it out, by ramming clay, sand bags, etc., in between the lower edges of the dam and the rock.

* The amount of lateral motion was small, and the test being considered satisfactory the bridge was opened for traffic the same day.

22. To keep the rock free from water whilst it is being levelled and prepared for the first courses of masonry, a hole or well of some 3 or 4 feet in depth will be made in the rock, into which the pump tubes will be let down.

23. It is found that the centrifugal pumps discharge besides water and a large amount of sand, many pieces of stone, gunny bags, etc., and they occasionally get out of order from the valves becoming jammed; a couple of iron cages are therefore being constructed to serve as guards for the ends of the pump tubes and prevent anything, except sand and water, from entering the pumps. It was expected that, in about a week's time from the date of my visit, the first courses of the foundation of this pier would be laid.

24. The five wells to carry the north abutment and its wing-walls have been sunk to their full depth, viz., 45 feet. They are 12 feet in external and 6 feet in internal diameter, the thickness of the well wall or ring of brick work being therefore 3 feet. They have not yet been filled with concrete; some difficulty is anticipated about getting them clear of water, as they are 45 feet in depth, and forcing pumps will have to be employed.

25. The masonry below the bed of the river in the south abutment and piers has been executed at a cost of Rupees 7-8-0 per cubic yard. Above river bed it has cost rather more, but still under Rupees 8 per cubic yard.

26. IRON PIERS.—The first 13 piers of the bridge, counting from the southern abutment, are masonry. The material being a fine dark-blue limestone, conveyed by rail from the Nirger quarries near the Yerragoontla Station on the North-West Line. The 14th and all the other piers of the bridge are to consist of two cast-iron cylinders each, to be sunk through the upper or sandy bed of the river to the lower bed of rock. Some will have to be sunk as much as 64 or 65 feet before reaching the rock.

27. Each pier-cylinder is 6 feet in diameter, and will consist of a number of shorter cylinders bolted together through inner flanges or narrow diaphragms at each end. Each of these shorter cylinders is 6 feet in length, and is composed of three segments, bolted together through inner flanges running in the direction of the cylinder's length.

28. All the joints are thus in the interior of the cylinders; the outer surface is smooth, and the minimum of friction or resistance whilst they are being sunk is consequently secured. The joints in the cylinders and between the segments are made watertight with "rust-joint cement," composed of iron borings, sal-ammoniac and flour of sulphur mixed in certain proportions. This cement sets quickly and becomes extremely hard, all the joints being thus made watertight the only entrance for water will be at the bottom of the cylinder, and the labour in pumping out the cylinders when filling them with concrete will consequently be lessened.

29. Cylinders for Piers Nos. 14, 15, 16 and 17 have been partially sunk, some of them have been checked by their lower edges coming in contact with boulders or debris of the masonry piers, for which screw pile piers were substituted when the Cheyaur Bridge was partially destroyed in 1870. Such boulders, etc., will, it is feared, give great trouble when sinking the pier cylinders, as blasting them will be out of the question.

30. "Bull's dredgers" are used for excavating the sand, and they are worked inside the iron cylinders with the greatest success. Their construction and action are so simple, natives can understand and work them at once, and they have the great merit of being not readily put out of working order.

31. I was surprised at the size of some of the stones and boulders which had been removed from inside the cylinders by these dredgers. When they seize a stone they hold on very firmly, their construction being such that the heavier the stone or, in other words, the greater the pull upon them the tighter their hold on the stone becomes. They lift about $1\frac{1}{2}$ cubic feet of sand at each hoist.

32. The rate at which the iron cylinders can be sunk has not yet been ascertained; they are being put down at present by daily labour.

When sufficient experience as to the cost of sinking them has been gained contracts will be entered into for sinking the remaining piers.

33. Mr. Stoney is in hopes of being able to carry on work at the Cheyaur Bridge without interruption. During the season when floods come down the river, he intends putting down the piers across the "island" or sand bank on which the branches of the present bridge abut.

34. KISTNA BRIDGE.—From Raichore I went on with Lieutenant Coaker to see the Kistna Bridge on the Great Indian Peninsula Line; there appears to be but little wanting to complete it, and it is a great pity that this little could not have been carried out before the commencement of the flood season. On the date of our visit, viz., the 17th instant, the Kistna was in flood, so that the train service across the temporary road in the river bed was interrupted. Passengers with their baggage, the mails, etc., were ferried over immediately above the bridge site in small boats, but all heavy goods traffic was stopped.

35. A good deal of the Nizam's Railway material was consequently accumulating at various stations along the line between Arconum and Raichore, and there now appears but little chance of its being worked across the Kistna until the end of the flood season.

36. From what we saw, and the information we could gather, only one pier more is wanting to complete the bridge, and girders have not yet been laid over three or four of the spans.

37. STATIONS AND BUILDINGS.—In Government Order No. 1,086 of 9th April 1873, sanction was accorded to the construction of six additional watchmen's huts between Ghooty and Raichore; these have been completed.

38. In G. O., No. 216, of 22nd January 1873, the construction of the fuel platforms at Condapooram was sanctioned; they have not yet been erected, but I think they should soon be so, as at present the wood fuel is piled close to the rails of the main track, the face of the pile next the line being retained by some upright and horizontal junglewood posts.

It appears to me that there is just the possibility of the pile slipping, in which case the rail next it might become covered up with logs just at an awkward moment.

39. The Engine Driver's Bungalow at Cuddapah, construction of which was sanctioned in G. O., No. 215, of 22nd January 1873, is almost completed. At

Raichore the covered central platform, sanctioned in G. O., No. 7, of 4th January 1873, has been completed, but the cross over-bridge at the Madras end of the station has not yet been commenced.

40. When passing through Yerragoontla, Mr. French, the Resident Engineer of the 2nd Division, North-West Line, pointed out to me that the back-verandah of the Yerragoontla Station had been paved by some villagers of the neighbourhood at their own expense and for their own convenience, to lie or sit upon whilst waiting for the trains. Their reasons for doing so being that the ground was full of bullock-ticks and vermin of various kinds which they thus got rid of. As the paving is not very nearly put down, and is in places so uneven as to be neither convenient nor pleasant to lie or sit on, Mr. French suggests that the verandah in question should be neatly and well paved so as to form a clean and convenient waiting place for native passengers. I think his proposal an excellent one; we have evidence that it would be a convenience to the native public there and the work would not cost much, as fine large flat slabs of stone are found in abundance in the vicinity. The verandah is 48 feet in length and 7½ feet in width.

41. The stations, out-houses, latrines, etc., along the line are generally clean and well kept, and the refreshment-rooms also seem clean and well supplied; there appeared to be a difficulty, however, at Raichore about providing a porter or cooly to pull the refreshment-room punkah during dinner. When dining there on the 16th instant, after requesting several times that the punkah might be pulled, I was informed by the butler that there was no one there whose duty it is to pull the punkah. I was, therefore, obliged to have it pulled by one of my own peons; passengers travelling without servants are, if such is the case, subjected to a good deal of discomfort, as during hot weather the Raichore refreshment-room is not what one would call a cool room.

42. The waiting-room for gentlemen at Arconum is not so well kept as it should be. When passing through to Madras on the afternoon of Monday, the 19th instant, the basins, jugs, water, and towels were all very dirty; the room was also in a dirty and untidy condition.

43. CLOTHING OF STATION OFFICIALS.—None of the Station Masters appear as yet to wear a uniform of any kind by which they may be recognized by the public. The ticket-collectors at Arconum, Tirupetty, Cuddapah, Ghooty, Bellary, Goondacul and Raichore, appear to wear the blue coat or uniform of their office, but none of the clerks, porters, or other officials whose duty it is to collect tickets at the minor intermediate stations, wear any uniform or badge to enable passengers to recognize them as the proper persons to whom to deliver their tickets.

44. MR. STONEY'S CARRIAGE COOLER.—When returning to Arconum from the Cheyaur Bridge, on the 19th instant, we travelled as far as Codoor in a composite carriage, to the roof of which Mr. Stoney had had a cowl attached over the lamp hole, for the purpose of cooling the carriage. The cowl was merely an experimental one which had been constructed in the work-sheds at the Cheyaur Bridge, and was not very accurately fitted. The day was an unfortunate one for testing the cooling powers of the cowl, as there was not sufficient hot wind to cause rapid evaporation, nor was the carriage one well adapted to trying the apparatus in. With all these disadvantages, however, the temperature was sensibly lowered. At 11-43

A. M. the temperature in the carriage was 98°. The train started at that moment and a thermometer was then suspended, below the mouth of the cowl, where the cool air entered the carriage. After remaining there 5 minutes, viz., at 11-48 A. M. the mercury stood at 93°. Five minutes afterwards, viz., at 11-53 A. M., it stood at 89° below which point it did not fall, but a reduction of temperature from 98° to 89°, viz., 9° in ten minutes, may be regarded as a very satisfactory result considering the disadvantageous conditions under which the apparatus was tried.

45. There is one feature in Mr. Stoney's invention which I consider very important, viz., the cooled air passes through a perfectly clean medium, and is free from the damp, stuffy, smell and feel of air cooled by means of passing it through a tattie, mat, cloth, or fabric of any kind, which in due course of time must become more or less decomposed and charged with dust. The air which entered the carriage from the mouth of the cowl felt fresh and dry as well as cool, and was totally devoid of smell.

46. I think there is every reason to believe that the larger and more perfect apparatus, which Mr. Stoney has invented for cooling carriages from below, will be most successful; but to give it a fair trial it should be used some way inland in a really hot, dry atmosphere. The efficiency of a cooling apparatus, the action of which depends upon rapid evaporation, can never be satisfactorily tested in an atmosphere laden with moisture such as we have at Madras, or even further inland if there are rain clouds hanging about.

47. AN INSPECTION CARRIAGE REQUIRED FOR CONSULTING ENGINEER'S DEPARTMENT.—I hope it will be found practicable before long to provide the officers of the Consulting Engineer for Railways Department with a special carriage in which to make their periodical inspections of the various lines. The heat and fatigue of travelling for 300 or 400 miles on the foot-plate of an engine, during several consecutive days in hot weather, are very trying. After travelling on an engine, say, 70 or 80 miles, it is almost impossible to be so alert and attentive to what is passing as one should be. It is, moreover, impossible to see as well from an engine as from the rear of an inspection carriage, and when it is found necessary to halt at any point on the line for the night, when there are no waiting or refreshment-rooms, it is very inconvenient not to have a carriage to sleep, dress, eat, etc., in. Mr. Going, the Acting Chief Engineer of the Madras Railway Company, very kindly placed his inspection carriage at the disposal of Lieutenant Coaker and myself; we were thus enabled to inspect the line between Arconum and Raichore in the best possible way, and with a minimum of fatigue and heat.

48. We were fortunate in having comparatively cool weather, as a good deal of heavy rain fell along the North-West Line on the evening of the 13th instant, and at intervals for several days afterwards.

The first fresh of the season came down the Pennair on the afternoon of the 14th; we saw it at 3-45 P. M., when it had only just passed through the Railway bridge; the bed of the river further down was perfectly dry. Although the rain had cooled the air a good deal, it was nevertheless quite warm enough to bring out the comfort and convenience of an inspection carriage in strong contrast to the discomfort and inconvenience of the foot-plate of an engine from which to make an inspection of 308 miles of railway.

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24th June 1873.*

49. The following are readings from a thermometer suspended from the roof of the inspection carriage inside:—

Date	Station.	Hour.	Temperature.
13th	Tirutany	10 15 A.M.	93 degrees.
	Nazareth	10 50 "	96 "
	Pattur	11 15 "	97 "
	Pond	11 47 "	98 "
	Cuddalore	12 15 "	98 "
	R. V. S. S.	2 45 P.M.	103 "
	R. V. S. S.	3 35 "	102 "
	R. V. S. S.	4 11 "	100 "
	R. V. S. S.	4 50 "	97 "
	R. V. S. S.	11 15 A.M.	93 "
14th	W. S. S.	11 15 A.M.	97 "
	Cuddalore	12 37 "	99 "
	Yercaud	1 18 P.M.	101 "
	Mooloor	4 11 "	82 "
15th	Royal Ensign	7 31 A.M.	86 "
	Glossy	8 38 "	78 "
16th	Gondalacul	5 45 "	89 "
	Bellary	9 56 "	103 "
	Auspreo	10 20 "	97 "
	Alor	11 15 "	98 "
	Kosge	11 30 "	
	Tongabudra river		

MADRAS,
27th May 1873.

(Signed) ROSS THOMPSON, Captain, R.E.,
Offg. Deputy Consulting Engineer for Railways.

No. 358. ORDER THEREON, 24th June 1873, No. 1,644.

RAILWAY, No. 49.

what arrangements have been made to test Mr. Stoney's larger and more complete apparatus for cooling carriages.
(True Extract.)

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for Railways.

Exd. S. T. Austin.
Spare Copies

*Roll on the North West Line
and Bellary Branch.
Madras Railway. Inspected
on the 13th-14th-15th-16th-17th
18th and 19th of May 1873.*

1. I have the honour to submit
the following report upon the
North West Line of the Madras
Railway, viz from Arcot
to Raichore and the Bellary
Branch between Gondalacul and
Bellary

Fencing 2. The fencing appears to be in good
and efficient condition.
3. In places where the
grass on the slopes of the line
have been burnt, some of the
Aloe forming the fence have
been scorched and the leaves
have withered and dropped
in consequence, but as this
has only happened on the
inner side of the fence.

from the main drainage.
The line running has suffered
a change in this way between
Grassfield and Middlebury.

In many places between 4
Soto and Middlebury, there
appears to be no hope of ever
growing good above fences.
The plants have increased but
little in size since they were
put down some years ago.
This looks weak and stunted
and it is evident that either
the soil or the climate is
unsuited to them.

In all places along the 5
line wherever the vegetable
fences are of doubtful efficiency
they are supplemented with
either stone walls or wire fencing.

I observed on the South West - 6
Line, when going from Mars
to Arcosum on the morning of
the 13th Inst. that three
buffaloes had forced their way
through the "Corkasullay" fence
on the South-Side of the line
near the 20th mile. 17th Telegraph
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South Slope of the Embankment 5
Buffaloes are attracted to the
spot by the side ditch of
the railway being full of
water. They bathe in it
and then force their way
through the fence, being at
the grass on the Embankment
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abundant - and better, than
what they find at the field.

Roadway 7 The road appears to be in
excellent order, and well
attended to. I observed
working parties in the
following miles. Lifting, packing
trimming sides of road &c. -

46	167	259
53	171	262
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99	220	308
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129	224	314
135	235	316
139	239	319
146	240	323
147	246	325
167	249	328
159	261	333
161	263	336
164		342
		343
		344
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		346
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		348
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		350

The ballasting of the following 8
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95-
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A ballast train is however
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12 I noticed on the
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the 45th mile 12th telegraph post.

Bridges 13 The diversion of the line between
Pordy and Sirupetty, at

49th-Mile 13th and 514th - Telegraph
posts - to extent of Mr. Reconstruction
of the bridge at that point,
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A single 50 ft - Jordan bridge is
now substituted for the existing
double 20 ft - one

The protective works at the Bonga
Bridge near Cuddalore are
in progress. This bridge consists
of 8 spans of 59½ feet each. The
Southern half of the flooring
is now being put in

At the 286th-Mile 14th - Telegraph
posts, on the Bellary Branch,
a bridge of two Jordan openings
of 65 and 63 feet - spans respectively
has been substituted for one of
the 30 ft - spans. The work
was sanctioned in G.O. No 519
of 26th February 1872. Its completion
being reported on the 15th inst -
it was tested on that date in
the presence of Mr. Smith - the
President - Engineer of the IIIrd
Division South West Line.
H. Cooper P.E. Dy. Commr. Engrs

1/16 And myself.
The deflections of the girders
on the two spans were as
follows.

Eastern Span

Clear Span ————— 63 feet

8 Amount of load — { Two locomotives
with tenders.
Rather more
than 60 tons

Deflection with
load at rest ————— $\frac{15}{32}$ inches

Deflection with
rolling load. ————— $\frac{16}{32}$ inches
Speed about 25
miles per hour

Western Span

Clear Span ————— 65 feet

Deflection with load at rest ————— $\frac{16}{32}$ inches

Do. with rolling load ————— $\frac{17}{32}$ inches
Speed about 25 miles per hour

Which shows the amount of
deflection in the smaller of the two
spans was $\frac{1}{32}$ of one inch less
in each of the two tests than in
the larger span

* The amount of lateral motion was small
and the test being considered satisfactory
the bridge was opened for traffic the same day.

The temporary road across the
bed of the Huggs River which
was washed away on the 16th
of last month - has been
restored and through com-
munication with Bellary
has been re-established

17 Huggs
Crossing

At the Cheyenne bridge the
state of progress is as follows
The Southern Masons, about mid-
and the piers next to have been
completed, the excavation for
the foundation of the 11th pier is
in progress. The 12th pier has
not yet been commenced and
the 13th pier is almost completed.
Only two or three more courses of
stone being required to bring it
up to its full height.

18 Cheyenne
Bridge

A good deal of difficulty is
experienced in getting the excavation
made for the foundation of the
11th pier. Two of Swynn's Centrifugal
pumps are employed in keeping
the Coffin dam free from water
they are capable of throwing out
more than 1800 gallons each
per minute, but the amount

19

amount of work performed is
about 1500 gallons, or 3000
gallons per minute for the two

20
S.

The Coffin dam consists
of piles at certain distances apart
with short horizontal planking
behind, the whole being stru-
ctured from piles at the center of
the dam, the joints of the
planking are rendered as
water tight as possible with
tar and brick dust - &c - -
but water does not find its way
into the Coffin dam so much
through the joints, as by getting
in between the edges of the cross
planks and the sides of the dam
and the uneven surface of
the rock on which they rest -
Mr. Stoney (the Resident Engineer)
informs me that the lower or
rocky bed of the river, on which
all the piers are built, is so
ragged and water worn, as if
the enormous bed or cushion
of sand between it and the
water had never existed.

21

It is impossible to get
the plank edges down on the
rock so as to keep the water
from getting into the dam

from below, as much as possible
is done to keep it out, by
ramming Clay, Sand bags and
within the lower edges of the
dam and the rock.

To keep the rock from
from water whilst it is being
levelled and prepared for
the first course of masonry,
a hole or well of some three
or four feet in depth will
be made in the rock, into
which the pump tubes will
be let down.

This found that the
Centrifugal pumps discharge
brackish water and a large
amount of sand, many pieces
of stone, gunny bags, &c. &c.
and that occasionally get out
of order from the valves
becoming jammed. A couple
of iron cages are therefore being
constructed, to serve as guards
for the ends of the pump tubes
and prevent any thing except
sand and water from entering
the pumps. It was expected
that in about a week time
from the date of my visit,
the first courses of the foundation

of this pier would be laid
The first wells to carry the
24 North Abutment - and the
walls have been sunk to their
full depth. viz 45 feet.
They are 12 feet in external
and 6 feet in internal diameter.
The thickness of the well wall
or ring of brick work being
therefore 3 feet. They have
not yet been filled with concrete,
some difficulty is anticipated
about getting them clear of
water, as they are 45 feet
in depth, and forcing pumps
will have to be employed.

25 The masonry below the level of
the river in the South Abutment
and piers has been executed
at a cost of Rs. 4-8-0 per
cubic yard. Above river level
it has cost rather more,
but still under Rs. 8-0-0
per cubic yard.

From Pier 26 The first 13 piers of the bridge,
commencing from the Southern
Abutment - are masonry
the material being a fine
dark blue lime stone, conveyed
by rail from the pier.

Quarries near the Yerragootla
Station on the N.W. Line.

The 14th and all the other
piers of the bridge are to consist
of two cast-iron cylinders each,
which sunk through the upper
or sandy bed of the river to the
lower bed of rock. Some will
have been sunk as much as
64 or 65 feet before reaching
the rock.

Each pier-cylinder is six
feet in diameter and will
consist of a number of short
cylinders bolted together through
inner flanges or narrow diaphragms
at each end. Each of these
short cylinders is six feet in
length, and is composed of
3 segments, bolted together through
inner flanges running in the
direction of the cylinder's length.

All the joints are thin in 28
the interior of the cylinders.
The outer surface is smooth,
and the minimum of friction
or resistance whilst they are
being sunk is consequently
secured. The joints in the

Cylinders and between the
segments are made watertight
with "Putty-joint-Cement,"
composed of iron borings, sal-
ammoniac and floss of
sulphur mixed in certain
proportions. — This cement
sets quickly and becomes
extremely hard. All the joints
being thus made watertight
the only entrance for water
will be at the bottom of the
cylinder, and the labour
of pumping out the cylinder
when filling them with
concrete will consequently be
lessened.

29 Cylinders for piers Nos 14.
15-16 and 17 have been
partially sunk. Some of them
have been checked, by their
lower edges coming in contact
with boulders or debris of
the masonry piers, for which
screw pile piers were substituted
when the clay was bridge was
partially destroyed in 1870.
Such boulders &c... will
be feared give great trouble
when sinking the pier cylinders.

as blasting them will be
out of the question —

"Bulls Druggers" are used for '30
excavating the sand, and they
are worked inside the iron
cylinders with the greatest success.
Their construction and action
are so simple, natives can
understand and work them
at once, and they have the
great merit of being not readily
put out of working order.

I was surprised at the size 31
of some of the stones and boulders
which had been removed
from inside the cylinders
by these dredgers. When
they seize a stone they hold
on very firmly, their construction
being such that the heavier
the stone or in other words the
greater the pull upon them
the tighter their hold on the
stone becomes.

They lift
about $1\frac{1}{2}$ cubic feet of
sand at each hoist.

The rate at which the iron
cylinders can be sunk has
not yet been ascertained

32

They are being put down at
present — & doing labour.

When sufficient experience
as to the cost of sinking them
has been ascertained, framed
contracts will be entered into
for sinking the remaining
piers.

33 Mr. Stony is in hopes of being
able to carry on work at the
Cheyann Bridge without
interruption. During the
season when floods come
down the river, he intends
porting down the piers
across the "Island" or sand
bank on which the branches
of the present bridge abut.

0
Vistula
Bridge

34 From Raichon Lant on with
H. Coaker to see the Vistula
Bridge on the G. & P. Line
There appears to be but little
wanting to complete it —
and it appears a great pity
that this little could not
have been carried out before
the commencement of the
flood season. On the date
of our visit viz the 17th inst —
the Vistula was in flood.

So that the train service across
the temporary road at the
river bed was interrupted.

Passengers with their baggage,
the mails &... were ferried
over immediately above the bridge
site in small boats; but all
heavy goods traffic was stopped.

A good deal of the Indian 35
Railway material was consequently
accumulating at various
stations along the line between
Arcotum and Raichore, and
there soon appeared but little
chance of its being moved
across the district until
the end of the flood season -

From what we saw 36
and the information we could
gather, only one pier more
is wanting to complete the
bridge; and girders have not yet
been laid over three or four
of the spans.

In G.O. No 1086 of 9th April
1873 sanction was accorded
to the construction of six
additional watchmen's huts

37
Stations
or
Buildings

between Gooty and Raichore
there have been completed

38

In G.O. No 216 of 22nd January
1873, the construction of two
fuel platforms at Cuddalore
was sanctioned, they have
not yet been erected, but I
think they should soon be so
as at present the wood fuel
is piled close to the rails of the
main track, the face of the
pile kept the line being
retained by some upright and
horizontal punywood posts.

It appears from what there
is just the possibility of the
pile slipping in which case
the rail kept at night - has
come up with logs piled
an awkward arrangement.

39

The Engineer Dring's bungalow
at Cuddalore, construction
of which was sanctioned in
G.O. No 215 of 22nd January
1873 is almost completed.

At Raichore the covered platform
platform, sanctioned in G.O.

No 7. of 4th January 1873. has been
Completed, but the Cross over
bridge at the Madras End of
the Station has not yet been
Commenced.

40

When passing through Gorrangolla
Mr French, the Resident Engineer
of the IInd Divn. N.W. Line
pointed out to me that the
back verandah of the Gerra-
-Gorralla Station had been
paved by some villagers of
the neighbourhood at their
own expense and for their
own convenience, to lie or sit-
upon whilst waiting for
the train. His reasons for
doing so being that the ground
was full of bullock ticks and
vermin of various kinds which
they thus got rid of. As the
paving is not very neatly put
down and is in places so
uneven as to be neither convenient
nor pleasant to lie or sit on
Mr French suggests that the
Verandah in question should
be neatly and well paved
so as to form a clean and
convenient place for waiting

place for native passengers.
I think this proposal an
Excellent one, we have evidence
that it would be a convenience
to the native public there
and the work would not
cost much, as fine large
flat slabs of stone are
found in abundance in
the vicinity. The
Verandah is 48 feet in
length and $7\frac{1}{2}$ feet in
width.

41 The Station Out-houses, Canteen
&c. along the line are
generally clean and well kept
and the refreshment-rooms
also seem clean and
well supplied. There appeared
to be a difficulty however at
Pachore about providing
a porter or coolie to pull the
refreshment-room punkah
during dinner. When dining
there on the 16th inst. after
requesting several times that
the punkah might be
pulled I was informed by
the porter that there was

No one there whose duty it is to pull the punkah.

I was therefore obliged to have it pulled by one of my own persons, Passengers travelling without servants, are, if there is the case, subjected to a good deal of discomfort - as during hot-weather the Paichore refreshment-room is not what one would call a cool room.

The waiting ^{Mr. Gentlemen} room at Arcconum is not so well kept as it should be, when passing through to Madras on the afternoon of Monday the 19th the 1st, the basin, fag, water, and towels were all very dirty, the room was also in a dirty and untidy condition.

None of the Station Masters, appear as yet to wear a uniform of any kind, by which they may be recognized by the public.

The Ticket Collectors at Arcconum, Sirindur.

43 Clothing of Station Officials

Footy, Bellary, Soundacul and Paichore, appear to wear the blue coat - or uniform of their office, but none of the Clerks, porters or other officials whose duty it is to collect tickets at the minor stations, wear any uniform or badge, to enable passengers to recognize them as the proper persons to whom to deliver their tickets.

44 Mr. Stoney's Carriage Cooler When returning to Arcconum from the Cheyaur Bridge on the 19th Inst. he travelled as far as Co door in a Composite Carriage, to the roof of which Mr. Stoney had had a Cool attached, over the Lamp holder for the purpose of cooling the Carriage. The Cool was merely an Experiment at one which had been constructed in the work sheds at the Cheyaur Bridge, and was not very accurately fitted. The day was an unfortunate one for testing the cooling power of the Cool, as there was not sufficient hot wind to test it.

Rapid Evaporation, nor was the Carriage one well adapted to trying the Apparatus in. With all the disadvantages however the temperature was sensibly lowered.

At 11.43 am. the temperature in the Carriage was 98° . The train started at that moment and a thermometer was then suspended, below the mouth of the Cowl, where the Cool Air entered the Carriage. After remaining there 5 minutes. viz

At 11.48 am. the Mercury stood at 93° . Five minutes afterwards viz

At 11.53 am it stood at 89° below which point it did not fall.

But a reduction of temperature:

from 98° to 89° — viz 9°

in ten minutes may be regarded as a very satisfactory result.

Considering the disadvantages conditions under which the Apparatus was tried.

45

There is one feature in Mr Stoney's invention which I consider

very important — viz

The cooled air passes through a perfectly clean medium

and is free from the damp, stuffy, smell and feel of air ~~which~~ cooled by means of passing it through a lattice of mat, cloth or fabric of any kind, which in due course time must become more or less decomposed and charged with dust. — The air which entered the Carriage from the mouth of the Cowl felt fresh and dry as well as cool and was totally devoid of smell.

46 I think there is every reason to believe that the Carriage and more perfect Apparatus, which Mr Stoney has invented for cooling Carriages from below will be most successful. But to give it a fair trial it should be used some way inland, in a really hot-dry atmosphere. The efficiency of a cooling apparatus, the action of which depends upon rapid evaporation can never be satisfactorily tested in an atmosphere laden with moisture such as we have at Madras or even further inland.

There are rain clouds hanging
about.

I hope it will be found practicable
before long, to provide the Officers
of the Consulting Engineers for
Railway Department, with
a special carriage in which
to make their periodical
inspections of the various lines.
The heat and fatigue of travelling
for 300 or 400 miles on the foot-
plate of an engine, during
several consecutive days in
hot-weather, are very trying.
After travelling on an engine say
40 or 50 miles, it is almost
impossible to be so alert and
attentive to what is passing as
one should be. It is moreover
impossible to see as well from
an engine as from the rear
of an inspection carriage,
and when it is found
necessary to halt at any
point on the line for the
night, when there are no
leaving or refreshment - soon
it is very inconvenient not
to have a carriage to sleep, dress

47

An inspection
carriage
required for
Consulting
Engineers Dept.

at once in Mr. J. J. J.
Acting Chief Engineer of the
Madras Railway Co. very
kindly placed his inspection
carriage at the disposal of
Mr. Coates and myself. We
were thus enabled to make
the line between Arcot and
Puducherry in the best possible
way and with a minimum
of fatigue and heat.

48

We were fortunate in having
comparatively cool weather as
a good deal of heavy rain
fell along the line on the evening of the 13th and
at intervals for some
days afterwards.

The first fruits of the
season came from the
Pernar on the afternoon of
the 14th. We saw it at 3
p.m. when it had only
just passed through the
Railway bridge. The land
on either side was
perfectly dry. Although
the rain had cooled the air
a good deal it was
nevertheless quite warm
enough to bring out the

Comfort and Convenience of an
Inspection Carriage in Strong
Contrast to the Discomfort and
inconvenience of the foot-plate of
an Engine from which to make
an inspection of 308 miles of
Railway.

The following are readings from
a Thermometer suspended from
the roof of the Inspection Carriage
inside —

Date.	Station	Time	Hour	Temperature
13 th	Sirataur		10.15 am	93°
"	Nagpur		10.50 "	96°
"	Pultoor		11.15 "	97°
14 th	Poody		11.47.9	98°
"	Cuddapah		12.15 "	98°
"	Riddipully		2.46 pm	103°
"	Rayampett		3.35 "	102°
"	Hundalore		4.11 "	100°
"	Wontimettah		4.50 "	97°
14 th	Cuddapah		11.15 am	93°
"	Gerragomla		12.37	97°
"	Moodanoor		1.18 pm	99°
"	Royalcheroo		4.11 "	101°
15 th	Gooly		7.31 am	82°
"	Goondacul		8.38 "	86°
16 th	Bellary		5.45 "	78°
"	Auspree		9.36 "	89°
"	Adoni		10.20 "	93°
"	Hosger		11.15 "	97°
"	Tongaboodra		11.30 "	98°
"	River			

Mr. Thompson
Capt. H. R.
Offg. D. Z. Comm. Eng. 2nd Div. 14th Regt.

Madras 24th May 1873

Railway Department.

CONSULTING ENGINEER'S OFFICE.

No. 299

From

LIEUT.-COLONEL J. H. M. SHAW STEWART, R.E.,

Consulting Engineer for Railways,

To

COLONEL G. W. WALKER, R.E.,

Secretary to Government,
Public Works Department,
Fort Saint George.

SIR,

I have the honour
to enclose for the information of
Government a report by Captain
Ross Thompson upon an inspection
made lately by him of the North-West
line of the Madras Railway.

I have drawn the
attention of the Agent to several
portions of the report. Paragraph
12 has been communicated for the
information of the Telegraph Department.

With reference to
paragraphs

P.W. 3192/73.

26. May. 1873.

[Signature]

paragraph 47 of the report, and to
the proceedings of Government dated
the 28 June and 12 August 1872
1866 and 1914, it may be
mentioned that the Board of
Directors lately approved of the con-
struction of one additional inspection
carriage, for the use either of this
Department, or of the Company's officers,
as might be required. The estimate
of the cost has not however been
yet received in this office for
transmission to Government.

I have the honour to be

Sir

Your most obedient servant
Madras 23 ~~March~~ ^{April} 1873
30 May 1873 Genl Engineer for Railways

P. M. 1873 Richard

RAILWAY DEPARTMENT.

1873.

20th 192.

From The Consulting Engineer for Railways,

To

The Secretary to Government, P. W. Department, Fort Saint George.

Dated 30th May 1873.

Encl. No. 299

Submitting

Col. Van Heemskerk's

Inspection Report

Re Sir M. J. van der

Public Order

On 23rd June 192 446 447
" 12 Aug 208-209

W. H. H.

Ordered to be recorded.

1644

Addressing to Para 16 the Government
arrangements have been made to
give Messrs. Jagers & sons complete
Alphabetic for looking Companies (M.M.)
in 1873 556
1873 556
1873 556

853-658 1923-258
No. 358 1923-258
Submitting
The Secretary to Government
P. W. Department
Fort Saint George.
1873.

Submitting
The Secretary to Government
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1873.

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