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MADRAS RECORD OFFICE

Government of Madras

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Not to be folded or roughly handled

No. 306. 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, 15th October 1873, No. 542 :—

I HAVE the honour to submit, for the information of Government, a report by the Deputy Consulting Engineer 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 paragraphs 9 to 15 of the Report.

3. I cannot altogether endorse the opinion given by Captain Thompson in paragraph 16, in favour of the substitution of covered vans for the open wagons which are in general use on the Madras Railway. There is much to be said on the other side of the question. At present the bulk of the goods traffic on the Madras Railway is carried in open wagons, tarpaulins being used when the goods are such as to require protection from the weather. Covered vans are unsuited to a large proportion of the goods traffic, and, in the event of the open wagons being replaced by them to any considerable extent, a great addition to the empty mileage would be the result. Again, covered vans are much more expensive than open wagons, and I am inclined to agree with the Railway Authorities that the interest on this additional outlay would more than cover the annual cost of tarpaulins. The covered vans are also considerably heavier than the open wagons, and by their use the paying weight in each vehicle would be proportionately reduced.

As regards the carriage of bulky goods, such as unpressed cotton, there would without doubt be a loss by the use of covered vans, as the loads would have to be reduced. And I cannot say that, in my experience, advantage is now taken of the fact that the vehicles are open to overload them with goods of this description. No accident has ever happened from this cause, and with careful packing none ought ever to happen so long as proper attention is paid to the loading gauge.

As regards the difficulty of keeping goods dry in rainy weather, there is not practically much difference between covered vans and open wagons with carefully arranged tarpaulins.

Upon the whole I agree with the Railway Authorities that at present the balance of advantage is in favour of the open wagons. The question is one which has often been discussed.

4. In consequence of the late heavy rains, I have found it necessary to inspect the North-West Line since the date of Captain Thompson's visit, and I am glad to be able to endorse all that he says as to the general good condition of the road and works. To the west of the Chittravutty river the greater part of the line passes through tracts of black cotton soil, and these places will for some years give trouble during rainy weather. In my letter dated the 10th instant, No. 538, I had to report the circumstances of an accident due to this cause; and near the Royalchervoo station part of the line was in a rather critical state when we passed over it, owing to the carrying away of the treacherous material of which the bank is formed. The Deputy Chief Engineer, who accompanied me, gave the necessary instructions for at once securing the road. I mention the circumstance to show how, in these black cotton soil tracts, the condition of the line is at present liable to be changed by the heavy rain of one night. In the course of a few years the regular and

constant supply of ballast, wherever it is required, will doubtless remove this cause of anxiety.

5. Every one of the large rivers crossed by the railway, the Cheyaur, the Paupagnee, the Chittravutty, the Pennair, the Toongabudra, and the Huggry, was in flood when we passed along the line. At the Cheyaur the sinking of the cylinders for the new bridge was in progress in spite of the fresh in the river. During July last I visited the river with the Chief Engineer of the Railway for the purpose of examining the foundation for the last of the masonry piers. As in the case of the others, this foundation was carried down to the rocky bed of the river and was in every sense satisfactory. This pier, as well as all the other masonry piers, has now been finished to girder level; and the sinking of the cast-iron cylinders for the northern piers is now making fast progress.

At the Huggry river the work upon the bridge is still stopped for want of the iron cylinders. This is greatly to be regretted, for, when the river is in flood, not only is the passenger traffic subjected to great inconvenience, but there is also great loss of goods traffic to the Railway.

Note on the North-West Line and Bellary Branch of the Madras Railway.

I HAVE the honour to report having lately inspected the North-West Line of the Madras Railway and its branch from Goonducul to Bellary.

2. The roadway on the whole appeared to be in excellent order. There was a slight want of ballast on the 190th, 191st, and 207th miles. On the main line the following miles were being ballasted :—

280th	282nd	283rd	284th	285th
286th	287th	290th	291st	292nd
293rd	294th	295th	306th	332nd
333rd	337th	338th	339th	342nd

and on the branch to Bellary the—

290th	293rd	295th	296th	297th
299th	301st	303rd		

3. The bed of the Huggry river affords a plentiful supply of excellent sand ballast for the Bellary Branch.

4. When proceeding to Raichore the roadway was much smoother than when returning, heavy rain having fallen in the interim, rendering the black cotton portions of the line rough.

5. The fencing generally appears efficient; in some places aloes do not thrive well; I observed that the 242nd mile was being replanted, the first plants not having grown up into an efficient fence.

6. The telegraph lines, both Government and Railway, appeared to be well maintained and the posts kept free from creepers, etc.

7. The stations were, as a rule, very neat and clean, and the state of the latrines satisfactory.

8. At Ghooty and Condapuram the wood-work of the station buildings had been painted a bright green. Unless there is some good reason, of which I am not at present aware, for painting the doors and windows of stations on the North-West Line, I think it is a great pity to cover the wood-work, as it is almost all particularly good and sound. A wood oil or clear varnish admitting of the grain of the wood being seen, is, I think, much to be preferred to paint of any kind when the wood-work is good, naturally dark in colour, and not exposed to sun and rain.

9. I observed that at Yerragoontalu, Moodanoor, and Goondacul the Station Masters did not appear in uniform.

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21*st November* 1873.

The Yerragoontalu Station Master explained that he had only just been appointed and had not yet been supplied with uniform.

The Moodanoor Station Master that he had not yet received his, and the Goondacul Station Master that he had been supplied with his, but not fitting properly it was undergoing the necessary alterations.

10. I noticed a considerable waste of water at the water columns at Goomanoor (on the Bellary Branch) and at Nundalore, owing to the canvas hose in each instance being out of repair.

11. I also noticed that Engine No. 42, running between Cuddapah and Ghooty, was very dirty. This is not a remark which can often be made regarding engines running on the Madras lines. The engine however appeared to be in perfectly good working order, and there may have been some special reason for its not having been so clean as it might have been.

12. Engine No. 49, running between Goondacul and Bellary, was somewhat out of repair. There was an escape of steam and water in small jets all round the fire hole. When the door was kept open for a short time this escape became considerable, owing, I imagine, to the iron shrinking in the cool air which rushed in. All that appeared to be necessary was to have the rivets tightened up. The driver, however, had considerable difficulty in maintaining steam and in keeping up to time although his train was not a heavy one.

13. Some little skill and care appears to be necessary in loading open wagons with *unpressed* cotton, so as to avoid all risk of accident. As an instance in point :—

High sided open goods wagon No. 1,061, loaded with unpressed cotton, was being sent from Goondacul to Bellary by the train in which I travelled. Shortly after leaving Goondacul on looking back from the engine I noticed that the load on the wagon in question had shifted considerably, and was overhanging the side. It continued to shift until it became a question whether Veerapoor could be reached without stopping to re-arrange the load. That station was however reached in safety, and I then pointed out the wagon to the Station Master, telling him I considered it dangerous to allow it to proceed in the condition in which it was. He then had it removed from the train and shunted into a siding. I presume it was afterwards re-packed before sending it on to Bellary, although when passing through Veerapoor two days subsequently I observed the wagon on a siding in the same state as before.

14. The Station Master explained that the station coolies had other work to do, and that there was no immediate necessity for the wagon to be re-packed, the Huggry being in flood and communication with Bellary for heavy goods being consequently interrupted.

15. The cotton was covered with a tarpaulin, over which ropes were passed and fastened to the sides of the wagon. Had the load fallen over and dragged by the side of the wagon, I think the passenger carriages in rear would undoubtedly have been thrown off the line.

16. From what I have seen, and such information as I have been able to gather, I think the ultimate economy of having open wagons and tarpaulins instead of covered goods vans in this country is open to question. The annual cost of repairing and replacing tarpaulins is enormous. Open wagons are certainly required for ballast, minerals, building and other heavy materials, which do not suffer from weather, but for all other goods I am convinced that it would be better to use covered vans. I believe that this principle is fully recognized at home. During the monsoons in this country it is almost impossible, even with the best tarpaulins and the greatest care, to keep goods in open wagons dry; and with covered goods vans all such risks as I have described, regarding the shifting or falling over of light, high piled loads, would be done away with.

17. There appears to be little if anything being done at the bridge over the Huggry river on the Bellary Branch, owing, I understand, to the non-receipt of material from England. This river being still unbridged causes great inconvenience, and removing the roadway across the river bed, when from time to time it is washed away, is a heavy annual charge.

18. The Cheyaur bridge has progressed rapidly within the last four months. It consists of forty-six spans of 70 feet each from centre to centre of the piers. Thirteen of the piers are of masonry, and the remaining thirty-two piers will consist of pairs of cast-iron cylinders, 6 feet in diameter, to be sunk through the sand and clay bed of the river to the rock below.

19. The south abutment and the thirteen masonry piers next it are completed. The cylinders for piers Nos. 14 to 38 (counting from the south abutment) inclusive, have been sunk through the upper or sandy bed of the river to the intermediate or clay stratum. The western cylinder of pier No. 39 was being sunk through the sand at the date of my visit.

20. In piers 14 to 39 the aggregate depth of cylinders sunk was 1,150 feet, and 450 feet of cylinders had been bolted together above the river bed ready for sinking. The 33rd pier will have to be sunk 68 feet 3 inches before reaching the rock. So that the total depth of this pier will be 74 feet 9 inches to the level of the cross girder beds.

21. The intermediate or clay stratum of the river bed is met with first at the 16th pier, when it is about 6 inches in thickness over the rock and at a depth of about 22 feet below the sandy bed of the river. Between the 16th and 22nd piers it lies at an average depth of about 23 feet, and from the 23rd to the 38th pier about 27 feet. Whether this bed of clay is only a few feet in thickness or extends down to the rock is not yet quite determined; possibly it may dip and be lost between the 38th pier and the north abutment, as no clay was met with when sinking the wells for the foundations of the north abutment, and they have been sunk to a depth of 45 feet.

22. Round the wells for the foundation of the north abutment a coffer dam has been constructed, and concrete was being put into them with a view to stanching them sufficiently to admit of their being pumped out, filled with concrete and built upon. The concrete, mixed as dry as possible, was being let down to the bottoms of the wells in bags. When the bags had reached the bottom they were tipped up by means of ropes attached to the two bottom corners and thus hauled up to be re-filled.

23. The stones used in this concrete were such as would pass through a 1½ inch mesh sieve, and the cement composed of—

Two measures chunam.
Three do. brick dust.
Two do. sand and nine of stone.

The chunam used is Cuddapah kunker. Mr. Stoney, the Engineer in charge of the work, thinks of using the lime obtained from the Nurghee stone for filling the cylinders, as he considers it better.

24. When mixing the cement the brick dust is passed through a fine sieve, then mixed with the chunam and sand and ground in a mill until thoroughly incorporated. I was shown a block of concrete made as above described. It had been about two months under water, and appeared a particularly hard and compact material.

25. Each cylinder appears to have been sent out *complete* from home, viz., a bottom, a top, and as many intermediate rings as the length of each cylinder required. Owing to this arrangement the commencement of the Piers 40 to 45 has been delayed, as there is not a sufficient number of bottom rings to go on with. These rings differ from the others in not having an interior flange or narrow diaphraghm below, and in their having a cutting edge to aid in sinking them.

26. Mr. Stoney expected to commence sinking the cylinders in the clay bed in the course of a day or two with Webb's "excavator," and an ingenious adaptation of his own of Bull's "Dredger," which have hitherto been used for sinking the cylinders through the sand.

27. Bull's dredgers are most effective in sand or loose gravel, but in clay they do not bite sufficiently. Mr. Stoney proposes making the biting edges serrated, and so arranging the dredgers on a guide rod firmly fixed in the ground, as to prevent the biting edges from slipping until they have made good their hold in the clay. A small model of this apparatus appeared to work satisfactorily, and to promise success in actual working with the full sized dredgers. Amongst Mr. Stoney's other devices for saving time and money is a bucket for lowering down concrete to fill such cylinders as cannot be pumped dry. The bucket is so arranged as to preserve the cement from being washed out, whilst the concrete is being lowered through water, and to deposit it evenly at the bottom of the cylinder with little disturbance or churning.

28. For baling out cylinders which cannot be cleared by means of ordinary suction pumps, he has constructed a large self-filling bucket which, when worked as he proposes, by means of a

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steam winch will, I have no doubt, be very efficient. A double action pump has also been constructed in the work sheds near the bridge which delivers a large and continuous stream of water, and has been found useful in clearing the cylinders.

29. The cylinders of Piers Nos. 14, 15, and 16 were sunk to their full depth, viz., to the rock below. In each of the first mentioned piers 1½ feet of concrete had been put down, and the east cylinder of Pier No. 16 had been pumped out, cleared of boulders inside, and was ready for putting in the concrete when the river came down in flood and stopped work.

30. When the cylinders have been sunk 2 or 3 feet in the clay bed by means of Webb's excavators or Mr. Stoney's adaptations of Bull's dredgers, it is possible that the clay will stanch the cylinders sufficiently to admit of their being pumped dry and the excavation continued by coolies.

31. Sinking through the clay will, I fear, be a slow and expensive operation, and will require the cylinders to be very heavily weighted. Even when sinking through the sand it has been found necessary to weight the cylinders with about 40 tons of rails, and as these have to be lifted off and lifted on again for about every 12 feet of cylinder sunk, the cost of handling the rails alone is heavy both in time and money.

32. Hitherto, sinking through the sand has cost about Rupees 2 per foot. This is for labour alone and exclusive of plant. In clay it is believed that sinking will cost not less than Rupees 10 per foot, probably more, but it is impossible to make any accurate estimate of what the cost will be until one or two cylinders have been actually put down.

33. The existing Cheyaur Bridge is in two portions, abutting on a sand bank, or as it is called "Island" in the bed of the river. The bridge now under construction is above this island and will be one continuous structure, there will consequently be eight additional spans in it. The girders for these spans are now on the ground and are being rivetted up. For the other spans those on the existing bridge will be used.

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

11*th October* 1873.

No. 307. ORDER THEREON, 21st November 1873, No. 2,820.

RAILWAY, No. 45.

ORDERED that the above reports on the inspection made of the North-West Line of the Madras Railway be recorded.

2. His Excellency the Governor in Council confidently leaves to the discretion of the officials of the Madras Railway the arrangements best calculated to afford the most efficient and economical means of transport of the description of goods required to be dealt with on their line.

3. The condition of the road on the portion of the Railway under notice demands the constant attention which the Engineering Department of the Company are reported to bestow upon it. It is hoped that special endeavours will be made to hasten the despatch from England of the iron cylinders indented for on account of the Huggry Bridge, considerable loss as well as inconvenience being now experienced owing to the incomplete state of the structure.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for Railways.
Exd. S. T. Austin.
Spare Copies.

Note on the North-West-Line and Bellary Branch of the Madras Railway —

1. In the Cuddapah Report having lately inspected the North-West-Line of the Madras Railway and its Branch from Gooticoul to Bellary

2. The Roadway on the Whole appears to be in Excellent Order. There is a Deficiency of Ballast on the 190th. 191st and 207th Miles. On the Main Line the following Miles require Ballasting:

280.	282.	283
284.	285.	286
287	290.	291
292	293.	294
295.	306.	332
333.	337.	338
339	342.	

And on the Branch to Bellary the

290th.		
296	293.	295
301.	303.	299

3. The bed of the Huggy River affords a plentiful Supply of Excellent Sand Ballast for the Bellary Branch.

When proceeding to Raichur the Roadway was much smoother than when returning, heavy Rain having fallen in the interim, rendering the black Cotton portions of the line rough. 4.

The fencing generally appears efficient. In some places also the Anti-Nuisance cutt, I observed that the 242nd mile was being replanted, the first plants not having grown up into an efficient fence 5.

The Telegraph Lines, both Government & and Railway appeared to be well maintained, and the posts kept free from Creepers &c. 6.

The Stations were as a rule very neat and Clean and the Staff of the Talukes satisfactory. 7.

At Gooty and Condapuram the wood work of the Station Buildings had been painted a bright green. Unless there is some good reason to which I am not at present aware, for painting the doors and windows of Stations on the North West Line, I think it is a great pity to cover the wood work, as it is almost all particularly good and sound. A wood oil or clear Varnish admitting of the Grain of the wood being seen, I think much to be preferred to paint of any kind when the wood work is good, naturally dark in Colour, and not exposed to Sun and Rain. 8.

I observed that at Yerragoontla Mordanoor and Gooductal the Station Masters did not appear in Uniform: the Yerragoontla Station Master explained that he had only just been appointed and had not yet been supplied with Uniform. The Mordanoor Station Master that he had not yet received his, and the Gooductal Station Master that he had been supplied with his, but not getting properly it was undergoing the necessary alterations 9.

I noticed a considerable 10.
waste of water at the Water
Columns at Soonamoor (on
the Bellary branch) and at
Nundadoor, owing to the canvas
hose in each instance being
out of repair.

I also noticed that Engine No 42 11.
running between Cuddapah
and Sooty was very dirty
This is not a remark which
can often be made regarding
Engines running on the Madras
Lines. The Engine however appeared
to be in perfectly good working
order, and there may have
been some special reason for
it not having been so clean
as it might have been.

Engine No 49 running between 12.
Goondacul and Bellary was
somewhat out of repair.
There was an escape of steam
and water in small jets all
round the fire hole. When
the door was kept open
for a short time, the escape
became considerable, owing
I imagine to the iron shrinking
in the cold air which rushed
in. All that

was to train the Fitters Lighteners
etc. The drivers however had
considerable difficulty in
maintaining steam and
in keeping up to time although
the train was not a heavy one.

13. Some little skill and care
appears to be necessary in loading
open wagons with Unpressed
Cotton, so as to avoid all
risk of accident.
As an instance in point -
High sided open Goods
wagon No 1061 loaded with
unpressed Cotton, was being
sent from Goondacul to
Bellary, by the train in which
I travelled. Shortly after
leaving Goondacul on looking
back from the Engine I noticed
that the load on the wagon
in question had shifted
considerably, and was overhanging
the side. It continued to
shift until it became a
question whether Tadrapoor
could be reached without
stopping to rearrange the
load. That station was
however reached in safety
and I then pointed out the
wagon to the Station Master,
telling him I considered it

dangerous to allow it to proceed in the Condition in which it was: He therefore directed some Men to be employed to unload the Waggon and Stranded into a Siding. I presume he was afterwards repacked before sending it on to Bellary although there passing through Veerapoor two days subsequently I observed the Waggon on a Siding in the same State as before.

14. The Station Master explained that the Station Coolies had other work to do, and that there was no immediate necessity for the Waggon to be repacked, the Buggy being in flood and communication with Bellary for many days being consequently interrupted.

15. The Cotton was covered with a Carpaulin over which ropes were passed and fastened to the sides of the Waggon. Had the load fallen over and dragged by the side of the Waggon I think the passenger carriages in rear would undoubtedly have been thrown off the line.

16. From what I have seen and such information as I have been able to gather, I think the ultimate economy of having open wagons and Carpaulins instead of Covered Goods Vans in this Country is open to question. The annual Cost of repairing and replacing Carpaulins is enormous. Open wagons are certainly required for ballast, Minerals, building and other heavy materials, which do not suffer from weather, but for all other Goods I am convinced that it would be better to use Covered Vans. I believe that this principle is fully recognized at home. During the Monsoons in this Country it is almost impossible even with the best Carpaulins and the greatest Care to keep Goods in open wagons dry. and with Covered Goods Vans all such risks as those described regarding the shifting or falling over of light, high piled Loads, would be done away with.

17. There appears to be little if any risk being done at the bridge over the Buggy River on the Bellary Branch, during I understand the Non Receipt of Material from England. This River being

Still undredged causes great-
er convenience, and removing the
Roadway across the River bed.
When from time to time it is washed
away, is a heavy Annual Charge

The Clay and Gravel has progressed 18.
Rapidly within the last four months
& consists of 46 Spans of 70 feet
each from Centre to Centre of the
piers. Thirteen of the piers are
of Masonry and the remaining
32 piers still consist of pairs of
Cast iron Cylinders, six feet in
diameter Which Sink through
the Sand and Clay bed of the
River to the Rock below.

The South-abutment and No- 19.
13 Masonry piers Respectively are completed
& the Cylinders for piers Nos 14
& 38 (Counting from the South-abutment)
in Position, have been Sunk through
the upper or Sandy bed of the
River to the intermediate or
Clay Stratum. The Western Cylinder
of pier No 39 was being Sunk
through the Sand at the date of
my Visit.

In piers 14 & 39. the aggregate 20.
depths of Cylinders Sunk was
1150 feet, and 450 feet of
Cylinders had been bolted together
above the River bed ready for
Sinking.

20. The 33rd pier will have been
Sunk 68' 3" before reaching
the Rock. So that the total
depth of this pier will be
74' 9" to the Crown
Girder beds.

21. The intermediate or Clay Stratum
of the River bed to rest with
first at the 16th pier, where
it is about six inches in
Thickness over the Rock and
at a depth of about 22 feet
below the Sandy bed of the River.
Between the 16th and 22nd piers
it lies at an average depth of
about 23 feet, and from the
23rd to the 38th pier about 27 feet
Whether this bed of Clay is only
a few feet in Thickness or extends
down to the Rock is not yet
quite determined, possibly it
may dip and be lost between
the 38th pier and the South-
abutment, as the Clay was
met with when Sinking the
wells for the foundations of the

North-abutment, and they seem
seem sunk to a depth of 46 feet.

Round the walls for the foundation 22.
of the North-abutment a Coffer
dam has been constructed, and
Concrete was being put into them
with a view to Stanching them
sufficiently to admit of their
being pumped out, filled with
Concrete and built upon.
The Concrete mixed as dry as
possible was being let down to
the bottoms of the wells in bags.
When the bags had reached the
bottom they were tipped up
by means of ropes attached to
the two bottom corners and
thus trailed up to be refilled 23.
The Stones used in this Concrete
were such as would pass through
a 1½ inch mesh sieve, and the
Cement composed of
2 measures Chunam
3 Brick dust
2 Sand and 9 of Stone
The Chunam used is Cuddapah
Kunker. Mr Storey the Engineer
in Charge of the work thinks
of using the lime obtained from
the Junjur Stone for filling the
Cylinders as he considers it
better.
24. When mixing the Cement, the
brick dust is passed through
a fine sieve, then mixed with
the Chunam and Sand and
ground in a Mill whilst
Watering is incorporated.
I saw shown a block of Concrete
made as above described. It
had been about two months
under water and appeared
a particularly hard and compact
Material
25. Each Cylinder appears to have been
sent out Complete from home
viz. a bottom, a top, and as
many intermediate Rings as
the length of each Cylinder
required. Owing to this
arrangement the Commencement
of the piers 40 & 45 has been
delayed, as there is not a
sufficient number of bottom
Rings to go on with. These
Rings differ from the Shirs.
in not having an interior flange
or Narrow diaphragm
below and an Iron facing or
Cutting Edge to aid in sinking
them

Mr Storey exhibited & explained 26.
Sinking the Cylinders in the
Clay bed as the Course of a
day or two, with "Webbs Excavator"
and an ingenious adaptation
of two pairs of Bulls "Dredgers"
which have hitherto been
used for Sinking the Cylinders
through the Sand
Bulls dredgers are first-rate 27
in Sand or Coarse Gravel, but-
in Clay they do not bite
sufficiently. Mr Storey proposes
making the biting edges serrated
and so arranging the dredgers
on a Guide Rod formerly fixed
to the Ground, as to prevent the
biting edges from slipping until
they have made good their
hold in the Clay. A small
Model of this apparatus appeared
to work Satisfactorily and
to promise success in actual
working with the full sized
dredgers. Amongst the Steps
that occurs for saving time and
money is a bucket for Lowering
down Concrete to fill such
Cylinders as cannot be pumped
dry. The bucket is so arranged

as to prevent the Cement from
being washed out while the
Concrete is being Lowered through
water, and to deposit it gently
at the bottom of the Cylinders
with little disturbance or
Churning.

28. For baling out Cylinders which
cannot be cleared by means
of Ordinary ~~Suction~~ Suction
Pumps he has constructed
a large self filling bucket-
which when worked as he
proposes by means of a Steam
Winch will I think no doubt
be very efficient.
A double acting pump has
also been constructed at the
work Sheds from the Bridge
which delivers a large and
continuous Stream of water
and has been found useful
in Clearing the Cylinders.

29. The Cylinders of Piers 14, Nos 15, and 16 were
Sunk to their full depth
Viz. to the Rock below in Each
of the first mentioned piers
1½ feet of Concrete had been
put down and the last Cylinder
of Pier No 16 had been pumped

out. Cleared of boulders inside and was ready for putting in the Concrete when the River came down in flood and stopped work.

When the Cylinders have been sunk into or Nearly Set in Mr Clay bed by means of Webb's Excavators &c Mr Sheriffs adaptation of Bull's dredgers, it is possible that Mr Clay will blanch the Cylinders sufficiently to admit of their being pumped dry and the Excavation Continued by Cribs Sinking Pumps. Mr Clay will 31
then be a slow and Expensive Operation and will require the Cylinders to be Every Nearly Reset. Even when Sinking Pumps the Sand Must have been found Necessary to weight the Cylinders with about 40 tons of Rails and as these have to be lifted off and lifted on again for about Every 12 feet of Cylinder Sunk. The cost of handling the Rails alone is Nearly both in time and Money.

Whether Sinking Pumps the Sand 32

30.

has cost about 15/2 per foot. This is for Cabon alone and Exclusive of Plant.

In Clay it is believed that Sinking will cost not less than Rs 10. per foot, [illegible] probably more, but it is impossible to make any accurate Estimate of What the Cost will be until the Cylinders have been actually put down.

32 The Existing Chenab Bridge is in two parts, Abutting on a Sand Bank, or as this is called "Island" in the bed of the River. The bridge now under Construction is above this Island and will be one Continuous Structure. There will Consequently be Eight additional Spans in it.

The Girders for these Spans are now on the Ground and are being Riveted up. In the Three Spans Those on the Existing bridge will be used.

Wm Thompson
Capt RE.
Offg. Dy. Com. Engr. for Railways.

F.B. No. 329-2
Secundrabad
P.W. 5643/75

11 Feb. 1876

Railway Department. CONSULTING ENGINEER'S OFFICE.

No. 542

From

LIEUT.-COLONEL J. H. L. 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 submit, for the information of Government, a report by the Deputy Consulting Engineer 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 paragraphs 9 to 15 of the report.

3. I cannot altogether endorse the opinion given by Captain

Captain Thompson in paragraph 16, in favour of the substitution of covered vans for the open wagons which are in general use on the Madras Railway. There is much to be said on the other side of the question. At present the bulk of the goods traffic on the Madras Railway is carried in open wagons, tarpaulins being used when the goods are such as to require protection from the weather. Covered vans are unsuited to a large proportion of the goods traffic and in the event of the open wagons being replaced by them to any considerable extent, a great addition to the empty mileage would be the result. Again, covered vans are much more expensive

expensive than open wagons, and I am inclined to agree with the Railway Authorities that the interest on this additional outlay would more than cover the annual cost of tarpaulins. The covered vans are also considerably heavier than the open wagons, and by their use the paying weight in each vehicle would be proportionately reduced.

As regards the carriage of bulky goods, such as unpressed cotton, there would without doubt be a loss by the use of covered vans, as the loads would have to be reduced. And I cannot say that, in my experience, advantage is now taken of the fact that the vehicles are open to overload them with

with goods of this description. No accident has ever happened from this cause; and with careful packing none ought ever to happen so long as proper attention is paid to the loading gauge.

As regards the difficulty of keeping goods dry in rainy weather, there is not practically much difference between covered vans and open wagons with carefully arranged tarpaulins.

Upon the whole I agree with the Railway authorities that at present the balance of advantage is in favour of the open wagons. The question is one which has often been discussed.

4 In consequence of the late heavy rains I have found it necessary

necessary to inspect the North-West line since the date of Captain Thompsons visit, and I am glad to be able to endorse all that he says as to the general good condition of the road and works. In the West of the Chilliwacky river the greater part of the line passes through tracts of black cotton soil, and these places will for some years give trouble during rainy weather. In my letter dated the 10 instant, No 538, I had to report the circumstances of an accident due to this cause, and near the Royal Oak station part of the line was in a rather critical state when we passed over it, owing to the carrying away of the treacherous material of which the bank is formed. The

Deputy

Deputy chief Engineer, who accompanied me, gave the necessary instructions for at once securing the road. I mention the circumstance to show how, in these black cotton soil tracts, the condition of the line is at present liable to be changed by the heavy rain of one night. In the course of a few years the regular and constant supply of ballast, wherever it is required, will doubtless remove this cause of anxiety.

5. Every one of the large rivers crossed by the railway, the Cheyair, the Ranpagree, the Chittravathy, the Ponnaw, the Pennaw, the Toongabudra, and the Huggry, was in flood when we passed along the line. At the Cheyair the sinking

sinking of the cylinders for the new bridge was in progress in spite of the press in the river. During July last I visited the river with the chief Engineer of the railway for the purpose of examining the foundation for the last of the masonry piers. As in the case of the others, this foundation was carried down to the rocky bed of the river and was in every sense satisfactory. This pier, as well as all the other masonry piers, has now been finished to girder level; and the sinking of the cast iron cylinders for the northern piers is now making fast progress.

At the Huggry river, the work upon the bridge is still stopped for want of the iron cylinders.

This

No. 2820 P.W. Dept.

Proceedings of the Madras Government.

Under date the October 1873.

Read the following

From the Consg Engineer
for Railways.

(Here enter No 542 d/16th October 1873)

Ordered that the above reports on the inspection made of the North West line of the Madras Railway be recorded.

His Excellency the Governor in Council confidently leaves to the discretion of the Officials of the Madras Railway the arrangements best calculated

RAILWAY DEPARTMENT.

Public Works Department
From
The Consulting Engineer
for Railways,

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

Dated 16th October 1873.
Recd. 17th October 1873.
No. 542

Submitting
his letter noted in the
margin with Report
on the inspection of the
N. W. line of the
Madras Railway by the
Consg Engr for Rlys.

Lt. Col R.E.
Consg Engineer for
Railways.

Secretariat
Madras
Oct 18th 1873

Submitted.

Chief Secretary to Govt.

Madras
Oct 18th 1873

Recd. 21st Nov 1873

No. 2820 - 21st Nov 1873

calculated to afford the most efficient and economical means of transport of the description of Goods required to be dealt with on their line.

The condition of the road on the portion of the Railway under notice demands the constant attention which the Engineering Department of the Company are reported to bestow upon it. It is hoped that special endeavours will be made to hasten the despatch from England of the Iron Cylinders indented for on account of the Huggry bridge.

considerable loss as well as inconvenience being now experienced owing to the incomplete state of the structure.

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To
The Consg Engineer
for Railways &c
Dublin 24/11/73

No. 304

Govt. of {1873} Madras.

PUBLIC WORKS.

To The Consulting Engr for Railways

Dated

Read.

Encl. 1

G. O. 21 "Nov." No. 2820.

Nos. 306 & 307

Mad. Ras Railway. Passing orders on letter from the Consltg. Engr. submitting Inspection Report by Capt Thompson of the N.W. line of the Mad. Ry.