M R O 1—10,006—28-2-50.

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(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 310-311 Press Original
B.P. ~~No.~~ Mis.

Dated 4. 2. 195. 1875

Not to be folded or roughly handled

No. 95. 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, 16th December 1874, No. 762 —

In continuation of my letter, No 706, dated the 18th ultimo, and previous correspondence, I have the honor to lay before His Excellency in Council a letter* from the Agent of the Madras Railway giving cover to the Chief Engineer's detailed report upon the damage sustained by that Company's lines during the floods of October last, and submitting plans and estimates for repairing the bridges over the Gooriattum, Cheyaur, Paupugnee, Chittravutty, and Pennair Rivers. The mode in which it is intended to carry out the necessary repairs to each of these bridges has been thoroughly discussed by Mr. Beresford Anderson and myself upon the ground, and the proposals now brought forward have my entire approval.

Five Plans

* No 1,103, 11th December 1874

2. The Gooriattum Bridge consisted originally of two portions united by an embankment of about 150 feet in length. The eastern portion consisted of twenty-four 30-feet arches on a skew of 60° and the western portion of five 30-feet arches on the square The western portion was entirely destroyed upon the 26th October, and it is now proposed to rebuild the five arches which gave way, and to replace the embankment by two 30-feet arches and one irregular opening spanned by wrought iron girders, uniting the square and skew portions of the bridge as shown on the plan. The estimated cost is Rupees 42,111, but it must be observed that the actual expenditure entailed by the accident will be far below that sum

3. The Committee appointed by Government to report upon the foundations of the Madras Railway Bridges recommended the construction of certain protective works at the Gooriattum Bridge, and after long discussion, recorded in the Proceedings of Government noted in the margin, a sum of Rupees 80,449 was finally sanctioned for the purpose. Unfortunately the weather has been singularly unfavorable for carrying out such works in the beds of rivers, and the floods of last October found the western portion of the bridge entirely unprotected In rebuilding the bridge, it is intended that the new foundations shall be carried down to rock, and a large part of the sanctioned protective works will thus be rendered unnecessary It is estimated that this will effect a saving of Rupees 18,133, so that, in estimating the cost of the damage caused by the flood, the actual expenditure incurred in rebuilding the bridge may be reduced by that amount, leaving Rupees 23,978 as the cost of restoring the bridge and of providing 100 feet of additional waterway

28th June 1872, No 1,568
10th Sept ,, ,, 2,148
7th Feb 1873, ,, 410
13th Aug ,, ,, 2,016-A

4. The bridge over the Cheyaur consisted originally of thirty-eight 70-feet openings spanned by wrought iron girders resting on masonry piers It was divided into two unequal portions by an embankment about 600 feet in length. During the flood in October 1870 seven masonry piers in the south portion were carried away, and, pending the construction of the new bridge which was then

determined on, these were replaced by eight screw pile piers. The damage sustained upon the 25th October may be thus summarized one masonry pier in the south portion and four in the north portion destroyed; the two abutments of the island destroyed, and about 80 yards of the embankment between them carried away, two screw pile piers in the south portion forced slightly down stream; and two sets of girders, 140 feet in length, carried nearly three-quarters of a mile by the flood.

It is now proposed to rebuild, for a single line of rails, the pier which was carried away in the south portion of the bridge, to replace the four piers in the northern portion with screw piles, to form the south island abutment by supporting cross girders upon the uninjured wing walls of the old bridge, to replace the north island abutment with screw piles, and to substitute new girders for those carried away. The arrangements are explained upon the plan.

The estimated cost of the work amounts to Rupees 61,072, but it must be observed that in this is included an item of Rupees 27,489 for new girders, and that this sum will be credited to the estimate if the missing girders are found, upon examination, capable of being used again.

5. The Paupugnee Bridge consisted originally of twenty 70-feet openings, spanned by wrought iron girders resting on screw pile piers Of these, one pier and one set of girders were greatly injured by the accident to the inspection train in June last, and the damage was temporarily repaired with short girders supported upon piers of wooden sleepers The flood of the 28th October carried away four screw pile piers, with two sets of 140-feet girders resting upon them; none of which have yet been recovered The two temporary piers of wooden sleepers were also washed away.

It is proposed to restore all the screw pile piers which have suffered, and to replace the missing girders The estimated cost amounts to Rupees 71,616, but it must be borne in mind that this sum includes the cost of repairing the damage sustained by the bridge both during June and November. It also includes an item of Rupees 41,444 for new girders to replace those not yet recovered from the bed of the river, and, as in the case of the Cheyaur Bridge, the estimate will, in all probability, be ultimately credited with a large portion of this. The item of Rupees 13,300, charged for new piles, is also liable to considerable reduction if the missing piles are recovered.

6 The Chittravutty Bridge consisted of forty 70-feet openings, spanned by wrought iron girders Of the piers, ten at each end were of masonry, and the remaining nineteen of screw piles The flood of the 25th October carried away nine of the ten masonry piers near the south abutment Two sets of 140 feet iron girders have disappeared, and two sets have been much twisted and damaged.

It is proposed to replace all the ruined piers with screw piles, and to substitute new girders for the missing and damaged ones The cost is estimated at Rupees 1,10,746, but, as in the cases of the Cheyaur and Paupugnee Bridges, an item of Rupees 57,298 is included for new girders, and it is believed that a large portion of this will ultimately be credited to the estimate

7. The Pennair Bridge consisted of twenty-four 70-feet openings, spanned by wrought iron girders resting on masonry piers. During the flood of the 25th

October two piers situated near the north abutment were destroyed, but fortunately without injury to the girders, and temporary piers of wooden sleepers having been erected, traffic over the bridge has been resumed.

In order to carry out the permanent repair of the ruined piers without interfering with the running of trains, it is proposed to sink five screw piles in a straight line on either side of each of the two temporary wooden sleeper piers, the two rows of piles at each pier being 24 feet apart Two piers of 26-feet girders, supporting the main girders of the bridge, will rest upon the piles The arrangement is explained on the plan, and, upon the removal of the wooden sleeper piers, the construction of the new masonry piers can be proceeded with, while traffic is passing over the bridge.

The estimated cost amounts to Rupees 10,762.

8. It is of great importance that the works above described should be finished before the next rainy season; and, as every day is of value, I have authorized their immediate commencement in anticipation of sanction. The only mode in which it is possible to provide without delay the necessary girders and screw piles is by making use of those intended for the bridge over the Huggry, and I have accordingly authorized their removal; for, desirable as is the completion of the Huggry Bridge, the maintenance of uninterrupted traffic along the main line is an object of far greater importance. I trust that the action taken will meet with approval.

9 As regards the Huggry Bridge, it may be here incidentally mentioned that the original design consisted of thirty-four 70-feet openings, spanned by iron girders resting on screw pile piers. Subsequent borings proved that the depth of sand was greater than had been supposed, and it was determined* to substitute iron cylinders for the piles in twenty-four out of the thirty-three piers. The remaining nine piers were constructed with screw piles in accordance with the original design, and it will now be necessary to unscrew those piles, in order to obtain sufficient material for repairing the injured bridges. The Chief Engineer intimates that he proposes to reconstruct the nine piers in question with iron cylinders, and I entertain no doubt as to the wisdom of that measure.

* Proceedings of Government, 21st September 1871, No 2,409, 16th November 1871, No 2,911.

10. I shall request the Railway authorities to make an examination, during the early months of next year, of the foundations of the piers at the Chittravutty and Pennair Bridges, both those which failed during the floods and those which remain standing. The result shall be communicated to Government in due course.

11. The question of providing additional waterway at the Paupugnee River and in the new bridge over the Cheyaur must remain in abeyance for the present. It is probable that no proposal upon this subject will come forward until Mr. Anderson has had an opportunity of consulting with Sir John Hawkshaw in England.

12. The detailed statement called for by Government in their Order, dated the 4th instant, No. 3,411-A, shall be forwarded as soon as possible.

From R B ELWIN, Esq., Agent and Manager of the Madras Railway Company, to Lieutenant-Colonel J H M SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Madras, 11th December 1874, No 1,103

WITH reference to my letter of the 12th ultimo, No 1,006, I have the honor to enclose you, herewith, copy of a letter* from the Chief Engineer in which he furnishs a detailed report of the damage sustained by the railway during the floods of 24th and 25th October and following days.

* No 792, 1st December 1874

2 I also enclose you plans† and estimates of the cost of repairing the breaches in the Pennair, Paupugnee, Chittravutty, Cheyaur, and Gooriattum Bridges, and I request that you will be so good as to communicate to me the sanction of Government for the required expenditure, viz :—

† Nos 144, 145, 146, 147, and 192

	Rs.
Pennair Bridge	10,762
Paupugnee do	71,616
Chittravutty do	1,10,746
Cheyaur do	61,072
Gooriattum do	42,111
Total .	2,96,307

3 Information, as to provision in the Budget and the dates on which the sanctions will lapse, is given on the face of the estimates in red ink

From B. ANDERSON, Esq., Chief Engineer, to R B ELWIN, Esq., Agent and Manager of the Madras Railway Company, dated Madras, 1st December 1874, No 792

IN continuation of my letter, No 729, of the 3rd ultimo, I beg now to furnish you with a detailed report of the damage sustained by the railway during the floods of 24th and 25th October and following days.

2. The up-line between Veysaurpaudy Junction and Perambore (3rd mile) was rendered impassable for trains on the 25th October, owing to several slips in the embankment

South-West Line

At the 38th mile there were two slips in the embankment, 39th mile one slip, 41st mile one slip.

At 48th mile, 4th telegraph post, the wing walls of a single 6-feet arched bridge were scoured out and cracked, but the damage was not of a nature to interrupt traffic

The water has since been dammed out of the bridge, and stones have been thrown in between the wings

98th The western portion of the Gooriattum Bridge, consisting of five 30-feet arches, was completely destroyed on the morning of the 26th October

This bridge was originally built in two separate parts divided by a small island of about 144 feet in width The eastern end of the bridge consists of twenty-four 30-feet arches built on a skew of 60°, and the western end of five 30-feet square arches

The bridge was examined and reported on in July 1871 by the Committee appointed by Government to inquire into the state of the foundations of the bridges on the Madras Railway, and extensive protective works, at an estimated cost of Rupees 80,449, were recommended, and were sanctioned by Government These works, however, were only in progress A few openings on the east end were finished, but nothing had been done at the western side

Copy of a letter, No 741, dated 1st November 1874, from the Resident Engineer, 1st Division, South-West Line, reporting the nature of the injuries sustained by the line under his charge, and the measures adopted for restoring through communication, was forwarded to you on the 3rd ultimo

Mr Carter deserves the greatest credit for his exertions under exceptional difficulties The Deputy Chief Engineer was with myself cut off between the Paupugnee and Chittravutty Rivers, and we were unable to communicate, even by telegraph, with the rest of the line Mr Carter, therefore, had to act entirely on his own judgment and responsibility, and it gives me great pleasure to say that when I visited the Gooriattum Bridge, I had every reason to be highly satisfied with the mode in which the temporary repairs had been carried out Mr Carter informs me that he was most ably assisted by Messrs French and Watson

At 98th mile, 3rd telegraph post, there was a slip in the embankment, caused by a scour to a depth of 13 feet under the foundation of a 6-feet arched bridge, about half a mile west of Gooriattum Bridge This was repaired by 29th October

The temporary bridge at Mailputty (105th mile, 11th telegraph post) erected to fill up the gap caused by the destruction of a four 15-feet arched bridge on 6th May 1874 was reported unsafe on the 25th October, but was repaired on the 28th

The temporary bridge at Vaniembady (123rd mile, 23rd telegraph post) erected to fill up the gap caused by the destruction of a five 15-feet girder bridge on 6th May 1874 was reported unsafe on the 25th October, but was repaired on the 28th

North-West Line

3 On the North-West Line the first damage sustained was at 70th mile, 2nd telegraph post, where the revetment round the screw pile abutment of a single 50-feet girder bridge, together with a portion of the slope of the embankment slipped on the 24th October These damages were repaired roughly the same day

At 81st mile, 15th telegraph post, the north-west wing wall of a 9-feet arched bridge was undermined and carried away, and the slope of the embankment scoured The line was diverted to the south side of the bridge the same day

At 85th mile, 13th telegraph post, the line runs through the Kircumbady Tank, and considerable slips took place in the slopes of our bank, these, however, were filled up the same day

At the 97th mile water to a depth of 2 feet flowed through the Ballapillay cutting A little surface ballast was washed away, but was replaced as soon as the water subsided

At the 107th mile the embankment was damaged, and the ballast washed away for a quarter of a mile, and a clear breach made of 20 feet in length Water stood 1 foot over rail level for a length of 15 chains

At 107th mile, 11th telegraph post, there was a considerable slip of bank behind the south abutment of the Codoor Bridge, but this was repaired immediately

At 130th mile, 7th telegraph post, a breach of 200 feet in length was made in the bank by the bursting of the southern portion of the bund of the Munnoor Ketchemah Tank, situated about 7 chains west of the line A single 12-feet arched bridge was left standing uninjured in the middle of the breach

From 131st mile, 10th telegraph post, to 131st mile, 13th telegraph post, the embankment was badly damaged, the ballast washed away, and gaps of from 30 to 100 feet in length caused by floods that flowed over the rails from a breach in the northern bund of the same tank

At 134th mile, 10th telegraph post, a length of 500 feet of embankment was washed clean away by floods from the Cheyaur River which overflowed its banks a few miles from this place

I annex, for your information, copy of a letter, No 100-D, of 4th November 1874, from Mr West who was at the time Resident Engineer of the 1st Division, North-West Line

It is almost needless for me to say that Mr West's services were on this occasion, as they have invariably been in cases of emergency, simply invaluable

Cheyaur Bridge

4 The floods in the Cheyaur River on the night of the 25th October were of an extent wholly unprecedented. The width of the river, where crossed by the railway, is about three-fifths of a mile, but the flood waters rose over the banks and spread out to the extraordinary width of over three miles

The 5th masonry pier of the southern bridge was overturned The 15th and 16th piers (screw piles to replace the masonry piers destroyed in the flood of October 1870) were forced out of line down stream to the extent of 8 inches, without however suffering any further injury.

The south abutment of the island in centre of river was completely destroyed, and 200 feet of the embankment behind the abutment washed clean away

The north abutment of the island was also destroyed

The 23rd and the three last masonry piers were swept away, and two sets of girders carried down the river for a distance of several hundred yards, and the dry revetment of the temporary northern abutment has disappeared, leaving the screw pile trestles standing

One hundred and fifty feet of embankment behind the northern abutment, together with the temporary tank-house, swept away

The new Cheyaur Bridge under course of construction suffered to the following extent —

At the south approach half the width of bank for a length of 100 feet was washed away, and at the north approach the embankment for 200 feet has been totally washed away.

Four of the iron cylinders have fallen out of the perpendicular, but, as they were neither properly bedded on the rock, nor filled with concrete, the damage sustained need not cause the slightest apprehension as to the stability of the piers when completed

The masonry of the new bridge stood remarkably well, though the water rose to the top of the piers It will, I fear, be necessary to increase the height of the new bridge by at least 3 feet, and to add still further to the waterway This will, however, form the subject of a separate communication at a future date

A copy of Mr West's report, No 302, of 4th November, is forwarded herewith for your information

At the Cuddapah River (162nd mile, 5th telegraph post,) the pitching of the north-west bank was undermined and fell in

At 172nd mile, 14th and 15th telegraph post, about 2 chains of embankment were washed away

At 173rd mile, 1st telegraph post, a simple 6 feet arched irrigation culvert and about 50 feet of bank washed away The masonry culvert has been replaced by a temporary sleeper bridge

At 173rd mile, 11th telegraph post, half a chain of bank and a little of the masonry of a 6-feet arched culvert washed away

At 175th mile, 2nd telegraph post, a slip of three-fourths of a chain in length from the centre of the embankment, and at 175th mile, 9th telegraph post, a slip of nearly 1 chain in length. The injuries to the line from 173rd mile, 1st telegraph post, to 175 mile, 9th telegraph post, were caused by the flood waters of the Paupugnee River

Paupugnee Bridge

5. This bridge, as originally constructed, consisted of twenty 70-feet openings, the piers being screw piles and the abutments masonry

In the accident to the inspection train on 16th June last one screw pile pier (No 14) and one set of girders were destroyed The gap, however, was filled up by two temporary wooden sleeper piers supporting girders of a shorter span Of the two wooden piers, one was swept quite away, and the other was overturned Screw pile piers, Nos 2, 3, 4, and 5, were completely washed away, and no trace has since been discovered of them Two sets of girders also were carried down the stream, and have not yet been found

Injuries resulting from breaches of Chentagontah Tank

6. At the Moodanoor Station the water stood over rail level, and some surface ballast was washed away

From 195th mile, 11th telegraph post, to 195th mile, 14th telegraph post, the ballast was washed away, points and crossings shifted, and fencing destroyed.

195th mile, 14th telegraph post, to 196th mile, 1st telegraph post, the embankment nearly all gone, and the permanent-way carried 20 feet beyond the slopes.

Proceedings of the Madras Government, Public Works Department, 4th February 1875.

196th mile, 3rd telegraph post, embankment breached.

196th mile, 6th telegraph post, to 196th mile, 8th telegraph post, bank completely carried away, and permanent-way slipped

196th mile, 8th telegraph post, to 196th mile, 8½ telegraph post, ballast washed away

196th mile, 15 to 16th telegraph post, ballast and aloe fencing destroyed

197th mile, 2nd to 3rd telegraph post, ballast and fencing damaged.

197th mile, 4th to 8th telegraph post, ballast and bank greatly injured, aloe fencing damaged and permanent-way shifted

197th mile, 9th telegraph post, flooring of 15-feet arched bridge scoured

197th mile, 11th to 16th telegraph post, aloe fencing destroyed

198th mile, 3rd telegraph post, pitching of bank at 9-feet arched bridge washed away Bridge scoured almost to foundations and flooring destroyed

198th mile, 4th to 8th telegraph post, bank completely washed away. Permanent-way carried beyond fence

198th mile, 9th telegraph post, bank washed away

198th mile, 12th to 14th telegraph post, ballast destroyed

199th mile, 1st to 2nd telegraph post, bank damaged Ballast washed away and permanent-way shifted

199th mile, 2nd to 6th telegraph post, bank quite carried away

199th mile, 7th telegraph post, slips in embankment

199th mile, 9th to 10th telegraph post, several slips in embankment.

Chittravutty Bridge

7 This bridge consisted of forty 70-feet openings The abutments and ten piers at each end were of masonry and the 19 centre piers of screw piles.

The masonry work was founded either on clay or on brick wells carried down to the clay

Piers Nos 2, 3, 4, 5, 6, 8, and 10 were completely destroyed and piers Nos 7 and 9 have fallen considerably out of the perpendicular

Two sets of girders have completely disappeared, and two more sets have been much twisted and injured, but may probably be repaired

Pennıar Bridge

8 This bridge consisted of twenty-four 70-feet openings The abutments and piers being of masonry, founded either on hard kunker or on brick wells, sunk down to the kunker

The 22nd pier was completely destroyed, and the 21st pier fell almost completely over Pier No 2 was cracked at the top, but the damage was due entirely to the displacement of the end of the girder

Temporary wooden sleeper piers were erected to supply the place of piers Nos 21 and 22 and the girders were got into place, and an engine and train ran across on the 17th ultimo to work the traffic from the 212th to the 233rd mile

The minor gaps in the line have all long since been repaired, and communication has been restored at the Gooriattum and Pennair Bridges

9 I am at present engaged in making preparations for constructing a road across the river beds at the Cheyaur, Paupugnee, and Chittravutty, but this cannot be done effectually until the rivers have gone down still further, and will of course be only a temporary expedient for working the traffic

10 The accompanying plans and estimates will give you the fullest information as to the steps I propose for restoring the Gooriattum, Cheyaur, Paupugnee, Chittravutty, and Pennair Bridges

11. At the Gooriattum I propose to rebuild the arches that have been destroyed, and to replace the island embankment by two arches, and one opening spanned by wrought iron girders in the manner shown on the plan, at an estimated cost of Rupees 23,978.

(2) [illegible]

(3) [illegible]

(4) [illegible]

4 [illegible]

5 [illegible]

No 96

ORDER THEREON, 4th February 1875, No 310

RAILWAY, No 17

The proceedings of the Consulting Engineer in connection with the proposals for the restoration of the Railway bridges on the Madras Railway are approved, and the powers submitted by him are forwarded for the sanction of the Government of India.

2. Lieutenant-Colonel Shaw Stewart will report the earliest date at which it is expected by the Railway authorities that the work of restoration will be sufficiently advanced to permit of the resumption of full traffic. His attention and that of his Deputies will be concentrated during their future inspections on the realization of this practical result of the operations now being undertaken, to which His Excellency the Governor in Council desires that every consideration except safety may be subordinated.

(True Extract)

Colonel, R E,
Secretary to Government.

To the Consulting Engineer for Railways.

Exd. A. Grubert
Spare Copies

6

PUBLIC WORKS DEPARTMENT,
FORT ST GEORGE, *February*, 4*th* 1875.

No 97. No 311

FROM

COLONEL G W. WALKER, R E,
Secretary to the Government of Madras,
Public Works Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
Public Works Department.

RAILWAY, No 18

SIR,—I am directed to forward, in continuation of the papers transmitted with docket, No 61, dated 9th January 1875, the accompanying correspondence, with plans and estimates for repairing the bridges over the Gooriattum, Cheyaur, Paupugnee, Chittravutty, and Pennair Rivers on the Madras Railway. The total cost of the work of repair and restoration is set down at Rupees 2,96,307, and is distributed as follows —

		Rs
Gooriattum Bridge		42,111
Cheyaur	do	61,072
Paupugnee	do	71,616
Chittravutty	do	1,10,746
Pennair	do	10,762

It will be observed that these sums are capable of reduction by the recoveries specified in the Consulting Engineer's letter.

2. The proposals now brought forward have been personally discussed with the Railway authorities by the Consulting Engineer, and are submitted with that officer's entire approval As it is of the greatest importance that existing interruptions to traffic should be removed without delay, the Consulting Engineer has authorized the commencement of the work in anticipation of sanction, and this proceeding has been approved by His Excellency the Governor in Council.

I have the honor to be,
Sir,
Your most obedient servant,

Colonel, R E,
Secretary to Government.

Exd. A Grubert
Spare Copies

No 1103

MADRAS RAILWAY

AGENT AND MANAGER'S OFFICE

Madras, 11th December 1874.

From Robt. B. Elwin Esq
Agent and Manager. MRC

To Lieut Colonel J. H. M. Shum Stewart RE
Consulting Engineer for Railways.

Sir,

With reference to my letter of the 12th ultimo No 1006, I have the honour to enclose for your information a copy of a letter from the Chief Engineer in which he furnishes a detailed Report of the damage sustained by the Railway during the floods of 24th and 25th October, and following days.

x No 792 - 1st Dec 1874

I also enclose for your information Plans and Estimates of the Cost of repairing the breaches in the Permair, Pampiguda Chittoreetty, Cheyaur, and Sonattum Bridges, and I request that you will be so good as to communicate to me the Sanction of Government for the required Expenditure, viz:

& Nos 144, 145, 146, 147 and 192.

Pennar Bridge	—	Rs 10762-0-0
Pampeyer Bridge	—	" -71616-0-0
Chittravatty Bridge	—	" -110746-0-0
Cheyaur Bridge	—	" -61093-0-0
Cortiattum Bridge	—	" -42111-0-0
		Rs 296308-0-0

3. Information, as to provision in the Budget and the date on which the Allocations will lapse, is given on the face of the Estimates in red ink.

I have the honour to be
Sir
Your most obed[ient] Servt
Walter H. Irwin
Agent and Manager

98 C 10

Madras Railway Company
Chief Engineer's Office
Madras 1st December 1874

No 792

The Agent and Manager,

Dear Sir,

In continuation of my letter
1 No 709 of the 3d instant I beg now to forward to
you with a detailed report of the damages sus-
tained by the Railway during the floods of 24th,
and 25th October, and following days

South West Line

2 The up line between Veyasurpandy and Jana-
tion, and Perambore (3 miles) was rendered im-
passable for trains on the 25th October owing to
several slips on the embankment.

At the 38th mile there were two slips in the
embankment, 39th mile one slip, 41st mile one slip

At 48th mile 4 Telegraph Posts the wing walls
of a single 6 feet arched bridge were scoured out,
and cracked, but the damage was not of a
nature to interrupt traffic

The water has since been dammed out of the
bridge, and stones have been thrown in between
the wings

9 98th The western portion of the Coovum
Bridge, consisting of five 30 feet arches, was
completely destroyed on the morning of the
26th October

The bridge was originally built in two separate
parts divided by a small island of about 144
feet in width The destroyed end of the bridge
consists of twenty-four 30 feet arches built

MADRAS RAILWAY CO.

From

The Agent and Manager

To

The Consulting Engineer

for Railways

Dated Fort 12. 1874

Received Dec. 15th

Superintendent's Office
Royapooram 12th Dec 1874
Respectfully submitted to the Chief
Engineer of the Railway
Allowed to Clay
Allowed to Clay
24 do 24 Oct
Enclosed Plans
of the Bridge
By Engineer
Agent
Chief Engineer
Consulting Engineer
for Railways

on a skew of 60°, and the wing and ends of from 30' square arches.

The bridge was commenced, and repaired and in July 1871 by the Commissioners appointed by Government to inquire into the state of the Foundations of the Bridges on the Madras Railway, and estimates for protecting works, at an estimated cost of Rupees 00419 were recommended, and were sanctioned by Government. These works however were only in progress - A few openings on the embankments were finished - but nothing had been done at the weakened side.

Copy of a letter 741 dated 1st November 1874 from the Resident Engineer 1st Division S. Arcot reporting the nature of the injuries sustained by the line under his charge, and the measures adopted for reclaiming through communication was forwarded to you on the 5th inst.

Mr. Carter describes the greatest exertion for the diversions under exceptional difficulties. The Deputy Chief Engineer was, with myself, cut off between the Pambyar and Chithravatty rivers, and we were unable to communicate, even by telegraph with the rest of the line. Mr Carter therefore had to act entirely on his own judgment, and responsibility - and it gives me great pleasure to say that when I visited the Gonattum bridge I had every reason to be highly satisfied with the mode in which the temporary repairs had been carried out. Mr Carter informs me that he was most ably assisted by Messrs. French and Watson

At 98 miles 3 Telegraph post the line runs

a slip in the embankment caused by a scour to a depth of 13 feet under the foundations of a 6 feet arched bridge, about half a mile west of Gonattum bridge. This was repaired by 29th October.

The temporary bridge at Manlpatty, (105 miles 8 chains) erected to fill up the gap caused by the destruction of a 4-15 feet arched bridge on 6th May 1874, was reported unsafe on the 25th October but was repaired on the 28th.

The temporary bridge at Vaimembadely (123 miles 23 chains) erected to fill up the gap caused by the destruction of a 5-15 feet girder bridge on 6th May 1874, was reported unsafe on the 25th October but was repaired on the 28th.

North West Line

3. On the North West Line the first damage sustained was at 70 miles 2 Telegraph post, where the revetment round the screw pile abutment of a single 50 feet girder bridge, together with a portion of the slope of the embankment slipped on the 24th October. These damages were repaired roughly the same day.

At 81 miles 15 Telegraph post the north west wing wall of a 9 feet arched bridge was undermined, and carried away, and the slope of the embankment scoured. The line was diverted to the south side of the bridge the same day.

At 85 miles 13 Telegraph post the line runs through the Veerambadey tank, and considerable slips took place in the slopes of our bank, these however were filled up the same day.

At the 97 mile water to a depth of two

feet flowed through the Ballaglass Cutting -
a little to the west of Bridge 6 was washed away,
but was replaced as soon as the water subsided -

At the 107th mile the embankment was
damaged and the ballast washed away for a
quarter of a mile, and a clear breach made of
20 feet in length. Water flowed over road
level for a length of 15 chains

At 107th mile 11 Telegraph Post there was
a considerable slip of bank behind the South
abutment of the Cadoor bridge, but that was
repaired immediately

At 130. mile 7 Telegraph Post a breach
of 200 feet in length was made in this bank by the
bursting of the Southern portion of the bank of the
Allunnoor Ket-chemah tank, situated about
7 chains west of the line. A single 12' arched
bridge was left standing in the middle
of the breach

From 131. 10 to 131. 15 the embankment
was badly damaged, the ballast washed away,
and gaps of from 50 to 100 feet in length caused by
floods that flowed over the road from a breach
in the northern bund of the same tank

At 134. mile 10. S. Post a length of 500 feet
of embankment was washed clean away by
floods from the Cheyair river, which overflowed
its banks a few miles from this place.

I annex for your information copy of a
letter No. 1175 of 4th November 1874 from Mr Wood -
who was at the time Resident Engineer of the
1st Division S.P. Line
He is almost unknown for many years

Mr Wood's services were on this occasion, as they
have invariably been in cases of emergency,
simply invaluable

Cheyair Bridge

4 The floods in the Cheyair river on the
night of the 25 October were of an extent wholly
unprecedented. The width of the river where
crossed by the Railway is about 3/5ths of a mile,
but the flood waters rose over the banks, and
spread out to the extraordinary width of over
3 miles

The 5 masonry piers of the Southern bridge
was overturned. The 15 and 16th piers (new piles
to replace the masonry piers destroyed in the
flood of October 1870) were forced out of line
down stream to the extent of 8 inches, in that
however suffering any further injury

The South abutment of the island in
centre of river was completely destroyed, and
200 feet of the embankment behind the abut-
ment washed clean away

The north abutment of the island was also
destroyed

The 2 and the three last masonry piers
were swept away, and 2 sets of girders carried
down the river for a distance of seven hundred
yards, and the superstructure of the temporary
northern abutment has disappeared, leaving
the new pile trestles standing

150 feet of embankment behind the northern
abutment, together with the temporary tank
house swept away

The new Cheyair bridge under contract of

consbruchon suffered to the following extent:

At the South approach half the width of bank for a length of 100 feet was washed away, and at the north approach the embankment for 200 feet has been totally washed away

Four of the new Cylinders have fallen out of the perpendicular, but as they were neither properly bedded on the rock, nor filled with concrete the damage sustained need not cause the slightest apprehension as to the stability of the piers when completed

The masonry of the new bridge stood remarkably well though the water rose to the top of the piers. It will, I fear, be necessary to increase the height of the new bridge by at least 3 feet; and to add still further to the waterway. This will however form the subject of a separate communication at a future date:

A copy of Mr Wood's report No 302 of 4th November is forwarded herewith for your information.

At the Cuddapah river (162 M. 5 C.) the patching of the South west bank was undermined and fell in

At 172 M. 14 C. about 2 chains of embankment were washed away

At 173 M. 1 C. a single 6' arched masonry culvert and about 50 feet of bank washed away The masonry culvert has been replaced by a temporary sleeper bridge.

At 173. 11 M. Half a chain of bank, and a little of the masonry of a 6' arched culvert washed away

At 175 M. 2 C. a slip of 3/4 of a chain in length from the centre of the embankment, and at 175 M. 9 C. a slip of nearly 1 chain in length. The injuries to the line from 173 M. 1 C. to 175 M. 9 C. were caused by the flood waters of the Penneyar river

Penneyar Bridge.

The bridge as originally constructed consisted of twenty 70' openings. The piers being screw piles, and the abutments masonry

On the accident to the Inspection train on 16 June last two screw pile piers (No 14) and one set of girders were destroyed The gap however was filled up by two temporary wooden sleeper piers, supporting girders of a shorter span Of the two wooden piers one was swept quite away, and the other was overturned. Screw pile piers No 2. 3 4 and 5 were completely washed away, and no trace has since been discovered of them Two sets of girders also were carried down the stream, and have not yet been found

Injuries resulting from breaches of Chunlay outlet Tank.

At the broad gauge station the water stood over rail level, and some surface ballast was washed away from 195 M. 11 C. to 195 M. 14 C. the ballast in a few openings destroyed.

From 195 M. 14 C. to 196 M. 1 C. the embankment entirely all gone, and the permanent way carried twenty feet beyond the slope

196 M. 8 C. Embankment breached

196. 6 M. to 196. 8 M. Bank completely carried away,

and permanent way shifted
196. 8 to 196. 8½ - Ballast washed away
196 15 to 16 - Ballast and also fencing destroyed
197. 2 to 3 - Ballast and fencing damaged
197. 4 to 8 - Ballast and banks greatly injured, also fencing damaged, and permanent way shifted
197. 9 - Widening of 15' arched bridge & culvert
197. 11 to 16 - Also fencing destroyed
198. 3 - Pitching of bank at 9' arched bridge washed away Bridge & culvert almost by foundation, and fencing destroyed
198 4 to 8 a Bank completely washed away. Permanent way carried beyond fence
198 9 Bank washed away
198 12 to 14 Ballast destroyed.
199 1 to 2 - Bank damaged Ballast washed away and permanent way shifted
199 2 to 6. Bank quite carried away
199. 7 Steps in embankment
199 9 to 10 Several steps in embankment

Chittaventty Bridges

7 This bridge consisted of twenty 70' openings. The abutments, and ten piers at each end were of masonry and the 19 centre piers of screw piles.

The masonry work was founded either on clay, or on brick wells carried down to the clay

Piers Nos 2-3-4-5-6-8 and 10 were completely destroyed and Piers Nos 7 & 9 have fallen considerably out of the perpendicular.

Two sets of girders have completely disappeared, and two more sets have been much twisted and injured, but may probably be repaired

Penrain

Penrain Bridge. 13

8 This bridge consisted of twenty-four 70 feet openings - The abutments and piers being of masonry, founded either on hard kunker, or on brick wells sunk down to the kunker

The 22nd Pier was completely destroyed, and the 21st pier fell almost completely over. Pier No 20 was cracked at the top, but the damage was due entirely to the displacement of the end of the girder

Temporary wooden trestle piers were erected to supply the place of piers Nos 21 & 22, and the girders were got into place, and one Engine and Train saw across on the 17th ultimo to work the traffic from the 212th to the 233rd mile

The minor gaps in the line above all leaving ceased been repaired and communication has been restored at the Goriattum, and Penrain bridges

9 I am at present engaged in making preparations for constructing a road across the river beds at the Cheyair, Pauppanee and Chittaventty but this cannot be done effectually until the rivers have gone down still further, and will of course be only a temporary expedient for working the traffic

10 The accompanying plans and estimates will give you the fullest information as to the steps I propose for restoring the Goriattum, Cheyair, Pauppanee, Chittaventty and Penrain bridges

11 At the Goriattum I propose to rebuild the arches that have been destroyed, and to replace the wooden embankment by two arches, and one opening spanned by W. I

Girders in the manner shewn on the plans, at an estimated cost of Rs 23,778.

12 At the Chengam I propose to renew bulk head for an single lane only, that is every pier & abutment that was washed away, and to replace the 23 and three last piers by screw piles. The wing walls which remain unmoved in their abutment south of this road will support an span of iron girders taken from the new bridges. The plans fully illustrate these alterations The estimated cost inclusive of girders &c Rs 61,072

13 At the Pauligunta the five screw pile piers which were carried away will be replaced as shewn on the plans at an estimated cost, inclusive of girders of Rs 71,616.

14 At the Chittivelly the nine bar away piers which were washed away will be replaced by screw piles, in the manner shewn on the plans at an estimated cost, inclusive of girders, of Rs 1,10,746.

15 At the Pennair I propose to renew bulk the two masonry piers which were washed away, as indicated in the plans, at an estimated cost of Rs 10,762. The full force for repairing girders has been allowed at the Chengam Pauligunta and Chittivelly bridges. I have reason to hope that many of the girders now lost, or injured may be recovered, and repaired, and the estimated cost of repairs will thus become much reduced I have however considered it safest to provide for the full amount in the first instance.

16 To enable me to carry out the repairs as proposed it will be necessary to dismantle the present screw pile piers of the Huggey bridge I propose replacing the screw piles at the Huggey by iron Cylinders, for which a plan and estimate will be forwarded under cover. Meanwhile to save the coming season I must commence at once to unscrew the Huggey piers, and to take the girders to pieces to replace such as cannot be recovered at the damaged bridges.

Yours faithfully
sd/ Berresford Anderson
Chief Engineer

True Copy

sd/ H. J. Lewin
Agent & Manager.

Madras Railway Company
Resident Engineer's Office
1st Division 4th N.L. Nov 4th 1874

a.f. 10c
D

The Secretary - Chief Engineer

Sir,

I beg to submit my report (delayed hitherto from press of such door work) of the damages sustained by 1st Division 4th N.L. during the heavy rains on 24th and 25th ultimo.

(1) The new branch round screw pile abutment of bridge at 7½ m. tipped to-gether with a length of the slope of bank had this mail repaired by the same day

(2) The many small bridges at 0/15 broke away - causing the slope of bank to be scoured away. The line was diverted over to the double line side the same day by keeping a ballast train working till late at night

(3) Considerable slips to slope of bank at 25/15 (Kunnumbady tanks bund) took place the materials of the bank being apparently soaked of time to end. These were filled up promptly by Inspector Rao the same day, by means of a ballast train.

(4) ... Ballasting cutting - 97 mile was a perfect river 2 feet deep at noon on the 25th October the 15 days month after ploughing through the stream at great risks, but with the object of reaching the top of incline, had to stop at 4 o'clock for 2 hours to let the water run off - After the train had proceeded coolies were sent to pack the portmills,

M 2905/74.

sleepers and repairs the roadway where the ballast had been washed away. The works appear in this cutting are I think too small and I would suggest that they be enlarged

(5) Ch 106/2 the bank was cut up for 1/4 of a mile, and breached completely to the extent of 20 feet with a flood flowing over the rails 1 foot deep for 15 chains. I staffed with repairers this myself, the train having been detained 2 days. The present bridges are of such ample opening, in I think sufficient for the drainage though the excess of water was due to the breaching of banks.

(6) Ch 107 11 a considerable slip had occurred in the slope of bank immediately behind south abutment of Cadoon bridge I repaired this partially myself so that trains could pass safely but the slope here requires strongly revetting to protect it against the oblique wash of the river.

(7) Ch 139 where there is a length of 12 feet arch a breach of 200 feet in length has been made in the bank by the bursting of bund of Mannoor Ketchemah tank situated 7 chains west of the line. The bridge is unimpaired.

(8) Trains 131/10 to 131/13 the bank has been badly cut up by a flood overflowing the rails and there occur a series of 8 slips varying from 30 to 100 feet in lengths the bridge is injured and I attribute the excess of water here to the discharge of the Mannoor Ketchemah tank, occasioned by a breach close to the Colmegudem and also to breaches in feeder channels to Mannoor tank

(9) Ch 114 11 a large gap of 300 feet in length was made in the bank by the discharge from the roadway running parallel to the bank. The roadway here is located into a hopeless mass and must be removed to the edge of the water

The repairs between Arcanum and Rajampetta were completed on the 26th and the trains ran regularly as Rajampetta Between Rajampetta and the Cheyair where slips occur 7, 8 and 9 in the trains will not be able to pass for a week or more although I have detached to all the procurable labor on this line. The progressive to date have been

My trains have been so much taken up at the Cheyair bridge that I have not been able to go over the diversion between the repairers behind Rajampetta and Arcanum are stated to be engaged as well. French etc relieved as soon I beg that he may be requested to personally examine all the places above enumerated, as had the diversion has sustained very much from floods.

Yours very truly
Henry B. Reed
Resident Engineer

To
The Chief Engineer
Madras

True Copy
for Chief Engineer
Agent & Manager

Aberdeen Railway Company
Resident Engineer's Office
Chapman Bridge Nov 4th 1874

W 2302

The Secretary to Chief Engineer

Sir,

I beg to forward my report (hitherto delayed for want of work) of the damages to the Chapman Bridge caused by the heavy floods on the 24th, 25th inst. & returns

1. The most ordinary freshet due to the melting of snow causes down the river on the 24th October at noon, when there is 4 feet deep, at 4 PM the stream by the bridge is 8 feet deep, at midnight it is 12 feet touching the underside of the girders, and inundated the roadway for 1/2 mile on the south and 1 mile on the north sides

The damages sustained by the bridge, when examined on the morning of the 25th October was found to be as follows

(1) Two 16 feet (main arch) of the southern bridge were washed off altogether, leaving the girders unsupported.

(2) Eight south and Sixteenth piers (seven feet) from the end of land, down stream, & inches below water are displaced & undermined. Both of these piers are broken

(3) South abutment of the bridge & part of the wall of the wing adjoining

girders unsupported

(4) 200 feet of the embankment on the extended washed away level with the river-bed immediately behind the South abutment

(5) North abutment of extended & is much cracked & fallen to pieces, leaving the end of girder resting on the debris.

(6) Twenty-third pier (masonry) and 1 in northern bridge) completely swept away.

(7) The last 3 piers (masonry) and S. North abutment (consisting of dry rubble & round screw pile trestles) completely disappeared. The screw-pile trestles are standing, but nothing of the girders or roadway is visible except a small portion about ¼ mile down the river.

(8) 150 feet of bank immediately behind the north abutment together with the bank house totally swept away

(9) The river having burst its natural bank above the artificial dam which confines it to its natural limits, came with full force against the embankment up to the telegraph post south, overflowing the rails from $\frac{134}{11}$ to $\frac{134}{4}$ and causing a complete breach for 500 feet at this mileage. (But for this breach rendering this and other branches for home unnecessary I should recommend in my report on this damage not to be formed in my opinion at the present time.)

3. The Lower Bridge also now in progress of construction, did not escape without injury which I am inclined to believe as follows

(1) The south approach half the width of bank for 100 feet in length has been washed away, and running a rod of girders erected ab

this not readily removed, but the girders are slightly twisted - but the damage is inconsiderable

(2) Of the South approach nearly 200 feet of bank have been completely washed away

(3) All the masonry, consisting of 2 abutments and 13 piers is secure and uninjured, with the exception of some little coping of parapet of South abutment

(4) Of the Cylinder piers, in Rev 14 both Cylinders sank 17 feet (one) have canted over down stream making an angle of about 18° with the vertical (in pier 22, the east Cylinder has similarly fallen over - but with less inclination to the vertical - and in pier 24 the inclination to the vertical - and in pier 24 the west Cylinder has canted over to the same extent as the one in Rev 22.

4 The entire bed of the river having been completely altered, all the temporary roadways laid down for the convenience of material & rails are displaced more and more - and the loss of small material belonging to the bridge will I fear be considerable. All the adjoining bank for some distance, and cross girders must be, I think, only a few feet below the surface, and every effort is being made to recover all missing rails

5 In conclusion I am glad to be able to report that no lives were lost, although a great many of my subordinates and coolies had their houses swept away, and lost their property - all the Europeans, storekeeper, and workmen escaped with the exception

of my Office, one half of which was undermined and destroyed on the night of the 24th ultimo.

I am &c.
Maj Henry G. Ward
President & Engineer

True Copy
Maj General Anderson
Chief Engineer.

True Copy
H. H. Kirkwood
Agent & Manager

No. 2905/96

Consulting Engineer's Office.

Railway Department

No. 762

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.

P. W. D.
14

5 Plans

Nos 1103 - 11 R.
Combaconum

I continuation of my letter No. 761 dated the 18th ultimo, and previous correspondence, I have the honor to lay before His Excellency in Council a letter from the Agent of the Madras Railway, giving an account of the damage sustained by that Company's lines during the floods of October last, and submitting plans and estimates for repairing the bridges over the Gaiattum, Cheyair, Pungunee, Chittravutty, and Pennair rivers; the mode in which it is intended

intended to carry out the necessary repairs to each of these bridges has been thoroughly discussed by Col. Beresford Anderson and myself upon the ground, and the proposals now brought forward have my entire approval.

2. The Goriatteem bridge consisted originally of two portions united by an embankment of about 150 feet in length. The eastern portion consisted of twenty-four 30 feet arches on a skew of 60°, and the western portion of five 30 feet arches on the square. The western portion was entirely destroyed upon the 26th October; and it is now proposed to rebuild the five arches which gave way, and to replace the embankment by two 30 feet arches and one irregular opening spanned by wrought iron girders, uniting the square and skew portions of the bridge

Rs. 21,558
" 2,148
" 610
Rs. 24,316

20th January 1873.-No. 22 Rs. 21,558
7th February 1873.-No. 218 " 2,148
13th August 1873.-No. 1 " 610

bridge as shewn on the plan. The estimated cost is Rs. 42,111; but it must be observed that the actual expenditure entailed by the accident will be far below that sum.

3. The Committee appointed by Government to report upon the foundations of the Madras Railway bridges recommended the construction of certain protective works at the Goriatteem bridge, and after long discussion recorded in the proceedings of Government noted in the margin, a sum of Rs. 80,449 was finally sanctioned for the purpose. Unfortunately the weather has been singularly unfavourable for carrying out such works in the beds of rivers, and the floods of last October found the western portion of the bridge entirely unprotected. In rebuilding the bridge, it is intended that the new foundations shall

shall be carried down to rock; and a large part of the sanctioned protective work will thus be rendered unnecessary. It is estimated that this will effect a saving of Rs. 18,133; so that, in estimating the cost of the damage caused by the flood, the actual expenditure incurred in rebuilding the bridge may be reduced by that amount, leaving Rs. 23,978 as the cost of restoring the bridge and of providing 100 feet of additional waterway.

4. The bridge over the Chyair consisted originally of thirty-eight 50 feet openings spanned by wrought iron girders resting on masonry piers. It was divided into two unequal portions by an embankment about 600 feet in length. During the flood in October 1890 seven masonry piers in the south portion were carried away; and, pending the

the construction of the new bridge which was then determined on, these were replaced by eight screw pile piers. The damage sustained upon the 25th October may be thus summarised: one masonry pier in the south portion, and five in the north portion, destroyed; the two abutments of the island-de-trayed, and about 80 yards of the embankment between them carried away; two screw-pile piers in the south portion forced slightly down stream; and two sets of girders, 120 feet in length, carried nearly three quarters of a mile by the flood.

It is now proposed to rebuild, for a single line of rails, the pier which was carried away in the south portion of the bridge; to replace the four piers in the northern portion with screw piles; to form the south island abutment by

supporting

supporting cross girders upon the uninjured wing walls of the old bridge; to replace the north island abutment with screw piles; and to substitute new girders for those carried away. The arrangements are explained upon the plan.

The estimated cost of the work amounts to Rs. 61,072; but it must be observed that in this is included an item of Rs. 27489 for new girders, and that this sum will be credited to the estimate if the missing girders are found, upon examination, capable of being used again.

5. The Paupegnes bridge consisted originally of twenty 70 feet openings, spanned by wrought iron girders resting on screw pile piers. Of these, one pier and one set of girders were greatly injured by the accident to the Inspection train in June last, and the damage was

was temporarily repaired with short girders supported upon piers of wooden sleepers. The flood of the 25th October carried away four screw pile-tubes carried away four screw pile piers, with two sets of 140 feet girders resting upon them; none of which have yet been recovered. The two temporary piers of wooden sleepers were also washed away.

It is proposed to restore all the screw pile piers which have suffered, and to replace the missing girders. The estimated cost amounts to Rs. 71,615; but it must be borne in mind that this sum includes the cost of repairing the damage sustained by the bridge both during June and November. It also includes an item of Rs. 41,444 for new girders to replace those not yet recovered from the bed of the river; and, as in the case of the Cayaix bridge, the estimate will in all probability be ultimately credited

credited with a large portion of this. The item of Rs. 13,300, charged for new piles, is also liable to consider-able reduction if the missing piles are recovered.

6. The Chittravatty bridge consisted of forty 70 feet openings, spanned by wrought iron girders. Of the piers ten at each end were of masonry, and the remaining nineteen of screw piles. The flood of the 25th October carried away nine of the ten masonry piers near the south abutment. Two sets of 140 feet iron girders have disappeared, and two sets have been much twisted and damaged.

It is proposed to replace all the ruined piers with screw piles, and to substitute new girders for the missing and damaged ones. The cost is estimated at Rs. 110,746; but, as in the cases of the Cheyair and Paupugnee bridges, an item of

of Rs. 57,298 is included for new girders, and it is believed that a large portion of this will ultimately be credited to the estimate.

7. The Pemaiw bridge consisted of twenty four 70 feet openings, spanned by wrought iron girders resting on masonry piers. During the flood of the 25th October two piers situated near the north abutment were destroyed, but fortunately without injury to the girders; and temporary piers of wooden sleepers having been erected, traffic over the bridge has been resumed.

In order to carry out the permanent repair of the ruined piers without interfering with the running of trains, it is proposed to sink six screw piles in a straight line on either side of each of the two temporary wooden sleeper piers, the two rows of piles at each pier being 26 feet apart. Two pairs of 26 feet girders

girders, supporting the main girders of the bridge, will rest upon the piles. The arrangement is explained on the plan; and, upon the removal of the wooden sleeper piers, the construction of the new masonry piers can be proceeded with, while traffic is passing over the bridge.

The estimated cost amounts to Rs. 10,762.

8. It is of great importance that the works above described should be finished before the next rainy season; and, as every day is of value, I have authorised their immediate commencement, in anticipation of sanction. The only mode in which it is possible to provide without delay the necessary girders and screw piles is by making use of those intended for the bridge over the Huggy;

and

and I have accordingly authorised their removal: for, desirable as is the completion of the Huggy bridge, the maintenance of uninterrupted traffic along the main line is an object of far greater importance. I trust that the action taken will meet with approval.

9. As regards the Huggy bridge it may be here incidentally mentioned that the original design consisted of thirty-four 70 feet openings, spanned by iron girders resting on screw pile piers. Subsequent borings proved that the depth of sand was greater than had been supposed, and it was determined* to substitute iron cylinders for the piles in twenty-four out of the thirty-three piers. The remaining nine piers were constructed with screw piles in accordance with the original design, and it will now be necessary to unscrew these piles in

* Proceedings of Government 21st September 1871 No. 2409.- 16th November 1871 No. 2911.-

in order to obtain sufficient material for repairing the injured bridges. The Chief Engineer estimates that he proposes to reconstruct the nine piers in question with iron cylinders, and I entertain no doubt as to the wisdom of that measure.

10. I shall request the Railway Authorities to make an examination, during the early months of next year, of the foundations of the piers at the Chettavutty and Pennaiur bridges, both of those which failed during the floods and of those which remain standing. The result shall be communicated to Government in due course.

11. The question of providing additional waterway at the Paiyanur river, and in the new bridge over the Cheyair, must remain

remain in abeyance for the present. It is probable that no proposal upon this subject will come forward until Mr. Anderson has had an opportunity of consulting with Sir John Hawkshaw in England.

12. The detailed statement called for by Government in their Order dated the 4th instant No. 3411 A shall be forwarded as soon as possible.—

I have the honour to be
Sir
your most obedient servant

Madras
16th December
1871.

Lieut. Colonel, R.E.
Lieutenant
Chief Engineer for Railways

P W. 1874 Dept.
Pers: of Govt Fort St. Geo.
Railway Department 175

From No: 7909 P.
The Consulting Engineer
for Railways,

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

Dated 16/17 December 1874.
Recd

& H & L
No 362
G.O. No 310. 4-2-75.

Submitting letter from the Agent-Mr Z Grenier covering the Consulting Engineer's detailed report upon the damage sustained by that Company's lines during the floods of October last together with plans and estimates for repairing the damages & asking for

No 95
e. 30.12.74.

by the Railway Authorities, that the work of restoration will be sufficiently advanced to permit of the resumption of night traffic. His attention and that of his deputies will be concentrated during their future inspections on the realization of this practical result of the operations now being undertaken, to which His Excellency the Governor in Council desires that every other consideration may be subordinated.

G.H.W.

e. 30.12.74.

To the Chief Engr. for Rpt.
Dest. 6/2/75.

311.

To The Secretary to the Govt. of India

Sir I am directed to forward, in continuation of the papers transmitted with docket No 61 dated 9th January 1875, the accompanying correspondence with the Chief Engineer regarding the estimates for repairing the bridges over the Gorreatturu, Chegair, Pauppanee, Chittravutty, and Pennair Rivers on the Madras Railway. The total cost of the work of repair and restoration is set down at Rs 2,96307, and is distributed as follows

	Rs
Gorreatturu Bridge	42,111
Chegair — " —	61,072
Pauppanee — " —	71,616
Chittravutty — " —	110,716
Pennaur — " —	10,762

It will be observed that

that these cuts are capable
of reduction by the recoveries
specified in the Consulting
Engineers letter.

The proposals now
brought forward have
been personally discussed
with the Railway authorities
by the Consulting Engineer
and are submitted with
that officers entire ap-
proval. As it is of the
greatest importance
that existing interruptions
to traffic should be
removed without delay,
the Consulting Engineer
has authorized the com-
mencement of the work
in anticipation of sanction,
and this proceeding
has been approved by
His Excellency the Governor
in Council.

Lynn

Signed 76 d. Copies & 30 Copies of No 310.
with 10 Encls. despd. 6/2/75.

7909

Govt. of 1875 Madras.

PUBLIC WORKS.

No.

The Commissioner of Salt Revenue & Superintendent of Police

Dated

Rec'd

Part 4

24 Feb: 1875, No. 310 311

Forwarding plans and Estimates for repairing the bridges over the Gorrialtan, Cheyair, Paupanasam Chittravelly, & Sir. Rivers on the Ry -

Nos. 95-97.

Bridges - (M Ry)

The proceedings of the Govt in connection with the adoption of immediate measures for commencing the restoration of certain ruined bridges on the Madras Ry, approved & the plans & Estimates forwarded for the sanction of the Govt of India -