

(1) Number of pages_____

(2) Date of repair_____

(3) Initials of the Referencer_____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	2564A	Press
B.P. No.		Mis.
Dated	10-9-	195
		874

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
10th September 1874.*

No. 194A. Read the following letter from W. J. ADDIS, Esq., C.E., to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, Madras, dated Bombay, 4th April 1874 :—

I HAVE the honor to place the following before you for the Government's most favorable consideration.

2. My attention was attracted some time ago to the want so much felt by the *bonâ fide* inhabitants of Ootacamund, Coonoor, Jackattalla, and other stations on the Neilgherry Hills, as well as by the annual visitors, or casual tourists, of a cheap and efficient mode of conveyance to and from the foot of the ghauts.

3. Up to the present, however, I could not devote to that really important question the time and attention it required, and was therefore obliged to defer its consideration to another time.

4. The advantages which a cheap and comprehensive mode of conveyance offers to the Hills are manifold, and need not be re-enumerated to you ; but I beg to draw your attention to two of them, I refer to the cheapening—that must ensue the introduction of the tramway system—of all articles of consumption and wear and, its natural consequence, the decrease of wages for labor.

5. It is a well known fact that competition in trade is an almost unknown thing in the Hills. I am not referring merely to the shops containing articles of European manufacture, but also to the other and more essential trades of grain of all kinds, coffee, tea, cloths, and other articles of country-produce or manufacture. Competition in these articles of daily want is a thing almost unknown, or rather unattempted, owing to the difficulty, but very partly removed by the Carrying Companies, of conveying those articles up those ghauts by other means than that of Brinjarry bullocks, which mode of conveyance is more or less monopolized by a certain class of merchants.

6. The introduction of the tramway from the foot of the ghauts to Ootacamund and its further extension, a fact that must ensue its introduction, will remove this great evil, and secure to the inhabitants of the Neilgherries the results of a healthy competition in trade, and to the inhabitants of the plains a comparatively cheap and easily got at sanitarium.

7. I shall now endeavour to lay before you some of the working arrangements with reference to the tramway. I guarantee that each passenger van will carry from thirty to forty passengers, and each goods truck from 3 to 3½ tons. I further engage to carry up the passengers and goods from the Railway terminus at the foot of the ghaut to Ootacamund at an average rate of speed of ten miles an hour if steam power is employed.

8. The outlay required for construction, rolling stock, etc., of the tramway from the foot of the ghaut to the above-mentioned places, including all intermediate stations, will not exceed three lakhs of rupees, which, taking the length to be twenty-five miles, gives an average of Rupees 12,000 per mile. This naturally diminishes the rates of fare per ton to a minimum. This cheapness, coupled with the speed attainable, renders this mode of conveyance far more preferable than all those in use at the present time.

9. You will from the foregoing statement be able to perceive that the amount of goods the tramway will be able to pour into Coonoor, Ootacamund,

Proceedings of the Madras Government, Public Works Department.
10th September 1874.

etc., every day, will be such as must greatly influence the market, and thus ensure the desired result of cheapness. This, therefore, surely deserves the patronage of Government.

10. I also beg to state that the construction of the tramway will in no way whatever curtail the breadth of the road, by unfitting it for the use of ordinary vehicles. The rails will be laid flush with the road now in existence, so that any kind of conveyance can pass over it without detriment to itself or the rails.

11. I will not dwell longer on this subject, nor point out any further benefits accruing to the planters of tea, coffee, and vegetables, etc., nor shall I refer to the relief offered to the sick but poor Europeans, who, owing to the present dearness of living on the Neilgherries, as well as to the expense of getting there, find it impossible to do so.

12. These and several other points must have suggested themselves to you, and will, I trust, be favorably viewed by Government when they take my projected undertaking into consideration.

13. It is my intention to construct a tramway from the foot of the ghauts to the Neilgherries. This, I find, I cannot do without the aid of Government, and therefore have the honor to solicit the favor of the following concessions:—

1st.—Six feet of the public road leading from the terminus of the Railway at the foot of the ghauts to Ootacamund, *via* Coonoor and Jackattalla. It is immaterial what portion of the road I obtain, whether the middle or either of its sides.

2nd.—A guarantee of 3 per cent. on all monies laid out on construction, purchase of rolling stock, etc., etc.

14. In conclusion, I am led to hope that the real substantial benefits the introduction of the tramway will bring to the Neilgherries, and by reversion to the plains, will weigh with the Government, and ensure to me the concession I have now the honor to solicit.

No. 194B. From W. J. ADDIS, Esq., C.E., to Colonel G. W. WALKER, R.E.,
Secretary to Government, Public Works Department, Madras, dated
Bombay, 18th April 1874.

I HAVE the honor to acknowledge the receipt of your letter under date the 9th instant, No. 237, and beg to submit, as requested, all detail information with reference to my proposed tramway from the Mettapolliem terminus to Ootacamund, *via* Coonoor and Jackattalla.

2. Although I have not seen the new Coonoor Ghaut since its completion in 1870, yet I have based my scheme for the projected tramway from the knowledge I had of the old road. The present line, no doubt, will be more in favor of the tramway both as regards gradients and curves; hence I anticipate no difficulty whatever as regards these two points.

3. The engine I purpose introducing is that of Mr. Fairlie's. I have already been in communication with this gentleman on the subject, and am prepared to adopt his system of locomotive, more so as you are doubtless aware his wheels are on the bogie principle, and will adapt themselves to the sharpest curves.

Proceedings of the Madras Government, Public Works Department.
10th September 1874.

4. The engines and brake vans will have all the latest improvements as regards brakes, so that there will be no difficulty whatever in case of necessity in bringing the train to a dead stand on any part of the ghaut or on any incline.

5. Engines on this principle have already been constructed in England by Messrs. Sharp, Stewart and Co., and are now worked on my system of single rail. The following is a description of the working of the tramway both as regards engines and vehicles on the Lisbon and Cintra line; also from Lisbon to Torres Vedras, a distance of seventy-seven miles. Upon this single rail run engines and carriages having one pair of broad wheels placed central to their length, and running on either side of the rail, and at either end a bogie frame carrying a double flanged wheel placed central to the width of the carriage working on the rail. In the locomotive, the pair of broad wheels are the drivers, and the small central flanged wheels acting mainly as guides. In the carriages and wagons, however, the exact reverse of this arrangement is introduced, the bearing being taken by the bogie wheels, whilst the outer wheels act simply as guides. The carriages and wagons, in point of fact, are therefore, as will be observed, steadied and prevented from overturning laterally by the outer wheels.

6. The engines are further fitted with an ingenious hydraulic arrangement, by means of which the body of the engine is preserved in a horizontal position when it is either ascending or descending an incline, so that the tubes are not uncovered by the water, the level of which is indicated outside. The power of each of these engines has been tested on this tramway on a level up to 300 tons. The steepest gradient on this line of tramway is 1 in 18 $\frac{1}{2}$, and the average over the whole length above mentioned is 1 in 22 $\frac{1}{2}$, and the curves are in places very sharp, averaging from 5 to 10 feet radius.

7. The ordinary working weight of an engine is 13 tons 5 cwt., and of this the driving and supporting wheels are calculated to sustain a maximum weight of about 9 tons, or four tons and a half on each wheel, the balance being distributed over the guiding wheels. But in running over gradient by means of the hydraulic ram, worked by steam and connected with the central mechanism, the weight on the support wheels can be reduced by one-half and transferred to the centre or guiding wheels, which enables a greater speed to be attained.

8. These engines are capable of drawing 25 tons up these gradients, but the weight of an average train with five vehicles attached is about 18 tons, and the speed, including stoppages, is fifteen miles per hour.

9. Carriages are of three classes, and so constructed for the convenience of passengers that they enter from the sides. The 1st-class carriage accommodates sixteen, the 2nd thirty, and the 3rd forty passengers. The backs of the seats are so arranged as to be turned either back to back or *vice versa* in order to save the turning of the carriages.

10. Goods wagons are constructed similar to those of an ordinary railway, but smaller and capable of conveying from 3 to 3 $\frac{1}{2}$ tons each.

11. All the guide wheels of the vehicles are constructed on the same bogie system, in order that each and every one may in its turn adapt itself to the sharpest curve on the ghaut. Each vehicle is further fitted with strong brakes on either side.

*Proceedings of the Madras Government, Public Works Department,
10th September 1874.*

12. The rail is a single one, combining a longitudinal sleeper and fish-plate, all of wrought iron; this enables chairs and spikes to be dispensed with. The iron sleepers are rolled to a curve (as shown in the full size drawing which accompanies this letter), and when set and fixed would present three curved surfaces; the rails are then fixed to the sleepers by means of bolts passing through them and the web of the rail, the jaws of the sleepers formed at the upper junction being of a suitable shape to embrace the single headed rail weighing 20 lb. to the yard.

13. The sleepers are formed in lengths of 18 inches, and fixed at a distance of 3 feet from centre to centre; but in places where the ends of rails meet a sleeper of a larger dimension is introduced in order to suit as well the requirements of a fish-plate.

14. I further beg to submit estimates for 25 miles of tramway, showing cost of construction and maintenance, together with rolling stock necessary for the length proposed.

15. In conclusion, I trust I have sufficiently explained all details in connection with my proposed scheme; should, however, any further information be required, I shall be happy to furnish it, or, if necessary, shall be glad to wait upon you either at Coonoor or Ootacamund in order that I may be able to place before you certain models in connection with the tramway.

No. 194c.

ORDER THEREON, 10th September 1874, No. 2,564A.

CIVIL WORKS, No. 15A.

THE concessions required by Mr. Addis on which he would be prepared to construct a tramway from Mettapolliem to Ootacamund, by the new ghaut and road, a distance of 33 miles, are not in themselves such as the Government of Madras would object to, were they satisfied as to the sufficiency of his estimates to provide adequate working power, and to lay down the line. But it does not appear that Mr. Addis has sufficiently appreciated the power necessary to carry the traffic to the Neilgherries up many miles of incline averaging 1 in 18 in gradient at the rate of ten miles an hour; or the cost of supplementing the road accommodation to be given, by bridges and drains of more solid construction than those in existence; by tunnels or other expedients necessary to get round the numerous zigzags; and by strengthening the outer edge of the road to ensure its not giving under the weight brought upon it. Under these impressions, His Excellency the Governor in Council must decline to entertain Mr. Addis' proposals.

2. The importance of facilitating traffic both of goods and passengers to and from the Neilgherry Hills is however so patent that His Excellency the Governor in Council resolves to instruct the Under Secretary to Government in the Department of Public Works to take up the subject during the latter portion of his stay on the Hills. He will ascertain as accurately as possible from the best authorities, official and private, the amount of existing traffic of all sorts, and the charges with which it is burthened. And with these statistics available it will be remitted to the Consulting Engineer for Railways to report as to the probable cost of a tramway laid and worked on some well established principle (such as that developed on the line over Mont Cenis) to be undertaken by State agency. It

*Proceedings of the Madras Government, Public Works Department,
10th September 1874.*

would be well in this view to obtain authentic details of the lines reported by Mr. Addis to be in actual operation between Lisbon and Torres Vedras.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

To Mr. Addis, C. E. Extract paragraph 1.

To the Consulting Engineer for Railways.

Under Secretary to Government, Public Works Department.

Exd. E. C. Shunker.

Spare Copies

33 Meadow Street, Fort.

Bombay 4 April 1874.

To
Colonel G. F. Walker R. E.
Secretary to Government,
Public Works Department,
Madras.

Sir,
I have the honor to lay the
following before you for the Government's
most favourable consideration.

2. My attention was attracted
some time ago to the want so much felt by
the bona fide inhabitants of Ootacamund,
Coonoor, Jackattalla and other Stations
on the Nilgerry Hills, as well as by the
annual visitors, or casual tourists, of a
cheap and efficient mode of conveyance to
and from the foot of the Ghats.

3. Up to the present, however, I
could not devote to that really important
question the time and attention it required,
and was therefore obliged to defer its con-
sideration to another time.

4. The advantages, which a cheap and comprehensive mode of conveyance offers to the Hills, are manifold and need not be re-enumerated to you, but I beg to draw your attention to two of them. I refer to the cheapening, that must ensue the introduction of the Tramway system of all articles of consumption and wear, and its natural consequence, the decrease of wages for labour.

5. It is a well known fact, that competition in trade is an almost unknown thing in the Hills. I am not referring merely to the shops containing articles of European manufacture, but also to the other and more essential trades of Grain of all kinds, Coffee, Tea, Cloths, and other articles of Country produce or manufacture. Competition in these articles of daily want is a thing almost unknown or rather unattempted, owing to the difficulty, but very partly removed by the carrying companies, of conveying those articles up those Ghats by other means than that of Brinjarry Bullocks, which

which mode of conveyance is more ^{or less} monopolised by a certain class of merchants.

6. The introduction of the Tramway from the foot of the Ghats to Ootacamund and its further extension, a fact that must ensue its introduction, will remove this great evil and secure to the inhabitants of the Hillgheries the results of a healthy competition in trade, and to the inhabitants of the Plains a comparatively cheap and easily got at Sanitarium.

I shall now endeavour to lay before you some of the working arrangements with reference to the Tramway. I guarantee that each passenger van will carry from 30 to 40 passengers, and each Goods Truck from 3 to $3\frac{1}{2}$ tons. I further engage to carry up the passengers and Goods from the Railway Terminus at the foot of the Ghat to Ootacamund at an average rate of speed of Ten Miles an hour, if Steam power is employed.

7. The outlay required for Construction Rolling Stock &c of the Tramway from and

and to the above mentioned places, including all intermediate Stations, will not exceed three (3) Lacs of Rupees, which, taking the length to be 25 Miles, gives an average of Rupees 12,000 per mile. This naturally diminishes the rates of fare per ton to a minimum. This cheapness, coupled with the speed attainable, renders this mode of conveyance far more preferable than all those in use at the present time.

9. You will, from the foregoing statement, be able to perceive that the amount of Goods the Tramway will be able to pour into Coonoor, Ootacamund, &c. every day, will be such as must greatly influence the market, and thus insure the desired result of cheapness. This, therefore, surely deserves the patronage of Government.

10. I also beg to state that the construction of the Tramway will, in no way whatever, curtail the breadth of the Road by unfitting it for the use of ordinary Vehicles. The Rails will be laid flush with

3
with the Road now in existence, so that any kind of conveyance can pass over it without detriment to itself or the Rails.

11. I will not dwell longer on this subject, nor point out any further benefits accruing to the Planters of Tea, Coffee, and Vegetables &c. nor shall I refer to the relief offered to the sick, but poor Europeans, who, owing to the present dearth of living on the Neilgherries, as well as to the expense of getting there, find it impossible to do so.

12. These and several other points must have suggested themselves to you, and will, I trust, be favourably viewed by Government when they take my projected undertaking into consideration.

13. It is my intention to construct a Tramway from the foot of the Ghauts to the Neilgherries. This, I find, I cannot do without the aid of Government, and therefore have the honor to solicit the favour of the following Concessions:

1st Six feet of the public Road leading from the Terminus of the Railway at the foot of the Ghats to Ootacamund via Coonoor and Jackattalla. It is immaterial what portion of the Road I obtain, whether the middle or either of its sides.

2^d A guarantee of 3 per cent. on all monies laid out on Construction, purchase of Rolling Stock &c &c

14. In conclusion, I am led to hope that the real substantial benefits the introduction of the Tramway will bring to the Antwerp, and by reversion to the Plans will be enough with the Government, and insure to me the Concession I have now the honor to solicit.

I have the honor to be
Your most obed^t. Servant,
R. B.

Yours most obed^t. Servant,
W. J. Aldrich



Estimate for the Construction of 25 miles
of Single Rail Tramway from the Mata-
pollium Terminus to Cotaacamund. via
Coonoor.

Estimate for Drawing No. 1 - Iron Sleepers.
Steam Power.

20 lb. Rails and Iron Sleepers, equal to 53 Tons per mile @ Rs. 110 per Ton for 25 miles — 1300 Tons.	1,45,750 .
Freight on 1300 Tons.	30,000
Insurance on 1300 Tons valued at 1,45,750 Rupees @ 1/2 per Cent.	728 12
Landing charges @ Rs. 1/1 per Ton for 1300 Tons.	1300
Custom House Dues @ 1/1 per Cent. on value of Rails, &c. Rs. 1,45,750.	1,457 8
Carriage of Plant to Site of Tramway.	268 12 8
For loading and unloading 1300 Tons @ Annas 4 per Ton	325
Construction @ Rs. 300 per mile for 25 miles.	7,500
Total Amount Rs.	2,13,873 12

18th April 1874. *W.J. Addis: C.E.*

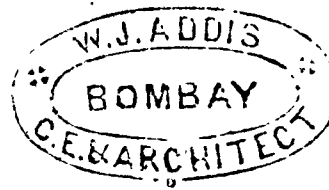
B. W. 1874 2245
No. 5705 A.
From

W. J. Addis Esq
Bombay

Detail 1/4 mile 1/4
Reel 10" 2 1/2 ft 1/4

Proposing
the construction
for running from
Matapollium to
Cotaacamund -
E.L. No. 2564 d. 10-9-74.

On Road



Maintenance and Working Expense of
Single Rail Tramway calculated for
one year.

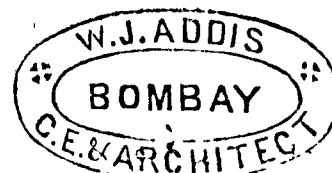
Iron Sleepers. Drawing No. 1
Steam Power.

3 Engineers @ Rs. 150 per month	5400	.	.
3 Firemen @ Rs. 30/- do.	1080	.	.
4 Greasemen @ Rs. 20/- do.	960	.	.
Coal	2000	.	.
4 Station Masters @ Rs. 40/- do.	1920	.	.
4 Assistt Masters @ Rs. 20/- do.	960	.	.
2 Superintendents @ Rs. 100 per do.	2400	.	.
1 Inspector on line of Road @ Rs. 1800	1800	.	.
25 Porters @ Rs. 12 per month	3600	.	.
10 Plate layers @ Rs. 15/- per month	1800	.	.
4 Pointmen @ Rs. 8/- per month	384	.	.
Repair of Road, Stations, Wagons			
Printing, Oil, Sundries &c.	2500	.	.
Total Cost of Maintenance	30804	.	.

18: April 2
1874

W. J. Addis: C.E.

By 10 Sept/74
In B. 194 B.



Estimate for Rolling Stock necessary for
working the Traffic with Steam power
together with Stations and Engine Sheds.
Steam Power

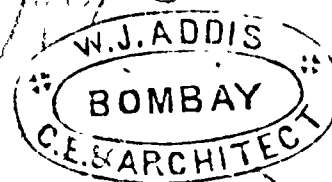
2 Engines @ Rs. 10,000 each	20,000	.	.
4 Brake Vans @ Rs. 1,000 each	4,000	.	.
50 Trucks or Vans @ Rs. 500 @	25,000	.	.
3 1 st class Carriages @ Rs. 1,000 @	3,000	.	.
4 2 ^d Do. Do. " 700/each	2,800	.	.
8 3 ^d Do. Do. " 400/each	3,200	.	.
4 Stations @ Rs. 1,000 each	4,000	.	.
2 Engine Sheds @ Rs. 500 each	1,000	.	.
Total Cost of Rolling Stock for Engine Power		63,000	.

18th April
1874.

W. J. Addis & Co.

A. B. Average Cost of Tramway
including Rolling Stock per mile
Rs 11,075/-

W. J. Addis



33, Meadows Street, Fort,
Bombay, 18th April 1874.

Sir,

Colonel G. W. Walker R.E.
Secretary to Government,
Public Works Department,
Madras.

Sir,

I have the honor to acknowledge the receipt of your letter under date the 9th Instant N^o 237, and beg to submit as requested, all detail information with reference to my proposed Tramway from the Matapollium Terminus to Ootacamund via Coonoor and Jackattalla.

2. Although I have not seen the new Coonoor Ghaut since its completion in 1870, yet I have based my scheme for the projected Tramway from the knowledge I had of the old road. The present line, no doubt, will be more in favour of the Tramway both as regards gradients and curves, hence I anticipate no difficulty whatever as regards these two points.

M 57064/1
2/1/74

Rd 210 Sept 1/74
En B. N. 1973

W. J. Addis

3. The Engine I purpose introducing is that of Mr. Fairlie's. I have already been in communication with this gentleman on the subject and am prepared to adopt his system of Locomotive, more so as you are doubtless aware his wheels are on the Bogie principle and will adapt themselves to the sharpest curves.

4. The Engines and Brake Vans will have all the latest improvements as regards Brakes so that there will be no difficulty whatever in case of necessity in bringing the Train to a dead stand on any part of the Ghaut or on any incline.

5. Engines on this principle have already been constructed in England by Messrs Sharp Stewart & Co. and are now worked on my system of Single Rail. The following is a description of the working of the Tramway both as regards Engines and Vehicles on the Lisbon and Cintra line, also from Lisbon to Torres Vedras - a distance of 77 miles. Upon this Single Rail run Engines and Carriages having one pair of broad wheels.

There is a very powerful engine - no doubt a very good one - but I am not sure if it is not better than the one I have proposed.

There is a very considerable saving in the cost of the engine - but I am not sure if it is not better than the one I have proposed.

There is a very powerful engine - no doubt a very good one - but I am not sure if it is not better than the one I have proposed.

All this is very good - but I am not sure if it is not better than the one I have proposed.

wheels placed central to their length, and running on either side of the rail, and at either end, a bogie frame carrying a double flanged wheel placed central to the width of the Carriage working on the rail. In the Locomotive, the pair of broad wheels are the drivers, and the small central flanged wheels acting mainly as guides. In the Carriages and Waggon's, however, the exact reverse of this arrangement is introduced, the bearing being taken by the bogie wheels, whilst the outer wheels act simply as guides. The Carriages and Waggon's in point of fact are therefore as will be observed, steadied and prevented from overturning laterally by the outer wheels.

6. The Engines are further fitted with an ingenious hydraulic arrangement, by means of which the body of the Engine is preserved in a horizontal position when it is either ascending or descending an incline, so that the tubes are not uncovered by the water, the level of which

which is indicated outside. The power of each of these Engines has been tested on this Tramway on a level up to 300 Tons. The steepest gradient on this line of Tramway is 1 in $18\frac{3}{4}$ and the average over the whole length above mentioned is 1 in $22\frac{3}{4}$, and the Curves are in places very sharp averaging from 5 to 10 feet radius.

7. The ordinary working weight of an Engine is 13 Tons, 5 Cwt. and of this the driving and supporting wheels are calculated to sustain a maximum weight of about nine Tons, or four Tons and a half on each wheel, the balance being distributed over the guiding wheels. But in running over gradient, by means of the hydraulic ram, worked by steam and connected with the central mechanism, the weight on the support wheels can be reduced by one half and transferred to the centre or guiding wheels, which enables a greater speed to be attained.

8. These Engines are capable of drawing 25 Tons up these gradients, but the weight

W.J. ADDIS
BOMBAY
ARCHITECT

See also
the
to the

weight of an average Train with five vehicles attached is about 18 Tons, and the speed including stoppages is 15 miles per hour.

9. Carriages are of three classes, and so constructed for the convenience of passengers that they enter from the sides. The first class carriage accommodates 16, the second 30, and the third 40 passengers. The backs of the seats are so arranged as to be turned either back to back or vice versa, in order to save the turning of the Carriages.

Opened 11/5
120 ft long
41 ft 5 in wide
5 ft 6 in high
3 ft 6 in high
10 ft 6 in high
10 ft 6 in high

10. Goods waggons are constructed similar to those of an ordinary Railway, but smaller and capable of conveying from 3 to $3\frac{1}{2}$ Tons each.

11. All the guide wheels of the Vehicles are constructed on the same rope system, in order that each and every one may, in its turn, adapt itself to the sharpest curve on the Ghan. Each Vehicle is further fitted with strong Brakes on either side.

12. The Rail is a single one, combining a longitudinal Sleeper and Fish-plate all

It is obvious
that a train line to
the Hills is a great
desideratum - whether
worked by locomotive
or for a time at least
by animal power - soon
or later some such
means of access will
become a necessity.

I am therefore
inclined to encourage
Mr. Adair's advances
for even if not finally
concluded at this
such a discussion
with outsiders & negotiation
will lead to thorough
investigation of the matter

Wm. J. Adair Esq.
Boulder
Dated 15 April 1883
Recd. 10 Sept. 1883

W. J. Adair Esq.
Boulder
Dated 15 April 1883
Recd. 10 Sept. 1883

Adair in connection
with his proposal
to construct a narrow
gauge line to the foot of the
Hills -

El. Co. 2564 & 108-24

Adair

in all its hearings
and may draw the
attention of men & Engineers to this
want. What I have
myself seen in America
and heard of elsewhere
- indeed Mr Addis dis-
cusses a Spanish Railway in
full working under the
system he advocates -
leads me to the belief
that Railway across
the straits at a comparatively
moderate cost is quite
within the reach of
Engineering skill.

Mr Addis's conditions
are most reasonable
- such as perhaps under
any circumstances
we would have to concede
viz - the use of six feet
of road already in
existence

16
existence (a use which
would prove no obstruction
and but slight inconvenience)
and a guarantee of a
most moderate interest
on the Capital outlay -
I agree with the Engineers
Officers who have examined
the Estimates that the
first outlay & working
Expenses are probably
^{much} under-estimated by
Mr Addis. New bridges
would be required (as
observed by Col. Walker)
and the outside 6 feet
of the Giant Road would
have to be greatly strengthened
for the use of a rail road.
Further it is by no means
clear that Major De C. Scott's
condemnation of the
principle of the machine
power &c. is not well merited.
But

And still I submit the
whole is in too conjectural
a state to justify our
summary rejection
of a laudable project.

I would therefore
accept Mr Addison's
proposal to come to
the Hills while the
work is on the spot -
~~paying if necessary his~~
~~actual expenses~~ - to
enable him to examine
the line & more thoroughly
and to explain in person
the difficulties which
present themselves to
our Engineers. The
discussion might
lead to further results.

^{of traffic}
h.B. I think returns
are underestimated by
Major de C. Scott - higher
tonnage charge might be
made on through traffic
and local traffic is not
included.

12/8 W.S.

5
A rail way up
the ~~mountain~~ would
be an immense
advantage to these
hills - and I would
give up the whole
of the new scheme
& the old road to
get in the ant heart
taken to it
it.

But I hesitate
to have any thing
to do with Mr Addison.
he is well known
to our G.P.W. and
the London & Rail.
Co. and what we
know of him is not

rest of a nation
has been since
to in the camp
advised him
dence in his ability
as an engineer
will of
this principle
to is directly
routed to stop
inches - even if
with any thing
elsewhere.

I would place
the matter in the
hands of Collet by
letter: the Zeller
cubits in the middle
him to make pretty
family of the
taller cubits
and he can form

a the vicinity of
the site of the
the east of the
L. ...
I would add
the fall by
the other
new bridges
be necessary
the plant
tunnels - a
station at
that town
in the
places to
for running
the Collet
roughly
the sea
some what

clearly
I know that
I would give up the
whole of the business
plant - my reason
is this - the transfer
of the plant in order
that the conveyance of
passengers & carrying of goods
may be as expedient
& cheapened - with
a little less trouble -
the only persons who
have been placed by
the plant are the
carriers - the public
are much as they
were - I would then
for give up the
whole road - for -

19
I sided the matters
of the Rail against
to a reasonable scale
of charges for pass.

larger goods - and
would be for the
old plant for
men - horses &
bullocks. The
public would be
larger parties - &
the plant was made
in their interests.

I am aware
to procure the
interest - especially
for not a single
line - The Rail
will

miles of course at
 all but 1 mile - 11 miles
 1 1/2 miles - If started
 under the management
 of the County Council
 in the 1st year of
 moderate amount
 1 limited liability
 2 I feel sure the
 necessary capital
 could be raised
 in this country.

L. G. S.
 20/11

Memo on Mr. Addie's proposal for a
 single line Tramway from Mettapolham
 to Otacammund via ...

P. 1

The Chief Engineer considers
 that "a Tramway capable of
 " being operated at a rate of 10 miles
 " per hour at a rate of 10 miles
 " an hour " is the best plan is
 unfeasible at a time when the
 cost proposed: and a time much
 larger than the cost proposed.
 means that the work would not
 yield even a moderate return.
 His opinion is that
 the work must be conducted with
 ... or a ...

by
 in
 am
 by
 do
 no
 stage
 1/2
 times
 1
 then
 imp-
 regd

Wish of course to
all put forth - think

The new plant as now in its
present state: or the Govt must
pay a great part of the interest
on the capital with which the Railway
works is to be equipped - a very
onerous task at its own
expense. This consideration applies
to all projects for communication
by the plant of rail: - namely it
can be shown that, in the case of
any particular proposal, Ed. Walker

Memo on Mr. Addie's proposal for a
single line Tramway from Mettapolliam
to Otacamund via Coonoor.

proposition does not apply. (I assume
that if the speed were much less
than 10 miles an hour, the material
rolling stock would be gained.)

Besides this general consideration,
Mr. Addie seems to be of no great
reputation as an Engineer, and it seems
extremely doubtful whether his proposal
is mechanically sound. I would not
waste time & money in
encouraging him. If one wishes to

kind of course to
all put forth - think

is that, if the work is to be done at
all, it is better that it should be done
by the post itself, in the same manner
as Indian Railways generally are
now constructed. With this view,
the subject might be taken into
consideration by our P. W. Dept.
in order to ascertain whether a loan
could properly be applied for
to the Government.

M 28/8

1-10-74

Memo on Mr. Addis's proposal for a
single line tramway from Mettapolliam
to Alacamund via Coimoor.

The proposal put forward by
Mr. Addis in his letter of the 4th April
last for a tramway from Mettapolliam
to Alacamund is not accompanied by
information of a sufficiently close and
accurate character to enable any one
to judge what are the special advantages
which he intends to claim for the single
line system worked by steam locomotives
but there are objections which suggest
themselves after a perusal of the written
description.

2. The engine and carriages are sup-
ported by four wheels which are arranged
apparently in the form of a cross two
being in a line bracing each carriage
or engine longitudinally and two in a
line

line breasting them crossways. The two
latter in the engine are the driving wheels
and they each are intended to sustain a
weight of $4\frac{1}{2}$ tons while the balance of
the weight of the engine viz 4 tons 5 cwt
is supposed to be carried by
the two central wheels. In the carriages
on the contrary the central wheels (which
travel on the rail and have double flanges
by which they are guided on it) are the
supporters of the weight and the outer
wheels are merely intended to prevent
the carriages from overturning.

3. The mechanical advantages of
this arrangement are not apparent.
on the contrary theoretical principles would
lead one to conclude that the power
employed would work under a disadvantage
as compared with the double line system.

1. As the friction is proportional to the
weight

weight, it will remain the same whatever
may be the distribution of that weight
amongst the wheels so far as regards any
carriage.

2. The driving wheels of the engine work
as it appears on the ordinary road out-
side the rail. The friction against
which the power acts is therefore on
a yielding surface compared with that
presented by a properly sleepers rail.
This would be especially the case in
wet weather. All work done on the road
such as rutting, crushing or tearing up
the materials is so much subtracted
from the effective work in driving the
train.

3. The load on each driving wheel of the
engine is $4\frac{1}{2}$ tons or 10,080 lbs and if the
adhesion limiting the tractive force is
assumed as is usual in ordinary railways
at $\frac{1}{4}$ of the load on the two wheels it will
amount

$$\text{Amount to } \frac{20,160 \text{ lbs}}{7} = 2,880 \text{ lbs}$$

now by an accepted formula: if

R = the resistance in lbs of an engine and

E = ^{trains to traction} the weight of the engine in tons

T = the weight of train in tons.

V = Velocity of train in miles per hour

i = ratio of height to length of incline or
sine of angle of inclination.

$$R = T + E \left\{ 8 + \frac{V^2}{180} + 2987 \times i \right\}$$

In this case:

T = 20 tons (assumed as the weight
of three wagons with $10\frac{1}{2}$ tons of goods)

E = 13 tons (see description by Mr.
Addis)

V = 10 miles per hour

(Minimum speed — guaranteed)

i = .055 for a gradient of 1 in 18

and therefore

$$R = 33 \left\{ 8 + \frac{100}{180} + 2987 \times .055 \right\}$$

$$= 5703 \text{ lbs}$$

while

14 We now come to the question of
Returns. The estimates of traffic for
the Kildgenny branch railway were
derived from statistics of existing road
traffic passing through toll bars on the
road between Pothanore and the hills in
the year 1865, 1866, and 1867. Taking
into consideration the undoubted increase
of intercommunication during the past
few years the existing traffic from and
up to the hills may be estimated to be

Yearly in	12000 tons
Goods	500
1 st Class passengers	1000
2 nd do do	8000
3 rd do do	

The present cost of the carriage of a ton
of goods by cart from the Plains to Aota
is estimated at 25 Rupees but
allowing for competition by less costly
mode of conveyance. It may be
assumed

assumed that there will be a traffic of 6000 tons capable of bearing a charge against of Rs 10 per ton and 6000 for which 5 Rs per ton may be the tariff.

1st Class Passengers would readily pay Rs 10 and the other rates may be set down at Rs 5 and Rs 1 per person.

The Revenue would be as follows:

6000 tons at Rs 10	60,000
6000 do at " 5	30,000
500 Passengers 10	5,000
1000 do 5	5,000
8000 do 1	8,000

Rupies 108,000

No allowance is made for line stock, horses &c as these would probably still be driven up the ghant.

Deducting from the above the cost of working and maintenance at Rs 50006 there

Balance of Rs 57,994

there remains a balance of Rs 57,994 to pay interest on Capital.

15 It seems therefore that a single rail tramway could be laid down on the existing ghant road and provided with rolling stock at a cost not exceeding Rs 14,000 per mile and that if it could be worked as proposed the returns from the probable traffic would pay nearly eight per cent on Capital & expenditure represented by the cost of the road on which was laid that of the tramway and the rolling stock. The flaw in the scheme is that adhesion and power to do the tractive work cannot be got without a firm bed for the driving wheels to work on and a heavy engine and this system provides neither.

It is to be observed that the return from

from traffic would by calculation give
 5 per cent on an expenditure of Rs 43877
 of per mile and it is worthy of inquiry
 whether a modification of Mr. Tello's
 arrangement where adhesion is obtained
 by causing the engine to grasp a central rail
 could not be constructed for that sum.

17 A much more close and accurate
 estimation of the traffic from and
 to the Hills is however required before
 a really trustworthy conclusion could
 be come to in reference to the probable
 return. The various proportions the
 different classes of Passengers and goods
 carried bear to each other, the quantities
 of the latter carried by coolies, pack
 bullocks and carts respectively, the
 actual cost of conveyance exclusive of
 the profit to the carriers and the
 various

	miles
Mettapallam to Villar	6
Villar to Leonoor	16
Leonoor to Otacamund	12
Total	34

adding to the estimate a sum proportion-
 ed to the extra distance on the basis
 of the rates adopted by Mr. Addis, we
 obtain an amount of Rs 290,868. The
 cost portion of the iron material, delivered
 at the site of the works is estimated at
 Rs 138, nearly. It should however be
 pointed out that the cost portion of iron
 rails delivered at Secunderabad for the
 Madras Railway Stitchery branch
 was about Rs 161.

There is therefore much reason to
 doubt the sufficiency of the estimate
 of Mr. Addis. It would be prudent
 to add to it for iron Rs 24,479.

12-10-1881 If the reasons urged the cost of
 the

the tramway would be more fairly represented by the sum of the amounts shown below viz.

Cost of bricking road from Mettappallium to Otacamund	Ruppes 408,000	This is Subject to correction. 1851-2. It is not a part of the estimate for the railway but the estimate for the railway is not available.
Cost of iron materials as priced	308,812	
Laying and Construction taken at the rate shown by Mr. Adchie	10,200	
Total	727,012	

13. The returned Capital Outlay and the charges against Revenue on account of the proposed tramway as revised may be exhibited at one view as shown below.

<u>Capital Outlay</u>		
Construction	Ruppes 727,012	3,19,500
Rolling Stock	145,300	1,25,000
Total	872,312	4,44,500
Interest at 5 per Cent on ^{or Rs. 25656 per mile} <u>Revenue Charges</u>		13,950
Interest at 5 per Cent on Capital	43,615	2,11,000
Maintenance & Working Expenses	50,006	
Total		

While therefore the engine's power to draw the train amounts to only 2880 lbs. - the resistance is equal to 6703 lbs. There is no reason to suppose that the adhesion of the engine driving wheels on the road would exceed that an ordinary cart and in wet weather it would no doubt be much less. We see that the engine designed could not draw the train up the gradient and in fact could do little more than drag itself, for its own resistance amounts to 2243 lbs by the same formula. The engine is altogether too light for its work.

14. It is impossible to comprehend on theoretical principles, how the engines described can do the work assigned to them in Mr. Adchie's description of the Portuguese tramway. The

The Fell system seems to be the only one capable of affording the necessary amount of adhesion to enable the gradients on the khant to be surmounted and as the central rail need only be laid where it is really required and omitted at other parts of the line it is not so expensive an arrangement as would at first sight appear.

5. The details of the engines alluded to by Mr. Adetis, the brakes, hydraulic arrangement for tilting the boilers and altering the distribution of the weight are too vaguely described to be the subject of criticism.

6. Exception must be taken to the estimate for working the tramway and first as regards the item of coal. This is put down at Rs 8000 per annum.

Now

For a tolerably fair approximation may be made to the truth by comparing the work done, with the coal expenditure on the Madras Railway, and assuming that the expenditure of coal on the tramway will be in a similar proportion to the traffic thereon, with due allowance for the different gradient. The expenditure for fuel on the Madras Railway is approximately at the rate of 0.229 pice per passenger mile and 0.901 per ton mile, taking the mean gradient of the railway at 1 in 300 and those on the tramway at for

5 6 miles to Kullas 1 in 150
16 - do - " Leonoor 1 in 25
12 - do - " Aotacamund 1 in 64.

and the resistances to traction on the railway at unity - the resistances on the several gradients of the tramway will be respectively $1\frac{1}{4}$, $6\frac{1}{2}$ and 2.6. Assuming the expenditure of fuel to be in the like proportion and that 1200 tons of goods and 9500 passengers are carried yearly

the expenditure in fuel would amount to about Rs 10,000. Similarly one may use as data the maintenance and management expenses on the Madras Railway for arriving at an approximate estimate of those on the steam tramway. The length of the tramway would not be less than $3\frac{1}{2}$ miles from Mettupalayam to Ootacamund and taking the maintenance &c at $\frac{2}{3}$ the rate per mile of that of the Madras Railway the following figures are obtained.

Locomotive expenses &c	
of fuel	9,180
Permanent way maintenance	16,320
Carriage and Wagon expenses	3,060
Traffic	8,182
Management	3,261
Adding for fuel as calculated above	10,000
The Total is	50,006
There	

There is no doubt that this is a very moderate estimate.

Mr. Addis estimates the maintenance and working expenses at Rs 30,804 but he is in error as to the distance between the terminal stations, which he computes at 25 miles, apparently somewhat in error as to the amount of fuel necessary.

9. The provision of rolling stock as detailed in the estimate is perhaps sufficient for the traffic which exists or which is likely to exist for some time to come except as regards engines but the cost would probably be much greater than is allowed for. Not only would it be necessary to have more powerful engines but the appliances for the adjustment of the boiler and weight on the several wheels would add to their cost. The average cost of the locomotives on the

the Madras Railway appears to be about £3500 but it is difficult to make a comparison with Mr. Addis' engine. The latter would no doubt be much cheaper as described, but then calculation would show that it is incapable of doing any useful work on the grant incline. Theory would lead to the conclusion that to obtain the adhesion necessary to do the work required the Locomotive must weigh not less 25 tons. It is difficult to see how such a weight is to be distributed on the two or even more driving wheels so as to work satisfactorily on an ordinary road surface. £2000 would be a moderate price for such a locomotive in England and in this country they would not cost less than £3000.

10. The following is the average cost of

6

of carriages on the Madras Railway. Rs 6,500.

1 st class carriages	4,000
2 nd do do	3,500
3 rd do do	2,500
Break vans	1743
Wagons	

at one half these rates the equipment of rolling stock proposed by Mr. Addis would cost Rupees 14,0350 his estimate is Rupees 63,000 but in the absence of a more detailed description of the carriages it is impossible to accept the conclusions come to.

Mr. Addis asks for the concession of 6 feet of the existing public road from Mettappathur to Aotacamund on which to place his tramway. This arrangement would seriously affect the utility of the road as a line of ordinary traffic; indeed it is impossible to suppose

suppose that it would remain available in any sensible degree whatever while it is of its present width. The passage on parallel lines for miles of trains of carriages and vehicles, drawn by locomotives and horses or bullocks, at a distance of one yard from each other without intervening fence and on a mountain road would occasionally, to say the least be productive of inconvenience!—

If the road were given up to the tramway it would be fair to charge to the latter its cost. This would at once add Rupees say 4,08,000 to the Capital outlay debitable against it. With the advantage of the concession alluded to the cost of 25 miles of tramway is estimated at Rs 2,13,871, but as has been already stated the distance to be covered is 34 miles.

Vis

various circumstances, if any exist, which would tend to maintain the present mode of traffic against competition by steam railway should all be known.

18. The conclusions to which the considerations discussed above lead, may be summed up as follows

1. The Engines described would not be powerful enough to surmount the heavy gradients on the Coonoor ghant with a profitable load behind them and at the same time the tramway is not adapted for heavy and powerful Locomotive Engines.

2. The principle of the single rail system tends to make the power work at a mechanical disadvantage and this disadvantage is so great as to more than counterbalance the advantage of the cheap roadway.

3. The concession required by Mr. Addis
of 6 feet of the existing road would be
equivalent to the concession of the ex-
clusive right of using the road.

4. The project is not one which it
is desirable to entertain under
present information.

Amel. Sato.
Mayor Mo.

Chief Engineer's Memorandum.

I have no faith either in Mr.
Addis' theoretical knowledge,
or practical experience of
railway work, and have
no doubt that his cal-
culations are open to the cor-
rections made by Messrs
Scott & Bond. But these
are not the only things
of the existing
road between Metapollis
and Ootahamund implies
that it is to be made over
to him free of cost. Hence
his corrected estimate would
stand thus:

Construction	\$ 3,19,000
Rolling Stock	1,45,300

Total Rs 4,64,300

Now if Mr. Addis could get
a company to carry out
a railway with steam
power on which such a
speed could be maintained
as would enable the
journey of 33 miles from
Metapollis to Ootahamund

to be performed in $3\frac{1}{2}$ hours,
for a capital outlay of
5 Lakhs, I should think
a guarantee of Rs 15000
per annum ~~could~~ ^{is} such
maximum capital, consid-
tional on the line being
incessantly opened, main-
tained, worked at ^{the}
fast speed, very little
for the Govt. to concede -
and inasmuch as the
amount of traffic demanded
by Major Scott averaging
13 passengers per train at
or above, & $36\frac{1}{2}$ tons of goods
either way, would not ex-
quire more than one train
a day, plying in con-
juncture with the Madras
Railway between 9-30 A.M.
and 2-30 P.M. I see no
objection to the concession
of the center 6 ft of the Road
and Shunt -

But I am utterly interest-
ed as to the practicability
of laying down a Tramway
capable of being efficient
ly worked by Steam Power

at a speed of 10 miles ^{an hour}
up gradients of 1 in 18 (of wh.
at least 25 miles out of the
33 miles) for such a capi-
tal as the Traffic shown by
Major Scott would suffice to
pay 5 per cent on - any 12
Lakhs of Rupees - One item
of additional revenue, expense
not calculated on by Mr. Ad-
dis is, the crossing of the
large Shant Road over
existing Shant Road one
for the most part spanned
by light wooden structures,
in lieu of which the Town-
-way must provide its own
Girder Bridges -

C.M.W.
7.8.74.

of his estimates to
provide adequate
working power,
and to lay down the
line. But it does
not appear ~~better~~
that Mr. Addis has
sufficiently appreci-
-ated the power neces-
-sary to carry the traf-
-fic to the heulherries
up many miles of
incline averaging
1 in 18 in gradient
at the rate of 10 miles
an hour; or the cost
of supplementing the
road accommodation
to be given, by Bridges
and Drains of more
solid construction
than

than ³³there are
-aided, by Tunnels
or other expedients
necessary to get
round the nume-
rous zigzags, and
by strengthening
the outer edge of the
road to ensure its
not giving under
the weight brought
upon it. Under
these impressions,
His Excellency the
Governor and Council
must ~~immediately~~
decline to entertain
Mr. Addis' proposals.

The ^{importance} ~~importance~~
of facilitating traffic
both of Goods and

Passengers to and from
the hillberry hills
is however so potent
that His Excellency
the Governor in Council
resolved to instruct
the Under Secretary
to Engr. in the Dept^t
of Public Works to
take up the subject
during the latter
portion of his stay
on the hills. ~~When~~
^{He} he will ascertain
as accurately as pos-
sible from the best
authorities, official
and Private, the
amount of existing
traffic of all sorts
and the changes with

which it is furthered
and with these sta-
tistics available
it will be remitted
to the Consulting
Engineer for Railways
to report as to the
probable cost of
a Tramway laid
and worked on
some well estab-
lished principle
(such as that de-
veloped on the line
over Mont Benis),
ple. understated
by State Agency.
It would be well
in this view, to obtain
authentic details of
the

the Lines reported by
 Mr. Adolfo in
 actual operation
 between Lisbon and
 Torres Vedras.

CMW

Handwritten notes in margin

Handwritten notes in margin

194 A - 194 C.

Res. of para 1 despatch in U.S.
 to Mr. Adolfo 10/9/74.

To the Comd. Genl. for P.W. ✓
 " Under Secy to Genl. P.W.D.
 S. Gifford despatch 30/9/74.
 S. Gifford Comd. Genl. signed 20/11/75

Rev. Secy to S.W. Comd.
 St. Eugene Mulgheir 4/11/74.
 Comd. Genl. ✓
 20/11/75

En 3/9/75, Pto 10/9/76

5706
 5705
 Govt. of 1874
 PUBLIC WORKS.



Mr. Adolfo C.E.

37

10 Sept 2304 A

No. 134 L 134 C.

Tramway -

Passing orders on
 the subject of the
 proposed construction
 of a Tramway from
 Metapollis to
 Botacavunch —

