

## APPENDIX.

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### APPENDIX No. 1.

**REPORTS of INSPECTIONS of NEW LINES of RAILWAY, of which the OPENING was POSTPONED in consequence of the INCOMPLETENESS of the WORKS or WORKING ARRANGEMENTS.**

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#### BELFAST AND COUNTY DOWN RAILWAY.

SIR,

*Dublin, June 26, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 21st instant, I have inspected the Belfast and County Down Railway, between Comber and Ballynahinch.

This portion of the Belfast and County Down Railway is a single line, 12½ miles long, which is to be worked continuously for the present, but of which the last three miles will form the Ballynahinch branch, when the main line is continued, as it is expected to be in six months time, to Downpatrick.

The permanent way is of a substantial description. It is laid with a heavy bridge rail, upon transverse sleepers, grooved by machinery; and the joints are secured, in an improved manner, to large saddle plates, which rest upon corrugated iron sleepers. A great deal of bolting and spiking, and, in one portion of the line, of ballasting, remains, as yet, however, to be completed.

There is one wrought iron lattice girder bridge under the railway, which is exceedingly stiff, but in regard to which I have suggested an alteration in the form of the compression bars. The other bridges, over and under the railway, appear to be standing well.

The junction stage and signals at Comber have not yet been erected, and there are other signals wanting, as I have pointed out, on other parts of the line.

There are a number of rock cuttings of which the sides require to be trimmed off, that they may be at a safe distance from the sides of the carriages.

Some fencing is still wanting, both at the sides of the railway and on the approaches to the over bridges, and some of the level-crossing gates are not yet up.

A stationary buffer will be required at Ballynahinch.

I have not yet received the necessary certificate,) which is being prepared, however,) in regard to the safe working of the single line.

On account of these several requirements, I beg to report my opinion, that by reason of the incompleteness of the works, the opening of this portion of the Belfast and County Down Railway would be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
Captain, R.E.

*Belfast and County Down Railway,  
Belfast, June 24, 1858.*

SIR,

REFERRING to my notices to the Lords of the Committee of Her Majesty's Privy Council appointed for Trade and Foreign Plantations under date of 18th inst, I have the honour to inform you that on our engineer-in-chief (Sir John MacNeill) going over the extension line yesterday he found the several matters necessary to be done, were not in so forward a state as he expected when ordering the ten days' notice of inspection to be sent you.

I am, therefore, instructed to withdraw the ten days' notice, and to say another will be sent you in a few days.

I have, &c.

Captain Galton, R.E.  
&c. &c.

THOS. WARD,  
Secretary.

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**INSPECTIONS.**

**Belfast and  
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Railway.**

*Belfast and County Down Railway,  
Secretary's Office, Belfast, July 5, 1858.*  
SIR, By direction of Captain Tyler, R.E., I have the honour to hand you the enclosed undertaking.

*Captain Galton, R.E.  
&c. &c.* I have, &c.  
*THOS. WARD,  
Secretary.*

*Belfast and County Down Railway,  
Belfast, June 30, 1858.*

WE hereby certify that there shall never be more than one engine in steam, except where two are coupled together in one train, between Comber and Ballynahinch at one time.

It is intended to work the line with a tank engine.

*W. H. ANKETELL,  
Chairman,  
THOMAS WARD,  
Secretary.*

*Railway Department, Board of Trade,  
Whitehall, July 17, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the Belfast and County Down Railway from Comber to Ballynahinch.

Upon consideration of that report my Lords direct the Belfast and County Down Railway Company to postpone the opening of the portion of line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.  
*DOUGLAS GALTON,  
Captain, R.E.*

*The Secretary of the  
Belfast and County Down  
Railway Company.*

*Belfast, July 15, 1858.*  
SIR, IN compliance with the instructions contained in your letter of the 9th instant, I have this day inspected that portion of the Belfast and County Down Railway which extends from Comber to Ballynahinch, and which was previously inspected by Captain Tyler and reported upon on the 26th June, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the requirements enumerated by Captain Tyler, and stated to have been pointed out to the company's engineer, have not yet been fully complied with. Thus, there is still a good deal of bolting, spiking, and screwing yet to be done; the ballasting is by no means complete, as the rails in one part are almost laid on the formation level. No distant signal has yet been put up to cover the Comber station from the Belfast side, and some of the other distant signals which have been put up, cannot be seen by the signalman from his post; where this is the case, there should be a repeating signal that can be seen.

Nothing has been done to the lattice bridge referred to by Captain Tyler, and the trimming of the rock cuttings

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has not been finished, and the fencing is still incomplete at places on the line. The stationary buffers at Ballynahinch have not been erected.

In addition to the preceding I should mention that the posts put up at Comber to carry the roof are too close to the rails; the distant signals require to have their handles brought together close to the station signals, and to be differently hung, so as to stand at danger in the event of the wire breaking. The sidings at Ballygawly and Saintfield are not laid down; the platform at the Ballynahinch junction is incomplete, and the signal should be put up close to the platform, and the embankments require widening, and the water channels clearing out in the cuttings. Gradient boards have not yet been erected.

No turntable has been erected at Ballynahinch, and there is one level crossing of a parish road, which is not authorized by the Company's Act. It is situated at 7 miles 22 chains, and is numbered No. 13 in the parish of Saintfield. I am informed that the Company when they went to Parliament wished to be allowed to cross Nos. 13 and 31 roads in the parish of Saintfield on the level; but No. 31 alone appears in the Company's Act, and there they have built a bridge, although a level crossing is sanctioned. I do not know if any error has crept in, during the printing of the Act, by transposing the figures of 13 and making it No. 31.

I am also told that the Company imagined, until the Act and the plans were brought forward and compared, that they had power to make a level crossing at No. 13.

I am, therefore, of opinion that, by reason of the incompleteness of the works, the opening of the portion of the Belfast and County Down Railway between Comber and Ballynahinch for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lieut-Col., R.E.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, August 13, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R.E., the officer appointed by them to inspect the Belfast and County Down Railway between Comber and Ballynahinch.

Upon consideration of that report my Lords direct the Belfast and County Down Railway Company to postpone the opening of the line in question for the public conveyance of passengers for a further period of one calendar month from this date.

I am, &c.

The Secretary of the  
Belfast and County Down  
Railway Company.

JAMES BOOTH.

SIR,  
*Belfast, August 10, 1858.*  
I HAVE the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that I have this day reinspected the portion of the Belfast and County Down Railway from Comber to Ballynahinch, and with reference to previous reports by Captain Tyler and by Colonel Yolland, I have to state that the line is incomplete in the following particulars:

At Comber Junction no distant signal has been yet put up to cover the Comber station from the Belfast side.

The main signal for Newtownards line is not fixed.

The repeating signal of the distant signal on the Ballynahinch line is in progress, and the lever of the distant signal on the Belfast side, to be brought near the main signal.

The alteration in the form of the compression bars of the bridge adjoining Comber station is in progress.

The posts on Comber station platform have been removed from their original distance of 2' 9" to that of 5 feet from the edge of the platform, and though an additional foot of platform width would have been desirable, the safety of the public may now be considered sufficiently provided for.

The stationary buffers at Ballynahinch have not been erected, and the turntable is incomplete.

Gradient boards have been erected on only one part of the line.

Progress has been made in ballasting and in widening the cuttings, but the channels in the latter will require clearing out.

I am informed that it is not intended at present to add a siding to Ballygowan station. An additional communication has been made to the warehouse at Saintfield by the addition of a siding leading from it towards Ballynahinch.

At Ballygowan the arrangements for bringing the handles at the distant signals to the station signal are not complete.

At Saintfield the repeating signal towards Belfast is not placed, and the signals are not yet altered to stand to danger in case of accident to the wire, and I understood that this alteration was still required to other signals on the line.

At the junction station the platform is in progress, and the handles of the levers of the distant signals were being placed near to the station signal, but a repeating signal is still required.

The bolting, spiking, and screwing of the permanent way has been properly attended to, and the fencing now appears complete; but on account of the other deficiencies it is my duty to report, that by reason of the incompleteness of the works the opening of the portion of the line between Comber and Ballynahinch for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

GEORGE ROSS,  
Captain, R.E.

*To the Lords of the Committee of the Privy Council  
appointed for Trade and Foreign Plantations.*

STATEMENT on behalf of the Belfast and County Down Railway Company.

The Belfast and County Down Railway Company were, by their Act of incorporation, 1855, authorized to extend their line from Comber to Downpatrick, with a branch to Ballynahinch, and also to extend their line from Newtownards to Donaghadee, with a branch to Bangor.

In the Bill deposited by the Company power was sought to cross eight roads upon the level, in the construction of the line from Comber to Downpatrick; that is to say—

No. of Road.	Mileage.	No. on Plan.	Parish.	Townland.
1	0 2½	25	Comber	Comber.
2	4 0	4	Killinchy	Ballygowan.
3	4 3	49	Killinchy	Ballygowan.
4	4 4	11	Killinchy	Ravarra.
5	7 0½	31	Saintfield	Glasdrumman.
6	7 2	13	Saintfield	Ballyagherty.
7	9 5½	146	Saintfield	Leggygowan.
8	12 1	25	Kilmore	Rademan.

Attention is requested to the fact that three of those crossings were all in the parish of Saintfield, and two of them, viz., Nos. 5 and 6, within a few perches of each other.

The officer of your Board reported against five of those eight crossings, viz.:

No. 3, Killinchy.  
No. 11, Killinchy.  
No. 13, Saintfield.  
No. 146, Saintfield.  
No. 25, Kilmore.

By the 25th clause of the Belfast and County Down Railway Act, 1855, the company were authorized to cross three roads, out of those eight, upon the level, in the construction of their line between Comber and Downpatrick (being those which your officer reported in favour of), viz.:

No. of Road.	Mileage.	No. on Plan.	Parish.	Barony.
1	0 2½	25	Comber	Comber.
2	4 0	4	Killinchy	Ballygowan.
5	7 0½	31	Saintfield	Glasdrumman.

It will be seen from this statement, that in the construction of the line between Comber and Downpatrick, the company were authorized to cross three roads upon the level, and in the construction of the line only three roads have been crossed in that manner.

Unfortunately, however, a mistake has occurred in respect of those two roads in the Parish of Saintfield which lie within a few perches of each other, that is to say, No. 31 and No. 13.

A level crossing has been made at No. 13 instead of at No. 31, and a bridge has been built at No. 31, where the level crossing was authorized, instead of being built at No. 13, where the level crossing was reported against.

The directors of the company regret very much that this mistake should have happened, and they were not aware of it until these last few days. They can only repeat that it is an error quite unintentional, as they submit, appears from the above facts, and they trust that, under the circumstances, your Lordships will be disposed to deal with the matter as clemently towards the Company as is possible, consistent with former precedents and regulations of your Honourable Board, as the line is now nearly ready for opening.

The Company are prepared to give an undertaking under seal, or any other guarantee that your Lordships may require, to apply in the next session of Parliament to have the level crossing at No. 13 legalized, and failing that effort to carry the road No. 13 over the railway by a bridge within six months from receiving an order from your Lordships to erect such bridge.

Signed on behalf of the Belfast and County Down Railway Company.

T. WARD,  
Secretary.

London, August 16, 1858.

#### Belfast and County Down Railway.

*Secretary's Office, Belfast,*  
August 23, 1858.

SIR, IN consequence of Sir John MacNeill's report from London to this Board, the directors resolved to execute the necessary deed of covenant to the Board of Trade, as to the level crossing of the road No. 13, in the parish of Saintfield. And the deed having been executed this day accordingly, I beg leave to send it to you herewith, and will feel obliged by your acknowledging its receipt.

I have, &c.

THOS. WARD,  
Secretary.

Captain Galton, R.E.  
&c. &c.

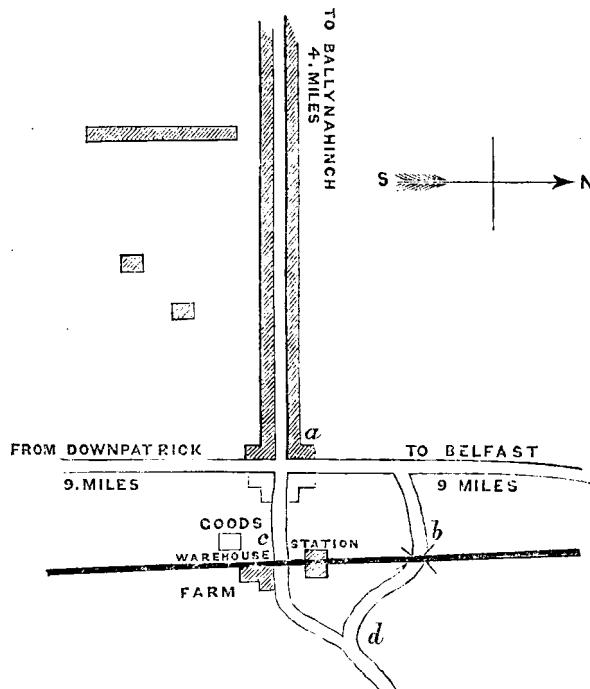
SIR,

Dublin, August 25, 1858.

I HAVE the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 21st instant, I have inspected the unauthorized level crossing No. 13, in the parish of Saintfield, on the line from Comber to Ballynahinch.

Saintfield is a town of about 1,000 inhabitants, having a weekly market, said to be very small, and a monthly fair, principally for horses, which, in some months, is largely attended.

From the eastern extremity of Saintfield four roads diverge at right angles to one another, three of them leading to towns of considerable size, and the others to an agri-



cultural district, in which the villages of Rillinsby and Carrickmannan are about four miles distant from Saintfield.

It is on this road, and adjacent to the new Saintfield station that the unauthorized level crossing is situated.

A bridge, referred to in the statement of the Belfast and County Down Railway Company, as having been built by mistake, is 417 yards from it, measured along the railway.

The roads from Saintfield, over the bridge and over the level crossing, unite at a point nearly 300 yards beyond the latter, the distance from Saintfield being about 1,200 yards over the bridge, and about 600 yards over the crossing, measured from the point *a* on the rough sketch here given, on which also *b* marks the bridge, *d* the junction of the two roads, *c* the level crossing; this last being about 230 yards from the nearest house in Saintfield.

There is a small valley between Saintfield and the level crossing, which latter is on a narrow ridge about 10 feet above the lowest part of the valley on the Saintfield side, where the road crosses it, and about 16 feet above the corresponding spot in the valley on the other side of the bridge.

The road has a fall from Saintfield of not less than 1 in 30, but being raised is about level across the bottom of the valley.

The fall beyond the level crossing is 1 in 12 $\frac{1}{2}$ , and the road is a little raised above this valley also. The opposite hill has a rise of 1 in 15.

The railway is horizontal for upwards of 100 yards on either side of the crossing, whence it ascends with a gradient of about 1 in 100 towards Belfast, and of about 1 in 200 towards Ballynahinch.

I do not, on inspection of the ground, consider that any difficulty, such as was apprehended, would occur in respect to drainage with an under-bridge.

With the gradient of the railway falling on either side to the station, it would be easy to raise the level of the rails near the crossing 4 or 5 feet, where the road from Saintfield could be led by an under-bridge to the lowest point of the road in the valley beyond the crossing; the only inconvenience being the existing levels of the station platform and of the goods warehouse, to which there would be a fall.

As regards an over-bridge, there is no special circumstance which would make the construction of it difficult, and the road being hilly the use of the bridge would be of the less consequence.

Sir John Mac Meill, the engineer of the line, estimates the expense of an overbridge at about 2,000*l.*, and of an under-bridge at about 1,600*l.*; the calculation being made, as he informed me, for three lines of railway, one of them being the communication to the goods warehouse, which, with an altered level of the rails, would have to extend beyond the position of the present level crossing.

The under-bridge would be most for the advantage of the public as regards the gradients of the road, and it appears that it would also be the least expensive to the company. I beg, therefore, to recommend that the bridge made should be an under-bridge, should their Lordships decide that one should be constructed at Saintfield.

I was accompanied on my inspection by the chairman and other gentlemen, directors of the company.

I was shown a copy of the guarantee which they told me they had submitted in regard to building a bridge, if required; and I was requested to draw attention to some circumstances which they thought might weigh with their Lordships, viz., that the level crossing is on a road, as they informed me, of comparatively little traffic; that the fairs and principal business of the town are carried on at the further extremity of it; that the principal proprietors in the neighbourhood and the people of the town rather prefer the level crossing; that the goods warehouse at the station is the place of most business, and on the Saintfield side of the crossing; and that the crossing is close to and protected by the station signals.

I have, &c.

Captain Galton, R.E.  
&c. &c.

GEORGE ROSS,  
Captain, R.E.

SIR,

Belfast, August 30, 1858.

I have the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that I have this day re-inspected the Belfast and County Down Railway from Comber to Ballynahinch.

The line is now sufficiently ballasted, the rock cuttings considerably widened, and the drainage of the cuttings in a satisfactory state.

The signals and distant signals and repeating signals, are fixed, and the turntable and buffers at Ballynahinch are complete. The alterations in the wrought iron bridge at Comber, have also been made as suggested by the inspecting officers.

I am therefore enabled to state, that I consider that this portion of line (from Comber to Ballynahinch) may be opened without danger to the public, when the question of

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the level crossing at Saintfield, now under their Lordship's consideration, shall have been decided.

I have, &c.

*Captain Galton, R.E.*  
&c. &c.

*GEORGE ROSS,  
Capt., R.E.*

*Railway Department, Board of Trade,  
Whitehall, September 8, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade, to inform you that my Lords do

not object to the opening of the Belfast and County Down Railway, between Comber and Ballynahinch, provided only one engine in steam be allowed upon it at one and the same time, but that opening is only allowed upon the condition that the company at once proceed to erect and complete as early as possible a bridge instead of the level crossing which has been constructed at Saintfield.

I am, &c.

*The Secretary,  
Belfast and County Down  
Railway Company.*

**DOUGLAS GALTON,  
Capt., R.E.**

**Dublin and  
Belfast Junc-  
tion Railway.**

### DUBLIN AND BELFAST JUNCTION RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, June 23, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Captain Tyler, R.E., of his inspection of the second lines of rails on the Dublin and Belfast Junction Railway, between Dunleer and Castle Bellingham, and between Mount Pleasant and Tonghill.

Upon consideration of that Report, my Lords direct the Dublin and Belfast Junction Railway Company to postpone the opening of the second lines of rails in question for the public conveyance of passengers for the period of one calendar month from this date.

*The Secretary to the  
Dublin and Belfast Junction  
Railway Company.*

I have, &c.  
**DOUGLAS GALTON,  
Captain, R.E.**

*Railway Department, Board of Trade,  
Whitehall, June 21, 1858.*

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 15th instant, I have inspected the second line of rails which has been laid on the Dublin and Belfast Junction Railway, between Dunleer and Castle Bellingham, and between Mount Pleasant and Tonghill.

These two portions of railway, the one to the north and the other to the south of Dundalk, are together about ten miles in length, and are laid with a substantial permanent way, similar to that on the line already opened.

In a wooden viaduct near Dunleer, over the White River, certain of the beams, which have been up nearly ten years, are in rather a bad state; and I have recommended that the bridge should be thoroughly re-examined, and that those portions which require it should be renewed.

The Dee masonry viaduct has signs of settlement in its abutments. It has now been standing for a great length of time, and appears to have undergone no material alteration for many years; and the same may be said of the Blackmill Bridge, and a farm pass at Foghill.

Distant signals are required at Dunleer, Castle Bellingham, and Mount Pleasant.

Some rock requires to be removed in two rock cuttings to the north of Mount Pleasant, in order that the sides of the cuttings may be at a safe distance from the sides of the carriages, and the ballasting north of Dundalk is not yet quite completed.

There are two iron lattice bridges south of Dundalk which are barely of sufficient strength, the middle girder of one of them being only of the same strength, though it is liable to support twice the weight of the outer ones. The outer girders are, however, stronger than is absolutely necessary, and I propose still further to test and consider the middle one.

On account of the requirements referred to in the above 3d, 5th, and 6th paragraphs, I beg to report my opinion, that these portions of railway cannot, by reason of the incompleteness of the works, be opened without danger to the public using the same.

*The Secretary,  
Railway Department,  
Board of Trade.*

I have, &c.  
**H. W. TYLER,  
Captain, R.E.**

*Railway Department, Board of Trade,  
Whitehall, July 1, 1858.*

SIR, WITH reference to my letter to you of the 23d ultimo, enclosing a copy of Captain Tyler's Report of his inspection of the second line of rails between Dunleer and Castle

Bellingham, and between Mount Pleasant and Tonghill, upon the Dublin and Belfast Junction Railway, I am directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of a further report of Captain Tyler, R.E., upon the portions of line in question.

I have, &c.

*The Secretary of the  
Dublin and Belfast Junction  
Railway Company.*

**DOUGLAS GALTON,  
Captain, R.E.**

SIR, *Dublin, June 24, 1858.*

WITH reference to my letter of the 21st instant, on the subject of the second line of rails which the Dublin and Belfast Junction Railway Company are seeking to open for public traffic, I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that I have further tested the iron bridge near Dunleer, and that I have further considered this bridge and that over the river Glyde.

These bridges are neither of them so strong as I should desire to see them, but I am of opinion that they may safely be used for public traffic, provided certain improvement which I have pointed out on the spot be made in the joints of the angle irons, of which the bottom flanges of the girders are composed; and I would suggest that similar improvements should be effected in those girders of these bridges which have already been for some years in use.

Their Lordships will probably have already directed the opening of the second line of rails on this railway to be postponed in consequence of my former letter, and I merely forward the present report as supplementary to that letter, in order to place on record the conclusions that I have arrived at in regard to the bridges referred to.

I have, &c.

*The Secretary,  
Railway Department,  
Board of Trade.*

**H. W. TYLER,  
Captain, R.E.**

*Railway Department, Board of Trade,  
Whitehall, July 20, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Colonel Yolland, R.E., the officer appointed by them to inspect the second line of rails on the Dublin and Belfast Junction Railway, between Mount Pleasant and Tonghill, and between Castle Bellingham and Dunleer.

Upon consideration of that report, my Lords direct the Dublin and Belfast Junction Railway Company to postpone the opening of the portion of the second line between a point 100 yards north of the White River bridge and Dunleer for the public conveyance of passengers for a period of one calendar month from this date.

My Lords do not object to the remaining portions being opened for public traffic.

I have, &c.

*The Secretary to the  
Dublin and Belfast Junction  
Railway Company.*

**DOUGLAS GALTON,  
Captain, R.E.**

*Railway Department, Board of Trade,  
Whitehall, July 20, 1858.*

SIR, IN compliance with the instructions contained in your letter of the 9th instant, I have inspected the portions of the Dublin and Belfast Junction Railway, between Mount Pleasant and Tonghill, and between Castle Bellingham and Dunleer, on which second lines of railway have been laid down, and which portions were recently inspected by Capt. Tyler, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the railway company propose to withdraw their second

notice of opening as regards the short portion of line between the wooden bridge over the White River and Dunleer, as they contemplate substituting an iron bridge instead of attempting to repair the wooden one adverted to by Captain Tyler; and the lattice bridge which Captain Tyler thought somewhat slight in respect of the middle girder occurs on this part of the line. I have further to state that when I made my inspection on the 16th instant, the whole of Captain Tyler's requirements had been complied with on the other parts of these lines, with the exception of the distant signals at the several stations, which, although on the ground and mostly erected, were not then in working order; and the lines were in very good order.

I am therefore of opinion that the second lines of rails on the under-mentioned portions of the Dublin and Belfast Junction Railway, viz., between Mount Pleasant and Tonghill, and between Castle Bellingham and a point 100 yards north of the bridge over the White River, may be opened for traffic as soon as the signals have been put into working order; but the portion between a point 100 yards north of the White River bridge and Dunleer, by reason of the in-

completeness of the works, cannot be opened for traffic without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c.

W. YOLLAND,  
Lieut.-Col., R.E.

Dublin and Belfast Junction Railway,  
Office, 73, Talbot Street, Dublin,

SIR, July 31, 1858.

REFERRING to the notice (some time since furnished to Board of Trade) of this Company's intention to open for traffic additional portions of second line of rails between Mount Pleasant and Tonghill, and Castle Bellingham and Dunleer, I am now directed to withdraw such notice so far as it relates to the portion of second line lying between Dunleer station and a point 100 yards north of White River bridge.

I am, &c.

Captain Galton, R.E.  
&c.

H. M. BOURNE,  
Secretary.

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No. 1.

INSPECTIONS.

Dublin and  
Belfast Junc-  
tion Railway.

### DUNDALK AND ENNISKILLEN RAILWAY.

Railway Department, Board of Trade,  
Whitehall, June 21, 1858.

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Captain Tyler, R.E., of his inspection of a portion of the extension of the Dundalk and Enniskillen Railway from Newbliss to Lisnaskea.

Upon consideration of that report, my Lords direct the Dundalk and Enniskillen Railway Company to postpone the opening of the portion of line in question for the public conveyance of passengers for the period of one calendar month from this date.

I am, &c.

The Secretary of the Dundalk and Enniskillen Railway Company. DOUGLAS GALTON,  
Captain, R.E.

Dundalk  
and Enniskillen  
Railway  
(Newbliss to  
Lisnaskea).

My Lords direct me to state that they will not object to the portion of line in question being opened for public traffic, provided that not more than one engine in steam, except when two coupled together are required for the same train, be permitted to be on the line between Clones and Newbliss, and between Clones and Lisnaskea.

I am, &c.

The Secretary of the Dundalk and Enniskillen Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

SIR,

Dublin, Saturday Night, June 19, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 15th instant, I have inspected a portion of the extension of the Dundalk and Enniskillen Railway, from Newbliss to Lisnaskea.

I propose to resume my inspection of this portion of railway, which I was unable to complete to-day, on Monday next, after I shall have inspected certain portions of the Dublin and Belfast Junction Railway; but I should not afterwards be able to communicate to you the result of that inspection in sufficient time to enable their Lordships to act upon it before the expiration of the ten days' notice which has been given by the Company; and I therefore write at once to report upon certain requirements which I have noticed in the portion between Newbliss and Clones, which I have this day inspected.

A considerable amount of additional fencing is required, and a good deal of extra spiking, to secure the rails to the sleepers; the flat-bottomed rails used, having been fastened, in places, by alternate spikes only, one on each side at every other sleeper, and those not passing through the lower web of the rail.

I have not yet received any certificate from the company as to the safe working of the single line.

On these accounts, I have the honour to report my opinion, that the opening of this extension of the Dundalk and Enniskillen Railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c. H. W. TYLER,  
Captain, R.E.

Extract.

Railway Department, Board of Trade,  
Whitehall, July 7, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed extract from the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Dundalk and Enniskillen Railway, between Newbliss and Lisnaskea.

SIR,

Dublin, June 24, 1858.

IN reference to my letter of the 19th instant, I have now the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that I continued on a part of Monday, and on Tuesday last, my inspection of the Dundalk and Enniskillen Railway, between Newbliss and Lisnaskea.

This portion of railway is about 15 miles long, and the works are of an important character. The line crosses several bogs, and one of them is one of the softest, probably, that is to be found anywhere, though it differs from the generality of bogs in being of a more spongy nature. There are also certain bog embankments. These portions of the line have been carefully drained, and the permanent way has been laid upon timber and brushwood, but they will require a great deal of attention, and they must be traversed at moderate speeds for some time to come.

The permanent way is laid partly with a bridge rail, similarly to other portions of the same railway, and partly

with a rail of the  section, upon transverse sleepers.

The latter rail weighs 74 lbs. to the yard, and is fished at the joints, with suspended wrought iron plates, and  $\frac{1}{2}$ " bolts. The sleepers are 3 feet apart on the average; but on the greater part of the line, except in the soft places, the spikes by which the rails are secured to them were only inserted originally on alternate sides at every other sleeper. The sleepers are grooved by machinery, to preserve the gauge; but I consider it very necessary in a case like the present, where the spikes do not pass through the holes in the bottom flange of the rail, but only fit into elliptical grooves cut out of the side of that flange, that there should be a spike on the outside of the rail in every sleeper. This measure has been at once carried into effect upon my suggestion, and I strongly recommend that spikes shall also be supplied in every sleeper on the inside of the rail, though I do not think it necessary to delay the opening of the line on that account.

The masonry appears to be standing well, with the exception of a flat elliptical arch, of 25' span on the square, and 26' 4" on the skew, over the Ballynure public road. The foundations of the abutments have so far settled as to occasion several openings in the masonry, and though it is stated to have been worked over by an engine for some four months without further alteration, it will require to be most carefully watched.

There are a great number of wrought iron lattice bridges and viaducts, supported, sometimes on masonry, sometimes on cast-iron columns, sometimes on wrought-iron standards. They are all of sufficient strength, the workmanship appears

Appendix  
No. 1.

## INSPECTIONS.

Dundalk and  
Enniskillen  
Railway  
(Newbliss to  
Lisnaskea.)

to be good, and they are very rigid. The girders vary in span from 25 to 60 feet, and in deflection, under the heaviest engines on the line, which give perhaps a ton to the lineal foot in weight, from  $\frac{1}{8}$  to  $\frac{1}{4}$  of an inch. The most remarkable of these works is a wrought iron arched lattice viaduct which has been erected as an ornamental work in front of a gentleman's house, through whose property the line passes. It is composed of eight openings, of 40' 4" each, in which the arched girders act as simple beams. They rest on cast iron columns, and are free to move at the two ends of the viaduct only. The greatest deflection of the arched girders was  $\frac{3}{16}$ ", and there was no perceptible movement at the ends, or longitudinally in the columns, when a train, consisting of three engines, with some carriages attached to them, passed over.

The spiking at the outside of the rail, and the fencing, were all but completed when I left the line; and I have since

heard from the engineer that they have been finished, as well as that a water crane and a level crossing gate, which were too near the rails, have been altered, as was agreed upon when I was on the spot. I now, therefore, beg to report my opinion, that this portion of railway may be opened without danger to the public using the same.

I beg to enclose a certificate in regard to the working of the single line, which is signed by the chairman, the Earl of Erne, and the secretary of the company, and which provides that there shall only be one engine (unless two are coupled together in one train), between Clones and Newbliss, or between Clones and Lisnaskea, at any one time.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
Captain, R.E.

East Somerset  
Railway.

Railway Department, Board of Trade,  
Whitehall, Oct. 30, 1858.

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the portion of the East Somerset Railway, between its junction with the Great Western Railway (Wilts, Somerset, and Weymouth Branch) at Witham Friary and Shepton Mallet.

Upon consideration of that report, my Lords direct the East Somerset Railway Company to postpone the opening of the line in question for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
East Somerset Railway Company.

JAMES BOOTH.

Railway Department, Board of Trade,  
Whitehall, Oct. 30, 1858.

SIR,

IN compliance with the instructions contained in your letter of the 22nd instant, I yesterday inspected the portion of the East Somerset Railway, between its junction with the Great Western Railway (Wilts, Somerset, and Weymouth Branch) at Witham Friary and Shepton Mallet, and I have the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that this line is single throughout, having sidings only at the extremities; but the land has been purchased and the over-bridges built for a double line, if a second line of rails should hereafter be required. Its length is 9 miles, and it is laid on the broad gauge of 7 feet in width.

The width of the line at formation level is 18' 6", and 19' 6" on embankments, and 19' in cuttings. The permanent way consists of a bridge rail, weighing 61 $\frac{1}{2}$  lbs. per yard, in lengths averaging 24 feet, laid on longitudinal sleepers 12" x 6", on stone formation, and 13 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " on clay, having transomes at 11 feet apart, with strap bolts; the rails being secured to the sleepers by  $\frac{3}{4}$  inch fang bolts. The ballast is of broken stone 1' 6" deep on stone formations, and 2 feet on clay.

The minimum space allowed between the sides of the largest carriages proposed to be used on the railway and any fixed work is 2 feet 7 $\frac{1}{4}$  inches at the level of their windows.

There are 19 bridges on the line, 11 under and 8 over, the whole of which, with the exception of one over bridge, are built of stone with lime mortar in a very substantial and satisfactory manner. The over bridge referred to is of wood, and is an occupation bridge a considerable height above the line.

There are no viaducts or tunnels, neither is there any unauthorized level crossing on the line.

A turntable has been erected at Shepton Mallet, but there is none at the junction at Witham Friary.

There are only two stations on the line; viz., at Cranmore and Shepton Mallet.

The line is in very good order, but in making my inspection I noticed the following:—Distant signals in both directions on the Wilts, Somerset, and Weymouth Branch are required at the junction at Witham Friary, and one is required at Shepton Mallet Station.

There is no lodge at the authorized level crossing. Gradient boards have not been put up. The end of the platform at Shepton Mallet to be ramped off.

There are two cuttings through clay which will require to be carefully looked after.

I understand that the line is to be worked by the Great Western Railway Company, but I am not in possession of

the regulations under which it is proposed to be worked. As it is a single line, and as it joins another single line at Witham Friary, unusual care will be required in framing the regulations, and if it is to be worked separately from the junction a turntable is required there, or the one put up at Shepton Mallet will be useless. If it is to be worked through to Frome, instead of changing carriages at Witham Friary, then, as there is a turntable at Frome, the one at Shepton Mallet will suffice.

As there are very heavy gradients on the line, and sharp S curves, without any intervening straight portions, I would recommend that the maximum speed should not be permitted to exceed 30 miles an hour.

From the absence of the undertaking showing the manner in which the line is to be worked, and the incompleteness of the works, I am of opinion that the opening of the East Somerset Railway for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lt.-Col. R.E.

## East Somerset Railway.

18, Duke Street, Westminster,  
November 8, 1858.

SIR,

ACCORDING to the requirements made by Colonel Yolland in his report upon this railway,—

I beg to report that a distant signal had been fixed at Shepton Mallet, that a lodge will be fixed at the level crossing before Monday next, and that the end of the platform at the Shepton Mallet station has been ramped off.

With respect to the working of the line, and the necessity for an engine turntable at Witham,—

I beg to enclose you an undertaking on the part the directors that the line shall be worked only by tank engines, by which is meant, that class of engines used by the Great Western Railway Company for short branches, and which work in either direction, and do not require turning, and in practice are not turned; all the branches on the Great Western Railway being so worked.

I beg to add, also, that the Great Western Railway Company, who are about to work the line, undertake to follow the usual rules adopted by them as previously approved by the Board of Trade for working a single line, namely, the having only one engine upon the line at any one time.

I trust, therefore, that I may assume that the prohibition to open is, on these conditions, withdrawn.

I have, &c.

Captain Galton, R.E.  
&c. &c.

I. K. BRUNEL.

(Enclosure.)

East Somerset Railway Company,  
Secretary's Office, Shepton Mallet,

November 4, 1858.

SIR,

REFERRED to Colonel Yolland's requirement in his report of the inspection of the line between Shepton Mallet and Witham, that an undertaking should be given showing the manner in which the line is to be worked; we beg to inform you that it is intended to work the line, so long as it shall remain single, with a tank engine, and not a tender, and in such a manner that but one engine, or two engines coupled together, shall be on the line at one and the same time.

We are, &c.

Captain Galton, R.E.  
&c. &c.

J. M. PAGET,  
Deputy Chairman.

GEORGE M. MACHEL,  
Secretary.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, November 13, 1858.*  
WITH reference to your letter of the 8th instant, remarking upon certain requirements of Lieut.-Col. Yolland, the officer appointed by this department to inspect that portion of the East Somerset Railway extending from Shepton Mallet to Witham Friary, I am directed by the Lords of the Committee of Privy Council for Trade to forward to you the enclosed copy of a letter their Lordships have received from Lieut.-Col. Yolland, and to request that you will favour their Lordships with any observations you may have to offer thereon.

I am, &c.  
DOUGLAS GALTON,  
*Capt., R.E.*  
I. K. BRUNEL, Esq.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, November 12, 1858.*  
WITH reference to Mr. Brunel's letter of the 8th instant, on the subject of the necessity of an engine turntable at Witham Friary for the proper working of the East Somerset Railway, I have the honour to state for the information of the Lords of the Committee of Privy Council for Trade, that all branches of the Great Western Railway with which I am acquainted, of any length, have turntables at the termini; and of those branches which I have inspected, I have, I think, been informed at the time that the branch would be worked in connexion with some station provided with an engine turntable, otherwise the erection of engine turntables at the termini without corresponding ones at the junctions would be an unnecessary expenditure of money.

I made inquiry, three days since, of an officer of the locomotive department of the Great Western Railway, and was told that it was the practice on that line to turn their tank engines, unless they were very much hurried, not on the ground of safety, but that the engines do their work so much better. No tank engines have, I believe, yet been constructed that have equal weights on the leading and trailing wheels when the boiler is full or empty, and with the full quantity of fuel, or without it; and I have been informed that the tank engines, constructed to run in either direction, on the East Kent Railway, and which are provided with bogie frames and rest on three points, are now turned in consequence of their getting off the line.

It will be for their Lordships to decide whether they will insist upon the erection of a turntable at Witham Friary, or to what extent they will abide by the practice which they have already followed in this respect; but the same rule must be followed on the narrow as on the broad gauge lines.

I have, &c.  
Captain Galton, R.E.  
&c. &c.  
W. YOLLAND,  
*Lt.-Col., R.E.*

SIR,  
*Duke Street, Westminster,  
November 22, 1858.*  
I BEG to make the following observations upon Col. Yolland's report to you of the 12th instant on the East Somerset Railway, a copy of which you were good enough to send me on the 13th.

First, as regards the working of the branches on the Great Western Railway, and the fact of their having large turntables at their termini, Colonel Yolland is mistaken; commencing from London,

The branches now open are,—

Uxbridge,  
Windsor,  
Wycombe,  
Henley,  
Abingdon, and

Devizes, on the Wilts and Somerset.

On none of these are the engines ever turned, and to none of them are there turntables at both termini or within any reasonable distance on the main line, except as regards the Wycombe branch, in which case there is a turntable capable of turning an engine, although inconvenient and never used for such purpose, within two miles of the point of junction.

In the case of the Uxbridge branch there is none at the junction or nearer than Paddington.

Of the Windsor, on which probably there is the largest and most important traffic of any of the Great Western Railway branches, there is none at Windsor.

The Wycombe branch I have already referred to.

Of the Henley branch there is none at the junction or within reach.

Of the Abingdon the same.  
Of the Devizes the same.

On the Torquay branch of the South Devon Railway, although there are turntables, the engine is never turned; and I believe it is the same on the Weston and Clevedon branches of the Bristol and Exeter Railway; it was so when I constructed them as their engineer.

It is therefore evident that the Great Western Railway Company, who are working the Shepton branch, have many engines adapted to run in either direction with safety; and this I beg to say is all that I represent, as I have no wish to offer any opinion as to the safety of engines, not expressly fitted for the work, running backward, or as to any general rule of dispensing with turntables; but in this case the Great Western Railway Company undertake to work the branch with engines so fitted, and they have considerable experience in such working, being, as I have above shown, in the constant practice of so working all their branches.

I am, &c.  
*Captain Galton, R.E.*  
&c. &c.  
I. K. BRUNEL.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, November 26, 1858.*

I RETURN Mr. Brunel's letter of the 22d instant, commenting upon my report of the 12th instant. I informed their Lordships, "that all branches of the Great Western Railway with which I am acquainted, of any length, have turntables at the termini," I did not say at the junctions; "and of those branches which I have inspected, I have, I think, been informed at the time that the branch would be worked in connexion with some station provided with an engine turntable." Also that I "was told that it was the practice on the Great Western Line to turn their tank engines, unless very much hurried, not on the ground of safety, but that the engines do their work so much better."

Mr. Brunel states that I am mistaken; it is quite possible, but it is necessary that I should mention for their Lordships' information, that I stated that the tank engines on the Great Western Railway were turned on the authority of Mr. D. Gooch's younger brother, who, I have met, as representing the locomotive department, at inquiries respecting accidents on that line, though I do not know the precise appointment which he holds.

With respect to the existence of turntables at the termini of the various branches, Mr. Brunel's letter confirms my statement. As I have already said, I made no mention of their existence at the junctions, and I should not have alluded to it in this instance, had not the superintendent of the western division of the Great Western Railway informed me, in reply to a question of mine, that he would not undertake to work all trains on the East Somerset Railway from Frome Station where there is an engine turntable.

I inspected the Henley and Devizes branches, and I think the whole of the Wilts, Somerset, and Weymouth section of the Great Western Railway. On the Henley branch, the engine turntable at Henley Station was not complete when I made the inspection, and their Lordships made it a condition that the branch, which is only 4 miles 46 chains in length, should be worked with a tank engine until the turntable was completed. On the Devizes branch there is a turntable at Devizes, and the impression is very strong on my mind that I was informed that the traffic was to be worked from a station on the main line furnished with a turntable.

I had not the pleasure of meeting Mr. Brunel at any of these inspections, neither do I know what passed with the inspecting officers and the officers of the Great Western Railway at the inspection of any of the other branches named in Mr. Brunel's letter.

As regards the Weston and Clevedon branches of the Bristol and Exeter Railway, the first is under two miles and the last only four miles in length, and neither fall within my description. On the Yeovil branch of the Bristol and Exeter Railway, 19 miles in length, I learnt that the eight-wheeled tank engine, which took the troop train from Yeovil to Exeter on the 19th October, was turned at Yeovil prior to starting, but I do not know whether this was the exception instead of the rule.

I cannot offer any opinion of the build of the Great Western tank engines, as I am not acquainted with the details of their construction or the disposal of the weights when loaded or empty, neither can I speak as to their liability to leave the rails when running in either direction, inasmuch as railway companies do not report all the accidents that occur to their engines or trains.

**Appendix  
No. 1.**  
**INSPECTIONS.**

**East Somerset  
Railway.**

But if Mr. Brunel is right in saying that their tank engines are never turned on the Great Western branches, and my informant was not correctly informed of the practice on such branches, I am the more surprised that an unnecessary heavy expenditure should be incurred for the erection of engine turntables at nearly all the termini of these branches. No object is gained by the erection of a single turntable, and no inspecting officer would ever think of stipulating for the erection of a single turntable on a branch line of railway intended to be worked distinct from a main line.

It will not, however, I think be disputed, that the probabilities of engines keeping to the rails are increased by having greater weight on the leading than on the trailing wheels. This is not provided for, at all times, and under all circumstances, when tank engines are not turned.

It will be for their Lordships to determine whether the inspecting officers shall, for the future, endeavour to secure for the public such works as will best provide for their safety in this respect, or if they shall cease to stipulate at all for the erection of engine turntables.

I am, &c.

**W. YOLLAND,  
Lieut.-Colonel, R.E.**

table at Witham Friary, should it be proved by experience to be necessary to have one at that place.

I am, &c.

**The Secretary of the  
East Somerset  
Railway Company.**

**DOUGLAS GALTON,  
Capt., R.E.**

**East Somerset Railway.**

**Secretary's Office, Shepton Mallet,  
December 16, 1858.**

SIR,

In reply to your letter of the 30th ultimo, I am instructed by the Directors of the East Somerset Railway Company to undertake that the Company shall put a turntable at Witham Friary, should it be found by experience to be necessary to have one at that place. An undertaking has already been given that not more than one engine, or two coupled together, be permitted to be on the line at the same time.

I shall be glad if you will, at your earliest convenience, forward me the authority of the Lords of the Committee of Privy Council for Trade, withdrawing their objections to the opening of the line.

I am, &c.

**Captain Galton, R.E.  
&c.**

**GEORGE M. MACHEL,  
Secretary.**

**Railway Department, Board of Trade,  
Whitehall, November 30, 1858.**

SIR, WITH reference to the correspondence which has taken place on the subject of the opening of the East Somerset Railway between Witham Friary and Shepton Mallet, I am directed by the Lords of the Committee of Privy Council for Trade to inform you that they will withdraw their objections to the opening of the line in question on the following conditions, viz.:—

That not more than one engine in steam, or two or more coupled together, but forming part of the same train, be permitted to be upon the line at one and the same time; and that the Company undertake to put a turn-

**Railway Department, Board of Trade,  
Whitehall, December 20, 1858.**

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 16th instant, giving an undertaking on the part of the Directors of the East Somerset Railway Company that they will erect a turntable at Witham Friary, should it be proved by experience to be necessary to have one there; and to inform you that my Lords no longer object to the line being opened for public traffic.

I am, &c.

**The Secretary of the  
East Somerset  
Railway Company.**

**DOUGLAS GALTON,  
Capt., R.E.**

**Epsom and  
Leatherhead  
Railway.**

### EPSOM AND LEATHERHEAD RAILWAY.

**Railway Department, Board of Trade,  
Whitehall, Dec. 23, 1858.**

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R.E., the officer appointed by them to inspect the Epsom and Leatherhead Railway.

Upon consideration of that report my Lords direct the Epsom and Leatherhead Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

**The Secretary of the  
Epsom and Leatherhead  
Railway Company.**

pleted some weeks, but horse power alone having been employed in their formation, further subsidence may be expected, and I should recommend no great speed to be maintained on them for some little time after the opening of the line.

The main signal at Epsom was not put up, and a cross-over road at Leatherhead was to be added, but these will be probably completed by to-morrow evening.

The bridges are nine in number, six over and under bridges being of brickwork in cement, two of cast-iron, which gave moderate deflections, and one (for a double line) has the roadway carried on two wrought iron plate girders with cast-iron tops. It is of 52' 6" span, and was tested with two engines, funnels together weighing about 60 tons on one line, and with a load of about 20 tons on the other line. The deflection of the most loaded girder was  $\frac{5}{16}$ ", which I consider satisfactory.

No turntable has been provided at Leatherhead. There are several projects before Parliament for prolonging the line to Dorking and Guildford, and I should have been disposed to consider Leatherhead a temporary and not a terminal station, but I was informed by an officer of the London, Brighton, and South Coast Railway Company, that they are not prepared to work the line from Epsom to Leatherhead with a tank engine, and under these circumstances a turntable cannot in my opinion be dispensed with.

The end of the London, Brighton, and South Coast Railway station at Epsom is closed by a galvanized iron shed, covering three sidings hitherto used for spare carriages.

One of these sidings has been prolonged to join the new single line to Leatherhead, and the rail of it through the shed is at a distance of only three feet from the wooden pillars supporting the shed.

Some of the carriages on the London, Brighton, and South Coast Railway are said to be eight feet in width, and I think that the interval of three feet is inadmissible even for their narrowest carriages, and that for carriages 8 feet in width an interval of not less than 4' 2" is necessary.

For these reasons it is my duty to report that the opening of the Epsom and Leatherhead Railway cannot in my

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 17th inst., I yesterday inspected the Epsom and Leatherhead Railway, in continuation of the London, Brighton, and South Coast Railway to Epsom.

This small portion of new line has been made by an independent company, but the London, Brighton, and South Coast Railway Company have agreed for the purchase of it. The line is single on land purchased for a double line throughout, with stations at Ashstead, 2 miles 20 chains, and at Leatherhead 3 miles 50 chains from Epsom.

The roadway is similar to that of the Portsmouth Railway, on which I lately reported to their Lordships, the same parties having been the promoters of both railways, and the same contractor employed under the engineer, who was also the resident engineer of the Portsmouth Railway.

There are some considerable clay embankments and cuttings near Epsom. The former are said to have been com-

opinion be sanctioned, without danger to the public using the same.

*Captain Galton, R.E.  
&c. &c.*

I have, &c.  
*GEORGE ROSS,  
Captain, R.E.*

they propose to work the single line between Epsom and Leatherhead on that principle.

I have, &c.  
*Captain Galton, R.E.  
&c. &c.*

*GEORGE ROSS,  
Captain, R.E.*

Appendix  
No. 1.

INSPECTIONS.

Epsom and  
Leatherhead  
Railway.

*Railway Department, Board of Trade,  
Whitehall, January 20, 1859.*

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, on my re-inspection this day of the Epsom and Leatherhead Railway, I found that the galvanized shed at Epsom had been removed, and that an engine turntable had been provided at Leatherhead station.

I see no reason, therefore, why their Lordships' sanction should not now be given to the opening of the line.

The London, Brighton, and South Coast Company, who, I understand, are to work the line, have the "train staff" system in operation on several of their branches, and I was informed by the Brighton Company's traffic manager that

*Railway Department, Board of Trade,  
Whitehall, January 31, 1859.*

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of a further report which they have received from Captain Ross, R.E., of his re-inspection of the Epsom and Leatherhead Railway.

My Lords direct me to inform you, that, having considered that report, they no longer object to the opening of the line in question, provided the line be worked in the manner there pointed out, or so that one engine only will be upon the line, or upon defined portions thereof, at one and the same time.

I am, &c.  
*The Secretary to the  
Epsom and Leatherhead  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

Fife and Kinross Railway  
(Strathmiglo and Milnethorp).

### FIFE AND KINROSS RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, March 6, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which their Lordships have received from Captain Tyler, R.E., of his inspection of the Fife and Kinross Railway between Strathmiglo and Milnethorp.

Upon consideration of that report, my Lords direct the Fife and Kinross Railway Company to postpone the opening of this portion of line for the public conveyance of passengers for the period of one calendar month from this date.

I am, &c.  
*The Secretary of the  
Fife and Kinross  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

works, be attended with danger to the public using the same.

I have the honour to enclose herewith, a certificate signed by the chairman and secretary, to the effect that only one engine, or two coupled together, will be allowed to be in steam upon the single line at one time.

I am, &c.  
*The Secretary,  
Railway Department,  
Board of Trade.*

*H. W. TYLER,  
Captain, R.E.*

**MEMORANDUM** in reply to CAPT. GALTON's Minute,  
No. 698, of 13th March 1858.

I ESTIMATE the ultimate strength of the weakest of the cast-iron girders under the line between Strathmiglo and Milnethorp at 40 tons in the centre, for spans of 15 $\frac{1}{2}$  and 15 $\frac{1}{2}$  feet, which gives a distributed breaking weight of 160 tons over each pair of girders.

Allowing three times the stationary load, in addition to six times the moving load, in the usual manner, as the amount to which the ultimate strength should be equal, these girders ought to carry safely a moving load of 25 tons.

But the Fife and Kinross Company work their own line with their own engines, which weigh only 18 tons.

Looking to the weight of the engines in general use in Scotland, I am of opinion that these girders are sufficiently strong, though I should not consider them so on some of the English lines, where much heavier engines are employed.

As the requirements referred to in my report of the 4th instant are now stated to be completed, I am of opinion that the Fife and Kinross Railway, between Strathmiglo and Milnethorp, may be opened without danger to the public using the same.

*H. W. TYLER,  
Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, March 23, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to inform you that they have received a further report from Captain Tyler, R.E., the officer appointed by them to inspect the portion of the Fife and Kinross Railway between Strathmiglo and Milnethorp, and to state that their Lordships will not object to the Line being opened for public traffic, provided that not more than one engine in steam be permitted to be on the portion of line in question at one and the same time, except when more may be required for the same train.

I am, &c.

*The Secretary of the  
Fife and Kinross  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

There are a considerable number of cast-iron girder bridges under the railway, of spans varying from 9' 2" to 15' 4", all of which are sufficiently strong for the engines in use upon the line, these engines weighing only 18 tons. The same may be said of two small under bridges, spanned by wrought iron girders; but of the bridges over the line, there is one, carrying a road over a little stream as well as over the railway, which the engineer has undertaken to strengthen. It is composed of cast-iron girders, on masonry abutments, 27 feet apart; and as the girders are 5' 6" asunder, and have each a calculated breaking weight in the centre of only 14 $\frac{1}{2}$  tons, I think it is desirable that cast-iron supports should be inserted under them, near their centre, which may be easily done. I see every reason to be satisfied with the remainder of the works.

With the exception of a couple of days work to the permanent way, and to the fencing near Milnethorp, which the contractor has been unable to execute in consequence of the recent unfavourable weather, the line is in a very complete state; but pending the completion of these requirements, I beg to report my opinion, that the opening of this portion of railway would, by reason of the incompleteness of the

Appendix  
No. 1.

INSPECTION.  
Fife and Kinross Railway  
(Milnethorp to Kinross.)

*Railway Department, Board of Trade,  
Whitehall, S.W., August 16, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Fife and Kinross Railway, between Milnethorp and the temporary station near Kinross.

Upon consideration of that report, my Lords direct the Fife and Kinross Railway Company to postpone the opening of the portion of line in question for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
Fife and Kinross  
Railway Company.

DOUGLAS GALTON,  
*Captain, R.E.*

SIR, *Perth, August 13, 1858.*  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 10th instant, I have inspected the portion of the Fife and Kinross Railway lying between Milnethorp and the temporary station that has been erected near Kinross.

This portion is a little more than a mile in length. The permanent way consists of a single line of rails similarly laid to that which is already in use, and containing the same defect, namely, the want of a better means for securing the joints of the rails.

There are two bridges over the line, constructed with cast-iron girders on masonry abutments; and there is one bridge which carries the railway over the river Queich, consisting of wrought-iron girders, also supported on masonry. The former are sufficiently substantial; the latter girders require to have some covering plates added to them, and they will then be of ample strength.

The line is complete in other respects, with the exception of a clock, which has not yet been fixed at the Kinross station.

The required covering plates on the wrought-iron girders, and this clock, may be supplied within a very few days, and I have requested that their Lordships may be informed when this has been done, which will probably be before they will consider it necessary to postpone the opening of the line, as the first notice given by the company was not received until the 20th July last.

In the meantime, however, in order that their Lordships may act as they think proper, I beg to report that, by reason of the incompleteness of the works, the opening of this portion of the Fife and Kinross Railway, would, in my opinion, be attended with danger to the public using the same.

I beg to enclose a certificate, signed by the deputy chairman and secretary of the company, to the effect that there shall never be more than either one engine in steam, or else two coupled together in one train, upon the Fife and Kinross Railway at any one time.

I have, &c.

The Secretary,  
Railway Department,  
Board of Trade.

H. W. TYLER,

*Capt. R.E.*

SIR, *Fife and Kinross Railway Company,  
Secretary's Office, 10, Northumberland Street,  
Edinburgh, August 16, 1858.*

At the inspection by Captain Tyler of the additional portion of this line between Milnethorp and Kinross on Friday last, he pointed out certain alterations which required to be made upon the bridge over the North Queich, and mentioned that upon our communicating to you that these alterations had been completed, you would give the company the sanction of the Board of Trade to the opening of said additional portion. We beg accordingly now to acquaint you that the beams of the bridge over the said North Queich have been strengthened by having covering plates riveted over the joinings. And also that a clock has been furnished to the Kinross station. And we beg to enclose a certificate by the company's engineer to this effect.

Having now made the alterations pointed out by Captain Tyler, we hope that you will have the goodness to send us

the Board's sanction to the opening of said portion of line on Friday next, the day when we mentioned in our last notice that it would be ready for the conveyance of passengers.

We have, &c.

Captain Galton, R.E.  
&c. &c.

LINDSAY & PATERSON,  
*Secretaries.*

*Fife and Kinross Railway, Edinburgh,  
August 16, 1858.*

I HEREBY certify that in terms of Captain Tyler's instructions, the beams of the bridge over the North Queich have been strengthened by having covering plates riveted over the joinings, and that a clock has been furnished to the Kinross station.

JAS. W. STEWART,  
*Engineer.*

*King's Walden, Hitchin,*

*August 24, 1858.*

SIR, I BEG to return herewith, the letter of the secretaries to the Fife and Kinross Railway Company, dated the 16th instant, which was forwarded to me this morning with your minute of the 20th instant.

I observe by that letter that the requirements referred to in my report upon the portion of line, about a mile long, which extends between Milnethorp and Kinross, have been completed. It will remain with their Lordships to order a re-inspection of the line, or not, as they may consider expedient; but this appears to me to be a case in which a re-inspection would not probably be necessary, and in which the certificate of the engineer may reasonably be taken, as to the fixing of the requisite covering plates on the wrought-iron girders carrying the railway over the River Queich, and the clock at the Kinross station.

The covering plates to which I have referred were not considered necessary by the engineer of the line, on account of the strength of the girders and the manner in which the plates were disposed; but I thought it desirable that they should be added at the joints of the plates, and at those of the angle irons, and the more so because one of the beams had been fixed upside down by a mistake, and the angle irons had been imperfectly welded together longitudinally. In the beam which had been placed with the right side uppermost, the lower web was constructed with a plate extending from one end to the other of the girder without a joint.

I beg to enclose the drawings of the girders which were supplied by the engineer of the company with the details of the line, and

I have, &c.

The Secretary,  
Railway Department,  
Board of Trade.

H. W. TYLER,  
*Capt., R.E.*

P.S.—I would add, that the secretaries do not properly represent in their letter of the 16th instant anything that I stated in reference to the opening of the line, when they say that Captain Tyler "mentioned, that upon our communicating to you that these alterations had been completed "you would give the company the sanction of the Board of Trade to the opening of said additional portion." If I had made any such promise on their Lordships' behalf I should have been justly blameable.

SIR, *Railway Department, Board of Trade,  
Whitehall, September 1, 1858.*

WITH reference to your letter of the 16th ultimo, relative to the proposed opening of the Fife and Kinross Railway between Milnethorp and the temporary station near Kinross, I am directed by the Lords of the Committee of Privy Council for Trade to state that they will not object to the opening thereof provided that not more than one engine in steam, or two or more coupled together, but forming part of the same train, be permitted to be upon the line in question at one and the same time.

I am, &c.

The Secretary of the  
Fife and Kinross  
Railway Company.

DOUGLAS GALTON,  
*Captain, R.E.*

## GLASGOW, DUMBARTON, AND HELENSBURGH RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, May 15, 1858.*

SIR, I HAVE been directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the report which they have received from their inspecting officer of his inspection of the Glasgow, Dumbarton, and Helensburgh Railway, from Cowlairs to Bowling, and from Dalreoch to Helensburgh.

Upon consideration of that report my Lords direct the opening of these portions of railway to be postponed for a period of one calendar month from this date.

I am, &c.

The Secretary of the DOUGLAS GALTON,  
Glasgow, Dumbarton, and Captain, R.E.  
Helensburgh Railway Company.

SIR, Glasgow, May 13, 1858.

I HAVE the honour to acquaint you that in compliance with the orders of the Lords of the Committee of Privy Council for Trade, conveyed to me in your letter of the 10th instant, I have this day inspected the Glasgow, Dumbarton, and Helensburgh Railway from Cowlairs to Bowling (10 miles 43 chains), and from Dalreoch to Helensburgh (7 miles 63 chains), the latter station being the terminus of the now through line from Glasgow to Helensburgh.

This line runs for about the first mile and a half from Glasgow, on the main line of the Edinburgh and Glasgow Railway to the Light Hill Junction. Thence by the new double line from Light Hill Junction (or Cowlairs) to Bowling. At Bowling it joins on to the double line of the Caledonian and Dumbartonshire Junction Railway Company, on which it runs to Dalreoch about  $3\frac{3}{4}$  miles, and from Dalreoch to Helensburgh it is carried by a new single line.

I understand that little goods or mineral traffic is expected, the company having been formed in a great measure by the resident gentlemen in the direction of Helensburgh, who are large shareholders, and that it will be mainly dependent on the summer passenger traffic between Glasgow and the sea-side place of Helensburgh.

It is to be worked entirely by the Edinburgh and Glasgow Company, who are to appoint the officers and servants, and to have the control of the stations upon it; and the mutual arrangements between these companies and the Caledonian and Dumbartonshire Junction Railway Company are regulated by a "Joint Committee of Management," under the Glasgow, Dumbarton, and Helensburgh Railway Act of 1855.

At the Light Hill Junction of the Edinburgh and Glasgow line several lines unite. It is 600 yards from the ticket station at Bowling, at which all trains stop, and being effectually covered in every direction, by main and distant signals, worked from a box, the traffic will, I consider, with proper care and attention, continue to be safely conducted.

From Light Hill Junction the gradient of the new line is generally a descending one, the whole way to Bowling.

There are 16 over bridges and 16 under bridges on this section of the line. Of the latter, one is a timber bridge, eight are cast-iron girder bridges, which are amply strong both by calculation and deflection; the rest, and most of the over bridges, two viaducts and the culverts, are very substantial structures of brick and stone. One of the viaducts, at 2 miles 54 chains from Light Hill station, is a considerable work 180 yards along.

The Forth and Clyde Canal is carried over the railway by an aqueduct of two spans, each 14 feet in width, which is well executed.

The permanent way is laid with transverse sleepers, and is of a very light description, the central intervals of the sleepers being only three feet six inches or three feet eight inches at the joints, and four feet four inches at the intermediate spaces. The rail is double headed, weighing 75 lbs. to the lineal yard, and in bars 16 and 20 feet long. The joint chairs weigh 26 lbs. and the intermediate chairs 21 lbs.

A similar distance between the sleepers is in use on many of the earlier formed Scotch lines, and among others the way was so laid about seven years ago, on the Caledonian and Dumbartonshire Junction Railway.

I walked along that line for some distance, and finding it still in fair working order, I am not disposed to make any objection to a similar roadway in this instance, considering the light traffic for which it is designed, but I would call attention to the necessity of watchfulness on the part of the company working the line, in regard to

the security of the spikes of the chairs on the sleepers a the curves, which in two instances are of only 30 chains radius, and in only one case, of a greater radius than 100 chains.

The ballast is of sufficient depth, and generally of good description, though I had occasion to point out some improvement in this respect which I considered should be effected for a distance of  $1\frac{1}{2}$  miles from the Light Hill Junction.

The embankments and cuttings seem secure. I observed on one spot on an embankment, at 5 miles 35 chains from Light Hill Junction, that some failure had occurred, and I was informed that it continued to be carefully watched, but that little settlement had taken place for some months.

A contractor's shed in too close proximity to the line should be removed.

The only level crossing at 7 miles 44 chains is authorized. It is protected by a signal, and has lodge and gates across road and railway.

The stations are three in number on this section of the line, viz. :—

	m. ch.
Mary Hill	- 2 50 from Light Hill Junction.
Dalmuir	- 7 70
Old Kilpatrick	9 25

They have good station buildings provided on the up line, but being small country villages, it had not been considered requisite to erect covering sheds for passengers on the down line.

The usually rapid development of passenger traffic near a large city makes it, in my opinion, expedient that every accommodation should be provided at stations no further removed than these are from Glasgow; and the engineer of the line undertook that they should at once be proceeded with.

The clocks were being put up at the stations, and a railing on the long viaduct nearly completed.

The station signals and distant signals were as well placed as the nature of the curves would admit; and one or two trifling alterations which I thought expedient were directed to be carried into effect.

I consider it my duty, in closing my report upon this section of the line, to suggest that the particular attention of the gentlemen composing the "Joint Committee of Management" should be drawn to the nature of the gradients by which the stations are approached on the down line.

The difference of level between Light Hill Junction and Bowing is about 180 feet in  $10\frac{1}{2}$  miles.

The down line approaches the stations at the following descending gradients:—

Mary Hill	- - 1 in 200 to within about 90 yards of the station, which is level.
Dalmuir	- - 1 in 346 to about 350 yards ditto.
Old Kilpatrick	- 1 in 100 " 150 "
Bowling Junction	1 in 116.

This last spot being at the foot of a continued steep descent of  $1\frac{1}{4}$  miles, with a siding to the canal, and from the nature of the curve by which it is approached, in a hazardous condition.

The Joint Committee of Management are required by the Act to regulate the hours of arrival and departure of the trains, the number and speed of such trains, and the number and description of the carriages, trucks, and waggons to be run in each train; and it is apparent, from the nature of the gradients, that to obviate the contingencies of mistakes and neglect, much of the safety of the working will depend upon the efficiency of the brake power supplied to each train, and upon strict regulations as to speed; and that the more critical points on the line, including the Bowing Junction, and the 30 chain curves, should be passed with the utmost caution.

On the Caledonian and Dumbartonshire line there was no station signal at Bowing. The traffic has been safely worked without it, but I was informed that the Company would willingly add one; and I think it desirable to have a station signal there, as elsewhere on the line from Glasgow to Helensburgh.

As regards the single line from Dalreoch to Helensburgh, it is proposed that all trains should proceed THROUGH from Glasgow to Helensburgh, turntables being provided at the latter place and at Cowlairs.

The junction at Dalreoch is in a contracted position, from its proximity to a deep cutting through the sandstone rock, which forms, for a distance of 300 yards on a curve, the entrance to a tunnel 750 yards in length on the Helensburgh line.

Appendix  
No. 1.

## INSPECTIONS.

Glasgow, Dumbarton, and Helensburgh, Railway.

The precautions taken for securing the junction by junction and distant signals in each direction, worked from a box, seem well considered.

Down trains are under the eye of the signal-man for nearly the whole distance from Dumbarton Junction.

*Every down train* is to stop at that place, which is  $\frac{1}{4}$  of a mile from the entrance of the Dalreoch Junction tunnel, and with a strict adherence to this rule in regard to all goods, as well as passenger down trains, for the Helensburgh line (with the junction signal constantly at "danger," except when they are to enter the line), and under the guarantee which I enclose, that "only one engine in steam, or two or more coupled together, and forming part of the train, shall ever be upon the single line at one and the same time," there seems no reason to doubt that the traffic should be safely conducted.

The tunnel is formed in the old sandstone rock, and is not lined with brickwork. It is protected by a signal-man at either end, and I requested that an auxiliary signal should be erected towards Helensburgh, the exit of the tunnel in that direction being in a cutting with a curve.

The remaining works on this section of the line are comparatively unimportant, the railway running nearly on a level close to the shore of the bay.

The line is on land purchased for a double line, and the over bridges are constructed with that view.

The only important deviation on plan was made at the request of the proprietor.

The two level crossings are authorized and duly protected with signals and gates.

The only station on this section of the line is Cardross, 3 miles 15 chains from Dalreoch Junction, and was complete, as was also the terminal station at Helensburgh, with the exception of the turntable and ticket collector's platform at the latter station, both of which were in progress.

The sidings are few, but I drew attention to the want of chock blocks on both lines; and the points at Old Kilpatrick siding and at Bowling Junction should be kept locked.

It is not intended to have at present more than six passenger trains in each direction between Glasgow and Helensburgh, and no goods traffic will be carried for some weeks.

Preparations are in progress for a line of telegraph from Glasgow to Helensburgh, and it is very desirable that it should be pushed on to completion.

With such limited traffic, and with the precautions which I have suggested, I see no objection to the line being opened at once; and I have reason to believe that the deficiencies to which I have alluded will be duly supplied in the course of a few days, but until I receive an assurance that they are made good, it is my duty to report that the opening of the Glasgow, Dumbarton, and Helensburgh Railway would be attended with danger to the public using the same by reason of the incompleteness of the works.

I have &c.

*The Secretary of the Glasgow, Dumbarton, and Helensburgh Railway Company.*

—

(Enclosure.)

Glasgow, Dumbarton, and Helensburgh Railway.

*Secretary's Office, 83, George Place, Glasgow, May 13, 1858.*

We, as chairman and secretary of the Glasgow, Dumbarton, and Helensburgh Railway Company, hereby undertake that the single line between Dalreoch and Helensburgh shall be worked in such a manner that only one engine in steam, or two or more coupled together, and forming part of the train, shall ever be upon the single line at one and the same time.

*The Lords of the Committee of Privy Council for Trade.*

*COLIN CAMPBELL, Jun., Chairman.*

*JAMES KEYDEN, Secretary.*

Glasgow, Dumbarton, and Helensburgh Railway.

*Secretary's Office, George Place, Glasgow, May 20, 1858.*

SIR,

REFERRING to my letter of yesterday, I beg to enclose certificate by Mr. Robson, engineer of this company, as to the execution of the works required in Captain Ross's report, and I am desired to say that the directors trust their Lordships will now see cause to sanction the immediate opening of the line.

I have, &c.

*Captain Galton, R.E.*

*&c. &c.*

*JAMES KEYDEN,*

*Secretary.*

Glasgow, Dumbarton, and Helensburgh Railway.

*95, Wellington Street, Glasgow, May 20, 1858.*

SIR,

I HAVE now to report, for the information of the directors, that the additional signals and other deficiencies pointed out by Captain Ross, R.E., while going over the line on the 13th, as well as those mentioned in his report received on the 17th instant, are now all completed, with the exception of the additional waiting sheds for Maryhill, Dalmuir, and Old Kilpatrick stations. These sheds are in progress, and will be completed as soon as possible.

I am, &c.

*James Keyden, Esq.*

*NEIL ROBSON,*

*Engineer.*

*Railway Department, Board of Trade, Whitehall, May 22, 1858.*

SIR,

I BEG to return the letter of the Secretary of the Glasgow, Dumbarton, and Helensburgh Railway, with its enclosure, from the engineer of that railway, referred to me by your minute of this day's date, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that as the waiting sheds for Maryhill, Dalmuir, and Old Kilpatrick stations are in progress, and as the other deficiencies noticed in my inspection of the line are all completed, I am of opinion that the Glasgow, Dumbarton, and Helensburgh Railway may now be opened without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.*

*&c. &c.*

*GEORGE ROSS,*

*Captain, R.E.*

*Railway Department, Board of Trade, Whitehall, May 25, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to inform you that they have received a further report from Captain Ross, R.E., the officer appointed by them to inspect the Glasgow, Dumbarton, and Helensburgh Railway, from Cowlairs to Bowling, and from Dalreoch to Helensburgh, and to state that they will not object to these portions of the railway being opened for public traffic, provided that not more than one engine in steam, or two or more coupled together and forming part of one train, be permitted to be upon the single line, as stipulated, at one and the same time.

I am, &c.

*The Secretary of the*

*Glasgow, Dumbarton, and*

*Helensburgh Railway Company.*

*DOUGLAS GALTON,*

*Captain, R.E.*

Hertford and Welwyn Junction Railway.

## HERTFORD AND WELWYN JUNCTION RAILWAY.

*Railway Department, Board of Trade, Whitehall, February 17, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of a report made by Lieut.-Col. Yolland, R.E., the officer appointed by their Lordships to inspect the Hertford and Welwyn Junction Railway.

Upon consideration of that report, my Lords direct the Hertford and Welwyn Junction Railway Company to post-

pone the opening of the line in question, for the public conveyance of passengers, for the period of one calendar month from this date.

I am, &c.

*The Secretary to the*

*Hertford and Welwyn*

*Junction Railway Company.*

*DOUGLAS GALTON,*

*Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, February 16, 1858.*

SIR,  
In compliance with the instructions contained in your letter of the 2nd, and memorandum of the 10th instant, I yesterday inspected the Hertford and Welwyn Junction Railway, and I have the honour to report, for the information of the Lords of the Committee of Privy Council of Trade, that this line, which is single throughout, on the 4 feet 8½ inch gauge, commences at a junction with the Great Northern Railway, near Welwyn, and ends at a junction with the Eastern Counties Railway at Hertford, the length being 7 miles and 30 chains. The land has been purchased and the over bridges have been constructed for a double line, if hereafter required.

The width of the line at formation level, both in cuttings and on embankments, is 18 feet. The permanent way consists of T rails, weighing 65 lbs. per linear yard, in lengths of 21 feet, fixed in cast-iron chairs, weighing 22 lbs., by oak keys; the joints are fished with wrought-iron plates, weighing 28 lbs. for each joint, and secured together by four bolts.

The chairs are fastened down on transverse sleepers of larch or Memel creosoted, by means of two 5-inch wrought-iron spikes. The sleepers are 9 feet long, by 10 × 5, half round, and laid 3 feet apart at the joints, and 4 feet 6 inches between the intermediates. It is contended that the form of the rail makes this road as good as the ordinary 75 lbs. rail laid on sleepers placed 3 feet 6 inches apart. I should very much prefer the latter.

The ballast is of gravel and sand, and it is stated to be 2 feet deep.

There are six over and nine under bridges, in addition to two footpath bridges carried over the line. Of the over bridges, two are built entirely of brick, and three consist of brick abutments, &c., and cast-iron girders; the sixth consists of five arches, one of which is spanned by cast-iron girder. Of the under bridges six are of brick, and two are constructed with brick abutments and wrought-iron girders; one has brick abutments and cast-iron girders, and the girders of a bridge over a cattle creep are formed of three rails bolted together. The greatest span of the over bridges is 28 feet on the square, and the greatest span of the under bridges, one with wrought-iron girders, is 42 feet on the skew.

The whole are well constructed and sufficiently strong, with the exception of that over the cattle creep of 10 feet span, which exhibited a deflection of  $\frac{1}{8}$  inch.

There are four wooden viaducts on the line, they are well constructed and sufficiently strong, but having been erected for a considerable time they require to be carefully looked over and wedged up, and the nuts on the bolts screwed up.

The line is in fair order, but will require to be looked after when traffic is worked over it.

There are no unauthorized level crossings on the line; seven were authorized by Parliament, but only four have been made. There are slight deviations beyond the limits, with the sanction of the proprietors of the adjoining land. There is at the present time only one station on the line; viz., at Hertford, but there is a platform provided at the Welwyn Junction.

In going over the line I noticed that the gates at three of the level crossings, and the goods warehouse at Hertford were far too close to the line. The end of a coal drop on the Eastern Counties Railway at Hertford abuts on the line, and at present there is nothing to prevent waggons projecting over this railway. No turntables have been provided at either extremity of the line. The rolling stock is to be provided jointly by the Great Northern and Eastern Counties Railways; the latter company has a turntable at Hertford, and it will be necessary that provision should be made in some way or other to prevent the necessity for running with the tender foremost when the line is opened.

I am, therefore, of opinion that, by reason of the incompleteness of the works, the opening of the Hertford and Welwyn Junction Railway for traffic cannot be sanctioned, without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lt.-Col., R.E.

SIR,

*Curzon Street, February 25, 1858.*

I HAVE the honour to state, that in consequence of representations made by Colonel Yolland, the Hertford and Welwyn Railway Company, of which I am chairman, offer a pledge that the line shall be so worked that not more than one engine with the steam up shall be in use at the same time on either of the two sections into which the line is divided, one section extending from the junction with the Eastern Counties Railway and the Hertford Station; the

other from the Hertford Station to the junction with the Great Northern Railway. We also undertake, in connexion with the Eastern Counties Company and the Great Northern Company, who have agreed to provide locomotive power, that the passenger trains shall be worked solely by tank engines, suitable for running fore and aft, until a turntable be placed at the junction with the Great Northern Railway.

I have, &c.

Captain Galton, R.E.

&c. &c.

W. COWPER.

Appendix  
No 1.

INSPECTIONS.

Hertford and  
Welwyn June  
tion Railway.

*Hertford and Welwyn Junction Railway Company.*

MY LORDS,

*Hertford, February 25, 1858.*

LIEUTENANT-COLONEL YOLLAND, R.E., the officer appointed by your Lordships to inspect this line of railway prior to its being opened for the public conveyance of passengers, having reported to your Lordships that—

“No turntables have been provided at either extremity of the line; the rolling stock is to be provided jointly by the Great Northern and Eastern Counties Railways; the latter company has a turntable at Hertford, and it will be necessary that provision should be made in some way or other to prevent the necessity for running with the tender foremost when the line is opened.”—

We, the undersigned, Chairman and Secretary of the above-mentioned company, have the honour to inform your Lordships that the line will be worked with suitable tank engines until turntables are provided for the use of the company; and we undertake that no returning engine shall travel tender foremost on the line; and whereas this railway is constructed as a single line only, we also undertake that it shall be worked in such a manner that only one engine in steam shall ever be upon the single line at one and the same time.

We have, &c.

W. COWPER,

Chairman.

To the Lords of the

Committee of Privy

JNO. MARCHANT, jun.,

Council for Trade.

Secretary.

*Railway Department, Board of Trade,  
Whitehall, March 1, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the Hertford and Welwyn Junction Railway.

My Lords direct me to state that they do not object to the line being opened for public traffic, on the understanding that a turntable or a triangular line at the junction with the Great Northern Railway shall be constructed within six months, and provided that not more than one engine in steam be allowed at one and the same time on either of the two sections into which the line is divided (except when more may be required for one train), and that the speed of passenger trains shall not exceed twenty miles an hour.

I am, &c.

The Secretary of the

Hertford and Welwyn

DOUGLAS GALTON,

Captain, R.E.

Junction Railway Company.

*Railway Department, Board of Trade,  
Whitehall, February 27, 1858.*

SIR,  
In compliance with the instructions contained in your letter of the 26th instant, I have this day re-inspected the Hertford and Welwyn Junction Railway; and I have the honour to report that the requirements detailed in my report of the 16th instant have now all been fully complied with, excepting that relating to the erection of a turntable at Welwyn Junction.

The Hertford and Welwyn Junction Railway Company have already informed you that the passenger traffic shall be exclusively worked by tank engines “suitable for running ‘fore and aft,’ until a turntable be placed at the junction with the Great Northern Railway; and I now beg to enclose a letter from the chairman of the company, the Hon. W. Cowper, engaging to provide within a period of six months either a turntable or a triangular line at the junction with the Great Northern Railway, to enable the engine to be turned.

I was also informed that the turntable belonging to the Eastern Counties Railway at Hertford was available for turning the engines working the Hertford and Welwyn traffic.

The Chairman and Secretary of the Company have also forwarded to you an undertaking that not more than one

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engine in steam shall be in use at the same time on either of the two sections into which the line is divided.

I am therefore of opinion, that their Lordships' sanction for opening the Hertford and Welwyn Junction Railway to public traffic may now be given; but in consequence of the sharp curves occurring on the line, I beg to recommend that the speed should not exceed 20 miles an hour.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*W. YOLLAND,  
Lieut.-Col., R.E.*

SIR,

*Hertford, February 27, 1858.*

I AM authorized by the Directors of the Hertford and Welwyn Company to assure you that within a period of six months they will provide at the junction with the Great Northern Railway either a turntable or else a triangular line, by means of which the engine may be rapidly turned round before it returns to Hertford.

I have, &c.

*Lieut.-Col. Yolland.*

*W. COWPER.*

**Inverness and  
Aberdeen  
Junction Rail-  
way (Elgin  
to Keith).**

### INVERNESS AND ABERDEEN JUNCTION RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, July 1, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the portion of the Inverness and Aberdeen Junction Railway extending from Elgin to Keith.

Upon consideration of that report, my Lords direct the Inverness and Aberdeen Junction Railway Company to postpone the opening of the portion of railway in question for the public conveyance of passengers for a period of one calendar month from this date.

I am, &c.

*The Secretary of the  
Inverness and Aberdeen  
Junction Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

SIR, *Aberdeen, June 28, 1858.*

I HAVE the honour to acquaint you, for the information of the Lords of the Committee of Privy Council for Trade, that on the receipt of your letter of the 24th instant, I wrote to the secretary of the Inverness and Aberdeen Junction Railway, naming Wednesday, the 30th instant, as the day for inspecting the portion of the line between Elgin and Keith; but in consequence of your instructions of the 25th to proceed to Scotland at once, on my arrival at Perth on the 26th I wrote to the secretary, requesting that an engine might meet me at Keith at 11 A.M. this day, or six days after the date of the Company's second or ten days' notice.

On my arrival at Keith no engine had arrived from Elgin; and after waiting about an hour, I walked eight miles down the line to the bridge over the Spey, and saw that the state of the line was not such as to admit of an engine passing along it. On my return towards Keith, at about a quarter past five o'clock, I met a messenger with note No. 1 from the secretary and general manager of the line; and on my arrival at Keith I received note No. 2, just before starting for Aberdeen, requesting me to make arrangements for going over the line on Wednesday, as I had first proposed when writing from London on the 24th instant.

I considered that it would be useless to comply with this request, as the state of the line was not such as, by every exertion on the part of the contractors, could be brought into proper order by that day.

I have not received any details of the line, nor any drawings of the bridges; but the following are among the requirements which must be attended to between Keith and the Spey before the line can be opened:—

Platform incomplete at Keith, and the line is single, so that, unless by passing on to the Great North of Scotland line, there is no means by which the engine can pass from the front to the rear of the train. Proper arrangements should be made for doing this, independent of the Great North of Scotland line. The signal should be worked from the station, not from a point a quarter of a mile from it; and the engine shed has been so placed as to entirely obstruct the view, and to render the line crooked. No turntable has been erected. The platform and rails on a small under bridge near Keith are not properly laid down. There is a curious specimen of an under bridge a short distance further on; the span is about 30 feet on the skew, but the cast-iron girders are cast in two parts, and bolted together at the centre, and appear to be too short for the span. It is a very unusual construction, but I have no details of its section, and if it exhibit a large deflection when tested hereafter, I shall be obliged to reject it. I do not say it is too weak, because I know nothing about its actual strength, but I do say it is very unusual.

There is one over bridge erected across the line without any approaches at all to it, as if it were put up as a triumphal arch; and there are several where the approaches are incomplete.

One of the under bridges has one of its piers yet remaining to be built.

The line passes for some distance over peat moss. In some places along this moss the ballast under the sleepers appears to be very thin, and in some of the cuttings there are parts where the rails were laid in a temporary manner, in order to take the directors along the line on the 21st instant, on sleepers placed at too great an interval apart, and without any ballast at all.

The sides of the slopes in some of the heavy cuttings overhang the line, and require taking off.

The drainage in these cuttings and along the moss requires attention.

A large quantity of ballast is wanted at different parts of the line, and the rails require to be lifted, packed, and properly lined almost throughout.

It is apparently intended to fish the joints over the peat moss, as the new rails, fished plates, and bolts are lying along the line. If this be the case, it had better be done before the line is re-inspected.

It is intended to have a station between Keith and the Spey, but scarcely anything has yet been done towards it.

The fencing is incomplete at places along the line.

I am therefore of opinion, that by reason of the incompleteness of the works, the opening of the Inverness and Aberdeen Junction Railway between Elgin and Keith cannot be sanctioned without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.*

*&c. &c.*

*W. YOLLAND,*

*Lieut.-Col., R.E.*

SIR,

*Auchlunkart, by Keith, N.B.,  
July 14, 1858.*

You may recollect my having last year an interview with you—I think in March—regarding the Aberdeen and Inverness Junction Railroad, which is shortly about to be opened. Colonel Yolland inspected it a short time ago, but of course was not satisfied; and I hear he, or some one else, will soon be here again. What I am anxious to communicate is regarding a turnpike road, as I applied last year to you to do what you could to prevent danger to the public. Knowing that I had so applied was, I believe, an element in inducing the railroad to arrange for changing the public road nearly two miles, by which the safety and convenience of the public are greatly ensured, and the Railway Company saved the expense of two bridges across the old turnpike. But the new line of turnpike is not yet fully completed; it has to receive the sanction of the trustees, and meantime the rail would cross upon the level twice the old line, which I cannot for a moment fancy the Board of Trade would permit, and if they did, any of the trustees, such as myself, could no doubt interdict the running. I believe any improper proceeding will be prevented by my calling the attention of your Board to these circumstances, and requesting that whoever comes down to inspect may communicate with me on the subject, or prevent the opening of the line for traffic, as it must be obvious that the railroad have no right to interfere with the turnpike road (in a way not authorized by their Act) until a proper line has been substituted to the satisfaction of the proper parties, viz., the road trustees.

Hoping that the attention of the inspector of the line will be specially called to this point, which otherwise he might very readily overlook,

I remain, &c.

*ANDREW STEWART.*

*Railway Department, Board of Trade,  
Whitehall, July 17, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of a letter their Lordships have received from Mr. Andrew Stewart on the subject of certain unauthorized level crossings of the Inverness and Aberdeen Junction Railway.

My Lords direct me to observe, that they cannot allow the opening of the Inverness and Aberdeen Junction Railway if there are level crossings upon it not authorized by Parliament.

I am, &c.

The Secretary to the DOUGLAS GALTON,  
Inverness and Aberdeen Captain, R.E.  
Junction Railway Company.

*Railway Department, Board of Trade,  
Whitehall, July 29, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copies of two reports made by Captain Tyler, R.E., the officer appointed by them to inspect the Inverness and Aberdeen Junction Railway between Keith and Elgin.

Upon consideration of these reports, my Lords direct the Inverness and Aberdeen Junction Railway Company to postpone the opening of the portion of line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the DOUGLAS GALTON,  
Inverness and Aberdeen Captain, R.E.  
Junction Railway Company.

SIR,  
Elgin, July 26, 1858.  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 21st instant, I inspected, on Saturday last, the Inverness and Aberdeen Junction Railway, between Elgin and Keith.

This is a single line, 18 miles long, running from the terminus of the Great North of Scotland Company at Keith, to the temporary terminus of the Inverness and Aberdeen Junction Company at Elgin; and it will, when it is opened for traffic, complete the through communication, by railway, between Aberdeen and Inverness.

The permanent way is laid with doubled-headed rails weighing 72 lbs. to the lineal yard, in cast-iron chairs, which are secured by wrought-iron spikes to transverse sleepers, of Strathspey fir, three feet apart. The joints of the rails are fished on an incline of 1 in 60 near Mulben, and for a mile through a peat bog, but on the remainder of the line they are secured by the ordinary cast-iron chair and wooden key only. It is much to be regretted that this fishing of the joints should not have been extended, and I would strongly recommend the directors to complete their line in this manner with as little delay as possible.

Some of the sleepers are rather small, and the chairs have been placed, on all parts of the line, apparently, more or less upon the round tops of the sleepers, without a flat bed having been provided for them. This will require to be rectified; and where the sleepers are not deep enough to allow of a proper seat being provided for the chairs, others must be substituted for them.

The ballast is generally good, and is in sufficient quantity.

The masonry is of good quality, and appears to be all standing well, with the exception of an over bridge, a mile and a half from Keith, which shows symptoms of movements in the foundations, and will require to be carefully watched.

There are a number of cast-iron bridges and viaducts, of spans varying from 12 to 31 feet, which are sufficiently strong by calculation, and of which the deflections do not generally exceed one-eighth of an inch. They only reach five-sixteenths of an inch in one case, in which the girders are not so deep in proportion to their other dimensions. The bridge referred to by Colonel Yolland, in his report of the 28th ultimo, has been altered; and girders of the ordinary form have been substituted for the original ones, which were bolted together in the middle.

The principal work on this line will be the bridge over the river Spey. It is to consist of two wrought-iron box girders, carrying a double line of rails over a span of 230 feet, upon masonry abutments, which are nearly completed. Drawings of these girders have been forwarded to me, and not being satisfied in regard to the bridge, I propose to

communicate with Mr. Fairbairn on the subject on my return to England.

In the meantime, a temporary viaduct has been constructed over the river, on which it is proposed to erect the permanent bridge, and to carry the trains while the work is in progress. I propose further to examine and to test this temporary viaduct to-day, at the same time that I inspect the Morayshire Railway, and discuss the mode in which the trains of the Morayshire, and Inverness and Aberdeen Railway Companies, are to be separately worked over the single line, which is about 10 miles long, between Orton and Elgin, and the arrangements that are required for the junctions at those two places.

These questions are of an exceedingly important nature; and I am obliged, as the second notice of the Company will expire on the 31st instant, to send in this report before I have discussed and considered them.

I observe the following requirements on the line, in addition to that which is referred to in the 4th paragraph:—

A separate line of rails to be laid down at the Keith Station, by means of which the engine may escape, after having arrived in front of its train. The Company will thus avoid the necessity of the measure which is at present contemplated, of employing the engines to push the carriages before them into the station.

Telegraph instruments, and complete arrangements for working the line by telegraph, at all the crossing places for trains, and at Orton.

Station signals at the stations, in addition to the distant signals.

The parapets of the over bridges, and the permanent fences on the approaches, to be completed.

A portion of rock cutting, and some temporary water-tanks, which are too near the line, to be removed.

An over bridge at Elgin, carrying an important road over both the Inverness and Aberdeen Junction, and the Morayshire Railways, of which the girders have not yet been placed, to be completed.

A signal on the gates, and a gatekeeper's lodge, to be furnished at the only authorized level crossing.

A certificate to be furnished in regard to the working of the single line.

On account of these various requirements, I beg to report my opinion, that the opening of the Inverness and Aberdeen Junction Railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

While inspecting this line, I notified to Mr. Stewart, the gentleman who has made a written complaint to their Lordships, in regard to two level crossings, unauthorized by Parliament, that I should be glad to have the pleasure of meeting him on the subject. A gentleman who accompanied me was good enough to drive up to his house with a message to this effect. But Mr. Stewart sent word in reply, that he was then taking an early dinner, preparatory to leaving home, and that he did not wish to add anything to what he had stated in his letter.

As I am informed, the trustees of the public road consented, some time since, to permit a deviation, a mile and three-quarters long, to be made at the places referred to by Mr. Stewart, in order that the Railway Company might be spared the construction of two bridges, in difficult situations, by which it was originally intended to carry the road over the railway; and they undertook, upon the completion of the deviated portion to their satisfaction, to shut up the bend in the road thus avoided, and to adopt, on behalf of the public, the line of the deviation.

The trustees meet to-morrow, and the question will then be brought before them. After they shall have formally expressed their opinion in regard to this deviation, and answered certain questions which I propose to address to them, it will then be necessary to give to this subject some further consideration.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
Captain, R.E.

SIR,

Inverness, July 27, 1858.

In reference to my report of the 26th instant, on the subject of that portion of the Inverness and Aberdeen Junction Railway which connects Keith and Elgin, I have now the honour further to report, for the information of the Lords of the Committee of Privy Council for Trade, that I am unable to recommend, that the temporary viaduct which has been constructed over the river Spey should be opened for passenger traffic during the erection of the permanent bridge, even after the remainder of the line shall have been completed.

Appendix  
No. 1.

INSPECTIONS.

Inverness and  
Aberdeen  
Junction Rail-  
way (Elgin  
to Keith).

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to Keith).

This viaduct is situated in a hollow, between falling gradients, of 1 in 100 on the one side, and 1 in 60 on the other. It is constructed with three main beams, each supported, vertically, on six piles, and each strengthened by diagonal struts, placed longitudinally. These beams steady each other, and are connected by transverse joists, laid loosely across them, and transverse diagonal ties; and they are intended, the two outside beams, which are 27' 6" apart, to carry the permanent girders, and the middle beam, to carry the temporary roadway; so that a weight of 200 tons will be gradually built up upon each of the exterior beams, while the line of rails is balanced on the middle one. The cross joists cannot be *fixed* in their places, as they would in that case interfere with the erection of the bridge.

A number of packing pieces have been inserted, between these loose cross joists and the longitudinal beam that carries the roadway, in a rough manner; and there are many minor defects of construction, to which it is unnecessary to refer.

The principal defects of the viaduct, as considered with reference to the safety of the public, are, in my opinion:—

1st. That the roadway is not independently supported.

2nd. That the number of piles under it is very small, and that, as they could only be driven to a very moderate depth, at one end of the viaduct, on account of the rock below, they cannot be considered as firmly fixed, at that end, in their places.

3rd. That a tree, or other large substance, floating down the river, during a flood or otherwise, might knock away one of the bearing piles, and bring down the whole structure.

For these, and other minor reasons, I am unwilling to recommend that it should be opened for public traffic.

In regard to the other matters to which I alluded in the report above referred to, I beg to enclose copy of a letter which I have addressed to the clerk of the Boat of Bridge road-trustees, on the subject of the unauthorized level crossings complained of by Mr. Stewart, of Auchlunkart, in his letter of the 14th instant; and I may add that I have referred, in my report of this date on the Morayshire Railway, to the junction and working arrangements which will have to be carried into effect by the two Companies.

I have, &c.

Captain Galton, R.E.  
&c.

H. W. TYLER,  
Captain, R.E.

#### Inverness and Aberdeen Junction Railway.

Chambers, 10, New Palace Yard,  
Westminster, July 30, 1858.

SIR,  
WITH reference to Mr. Stewart's communication to the Board of Trade, I beg to enclose a certified extract from the minutes of a meeting of the trustees for the Boat of Bridge turnpike road, held at Keith on the 27th instant, agreeing to the new line of road constructed by this Company between Rosearie, in the parish of Botriphnie, and Deanshaugh, in the parish of Boharm.

I am, &c.

Captain Galton, R.E.  
&c.

For THEODORE MARTIN,  
&c.

SAMUEL TEED.

(Enclosure.)

EXCERPT from Minutes of a Meeting of the Trustees for the Boat of Bridge Turnpike Road, held within the Gordon Arms Inn, Keith, on Tuesday the 27th day of July, Eighteen hundred and fifty-eight years.

THEREAFTER Mr. John Watson, surveyor of the road, appeared and gave in a report of yesterday's date to the effect that he had that day minutely inspected the deviation or new line of road betwixt Rosearie, in the parish of Botriphnie, and Deanshaugh, in the parish of Boharm, and that he had found the road well and substantially made, with certain small exceptions detailed in the report, but that having met with a committee of the directors of the railway after his inspection of the road, he mentioned to them what the road and its bridges wanted to make them complete, and that the committee most readily assured him that the works wanted would be immediately completed, and the road made perfect in all its works; and by said report Mr. Watson recommended that the trustees should authorize the road to be opened immediately for general traffic. And the meeting having taken the said report into consideration, and that the exceptions mentioned are of a trifling nature, and can immediately be executed, authorized and hereby authorize the fore-said line of road betwixt Rosearie and Deanshaugh to be opened and used immediately for public and general traffic, in lieu and place of the former road betwixt said two points, which report was docqueted and signed by the preses of this meeting as relative hereto.

Excerpted from the minutes by

ROB. GUEEM,  
Clerk.

#### Inverness and Aberdeen Junction Railway.

Chambers, 10, New Palace Yard,  
Westminster, July 28, 1858.

SIR,  
I UNDERSTAND that Captain Tyler has recommended that the opening of this line from Keith to Elgin should be delayed on account of the incomplete state of the works in certain particulars, and I am instructed by the directors to make the following statement to you upon the points which they understand are adverted to in Captain Tyler's report:—

1. In regard to such of the chairs as are laid upon rounded sleepers, numerous parties of platelayers have been set to work by the engineer to examine the chairs and remedy the objection as soon as possible. The sleepers are of natural Strathspey grown wood, and far superior to the timber ordinarily used; and, as a matter of course, such of them as might in the course of time turn out in any way defective from decay will be the first to be renewed.

2. Telegraph instruments at Fochabers and Mulben and Orton. These have been fixed since the inspection, but I may observe that the various sections of the line already opened have been worked safely and efficiently before the telegraphic communication was secured.

3. Signals. Captain Tyler, I understand, requires a third signal to be erected on the platform at each station. This requirement the Board are ready to comply with, but at the same time no such arrangement exists at any station on those parts of the line which are now open, nor on the Great North of Scotland line, nor, to the best of the Board's information, on *any* line north of the Tweed. There are two signals at each station at the proper distances on either side, which have always been found sufficient.

4. Siding at Keith. Captain Tyler stipulates for an additional siding outside the passengers' station, to admit of the engine getting from the front to the rear of the train without interfering with it, to the engine-shed and tank, although there is no such accommodation at Inverness, Aberdeen, Edinburgh, or Glasgow. This had formed part of our engineer's original plan, but was objected to by the Great North of Scotland Railway Company.

5. Projection of a part of a rock. This projection is the legal distance from the rails. It is, however, in the course of being removed.

6. Overway bridge at Rothes road. This will be completed in about a fortnight. But the use of the level crossing in the meantime will be so guarded as to prevent the possibility of danger; and it is the general feeling of the country and of the persons using the road, that the opening of the line ought not to be delayed on this account.

You will observe that none of these matters involve any great time to rectify, and that on the more material of them the Company could not have anticipated that any objection would be taken.

I therefore trust that, although the Board of Trade may, as a matter of form, direct the opening of the line to be delayed for a month, they will not object to order a fresh inspection so soon as the Company are able to report that the requirements have been complied with. The delay in opening the line is attended, not only with great loss to the Company, but with serious inconvenience to the public.

I am, &c.

Captain Galton, R.E.  
&c.

THEODORE MARTIN.  
&c.

Railway Department, Board of Trade,  
Whitehall, July 31, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 28th instant, transmitting certain remarks on the report made by Captain Tyler of his inspection of the Inverness and Aberdeen Junction Railway between Elgin and Keith, also requesting their Lordships to cause the line to be re-inspected as soon as the Company are able to report that the requirements of the inspecting officer have been carried out.

In reply I am to state that your letter shall be referred to Captain Tyler.

As regards your request to have the line re-inspected, I am to observe, that my Lords have twice ordered an inspecting officer to proceed to the north at considerable inconvenience, solely for the purpose of inspecting this line, although it was not ready for inspection.

I am, &c.

The Secretary to the  
Inverness and Aberdeen  
Junction Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

SIR,

*Dublin, August 3, 1858.*

IN reference to my former reports on the subject of the portion of the Inverness and Aberdeen Junction Railway which connects Elgin with Keith, I have the honour to enclose a communication which I have this day received from the clerk to the trustees of the Boat of Bridge turnpike road, by which it will be seen, that the trustees have authorized the opening for traffic of the deviated portion of road between Rosearie and Deanshaugh, in the parish of Boharm, and have formally sanctioned the substitution of this deviated line of road, in lieu of that which crossed the railway twice on the level, and which was complained of by Mr. Stewart, of Auchlunkart, in his letter to their Lordships.

I have, &amp;c.

*Captain Galton, R.E.  
&c. &c.**H. W. TYLER,  
Captain, R.E.*

SIR,

*London, August 9, 1858.*

WITH reference to the notice already given for the opening of the portion of the Inverness and Aberdeen Junction Railway between Keith and Elgin, I beg to withdraw the second notice as far as regards the portion of the line lying between the Orton Junction and the eastern extremity of the viaduct across the Spey, as we now propose to open for public traffic two sections extending from Keith to the Spey on the east side, and from Orton to Elgin on the west.

I have, &amp;c.

*Captain Galton, R.E.  
&c. &c.**THOMAS C. BRUCE,  
Deputy Chairman.*

SIR,

*August 9, 1858.*

IN reference to my letter of the 5th, requesting their Lordships' permission to use a level crossing over the road between Elgin and Rothes for the Inverness and Aberdeen Junction Railway, on a pledge being given that the bridge carrying that road over the railway will be completed within a month from that date, and in anticipation of the line being again inspected within a few days, I should be much obliged by your informing me whether their Lordships will be prepared to give that permission in the event of the inspector reporting the line to be in other respects in a fit state to be opened for public traffic.

I have, &amp;c.

*Captain Galton, R.E.  
&c. &c.**THOMAS C. BRUCE,  
Deputy Chairman.*

SIR,

*Railway Department, Board of Trade,  
Whitehall, August 10, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 9th instant, requesting permission to open the Inverness and Aberdeen Junction Railway between Keith and Elgin, on giving an undertaking that the bridge over the railway at Rothes will be completed within a month.

In reply, I am to inform you that under the circumstances my Lords will not object to the opening of the line on account of the level crossing alone, provided they receive an undertaking under the seal of the Company that the bridge shall be completed within a month from the opening of the portion of line in question, and provided the inspecting officer reports that the arrangements for working the level crossing meanwhile are as safe as possible.

I have, &amp;c.

*The Hon. Thomas Bruce,  
Deputy Chairman, Inverness  
and Aberdeen Junction Railway Company.*

Inverness and Aberdeen Junction Railway.

*Secretary's Office, Inverness,  
August 12, 1858.*

SIR,

I BEG to enclose herewith undertaking by the Company in respect of the completion of the Rothes turnpike road bridge near Elgin Station, and hope the same will be satisfactory to their Lordships.

I am, &amp;c.

*Captain Galton, R.E.  
&c. &c.**ANDREW DOUGALL,  
Secretary.*

(Enclosure.)

Inverness and Aberdeen Junction Railway.

*Secretary's Office, Inverness,  
August 12, 1858.*

WE, Thomas Charles Bruce, of 3, St. James Street, London, Deputy Chairman, and Andrew Dougall, Secretary of the Inverness and Aberdeen Junction Railway Company,

hereby undertake and become bound that the bridge over the railway near Elgin Station, called the Rothes turnpike road bridge, will be completed and ready for the public passing over the same in one month from this date.

THOMAS C. BRUCE, *Deputy Chairman.*  
ANDREW DOUGALL, *Secretary.*

*Railway Department, Board of Trade,  
Whitehall, August 16, 1858.*

SIR,

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 6th instant, I have re-inspected the Inverness and Aberdeen Junction Railway, between Keith and Elgin.

In passing over the line, on the 14th instant, I found, that the extra siding at Keith had been completed; that the station signals at the different stations had been supplied; that platforms had been constructed, and signals erected, at the Orton Junction; and that a material improvement had been made in the permanent way, about one-tenth of the chairs having been re-set on the sleepers, and certain of the old sleepers having been replaced by new ones.

On causing the permanent way to be opened out at different parts of the line, I found that some of the sleepers were still of a size which cannot but be considered as too small, 8" x 4" at the smaller ends; and I would observe that this will necessitate extra care and attention in maintenance, though I do not consider it necessary to make any further objection on that account to the opening of the railway.

I found, also, that there were still several requirements, namely,—

1. A siding, which was liable to be used for passenger trains, at Keith, was laid at a less distance than 3' 6" from the engine shed.

2. Although there were telegraph instruments, of the ordinary description for *through* working, at the different stations, yet the train-telegraph instruments, to work from station to station only, had not been supplied.

3. A blind siding was required at Mulben, to prevent waggons from running down the incline of 1 in 60, which occurs between that place and the river Spey.

4. The stage from which the points and signals at the Orton Junction are to be worked, was incomplete, and in a state that would have been dangerous to the signalman, and therefore unsafe for the working of the traffic.

5. A fixed signal was required on the gates of the level crossing near Keith.

6. The distant signals on the main line from the Orton Junction required to be moved to a greater distance from that junction.

7. The mode in which the flat-bottomed rail of the Morayshire Company, was attached to the double-headed rails on the main line, at the Orton Junction, required to be improved.

I have, however, been over the line again this evening, and have found all these requirements completed, with the exception of the junction stage at Orton, the hand rail and signalman's box of which are only in progress. As the points, handle, and signal levers have now been brought, however, on an extended stage, and as only a few hours' work remains to be done, I am satisfied in this respect.

I beg to enclose a certificate, signed by the chairman and secretary of the Company, to the effect that, there will never be more than one engine in steam, or two coupled together, at one time, upon either of the divisions on which the train-telegraph instruments will be available for working the traffic; and, as no siding has yet been supplied at the Orton Junction, by means of which any shunting at that junction might be safely and conveniently performed, I beg to enclose a further certificate, signed by the chairmen of the two Companies whose lines meet at this junction, by which it is stipulated, that all interchange of vehicles will take place at one of two stations to the west of Orton, until after the completion of the siding which is required at that junction, as well as that the siding there required, and shown in a diagram which accompanies the certificate, will be completed within one month from this date.

I have been informed by your letter of the 10th instant, that the Company have withdrawn the notice for opening that portion of their line which extends between the Orton Junction and the east end of the Spey bridge; and that their Lordships have stated that they will not object to the line being opened on account "of the unauthorized level "crossing at Rothes," (which I take, of course, to mean that near Elgin, as there has been no question in regard to a level crossing near Rothes,) provided the Company forward to them an undertaking, under their seal, that it will be completed within one month from the opening of the line, and provided that I report the level crossing to be made as safe as possible.

Appendix  
No. 1.

INSPECTIONS.  
Inverness and  
Aberdeen  
Junction Rail-  
way (Elgin  
to Keith).

Extract sent to Company.

Appendix  
No 1  
INSP ECTIONS.  
Inverness and  
Aberdeen  
Junction Rail-  
way Elgin  
to Keith).

*Extract sent to Company.*

I am not aware whether the undertaking which I believe to have been furnished to their Lordships, is considered to be satisfactory; but I beg to report, that the girders have now been thrown over the line, and that the approaches are being metalled. The temporary level crossing is provided with good gates, and with a gateman's box. It is about 120 yards from the Elgin Station, on the one side, and is under the protection, on the other side, of the distant signal fixed to the eastward of the station. I am of opinion that this level crossing may be used with safety while the bridge is being completed.

I beg, in conclusion, to report my opinion, that the Inverness and Aberdeen Junction Railway, between Elgin and the Orton Junction, and between Keith and the east of the river Spey, may be opened without danger to the public using the same, though I would remark, in doing so, that great care will have to be taken in descending the gradient of 1 in 60 on which the river Spey is approached; and I would recommend seriously to the notice of the directors the desirability of their adopting continuous breaks on their carriages, such as are in use on many English lines under the names either of Newall or Fay.

I have, &c.

H. W. TYLER,

Captain Galton, R.E.  
&c. &c.

Captain, R.E.

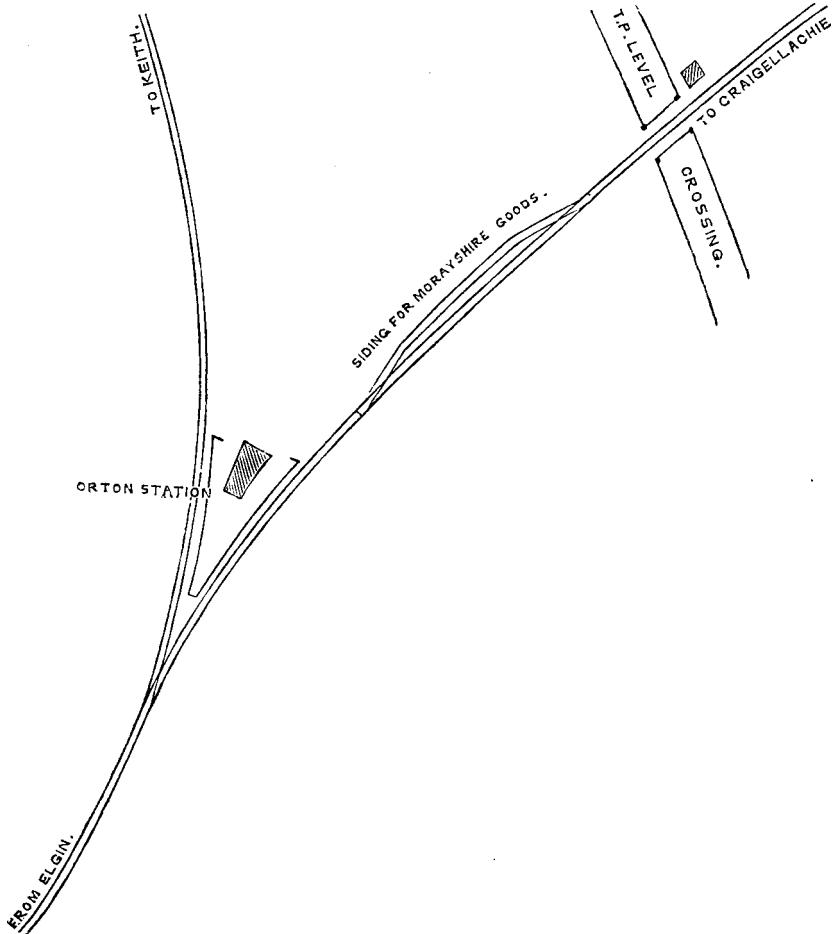
(Enclosure.)

August 16, 1858.

UNDERTAKING by the Inverness and Aberdeen Junction Railway Company and the Morayshire Railway Company to the Right Honourable the Lords Commissioners of the Railway Department of the Board of Trade.

WE, the undersigned, Thomas C. Bruce, deputy chairman, and Andrew Dougall, secretary, in behalf of the said Inverness and Aberdeen Junction Railway Company, and we, James Grant, banker in Elgin, chairman of directors, and James Jenkins, secretary, in behalf of the said Morayshire Railway Company, hereby undertake that the exchange of traffic between the two Companies at the Orton Junction shall, for the present, be limited to the passengers to and from the south; and that until proper goods traffic arrangements, according to the accompanying plan, shall be completed at the said Orton Junction, the goods traffic of both lines, which would otherwise be done there, shall be carried on to, and transacted at Smithfield or Fochabers Station. We also undertake that the requirements set forth in the said accompanying plan shall be completed within one month from this date.

THOMAS C. BRUCE.  
ANDREW DOUGALL.  
JAMES GRANT.



Railway Department, Board of Trade,  
Whitehall, August 18, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed extracts from the report of Captain Tyler, R.E., the officer appointed by my Lords to inspect the portions of the Inverness and Aberdeen Junction Railway between Elgin and the Orton Junction, and between Keith and the east of the river Spey.

My Lords direct me to state that they will not object to the two portions of line in question being opened for public traffic, provided that the following conditions be observed.

That not more than one engine in steam, or two or more coupled together and forming part of one train, be allowed upon the portions of line specified below at one and the same time, viz., between Keith and Mulben, Mulben and Orton, Orton and Fochabers, Fochabers and Elgin.

That the exchange of traffic between the Inverness and Aberdeen Junction Railway Company and the Morayshire

Railway Company at the Orton Junction shall for the present be limited to passengers to and from the south; and that until proper goods traffic arrangements, according to the plan attached to the undertaking given by both Companies on the 16th instant, shall be completed at the said Orton Junction, and for which one month is allowed, the goods traffic of both lines, which would otherwise be done there, shall be carried on to and transacted at Smithfield or Fochabers Stations.

And also that the bridge for carrying the Rothes road at Elgin over the railway shall be completed within one month from this date.

I am, &c.

The Secretary of the DOUGLAS GALTON,  
Inverness and Aberdeen Captain, R.E.  
Junction Railway Company.

## Inverness and Aberdeen Junction Railway Company.

*Secretary's Office, Inverness,  
September 17, 1858.*

SIR,  
WHEN Captain Tyler, R.E., was inspecting this line between Elgin and Keith last month, this Company gave an obligation in respect of the completion of the Rothes turnpike road bridge, near Elgin Station. A joint obligation by this Company and the Morayshire Company was also given regarding the construction of a siding at Orton Station.

As some unexpected difficulties have arisen in reference to the completion of these works, the directors will feel obliged by their Lordships extending the time for completing the same, by one calendar month, the date of expiry of the obligations.

I am, &c.

Captain Galton, R.E.  
&c. &c.

ANDREW DOUGALL,  
*Secretary.*

Appendix  
No. 1.

Inverness and  
Aberdeen  
Junction Rail-  
way (Elgin  
to Keith).

Railway Department, Board of Trade,  
Whitehall, October 2, 1858.

WITH reference to your letter of the 17th ultimo, in which you request an extension of time for completing the bridge over the railway at Elgin and the siding at Orton, I am directed by the Lords of the Committee of Privy Council for Trade to state that they are willing, in compliance with your request, to extend the time for the completion of the works in question to the 18th instant, being one month from the expiration of the time previously allowed by their Lordships.

I am, &c.

The Secretary of the DOUGLAS GALTON,  
Inverness and Aberdeen Captain, R.E.  
Junction Railway Company.

## INVERNESS AND ABERDEEN JUNCTION RAILWAY.

Inverness and  
Aberdeen  
Junction Rail-  
way (Spey  
Viaduct).

Railway Department, Board of Trade,  
Whitehall, October 23, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you for the consideration of the Inverness and Aberdeen Junction Railway Company, the enclosed copy of the correspondence which has taken place between Captain Tyler, R.E., and Mr. Fairbairn, on the subject of the bridge carrying that line over the river Spey.

The Secretary to the  
Inverness and Aberdeen  
Junction Railway Company.

I am, &c.  
DOUGLAS GALTON,  
*Captain, R.E.*

(Enclosures.)

Railway Department, Board of Trade,  
Whitehall, October 19, 1858.

SIR,  
I HAVE the honour to enclose herewith, copy of a correspondence in which I have been recently engaged with Mr. W. Fairbairn of Manchester, in reference to a bridge of 230 feet span, which he is at present constructing, with box girders of wrought iron, upon masonry abutments, to carry the Inverness and Aberdeen Junction Railway over the river Spey.

As the drawings of this bridge were forwarded to me at the same time with the drawings of the other works on the line, and as I was called upon to report upon a temporary bridge for carrying the railway over the same spot, between the permanent girders, any approval of which would have virtually carried with it the approval of the permanent bridge (inasmuch as no further inspection would probably have been required by an officer of this department, if the temporary bridge had been opened for traffic), it became my duty to examine the drawings thus furnished, before inspecting the line between Keith and Elgin, in order that I might be able to report upon the subject, if necessary, for the information of the Lords of the Committee of Privy Council for Trade.

The result of my examination was not such as to satisfy me, and I at once expressed my intention of conferring with Mr. Fairbairn, himself, on the subject of the bridge. I afterwards thought it only right to persevere in that intention, although I was unable to report in favour of the temporary bridge, and although, therefore, (as the temporary bridge was not opened for public traffic,) the question of the permanent bridge did not come directly before their Lordships.

It will be observed by this correspondence, that I have been obliged to differ with Mr. Fairbairn on the question of the sufficiency of this bridge to carry a double line of rails over a span of 230 feet, as is intended; as well as that his own calculations, and his own data, show, that the breaking weight of the bridge would be but little in excess of three times its total load, when carrying a rolling weight of three-quarters of a ton per foot lineal for each line of rails.

I do not apprehend that their Lordships will think it necessary to take any steps in reference to this structure, or even, perhaps, to be called upon by the railway company to order an inspection; but I think it right to place this correspondence in their possession, in order that any inspecting officer who may in future be appointed to inspect the bridge, may have an opportunity of perusing it.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
*Captain, R.E.*

SIR,  
Manchester, August 5, 1858.  
In reply to your inquiries, I have to state that the total weight of the iron work of the bridge is 400 tons, and the rails, wooden platform, and sand will probably weigh from 40 to 50 tons in addition.

The sectional area of the cellular top is 120 square inches, and of the bottom 110 inches, and the breaking weight of the girders in the middle is 1,220 tons, or 2,440 tons equally distributed. There will be arches at each end connecting the girders.

I had a letter from the Findhorn\* yesterday, to say that they had removed the scaffolding next Inverness, and the deflection of the span with its own weight was  $\frac{1}{2}$  of an inch.

Capt. H. W. Tyler, R.E.  
&c. &c.

I am, &c.  
W. FAIRBAIRN.

Railway Department, Board of Trade,  
Whitehall, September 1, 1858.

SIR,  
I AM much obliged for your note, which I received some little time since, on the subject of the Spey bridge, and am sorry that I have not had leisure sooner to reply to it. I have since been again on the spot, and have seen the bottom of one of the girders laid in its place.

You mention that the area of the bottom web is 120 square inches, and I observe that this would give, according to the formula and constant that you employ,  $W = \frac{a d c}{l} = \frac{120 \times 15 \times 80}{230} = 626$  tons = the central breaking weight of each girder: or  $4 \times 626 = 2,504$  tons = the distributed breaking weight of the whole bridge.

The maximum load, at one ton per foot run, added to the weight of the whole bridge and permanent way, also, would = 440 + 460 = 900 tons; and would be considerably more than one-third of the breaking weight of the bridge.

But I cannot, myself, make out so much as 120 square inches in the area of the bottom web, and I should be much obliged if you would let me have correctly the details of that area.

It appears to me, from what I have seen, that there will be, doing duty in the bottom web,—

$$\begin{aligned} 2 \text{ plates } & 3' 6'' \times \frac{3}{4}'' = 2 \times 42 \times \frac{3}{4} = 63 \\ 2 \text{ strips } & 8'' \times \frac{3}{4}'' = 2 \times 8 \times \frac{3}{4} = 12 \\ 4 \text{ angle irons } (4+4) \times \frac{3}{4} & = 4 \times 8 \times \frac{3}{4} = 24 \end{aligned}$$

99

Deduct for rivet holes :—

$$\begin{aligned} 2 \text{ plates } 7 \times 1 \times 1\frac{1}{2} & = 10.5 \\ \text{Strips } 2 \times 1 \times 1\frac{1}{2} & = 3.0 \\ \vee \text{ irons } 4 \times 1 \times 0\frac{1}{2} & = 3.0 \end{aligned}$$

16.5 ————— 16.5

Working area of bottom web = 82.5

And this would give, according to your formula, a breaking weight of only  $4 \times \frac{82.5 \times 15 \times 80}{230} = 1,721$  tons, which would be less than double the total maximum load above referred to.

The strain on the bottom web, if it contained 120 square inches of sectional area, would be more than 7 tons to the square inch, under the same total load of 900 tons; and that strain would be increased to about  $10\frac{1}{2}$  tons per square inch, if the area were only, as I imagine, 82.5 square inches; whereas the ultimate strength of the plates cannot be taken, probably, at more than 19 tons per square inch.

I feel a delicacy in writing thus to you about the bridge before it is finished, and under inspection; but I make no doubt that you would rather discuss the subject quietly now, than put it off to a more inconvenient time; and I write, therefore, at once, to ask you to be kind enough to inform me whether I have assumed correct data in the above calculations, and to give me the details of the area, at the middle of the girders, in the top and bottom webs.

I remain, &c.

Wm. Fairbairn, Esq., C.E.  
&c. &c.

H. W. TYLER,  
*Captain, R.E.*

## The Spey Bridge.

SIR,  
Manchester, September 3, 1858.  
In order that you may be in full possession of all the facts connected with the above bridge, I have had all the parts carefully

\* This refers to a viaduct carrying the same railway over the river Findhorn.

Appendix  
No. 1.

measured and taken from the working drawings as under, the area of the bottom of one girder being as follows:—

4 plates	-	$21 \times \frac{3}{4} = 63$	square inches
4 packing straps and covers	=	25·1	"
4 angle irons	-	$4 \times 4 \times \frac{1}{16} = 23\cdot4$	"
111·5 square inches			—

Taking this area we have from formula  $W = \frac{ad c}{l} = \frac{111\cdot5 \times 16 \times 12 \times 80}{230 \times 12}$   
 $= 620\cdot5$  tons, the centre breaking weight of one girder.

From this you will observe that the formula is deduced from the experiments with the rivet holes punched out, or in other words the constant 80 is obtained from the ultimate power of resistance of girders in their riveted or finished state.

This being the case we have  $620\cdot5 \times 4 = 2,482$  tons, as the ultimate strength of the bridge on a span of 230 feet. From this we deduct 400 tons, the weight of the bridge, which leaves 2,082 tons against a rolling load of eight locomotives, 4 on each line, which is the greatest strain that can ever come upon the bridge, equivalent to 1½ per lineal foot.

Again, the above area gives 10·8 or nearly 11 tons per lineal foot, which I apprehend is a sufficient margin of strength. Trusting these explanations may be satisfactory.

I am, &c.

W. FAIRBAIRN.

Capt. H. W. Tyler, R.E.

&c.

Railway Department, Board of Trade,  
Whitehall, October 18, 1858.

Sir, I BEG to thank you for your further letter of the 3rd ult., on the subject of the Spey bridge, and for the details which you took the trouble to furnish me with therein.

The only differences between the data which I assumed and those which you have given, appear to be, that, in the first place, I omitted two packing strips in the bottom flanges of each girder, because I believed that they were only packing strips, and were not united at the joints by covering plates, and that they could not, therefore, be taken as adding to the working area; in the second place, that I deducted for the rivet holes in using your formula, which you are not in the habit of doing; and, in the third place, that I took the depth of the girder, for the purpose of calculation, to be 15 feet, whereas you have taken it at 16; but as I allowed 120 square inches, in using your formula, instead of 111·5, the results at which we arrived were pretty much the same.

I cannot, however, admit that it is fair, first to deduct the weight of the bridge, as you have done at the end of your last note, from its ultimate strength, and then to consider, that the margin you state, is left for the strength of the structure, as compared with the maximum rolling load.

Taking your own data, I should put it rather in this way:—

Tons.		
Weight of bridge	-	400
Permanent way	-	50
Moving load, at three-quarters of a ton per foot lineal for each line of rails,	-	345
Total load 795, say 800 tons.		

But  $\frac{2482}{800} = 3\cdot1$ , and the ultimate strength of the bridge is, therefore, upon your own data, but little more than three times the maximum total load. This I cannot think a sufficient margin to allow for a structure of this nature; and it must be remembered, that two heavy goods trains passing each other on the bridge, with two engines and tenders and 10 waggons each, might easily weigh between 350 and 400 tons.

My own calculation, including the strength given by the packing strips, and supposing them to be covered at the joints by separate covering plates, and assuming one ton per foot run as the maximum load on each line of rails, which is not too much for purposes of calculation, would show a strain of about eight and a half tons per square inch on the working sectional area at the bottom of the girder, which I think much more than is desirable.

I am sorry that my other occupations have caused me to be again so long in replying to your letter, and remain,

Yours, &c.

H. W. TYLER,  
Captain, R.E.

Wm. Fairbairn, Esq., C.E.  
&c.

Railway Department, Board of Trade,  
Whitehall, November 6, 1858.

Sir, I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you, for the information of the directors of the Inverness and Aberdeen Junction Railway Company, the enclosed copies of letters which have passed between Captain Tyler, R.E., and Mr. W. Fairbairn, on the subject of the bridge carrying the Inverness and Aberdeen Junction Railway over the river Spey.

I am, &c.

DOUGLAS GALTON,  
Captain, R.E.

The Secretary of the  
Inverness and Aberdeen  
Junction Railway Company.

(Enclosures.)

Railway Department, Board of Trade,  
Whitehall, November 3, 1858.

Sir, IN reference to my letter of the 19th ult., I have now the honour to enclose copies of two further letters which have passed between Mr. W. Fairbairn of Manchester and myself, on the subject of the bridge which is being constructed to carry the Inverness

and Aberdeen Junction Railway over the river Spey, for the information of the Lords of the Committee of Privy Council for Trade, and for the use of any inspecting officer who may in future be appointed to examine this structure.

It will be observed, that I am still unable to consider this bridge sufficiently strong for the purpose, for which it is intended, of carrying a double line of rails; and I may add, that it is not even as strong as I think it ought to be for carrying a single line of rails.

I may add, further, that Mr. W. Fairbairn is solely responsible to the directors of the Company for the iron work of this bridge, and that, in fact, he may be considered to be their engineer as well as their contractor for this particular work.

I have, &c.

H. W. TYLER,  
Captain, R.E.

Sir, Manchester, October 22, 1858.  
SOME days' absence in Ireland has prevented an earlier reply to your favour of the 18th. After a re-examination of the question in regard to the question of the Spey bridge, I must reiterate my opinion that the ultimate strength of the bridge is, as stated in my last, 2,482 tons, or 10·8 tons per lineal foot. From this, as stated in my printed works, I deduct the weight of the bridge, and the remainder is the power, equally distributed, to resist the action of the rolling load.

Viewing the subject in this light, I calculate the strength of the Spey bridge to be 5·8, or nearly six times the greatest load which can be brought upon it; and this leaves a large margin of strength to meet the power of impact and other contingencies to which it may be subjected. In fact, this is the method adopted by general consent in adopting the formula  $W = \frac{ad c}{l}$ . I am moreover of opinion that 2 tons per lineal foot is in excess of the rolling load. Indeed, 1½ tons has always been considered sufficient even by the Government inspectors, for bridges supporting a double line of rails, as may be seen in the disputed case of the Torksey bridge. You may, however, submit the Spey to any test you may consider expedient for the public safety, and I will cheerfully abide by the result.

Believe me, &c.  
W. FAIRBAIRN.

Sir, York, October 25, 1858.  
I BEG to acknowledge the receipt of your further letter of the 22nd instant, on the subject of the Spey bridge. In doing so, I think it only fair to yourself to represent to you, that I cannot admit, either that 1½ tons per lineal foot for two lines of way (= 4 ton per lineal foot for each line) has always been considered sufficient by Government inspectors, or others, for the rolling load on a railway bridge; or that the method of calculation which you enunciate, of first deducting the weight of the bridge from its ultimate strength, and then considering the remainder as the available strength, applicable for the support of the rolling load, is "the method adopted by general consent in adopting the formula " $W = \frac{ad c}{l}$ ".

In regard to the first of these two points, I may observe to you, by way of illustration, that the most prominent recent structure, approaching nearly to the span of the Spey bridge,—the large span (260 feet, I think) over the river Boyne, near Drogheda, was calculated for a rolling load of a ton per lineal foot on each line of rails; and that even then, a maximum strain of 5 tons to the square inch only, was allowed in tension on any part of the structure. This presents a most favourable contrast to the strain (8·5 tons to the square inch) that I estimate for the bottom of the Spey bridge under a similar load.

I may add, that the weights to be allowed for the heaviest rolling loads at different spans, must be governed by the actual weights to which railway bridges can in practice be subjected, and that these may be stated, roughly, to be, for the heaviest engines now in use, —2½ tons per foot run, for spans of 16 feet; 1½ tons per foot run, for spans of 36 feet; 1¼ tons per foot run, (50 tons on every 40 feet,) for a train of the heaviest engines on spans of any length. I think, under these circumstances, that 1 ton per foot run for each line of way, is a fair amount to allow for calculation, on a span of 230 feet.

On the second point, I would also make a few remarks. I do so with a full appreciation of your experience in such matters, and of the benefits that you have conferred upon the world by your labours in this branch of science; but I feel that it involves a first principle, so simple in its nature, and of such great importance, that I have no excuse for shrinking from the duty of discussing it with you.

In the first place, you employ your formula,  $W = \frac{ad c}{l}$ , as a simple means of ascertaining the breaking weight of any girder (or pair of girders), by attaching to the constant, c, such a value as you believe from your experiments it ought to bear; and this has nothing to do with the method you further set forth, of determining, after having found this breaking weight, what ought to be the rolling load to which, in practice, the girder should be subjected.

In deciding upon this latter point, you first deduct the weight of the girder, and you then consider, that if the remainder is a certain multiple—say 6 times—of the rolling load, the girder is sufficiently strong.

In doing this, you ignore the fact that a girder requires a margin of strength to stand by itself, and that even if it had no appreciable load to carry, you would still have to make its breaking weight—say three times its own weight. Now, that which is necessary in regard to a girder having only its own weight to carry, becomes all the more necessary when it has the additional weight of a rolling, or any other load, to support; and it is quite clear, that whatever allowance it may be considered desirable to make for the support of the rolling load, due margin should also be afforded for the support of the weight of the girder.

In short spans this point does not come out with the same force, because, the shorter the span, the less is the proportionate weight of the girders; but, on the other hand, in long spans it becomes more clear, because, the longer the span, the heavier is the girder in proportion, and the greater the importance of duly allowing for it. In the case of the Spey bridge, the breaking weight being taken at 2,482 tons, the weight of the bridge at 400 tons, and the permanent way at 50 tons, the breaking weight is only  $5\frac{1}{2}$  times the permanent load, before the rolling load is considered at all; whilst, if the rolling load be taken at 345 tons ( $\frac{1}{4}$  ton per foot run for each line), the breaking weight will be  $3\cdot2$  times the total load; and if the rolling load be taken at 460 tons ( $1\frac{1}{2}$  ton per foot run for each line), the breaking weight will be only  $2\cdot7$  times the total load.

But, further, the increase of the rolling load may be considered to be constant, in bridges of long span, in exact proportion to their length, whilst the weight of the bridge increases in a very much greater proportion; and if you increase the length of your bridge beyond a certain amount, the case becomes proved against you by a *reductio ad absurdum*, inasmuch as, in carrying out your method of adding the simple weight of the bridge to 6 times the rolling load, you arrive at a point where the bridge is strained beyond the limits of elasticity by its own weight, and where it will not, therefore, stand.

In fact, the longer the span, the weaker a bridge becomes, on your method; and this point is entirely distinct from the question as to how far it is practicable to increase the length of such bridges, depending solely upon the mode of calculation, now under discussion, which you have brought forward.

I am sorry to be obliged thus to insist upon my objections to the Spey bridge, but its strength appears to me to be very much under what is desirable; and I may add, that even if it were to carry a single line of way, the breaking weight would be only  $(\frac{2482}{400 + 30 + 230} = \frac{2482}{660}) = 3\cdot76$  times the rolling load and permanent load taken together.

Believe me, &c.

*W. Fairbairn, Esq., C.E.  
Manchester.*

*H. W. TYLER,  
Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, December 8, 1858.*

SIR, WITH reference to my letter of the 6th ult., I am directed by the Lords of the Committee of Privy Council for Trade to transmit to you, for the information of the directors of the Inverness and Aberdeen Junction Railway Company, the enclosed copy of a further correspondence which has passed between Captain Tyler, R.E., and Mr. Fairbairn, upon the subject of the bridge over the river Spey.

I am, &c.

*DOUGLAS GALTON,  
Captain, R.E.*

(Enclosures.)

*Railway Department, Board of Trade,  
Whitehall, December 3, 1858.*

SIR, I HAVE the honour to enclose, for the information of the Lords of the Committee of Privy Council for Trade, copies of some further letters which have passed between Mr. Fairbairn and myself, with reference to the bridge which is being constructed to carry the Inverness and Aberdeen Junction Railway over the river Spey.

I may observe, in doing so, that my opinion in regard to the bridge has in nowise changed since the commencement of the correspondence, and that I still consider that it is not sufficiently strong for the purpose for which it is intended; besides which, I am confident, that even if the girders themselves were stronger, they would still require to be connected together at intervals along their length—a measure which was not originally contemplated, and which is not yet, as far as I am informed, considered necessary.

As will be seen by the concluding letters of this correspondence, I had hoped, at Mr. Fairbairn's desire, to have had the pleasure of meeting him on the 29th ult. for the sake of personally discussing the question at this office; but I was unfortunately prevented from doing so by absence, on other duties, in Ireland. If, however, their Lordships should consider it desirable, I should have great pleasure in calling at Manchester on my return from Ireland, to which country it will be my duty again to proceed, in order to meet Mr. Fairbairn's wishes for a personal discussion.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*H. W. TYLER,  
Captain, R.E.*

*Fern Tower, near Crieff,  
October 30, 1858.*

SIR, It is not without much surprise that I find myself involved in controversy with the Board of Trade, relative to the Spey bridge. Had I had the least idea that it was your intention to communicate the whole of what I considered a private correspondence,—*unofficial in its character*,—to the authorities at Whitehall, I should have been more careful and more particular in my replies. As it is, I think it was unfair to criticise and, to a great extent, condemn the bridge before you had seen it, and also before you had received instructions to that effect.

I am perfectly willing to acquit you of any intention to do injury to the company or my own reputation by these gratuitous strictures; on the contrary, I believe you are actuated by a sense of duty and the public good, but before announcing your opinion that you considered the bridge insufficient in strength, it was only fair that you should have given Mr. Mitchell and myself intimation of your intention; and at the same time, that your calculations were based on correct data. I am not sure what changes

may have taken place in the Board of Trade, nor what are the limits of strength indicated by that body for bridges; but this I know, that in former years (not more than ten) six times the rolling load was considered a large margin of strength for a double line of rails. If more is required, the sooner we know it the better; as it is, I am satisfied there are many bridges in existence at the present moment considerably under that allowance of strength.

You are probably not aware that the formula  $W = \frac{ad^c}{l}$  is deduced from careful experiments upon a large scale, viz., 75 feet, span, without deducting the weight of the bridge; but in the adoption of the coefficient, I considered it efficient in practice to deduct the weight of permanent load, and for this reason, that as the strengths are inverse only as the squares, the weights are as the cubes of the span. Had the weights followed the same ratio as the strengths, there would have been no occasion to deduct the weight of the bridge, but that allowance has been made, and I believe I was the first to make it.

You give an illustration of your calculations and opinion by referring to the Boyne viaduct. Now, the Boyne viaduct will not bear a comparison to the Spey bridge, and for this reason, that nearly the whole of the material is concentrated in the top and bottom flanges resisting the forces of compression and tension, and the sides perform no part of the work, but are simply employed to retain the girder in shape. It is, however, very different with the tubular girder; there the sides are an important element of strength up to the neutral axis for tension, and the converse for compression. Rob the Spey bridge of its solid sides, and you weaken it nearly one-fourth, and to give the same strength we should assuredly have to increase the top and bottom areas of the girder.

With regard to the heaviest rolling weight over a bridge with a double line of rails, I have always taken the number of locomotives and tenders that can be placed upon the bridge at 345 tons weight, and assuming the breaking weight of the bridge according to formula 2,482–450 tons, the weight of the bridge and roadway, we then have 2,030 tons as an antagonistic force against 345 tons the rolling weight, or in the ratio of 1:5.88, or nearly six times the heaviest load. Now, this seems to me a large margin of strength, and one calculated to meet any contingency either as regards atmospheric influence or the force of impact weight.

You are perfectly correct in my view with regard to the formula  $W = \frac{ad^c}{l}$ , which, for practical purposes, I consider the simplest and the best. The more correct method is to calculate from the whole sectional area, but this for practical purposes is not so convenient, nor yet so simple, and for that reason I recommend the above. You are also quite right in supposing that after deducting the weight of the girders, roadway, platform, &c., that I consider the remaining power of resistance should be set against the rolling load. This is what it should be, and I certainly ignore, as you properly observe, any margin whatever "for the bridge to stand by itself." I do clearly understand what is meant by the above expression. The bridge stands, theoretically, when it carries itself, and remaining strength assuredly goes to the resistance of the moveable load, and all other contingencies to which the bridge may be subject.

You say, "it is quite clear that whatever allowance it may be considered desirable to make for the rolling load margin, "should be afforded for the support of the weight of the girder." In reply to this I have to observe, that I have already made that allowance by deducting the whole strength of the bridge from its ultimate powers of resistance, and certainly I must be very dull of apprehension if I understood you to wish for a second deduction to compensate for some imaginary weight or source of danger of which I am not cognizant in any substantial form.

There must be something wrong in your calculations with regard to the breaking weight being  $3\cdot2$  times the total load; that is, by adding the rolling load to the weight of the bridge, but I must submit that is not the way to look at it, as the rolling road is not a constant quantity like the weight of the bridge, but an antagonistic force, as I said before, to the surplus strength of the bridge. I am perfectly aware of your reasoning wherein the weight of the bridge increases in a much greater proportion than the span, and I believe I have already calculated, that in a span of 1,800 or 2,000 feet, the weight becomes equivalent to the ultimate powers of the bridge.\* The span of the Spey does not, however, admit of this reasoning, and I have therefore not taken it into account, and that for the reason already adduced for the margin of allowance in the formula  $W = \frac{ad^c}{l}$ , which applies with considerable exactitude in bridges up to 300 feet span. Beyond that your elements of calculation are admissible.

We are in the habit of setting limits to the elastic powers of iron and other materials. Some take it at one-third the breaking weight, but we have found a permanent set at one-tenth, and I believe that one-twelfth or one-twentieth will produce that effect. In wrought iron we can measure it to one-fifth, but the power of resistance is increased, and not diminished, by the force applied, as may be seen in my paper in the Transactions of the Royal Society for 1851–2.

As respects the Spey bridge, I am under no apprehension of its strength and security, and should you be called upon to inspect the bridge, I think you will agree with me that is a substantial structure, and a well-executed piece of work.

I am, &c.

*W. FAIRBAIRN.*

*Railway Department, Board of Trade,  
Whitehall, November 8, 1858.*

SIR, I RECEIVED on the 5th instant, your letter dated from Crieff, on the 30th October. I have already stated to you my opinion in

\* And in fact in that extent of space if practical would only carry itself.

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regard to the Spey bridge itself, and my reasons for it, and I shall therefore add nothing more now upon the subject.

I should wish, however, to make one or two remarks with reference to the first part of your letter.

You complain of my having criticised the bridge before seeing it, and without instructions, and you call my remarks about it "gratuitous strictures."

I would therefore put it to you, that if I had, after receiving the plans of that bridge, together with those of other less important bridges on the line, when it became my duty to inspect, and re-inspect, the Inverness and Aberdeen Junction Railway, and to inspect the temporary bridge over the Spey, neglected to express the opinion that I formed in regard to the permanent bridge, I should have been liable to a subsequent imputation of having acted, both unjustly and without the consideration, either for yourself or the Company, that might have been expected from me.

My waiting to see the permanent bridge completed, would make no difference in the proportion between its calculated strength and its loads, which is the question that we have been discussing.

And, considering the nature of the correspondence that has passed between us, I should also have been blameable had I not communicated it to the Board of Trade, for the perusal of my brother inspecting officers.

I could not properly have acted otherwise than I have done. Mr. Mitchell, the engineer of the line, when I was on the spot, referred me to you as being responsible for the iron-work of the bridge; and I, therefore, first asked you for precise information as to its dimensions, and then, upon information which you readily and courteously afforded me, I openly told you my opinion in regard to it.

I considered that I could not keep this correspondence from the Board of Trade, and my brother officers, and it appears to have been further considered right to forward it for the information of the Railway Company.

That the bridge should form a matter of discussion between us, and that we should so widely differ in opinion about it, I sincerely regret; but I should have been much more sorry to have led you to believe, by a deceitful silence, that I had been satisfied with the drawings that were furnished to me.

I have, &c.

H. W. TYLER,  
*Captain, R.E.*

*W. Fairbairn, Esq.*

SIR,

*Manchester, November 9, 1858.*  
I AM sorry that any remark of mine should have given you the least uneasiness, as I can assure you nothing was further from my intention.

In regard to the differences between us about the Spey bridge, I think all these points of difference might be reconciled by a personal interview, and that much more satisfactory than by a lengthened correspondence.

Would you, therefore, favour me with your company here for a few days, my guest for the time, and we will endeavour to fix such margin of strength as will meet the wishes of the Board of Trade and the safety of the public. I shall be at home all next week, and provided you can give me a day or two, I shall be glad to see you. Meanwhile

I am, &c.

W. FAIRBAIRN.

*Captain Tyler, R.E.  
&c. &c.*

*Railway Department, Board of Trade,  
Whitehall, November 11, 1858.*

SIR,

I AM much obliged to you for the kind invitation contained in your note of the 9th instant, to spend a few days with you at Manchester, and am sorry not to be able to accept it; but I shall be happy to talk over the Spey bridge with you at any time, either when I may be passing through Manchester, or when you may happen to be in London.

Curiously enough, I happened last evening to hit upon the very point that we have been discussing, in regard to the application of the factor of safety to the rolling load only, at p. 514 of Mr. Clark's work on the Britannia and Conway bridges. It is there referred to as having formed a subject of correspondence between himself and Professor Airy.

I remain, &c.

H. W. TYLER,  
*Captain, R.E.*

P.S.—I observe also in a letter published in your own book on the same subject, that you give (at p. 105, line 1) *one ton per foot run* for rolling load, for the purpose of calculation.

I am, &c.

*William Fairbairn, Esq., C.E.*

*&c. &c.*

H. W. TYLER,  
*Captain, R.E.*

SIR,

*Manchester, November 15, 1858.*  
I WILL be very glad to see you any time when you may have occasion to be in Manchester, in the interval I expect to be in town on the 29th and 30th instant, and provided you are at home we can resume our discussion about the bridges. I have no objection to the two ton test, and a much larger margin, only I think we should understand correctly what that margin is. Hoping to find you in town at the time above stated.

I am, &c.

W. FAIRBAIRN.

*Captain Tyler, R.E.  
&c. &c.*

*Railway Department, Board of Trade,  
Whitehall, November 17, 1858.*  
SIR,

I SHALL hope for the pleasure of seeing you on the 29th instant, as proposed in your letter of the 15th.

I remain, &c.

H. W. TYLER,  
*Captain, R.E.*

*W. Fairbairn, Esq.*

SIR,

*Limerick, November 23, 1858.*  
I AM sorry to find that I shall be unable to get back to London by the 29th, as I had hoped to do; but I will endeavour to call upon you at Manchester a few days later, if you are likely to be there; or I should be happy to meet you later in London.

I remain, &c.

H. W. TYLER,  
*Captain, R.E.*

*W. Fairbairn, Esq.*

*Inverness and Aberdeen Junction Railway.*

*Engineer's Office, Inverness,*

*April 4, 1859.*

SIR,

THE viaduct constructed across the Spey, for the conveyance of the traffic on this railway, is now completed, and will be ready for inspection any day after the 18th instant. Perhaps, therefore, you will direct an officer from your board to come at such time as may be convenient for him after the 18th, to examine and test the bridge.

It will be obliging if you will give me notice as early as convenient, when the officer proposes to be at the Spey, in order that I may inform Mr. Fairbairn, who wishes to be present at the examination.

I have, &c.

W. J. MITCHELL.

*Captain Galton, R.E.  
&c. &c.*

*Railway Department, Board of Trade,*

*Whitehall, April 26, 1859.*

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copies of two reports made by Captain Tyler, R.E., the officer appointed by them to inspect the viaduct which carries the Inverness and Aberdeen Junction Railway over the river Spey.

Upon consideration of these reports, my Lords direct the Inverness and Aberdeen Junction Railway Company to postpone the opening of the viaduct in question for the public conveyance of passengers for a period of one calendar month from this date.

I have, &c.

DOUGLAS GALTON,

*Captain, R.E.*

*The Secretary to the*

*Inverness and Aberdeen*

*Junction Railway Company.*

*Railway Department, Board of Trade,*

*Whitehall, April 23, 1859.*

SIR,

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 7th instant, I have inspected the viaduct which carries the Inverness and Aberdeen Junction Railway over the river Spey.

This viaduct consists of a pair of box girders, 245 feet long, and covering a span of 230 feet, supported on masonry abutments, with six land arches of masonry on the west, and one on the east of the river.

It is situated in a hollow, with gradients of 1 in 60 on the east, and 1 in 100 on the west; and there is no level portion between the former gradient and the iron girders, though the incline is less severe on the immediate approach to them.

It has been constructed for a double line of rails, and, considering its situation, it is evidently desirable that there should be a double line of rails running over it, which might, with great advantage, be continued up to Mulben Station on the one side, and the Orton Junction on the other. The double line which has been laid down, extends, at present, only to a short distance on each side of it.

It has been virtually opened for public traffic for many months, and the north line is that over which the trains are conducted. When only one line is loaded, upwards of two thirds of the strain from the rolling load, is brought, at present, upon one girder, because the distances from the middle of either line of rails to the middle of the two girders, are 19' 3" and 8' 3", respectively.

The camber which it was intended to give to the girders was lost, it is stated, in consequence of the failure of one of the bearing piles which supported the temporary viaduct on which they were erected; and the south girder is a little out of line, its direction having been disturbed by a strong wind during its construction.

The engineer of the company desired that the bridge should be tested for a double line, for which it has been constructed, and with which, as I have already explained, it is laid; though he may, perhaps, take up the second line, and substitute, instead of the present arrangement, a single line of rails placed in the middle between the two girders.

For a testing load, a total weight of one ton per foot run for each line, had been provided, at my request. Two engines and tenders, and eight waggons loaded with ballast, upon each line, just covered the bridge, and weighed altogether 408 tons; and rails were ready to be placed upon the platform, so as to make the whole testing weight up to 460 tons.

I first tried the bridge with the rolling load, of 408 tons only. After three tests with this load, I found that a permanent set of half an inch had been given to each girder, and that the deflection due to the weight was, in addition to this permanent set, 2 $\frac{1}{4}$  inches, or about .00674" for each ton.

The extra load, of 52 tons of rails, was then laid on the platform; and the deflections of both girders were taken eleven times, as the rolling loads were moved on and off each line. It occupied, perhaps, half an hour, or three quarters of an hour, to place these rails upon the platform; and the deflection which they separately occasioned could not be taken so accurately as the remainder; but, at the above rate, the additional deflection from them would obviously have been .32", or nearly a third of an inch. The deflec-

tions from the rolling load were similar to what they had been previously, and the total deflection of the girders, from a load of a ton to the lineal foot on each line of way, was, therefore, a little more than three inches, independently of the permanent set, which latter amounted to  $\frac{1}{16}$  in one girder, and an inch in the other, at the end of all the trials.

The girders are stated to have gone down three inches from their own weight; they have lost an additional inch of permanent set; and they deflect  $\frac{3}{4}$ , independently of that permanent set, under a load of 460 tons. Their gross deflection for 809 tons has therefore been seven inches, or at the rate of about .00789 per ton. Their ultimate deflection would not probably be more than 15 inches.

The deflections were taken with levelling instruments, placed on solid ground, on the east of the girders: the readings were noted, for one girder by the assistant of the company's engineer, and for the other by myself, on each occasion. The loads were, for the most part, brought on both lines from the west end of the bridge, so as not to cause disturbance to the instruments. The results were closely similar on the two girders.

The permanent set, which increased gradually, up to nearly an inch, after the set, of from three eighths to seven sixteenths, which was obtained on the first test, and half an inch on the first three tests, indicates that the metal was being strained beyond the limits of elasticity; though I should add, that, in the later trials, made after the extra 52 tons had been laid upon the platform, it appeared to have reached its maximum for the load employed, and no further additions to it were then observable.

The lateral oscillations of the girders varied between a quarter and half an inch, and this would no doubt be increased in a high wind. The girders are now connected together, at their ends, by cross-beams of sufficient height to admit of the engines and trains passing under them.

With regard to the strength of this bridge, it will, perhaps, be within their Lordships' recollection, that I had some correspondence with Mr. William Fairbairn of Manchester, by whom the iron work of the bridge has been designed and constructed, in the latter part of last year; and that I then pointed out, that it did not appear, even by his own calculations, to be sufficiently strong for the purpose for which it was intended. It is now necessary to revert to this subject.

Taking the gross sectional area of the bottom of one girder at  $111\frac{1}{2}$  square inches, the depth at 16 feet, and the span at 230 feet, and using a constant of 80 (to express four times the ultimate strength of the material in tons per square inch) Mr. Fairbairn estimates the central breaking weight for each girder at  $\frac{111\frac{1}{2} \times 16 \times 12 \times 80}{230 \times 12} = 620\frac{1}{2}$  tons, according to the formula  $W = \frac{a d c}{l}$ ,

which he is accustomed to employ. And he thus deduces a distributed breaking weight of  $4 \times 620\frac{1}{2} = 2,482$  tons, for the two girders, or, in other words, for the total strength of the bridge.

Even if these figures could be fairly taken as representing the strength of the bridge, I should not consider it sufficiently strong; but, further, employing the same formula, I am unable to estimate the strength of this bridge so highly, for several reasons. In the first place, Mr. Fairbairn has included in the area of the bottom web, two packing strips, which lie under the angle irons at the sides of the girders. These are not covered, technically speaking, at their joints; and they lose their continuity, and therefore the whole of their strength, at the points where they abut against the covers of the lower plates of the girder, at every 12 feet along the bridge. This reduces the working area of the bottom, without deducting for rivet holes, to  $98\frac{1}{2}$  square inches. In the second place, it is not fair to calculate the depth as extending further than between the bottom of the girders and the middle of the top cells; whereas, Mr. Fairbairn considers it to extend from the top to the bottom of the girders. It should properly be measured from the centre of gravity of the top, to that of the bottom section; and  $15\frac{1}{2}$  instead of 16 feet, is even in excess of what should be allowed as the working depth of the girders. In the third place, the constant of 80, deduced by Mr. Fairbairn from the experiments made upon the model tube at Millwall, with a view to the determination of the dimensions of the large tubular bridges on the Chester and Holyhead Railway, is rather a high one. Mr. Clark, in his work on the Britannia and Conway bridges, deduces from the same experiment, at p. 188, vol. i., a constant of  $74\frac{1}{4}$ ; which is  $4 \times 18\frac{1}{2}$ , or four times the mean results of three experiments, in which the bottom of that tube gave way, with strains of 19, 20 $\frac{1}{2}$ , and  $16\frac{1}{2}$  tons, respectively. And Mr. Fairbairn, himself, says (the italics being mine), at page 73 of his own work on the subject of these bridges:—"Subsequent experiments sufficiently justified the general form of these conclusions, " while an improved series of results determined the co-efficient " to range between  $74\frac{1}{4}$  and 80. The latter number is now used as " the co-efficient in the formula for computing the strength of hollow girders and wrought iron tubes."

Under these circumstances, I should not think it right to give a higher estimate for the strength of this bridge, than is afforded by calculations, in which the span is taken at 230 feet, the depth at  $15\frac{1}{2}$ , the bottom area at  $98\frac{1}{2}$ —say 99", and the constant at  $74\frac{1}{4}$ ; and this is without deducting for rivet holes in the bottom area, because the above constant is arrived at without any such deduction in the case of the Millwall model tube. The calculation then becomes,  $\frac{99 \times 15\frac{1}{2} \times 74\frac{1}{4}}{230} = 488\cdot37$  = the central breaking weight

of each girder; and  $4 \times 488\cdot37 = 1,953\cdot48$  tons = the breaking weight for the whole bridge.

The weight of the bridge, itself, is given at 400 tons, and this would be reduced to 375 tons between the abutments, if the weight of the portions of the girders which rest on the abutments be deducted from this total weight. The weight of the platform, also, without ballast, is stated to be 46 tons; and we have thus a total stationary load of 421 tons. The maximum rolling load, taken at 408 tons, (which was that which I had upon the bridge, and which was composed of two engines and tenders, and eight loaded trucks, on each line of way,) added to the stationary load, gives a total load of 829 tons; and this total load divided into 1,953 tons, which represents the breaking weight of the bridge, gives a factor of safety of only 2.355 (or about 2½) when a double line is employed. This fully

accounts for the permanent set which occurred in the girders during my tests, as above described.

If only a single line is employed, then, adding the stationary load of 421 tons, to a rolling load of one ton per foot run, or 230 tons (which is a larger proportion than I have allowed for a double line, but not more than should be used in calculating for a maximum load for a single line), the factor of safety becomes  $\frac{1953}{651} = 3$ , which is much smaller than is desirable in a railway bridge.

The model tube from which the constants above given were derived, was constructed of particularly good material, and it must be considered, therefore, that it is more prudent to take an average result, as Mr. Clark has done, than a high one, as Mr. Fairbairn has done, for indicating the ultimate strength of the material, in plate girders and tubes in general.

The results above shown are, in plain language, that, when the strength of this bridge is, as I consider, fairly calculated, the breaking weight of the whole bridge is only two and a third times the greatest load, when a double line, and is only three times the greatest load, when a single line (in the middle), are respectively placed upon it.

I have, hitherto, purposely adapted my calculations to Mr. Fairbairn's method, because the bridge has been constructed by that gentleman; but I will now state the strains to which the bottom of the girders is subjected at the centre, in the terms more commonly employed, by other engineers, with reference to wrought-iron structures.

The span, depth, and bottom area, being taken, as above, at 230,  $15\frac{1}{2}$ , and 99 square inches, for each girder, respectively; and the weight of the whole stationary load being 421 tons; while that of the rolling load, for a double line is 408 tons, and for a single line, 230 tons;—then I find that the strains per square inch, upon the gross area of the bottom of the girders, are as follows:—

	Strains in tons per square inch of gross sectional area.
Stationary load (421 tons)	- - - 4·008
Rolling load for double line (408 tons)	- - 3·884
Rolling load for single line (230 tons)	- - 2·189
Total load for double line (829 tons)	- - 7·893
Total load for single line (651 tons)	- - 6·198

These strains, of nearly eight tons per square inch for a double line, and upwards of six tons per square inch for a single line, must be contrasted with 18·6 tons per square inch as a breaking strain, the plates being supposed to be of excellent quality, and no deduction being made for the weakening of the plates by rivet holes.

There are, however, seven rivets in a row in the bottom plates of the girders, two rivets in each angle iron, and two through the middle strips. The rivets being an inch in diameter, and  $1\frac{1}{2}$ " being allowed for the rivet holes, the sectional area of the bottom web actually to be depended on, is reduced by  $22\frac{1}{4}$  square inches. It thus becomes  $98\frac{1}{2} - 22\frac{1}{4} = 76\frac{1}{2}$ ; and, calculating as above, the maximum strains upon the working area of this bottom web are, 10·2 tons per square inch in the case of a double line being employed on the bridge, and 8·02 tons per square inch in the case of a single line being used upon it. This is twice the strain for a double line, and upwards of half, in fact three-fifths, as much again for a single line, as the strain of 5 tons per square inch, which (as I am informed in the circular letter that I received from you on the 30th March last) is, according to the opinion of their Lordships, the greatest that should be allowed in wrought-iron bridges.

I have already mentioned, that, while the bridge is laid with a double line, and used only for a single one, as at present, upwards of two-thirds of the rolling load comes upon one girder, and that, therefore, the strain is by so much greater per square inch upon the north girder than it would otherwise be. This might, of course, be obviated, by placing a single line in the middle between the two girders of the bridge, if the idea of using it for a double line were given up. The strains would then be as I have stated them, for a double and single line, respectively.

In calculating the strength of wrought-iron girders, the sides are not in practice taken into account, and I have hitherto omitted all reference to them in the present report. It is right, however, that I should now say a word or two on the subject.

The Millwall model tube, like tubular girders in general, had only two sides; whilst the box girders employed by Mr. Fairbairn have two sides each; and there are, therefore, four sides, so to speak, acting upon such a bridge as that over the Spey. When a constant, of either  $74\frac{1}{4}$  or 80, as above referred to, is considered as derivable from the Millwall experiments, (according as the ultimate strain is taken at 18·6 or 20 tons per square inch of the metal,) it is to be remembered that the sides of the model tube were acting to produce the results obtained, and that if there had been four sides instead of two somewhat higher figures would have been given. Now, the metal in the sides of the Spey bridge cannot be considered to be acting in tension to the same advantage (in proportion to the depth of their respective parts) as the metal at the bottom, because the joints at the sides are only single riveted, as well as for other reasons; but it does undoubtedly add to the strength of the girder. The amount of additional strength which is thus obtained in practice cannot be accurately estimated, and more particularly when the girders are not straight, as is the case with one of those under consideration. It is evident, from the extract which I have above quoted from Mr. Fairbairn's work upon the Conway and Menai bridges, that it is not on account of any increased strength thus obtained that he increases his constant from  $74\frac{1}{4}$  to 80, because he states that the latter constant applies to "wrought-iron girders and tubes"; and, indeed, as he computes the strength of one girder, having only two sides, in the first instance, and then doubles the amount of breaking weight thus obtained, in order to obtain the ultimate strength of the two girders, he takes two sides in each case into consideration.

At the same time, wishing to allow to the girders in question as much strength as they can in fairness be assumed, under all circumstances, to possess, I should prefer, in stating the strain upon

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the net area of the section, to add, on account of the sides, about one-half of what is taken from the gross area of the bottom, as the deduction for rivet holes. Such an allowance would reduce the maximum strain in tension on the working area of the metal, to about nine tons per square inch for a double line, and seven tons per square inch for a single line, over the bridge, as against a breaking strain of not much more than twenty tons per square inch for unpunched plates. Somewhat similar figures to those which have before been given, viz., 2 $\frac{1}{2}$  and 3, would thus, also, represent the factors of safety, for a double and a single line, respectively.

These strains are still a good deal in excess of what their Lordships consider desirable; and, having reference to bridges of this description, I entirely agree with the opinion that their Lordships have expressed, which, in fact, only embodies the practice now generally carried out by the majority of engineers. A maximum strain of five tons to the square inch, has been given in other bridges of larger dimensions, though the Conway tubes, of 400 feet span (which are much weaker than the Britannia bridge), would, if loaded with one ton to the foot run, throughout their lengths, be strained to very nearly the same amount as the Spey bridge, carrying a similar rolling load on one line of way. The Conway tubes, however, are not liable, from their greater length, to be subjected to loads so heavy in proportion as the Spey bridge, and their own masses bear a much larger proportion to the loads passing through them.

I have no doubt that Mr. Fairbairn has employed good materials in the construction of this bridge, and these materials appear to have been carefully put together; but, whilst admitting that there is a considerable margin between the strength that is desirable in such structures and actual fracture, I am of opinion, that this bridge could not be used, through a series of years, for a double line, without danger to the public; and I consider that it is weaker than it ought to be, by at least two-fifths of its present strength, even to carry a single line, if it were placed in the middle between the two girders.

Captain Galton, R.E.  
§c. §c.

I have, &c.  
H. W. TYLER,  
Captain, R.E.

Railway Department, Board of Trade,  
Whitehall, April 26, 1859.

SIR, I HAVE the honour to acknowledge the receipt of your letter of yesterday, in which, with reference to my report upon the viaduct which carries the Inverness and Aberdeen Junction Railway over the river Spey, you request me to state whether, in my opinion, the opening of that viaduct for the public conveyance of passengers, will be attended with danger to the public using the same.

I have already stated, in my report referred to, that this viaduct has for many months been employed for the conveyance of passengers, that it is laid with a double line, and that, in my opinion, it could not be used through a series of years for a double line without danger to the public.

I apprehend, that, so long as this viaduct is thus laid with a double line, the question as to whether it can safely be used for a single one, does not properly come before their Lordships; and that I am not required to report more precisely upon it except in its existing state. I have explained in my report, that the north line only is used, as I am informed, as the main passenger line; as well as that, if the bridge were to be used permanently for a single line, that single line ought to be placed in the middle between the two girders. Looking to the existing state of this bridge, I have no hesitation in further reporting my opinion, that its being opened for traffic is, by reason of the incompleteness of the works, attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
§c. §c.

H. W. TYLER,  
Captain, R.E.

SIR,

Manchester, May 4, 1859.  
I HAVE been favoured, through Mr. Mitchell, the engineer of the Inverness and Aberdeen Junction Railway, with a copy of Captain Tyler's report on the tubular girder bridge, of 230 feet span, recently erected across the river Spey.

As the construction of the superstructure of that bridge was left entirely in my hands, on the part of the engineer and the directors, I consider myself responsible to the public for the full and perfect security of that bridge.

The strengths of the girders, the quality of the material, and the general character of the workmanship, were based upon a resistance of six times the heaviest load that could ever come upon the bridge, and it has only occurred to me since the receipt of Captain Tyler's report, that a different formula and a different estimate of the margin of security had been adopted by the Board of Trade.

In all my constructions I have never attempted to weaken that margin of security, and had I been aware at the time of the contract that such extra security was required, it would have formed the leading principle in the construction of the bridge. Acting, however, under the impression that six times the heaviest load would be acceptable to the Board of Trade, as well as the public security, the bridge was constructed and calculated from that datum. Having stated this much, I may be permitted to question the conclusions Captain Tyler has arrived at in these calculations; and to show that they are not founded on the facts of the case, I may be excused for contrasting those opinions and calculations with my own, and other authorities of as high standing as that of Captain Tyler. I do not, however, enter upon this investigation with any desire on my part to defend a position where weakness is visible, on the contrary, I am prepared to acknowledge and to remedy any existing defect, but I am not prepared to admit the sweeping clause of condemnation as arrived at by Captain Tyler.

Captain Tyler, in the opening of his report, states what is perfectly correct, "that the viaduct consists of a pair of box girders, 245 feet long, covering a span of 230 feet, supported on masonry abutments, &c.;" and he then goes on to describe the position, approaches, and gradients that border upon the bridge on each side, but which has no direct reference to the question under consideration. He then goes on to state that having made preparations for the required tests of 2 tons to the lineal foot,\* a load of 408 tons was laid on, and, after three tests with this load, a permanent set of half an inch was given to each girder with a deflection of 2 $\frac{1}{2}$  inches. An additional load of 52 tons of rails were then laid on and the deflection of both girders were taken eleven times as the rolling loads were moved off and replaced upon the line, and amounted, although not accurately taken, to 3 inches. Now, in reply to these statements, I have the returns from my own engineer and that of the company who were present, and the following table will show the correct deflections and permanent set from the time when the scaffolding was removed up to the conclusion of the tests.

DEFLECTIONS AND SET.

No.	Weight on Bridge in Tons.	North Deflection in inches.	Girder Set.	South Deflection in inches.	Girder Set.
1	408	—	7 $\frac{1}{2}$	—	—
2	408	2 $\frac{1}{2}$	1 $\frac{1}{2}$	—	—
3	408	2 $\frac{1}{2}$	3 $\frac{1}{2}$	—	—
1 a.	400	3	1 $\frac{1}{2}$	—	—
2 a.	400	3	1 $\frac{1}{2}$	—	—
1 b.	408	—	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{1}{2}$
2 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
3 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
4 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
5 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
6 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
7 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
8 b.	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$
9	400	—	—	2 $\frac{1}{2}$	1 $\frac{1}{2}$

From the above it would appear that the deflection of the bridge, due to a load of 408 tons was 2 $\frac{1}{2}$  inches, equivalent to  $\frac{3}{8}$ ths, or 673 inches to every 100 tons. This being the case, and taking the ultimate deflection as calculated at 16.9 inches, it therefore follows that it would require 2,090 tons to break the bridge. In regard to the packing strips, it is true they have not covering plates the same as in the joints of the large plates, but the bridge has an extra thickness in the side plates, and four strong angle irons that cover the break of joint.

Captain Tyler says it is not fair to calculate the depth of the girder further than the middle of the top cells. In reply to these remarks, I apprehend that Captain Tyler is probably not aware that  $d$ , in the formula  $W = \frac{a d c}{l}$ , was deduced not for the centre of the top cells but for the whole depth of the model tube; and again, with regard to the constant 80, that number was derived from the last experiment on the model tube, and confirmed by subsequent experiments, and fully acknowledged by some of the first mathematicians in the kingdom. If this constant is wrong according to Captain Tyler, the public, as well as myself, have been labouring under a mistake that it is most desirable should be rectified.

Taking the new constant of 74, and throwing away the packing strips, and taking the depth of the girder at 15.3 instead of 16 feet under the angle iron, Captain Tyler arrives at a breaking weight of 1,953.48 tons equally distributed. Now these deductions are decidedly unfair, both as regards the formula and the deduction of the depth of the girders, as also abandoning the strips without allowing for the sides, which are in a state of tension up to the mutual axis of the girders. But even upon Captain Tyler's calculations of the breaking weight of 1,953 tons, there is still a large margin left, after deducting the weight of the bridge and permanent way, as under 1,953 - 421 = 1,532, or about 4 $\frac{1}{2}$  times the greatest load that can ever come upon the bridge.

With regard to the greatest load, I have taken some pains to estimate the weight of the heaviest trains with double engines to each, and I find them to be considerably under 1 $\frac{1}{2}$  tons to the lineal foot. I have no objections to the test of two tons, but in talking of the heaviest load as a measure of strength, it is assuredly correct to make the comparisons by the maximum load possible, and not by a load at least one-fourth heavier, to which the bridge can never be subjected.

In the report it was observed that the model tube was constructed of particularly good material. Now, I am utterly at a loss to know where Captain Tyler obtained this information, as I was present myself at every experiment on the model tube, and I can assure him it was not composed of selected plates, but of common iron taken promiscuously from the warehouse. Again, Captain Tyler arrives at the conclusion that the Spey bridge is composed of common plates which would fracture with a force of 18.6 tons to the square inch which is a low estimate, and indeed the whole of the calculations are reduced to the minimum. I have, however, to state, for the information of their Lordships, that there are two kinds of iron in the Spey bridge, one of double wrought plate for the bottom, and the other for the sides and top of the best Staffordshire and angle iron; the former averaging from 22 to 24 tons on the square inch, and the other ranging from 20 to 21 tons per square inch. For the last ten years all the bridges I have had to do with have been composed of this material, and I can assure Captain Tyler that he may safely raise the standard value of his material for tension from 18.6 up to 22 tons on the square inch. I quite agree with Captain Tyler's remarks on the effect of the sides in a tubular girder in regard to tension, but I do not agree with him that the sides of the Spey Bridge "cannot be acting in tension otherwise than what is derived from single rivetting." In single rivetting it will, how-

\* My calculations were founded on the weight of two heavy trains, each 170 to 180 tons, as the greatest load, exclusive of the dead weight, that could ever come upon the bridge.

ever, be observed, if Captain Tyler will refer to the experiments on, rivetted plates in the transactions of the Royal Society, Part 2, 1850 he will find that the single rivetted joints are equal to at least one-half the solid plate, or in the ratio of 100 to 56, and, making allowance for the distance of the rivets in the case of the Spey bridge, he may fairly assume 40 as the maximum strength of those parts, diminishing in the ratio of the distance from the mutual axis round which the two forces of tension and compression revolve.

In conclusion, I have to state, if Captain Tyler's conclusions are correct, that the Spey bridge is weaker than it ought to be by at least 2-5ths in its present strength, even to carry a single line, it is time to look out for a serious amount of casualties in bridges now in existence.

Captain Galton, R.E.  
&c. &c.

I have, &c.  
WM. FAIRBAIRN.

Railway Department, Board of Trade,  
Whitehall, May 31, 1859.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the observations made by Captain Tyler, R.E., upon Mr. Fairbairn's letter of the 4th instant, on the subject of the Spey viaduct on the Inverness and Aberdeen Junction Railway.

My Lords direct me at the same time to request that they may be informed—

1st. What course the Company propose to pursue in respect of this viaduct, as their continued user of this bridge after the prohibition to open it given by their Lordships, subjects the Company to a penalty of 20*l.* per day for every day during which they have so used it?

2nd. What reasons the Company have to urge why my Lords should not take proceedings for the recovery of the penalties already incurred?

The Secretary of the  
Inverness and Aberdeen  
Junction Railway Company.

I have, &c.  
DOUGLAS GALTON,  
Captain, R.E.

SIR, Bradford, May 16, 1859.

I HAVE the honour to return herewith, Mr. Fairbairn's letter of the 4th instant, referred to me with your's of the 7th instant, for my observations.

Mr. Fairbairn states at the commencement of that letter, that "the quality of the material, and the general character of the "workmanship" of the Spey bridge "were based upon a resistance "of six times the heaviest load that could ever come upon the "bridge."

I have already fully explained, in a correspondence with him, of which their Lordships, and the Railway Company for which the bridge has been constructed, are in possession, that when the weight of a bridge and platform of these dimensions are added to that of the heaviest load that can be brought upon it, this margin of six times becomes very much reduced; and that the ultimate strength of such a bridge ought to be contrasted, not with the rolling load only, after once the stationary weight has been deducted, but with the total load, moving and standing, which it has to support.

The maximum strain upon the metal, of five tons to the square inch, which their Lordships desire to obtain in bridges of this description, requires, in round numbers, that the bridge should be able to support four times the stationary load, in addition to four times the greatest moving load that can be brought upon it.

When Mr. Fairbairn states that the position of the bridge, and the gradients on either side of it, have no direct reference to the question under consideration, it becomes my duty to add, that its situation, in a hollow between two steep gradients, (one of which, of 1 in 60, runs down to within a short distance of, and is only eased off so as to conduct to the bridge itself,) renders it desirable that it should be, if anything, stronger than would otherwise be desirable.

With regard to the deflections of the bridge, Mr. Fairbairn has, of course by an oversight, made it appear, by the table which he has compiled from the observations taken by the assistant engineer of the company, that the south girder gave deflections of about two and three quarter inches, under a load of 460 tons; whereas, as he afterwards correctly mentions, that was the deflection obtained, though with occasional variations, as might be expected, from 408 tons. Calculating the strength of the bridge from its deflections, upon the assumption that 16·9 inches would be its ultimate deflection, and omitting from consideration the permanent set which it yielded of fifteen sixteenths of an inch, he even then only obtains for the bridge a strength of 2,090 tons, which is 372 tons less than he estimated it at by his original calculation. As I stated in my report on the bridge, I had myself computed the ultimate deflection to be about 15 inches.

Mr. Fairbairn admits that the packing strips have no covering plates. When he states that four angle irons cover their break of joint, it must be remembered that these angle irons have their own duty to perform, and that their whole section is allowed for in calculating the strength of the bridge. The deduction for these packing strips is the most serious that has to be made from Mr. Fairbairn's calculation.

With regard to the depth, Mr. Fairbairn apprehends, that I am not aware, that the formula,  $W = \frac{a d c}{l}$ , was deduced, not for the mean depth, but for the whole depth of the model tube at Millwall; and he adds, that the constant, 80, was derived from the last experiment on the model tube, and that it was confirmed by subsequent experiments, and fully acknowledged by some of the first mathematicians in the kingdom.

There are two valuable works in which the experiments upon the model tube are given,—the publication of Mr. Fairbairn him-

self,—and that of Mr. Clark, which is put forth under the authority of Mr. Robert Stephenson.

In deducing a formula for future practice, Mr. Fairbairn employed the one experiment, in which the model tube gave way at the bottom under the greatest strain; and, taking the whole depth of the tube, 54 inches, he arrived at the constant of 80 which is referred to.

Mr. Clark, on the other hand, employed the three experiments in which the model tube gave way at the bottom, (namely, those which he enumerates as the 1st, the 3rd, and the 4th,) under strains of 19, 20·3, and 16·6 tons, per square inch, respectively. Taking the mean strength of the bottom of the tube from the average of these three experiments, he set it down at 18·6 tons per square inch of the gross sectional area, or of the sectional area of the bottom without deducting the area of the rivet holes. In his calculation of the strains, he employed, not the whole depth of the model, 54 inches, but the depth, from the bottom to the middle of the top cells, of 51 inches; and he arrived at a constant of 74·4, which is, in fact,  $4 \times 18\cdot6$ , as that which it is right to employ in analogous girders.

In taking a constant of 74·4, and mean depth,—instead of the constant of 80, and the total depth, employed by Mr. Fairbairn,—I am acting, therefore, not only upon excellent authority, but also upon reasons that admit of easy and full explanation. Indeed, I might, with almost equal justice, derive from the 4th experiment, in which the model tube gave way at the bottom with the lowest strain, (of 16·6 tons to the square inch,) the constant of 70,—as Mr. Fairbairn that of 80, for which he contends, from the experiment in which the model tube gave way under the highest strain.

In adopting the medium constant of 74·4, given by Mr. Clark, with a mean depth for the girders, I conceive, therefore, that I am only doing what is right and fair. If Mr. Fairbairn will refer me to any of those subsequent experiments, by which, as he states, his calculations with a higher constant are confirmed; or refer me to the works of those of the first mathematicians in the kingdom by whom they have been fully acknowledged, I shall be glad to give to them my attentive consideration.

When Mr. Fairbairn asks, where I obtained the information, that the bottom of the model tube was composed of particularly good material, I must again refer him to Mr. Clark's work, in which, at p. 186, vol. 1, I find the following passage:—"It is important to observe that the iron used in the bottom was of very excellent quality."

Upon re-perusing my report, Mr. Fairbairn will find that he does not properly represent me, when he states that I have come to the conclusion, that the bottom of the Spey bridge is composed of common plates, which would fracture with 18·6 tons to the square inch. On the contrary, I have taken 18·6 tons per square inch as their ultimate strength in the bottom of the bridge, when the gross sectional area alone is considered, that is to say, when the rivet holes are not deducted. That was the mean strain, as I have already explained, under which the bottom of the model tube gave way; and, the sides being considered as acting in both cases, have, in fact, put the plates used at the bottom of the Spey bridge, on a par with those employed in the model tube. In another part of my report,—near the end of the last paragraph but two,—I contrasted the strains upon the plates, after deducting for rivet holes, with "a strain of not much more than 20 tons per square inch for unpunched plates."

With regard to the sides, Mr. Fairbairn will find, if he will work out the calculation, that the allowance which I have made on account of those parts of them which may be considered as acting in tension, is as nearly as possible that which he suggests—viz., 40 per cent. upon the strength of the plates. An addition to the net area of the bottom, of half of the amount by which it is weakened by rivet holes, does, in fact, strengthen the girder to the same extent as the sides, on this assumption, and supposing the lower half of them to be acting in tension; though I may add, that I am hardly justified in adding so much in this instance, on account of the curvature which has unfortunately been produced in one of the tubes during its construction.

Since writing the above, I have had the pleasure of seeing Mr. Fairbairn, himself, at this office, and of conferring with him upon the subject of the bridge in question. I learn from him that he now proposes to lift the bridge, so as to relieve it from the strains in tension and compression, to which its parts are respectively subjected, and to add to it as much metal as will bring those strains within the limits which I have stated to be desired by their Lordships. I need not, therefore, pursue the subject any further at present.

I have, &c.  
Captain Galton, R.E.  
&c. &c.  
H. W. TYLER,  
Captain, R.E.

Railway Department, Board of Trade,  
Whitehall, May 31, 1859.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 6th instant, upon the subject of the Spey viaduct on the Inverness and Aberdeen Junction Railway, and to transmit to you the enclosed observations made thereon by Captain Tyler, R.E.

I have, &c.  
W. Fairbairn, Esq., R.E.  
&c. &c.  
DOUGLAS GALTON,  
Captain, R.E.

Railway Department, Board of Trade,  
Whitehall, May 23, 1859.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Viaduct which carries the Inverness and Aberdeen Junction Railway over the river Spey.

Appendix  
No. 1.Inverness and  
Aberdeen  
Junction Rail-  
way (Spey  
Viaduct).

Upon consideration of that report, my Lords direct the Inverness and Aberdeen Junction Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for a further period of one calendar month from this date.

I am, &amp;c.

JAMES BOOTH.

*The Secretary of the  
Inverness and Aberdeen  
Junction Railway Company.*

SIR,

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 12th instant, I have re-inspected the viaduct which carries the Inverness and Aberdeen Junction Railway over the river Spey.

There is not now any connexion between the two lines of rails on this viaduct; but both lines are still in their places; and the weight of the traffic passing over it is, therefore, as I have before shown, very unequally distributed upon the iron girders; upwards of two-thirds of the moving load being, in all cases, thrown upon the north girder.

I do not wish to create any unnecessary alarm, and I admit, as I have always been ready to do, that there need be no immediate apprehension of the fracture of the girders; but I maintain that the margin of strength which is necessary in a work of this nature has not been afforded; and I am unable, therefore, to recommend their Lordships to sanction the opening of this viaduct for public traffic.

The most careful supervision cannot, or, at least, such supervision as structures of this description commonly receive, do not, prevent portions of the metal from becoming oxidized, and eaten away, from time to time: the most cautious selection will not ensure the best material, of the description used, even in those parts where it is most required; and an element of risk is introduced, as soon as the limits of the practical elasticity of the metal are infringed upon, in a work which is intended to be in constant use for a long series of years. I have already given the strains to which the girders are subjected, and I have stated those to which I think they ought to be limited, namely, 5 tons to the square inch. This would cause the breaking weight to be equal to about four times the total maximum load.

Under these circumstances, I can only repeat, in the terms which I am required in such a case to employ, that I am of opinion, that the opening of this viaduct would be, by reason of the incompleteness of the works, attended with danger to the public using the same.

After my tests upon the girders on the 19th of last month, the assistant of the engineer of the Company made marks upon them, and upon the masonry of the abutments, as a record of the then condition of the bridge. On comparing those marks yesterday, I found that the north girder was shown to have risen  $\frac{1}{16}$ , and the south girder  $\frac{1}{8}$  of an inch, since they were made; and that therefore they had regained so much of the permanent set that those tests had caused to them.

I also found that the middle of the south girder was 1.98", and that of the north girder was 1.704", below the mean height of their two ends, respectively; as well as, that, at a point over the 19th cross girder, or about 74 feet from the east end, the north main girder was 1.08" lower than at the middle, while at a point over the 20th cross girder, or about 78 feet from the east end, the south main girder was .66" lower than at the centre. This sinking of the girders, which is greatest between 70 and 80 feet from their east ends, is stated, as I have already mentioned in my previous report, to have been occasioned in consequence of the failure of one of the bearing piles of the temporary viaduct on which they were constructed.

I learn from the engineer who took the levels of the girders before their supports were removed from beneath them, that they had then a camber of between  $2\frac{1}{2}$  and  $2\frac{1}{4}$  inches—say 2  $\frac{1}{8}$  inches. It would therefore appear, that they have sunk altogether, in the middle, the north girder 4.89, and the south girder 4.66 inches, as the combined effect of their own weight, the traffic which has passed over them, and the tests which have been applied to them. This is, of course, independent of, and in addition to, the deflections which the girders yield under passing loads; and the passage of a heavy goods train, or 180 tons, on the present line, over the bridge, would increase this deflection to 6 inches, in the north girder, as against an ultimate, or breaking deflection, estimated by myself at 15 inches, or by Mr. Fairbairn at 16.9 inches. This would, in either case, be more than one third of the ultimate deflection.

It is right that I should mention, in concluding this report,—what I had not before observed,—that whilst the top plates of these girders have short covers at their joints, with a row of rivets on each side, the angle irons, which form a considerable portion of the sectional area at the top, are not covered at all at their joints, and are far, in many cases, from coming into close contact with each other, as they ought to do, if they are considered to be doing their full duty in compression at the top of the girders.

I have, &amp;c.

*Captain Galton, R.E.  
&c. &c.*

H. W. TYLER,  
*Captain, R.E.*

*Montrose, June 13, 1859.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 8th instant, I have re-inspected the viaduct which carries the Inverness and Aberdeen Junction Railway over the river Spey.

The Company have not made any alteration in this viaduct since my inspection of last month; and, under the same circumstances as those which were referred to in my report of the 20th ultimo, I am obliged again to state my opinion, that it cannot, by reason of the incompleteness of the works, be opened without danger to the public using the same.

I have, &amp;c.

*Captain Galton, R.E.  
&c. &c.*

H. W. TYLER,  
*Captain, R.E.*

*Inverness and Aberdeen Junction Railway.*

*General Manager and Secretary's Office,  
Inverness, June 13, 1859.*

SIR,

I HAVE the honour to acknowledge receipt of your letter, dated the 31st ultimo, in reference to the Spey viaduct, which has been under the consideration of the directors.

In reply to the first question contained in your letter, as to what course the Company propose to pursue in respect to this viaduct after the prohibition to open it by their Lordships, I beg to say that the directors have given instructions to Mr. Fairbairn and their engineer to take immediate steps for strengthening the bridge, so as to bring it up to the requirements of their Lordships.

In regard to the second question, as to "what reasons the Company have to urge why my Lords should not take proceedings for the recovery of the penalties already incurred," I am requested to say that it is not intended at present to use the viaduct for a double line, and if the Company considered that the temporary use of it was attended with the slightest danger to the public, they would on no account run the trains over it; but as it appears there is on reason to apprehend any immediate danger from its use as a single line, which view is confirmed by the tenor of Captain Tyler's report of date the 26th April last, addressed to you, and as any interruption to the traffic would be attended with the most serious consequences to the interests of the Company, and subject the public to great inconvenience, the Company venture to hope that their Lordships will not see cause to institute proceedings in respect of the penalties.

I have, &amp;c.

*Captain Galton, R.E.  
&c. &c.*

AND. DOUGALL,  
*Secretary.*

*Railway Department, Board of Trade,  
Whitehall, June 17, 1859.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 13th instant, relative to the opening of the Spey Viaduct on the Inverness and Aberdeen Junction Railway.

My Lords direct me in reply to inform you that although they much regret that the directors should have committed the irregularity of opening the line over the bridge without the previous inspection of one of their inspecting officers, it is not their intention, under all the circumstances of the case, to institute proceedings against the Company.

My Lords request that they may receive an early intimation of the steps taken to strengthen the bridge, as promised by the Company.

I am, &amp;c.

*The Secretary to the  
Inverness and Aberdeen  
Junction Railway Company.*

Douglas Galton,  
*Captain, R.E.*

*Inverness and Aberdeen Junction Railway.*

*General Manager and Secretary's Office,  
Inverness, June 21, 1859.*

SIR,

I HAVE the honour to acknowledge receipt of your letter, dated the 17th instant, in reference to the Spey Viaduct, which has been under the consideration of the directors, and I am requested to express their cordial satisfaction at the decision which their Lordships have arrived at, not to institute proceedings against the Company for the recovery of penalties.

The directors have given instructions to the engineer to draw up a statement, detailing what is proposed to be done to the viaduct to bring it up to the required strength, and I expect to be able to forward this to you on an early day.

I am, &amp;c.

*Captain Galton, R.E.  
&c. &c.*

AND. DOUGALL,  
*Secretary.*

## LEWES AND UCKFIELD RAILWAY.

SIR,  
*Railway Department, Board of Trade,*  
*Whitehall, October 1, 1858.*  
 I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Lewes and Uckfield Railway.

Upon consideration of that report, my Lords direct the Lewes and Uckfield Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.  
 T. H. FARRER.

The Secretary of the  
 Lewes and Uckfield  
 Railway Company.

SIR,  
*Railway Department, Board of Trade,*  
*Whitehall, September 28, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 23rd instant, I have inspected the Lewes and Uckfield Railway.

This is a single line,  $7\frac{1}{2}$  miles in length, connecting the London, Brighton, and South Coast Railway, by means of a junction a mile to the north of Lewes, with the town of Uckfield.

The permanent way is laid with the old rails of the Brighton Company, 15 feet long, and weighing 72 lbs. to the lineal yard. They are double-headed in section, and are supported in cast-iron chairs of the usual form, which are secured by wrought iron spikes to transverse sleepers, partly of larch, and partly of creosoted memel. The ballast is a mixture of sand and soft sandstone. The double-headed rails have been fished at the joints, and will, no doubt, do good service for a number of years; but I have found it necessary to recommend that the joints formed between them and certain bridge rails, which have been employed on some of the bridges, should be improved.

The bridges have been formed, in a great measure, of timber. In one viaduct, there are four openings constructed with cast-iron girders on timber piling, the two middle spans covering 28 feet, and the two outside spans 14 feet each. The ultimate strength of the four girders which carry the single line of rails in each of the two middle spans, may be estimated at about 25 tons each in the centre, which gives a distributed breaking weight for each of these spans of 200 tons. I do not think it necessary to condemn this bridge, but I would point out that it is not quite so strong as is desirable when cast iron is the material employed.

Two public road level crossings have been constructed on this line which have not received the sanction of Parliament. They are very near the junction with the Brighton Railway, and within a short distance of each other, and they are on roads leading from certain villages and hamlets to a species of island in marshy ground, on which are situated a farm and a church. I am informed that the church will be shut up as soon as another church, which is being built at some little distance on the other side of the railway, shall have been completed, and that the farm and burial ground will then be the only remaining causes of traffic on these roads. These crossings were originally recommended for sanction by Colonel Wynne, when he reported to Parliament on the subject of the Company's bill; but a bridge was provided in lieu of them, in consequence of the opposition of the people of the district, and of one landed proprietor in particular; and afterwards when this opposition changed into a desire to retain the level crossings, they were constructed. The gradients of the line have been somewhat altered from that which they would have been if a bridge had been built, and the roads being below the level of the railway, the construction of a bridge would now be rather a troublesome matter, necessitating the raising of the line for a considerable distance.

It will remain with their Lordships to decide, whether they will call upon the Company to construct a bridge or bridges before the opening of the line in lieu of these level crossings, or whether they will permit the line to be opened without their construction, and simply reserve to themselves the power of doing so, in case of their considering it desirable, at any future period. The engineer informs me that he was not aware until I pointed it out to him, that they were not provided in the Act, as he had simply observed that level crossings were provided at these points in the Parliamentary plans; and, looking to all the circumstances

of the case, I am disposed to recommend that the latter course should be pursued.

No engine turntable has yet been supplied at Uckfield, and I have not yet received the necessary certificate in regard to the working of the single line.

Under these circumstances, I beg to report my opinion, that the opening of the Lewes and Uckfield railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
 &c. &c.

H. W. TYLER,  
 Captain, R.E.

Appendix  
 No. 1.

INSPECTIONS.

Lewes  
 and Uckfield  
 Railway.

SIR,  
*Holyhead, October 12, 1858.*  
 WITH reference to my letter of the 5th instant, on the subject of the working of the single line of the Lewes and Uckfield Railway, I have now the honour to enclose, for the information of the Lords of the Committee of Privy Council for Trade, an amended certificate which I have this morning received from the company, and which provides that that line shall be worked with a train staff, in the manner recommended in the list of requirements with which their Lordships have furnished the company.

I have, &c.

Captain Galton, R.E.  
 &c. &c.

H. W. TYLER,  
 Captain, R.E.

Lewes and Uckfield Railway.

*Lewes, October 6, 1858.*

WE undertake that the Lewes and Uckfield Railway (the same being a single line), shall be worked in the manner following, namely, that a "train staff" shall be employed for the whole line, as shown in the following regulations, namely:—

No engine or train is to be permitted to leave either of the terminal stations of the line unless the staff is then at the station.  
 If no second engine or train is intended to follow immediately, the staff is to be given to the guard or person in charge.  
 If another engine or train is intended to follow in succession, a train ticket stating "staff following," will be given to the person in charge of the leading train, the staff itself being given to the last, after which nothing more can leave the station under any circumstances whatever until the return of the staff.

When a ballast train has to work on the line, the staff is to be given to the guard in charge, and when the load is taken up or discharged, the train is to proceed to the terminal station of the staff, in order to open the line either for an expected train or one that may be there in waiting.

The station-master or person in charge for the time is the sole person authorized to receive and deliver the staff, or to issue the tickets.

The engine man is not to start from a station until the guard or person in charge has shown him the train staff or train ticket.

ROBERT WILLIS BLENCOWE, } Of the Lewes  
 Chairman, } and Uckfield  
 JOHN SMITH, } Railway  
 Secretary, } Company.

*Railway Department, Board of Trade,*  
*Whitehall, October 8, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 6th instant, and its enclosures, and in reply to inform you, that upon receiving a statement from the parties who opposed before Parliament the two level crossings in the parish of Hamsey, numbered respectively 8 and 12 in the plans, that they no longer oppose them, my Lords will no longer object to the opening of the Lewes and Uckfield Railway, upon the following conditions, viz., that a turntable be constructed at the Uckfield terminus without delay; that until the turntable is completed, only tank engines be used on the line; and that the traffic be worked by means of a train staff; and that application be made to Parliament within the two next sessions to legalize the level crossings.

I am, &c.

The Secretary to the  
 Lewes and Uckfield  
 Railway Company.

DOUGLAS GALTON,  
 Captain, R.E.

Appendix  
No. 1.

## INSPECTIONS.

Lewes  
and Uckfield  
Railway.

## Lewes and Uckfield Railway.

*Hartswood, Reigate, October 9, 1858.*

I HEREBY certify to the Railway Department of the Board of Trade, that the bridge provided by section 23 of the "Lewes and Uckfield Railway Act, 1857," has been dispensed with, and that the said railway has been con-

structed across and on the level of the two roads numbered 8 and 12 in the parish of Hamsey, on the Parliamentary plan of the said railway, with the consent and concurrence of Sir Charles Merrick Burrell, Bart., at whose instance the clause as to the said bridge was introduced into the said Act.

ROBERT CLUTTON.

Limerick  
and Foynes  
Railway  
(Askeaton and  
Foynes).

## LIMERICK AND FOYNES RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, April 23, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the portion of the Limerick and Foynes Railway between Askeaton and Foynes.

Upon consideration of that report, my Lords direct the Limerick and Foynes Railway Company to postpone the opening of the portion of line in question for the public conveyance of passengers for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
Limerick and Foynes  
Railway Company.

DOUGAS GALTON,  
*Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, April 20, 1858.*

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 14th instant, I have inspected the Limerick and Foynes Railway between Askeaton and Foynes.

This concluding portion of the Limerick and Foynes Railway is about six miles in length, is single, and is laid similarly, as regards its permanent way, to the remainder of the line. It is better ballasted than the portions of the line which have been already opened for traffic, and additional ballast is now being supplied on those portions.

At two miles from Foynes, there is a wooden viaduct, containing 15 openings, of 20 feet each. The ground at the Foynes end of this viaduct proved to be of a treacherous character, and the permanent way is carried on piles for some little distance between the viaduct and the firm soil. The rails on the viaduct, and the permanent way on the piles, require to be better packed, but the structure appears to be otherwise substantial.

There are three bridges over the line, on which the approaches are in an incomplete state. On the mail-coach road from Foynes to Askeaton, the one parapet of the approach which is now wanting should be completed before the opening of the line, as there is no other fence between the road and the railway. The other approaches are already in a state in which they can be used for traffic, and they may safely be perfected after the line is opened.

Some fencing is required to shut off the Askeaton station from the public road, and in a few other places.

The distant signal is supplied, but not erected at Foynes, and the clock has not yet been put up at that station.

Some contractor's shifting points leading to a forge near Foynes should be removed.

On account of these various requirements, I beg to report my opinion, that the opening of the Limerick and Foynes Railway, between Foynes and Askeaton, would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

The Limerick and Foynes Railway now forms a single line 27 miles long, and as it has not been supplied with a telegraph, it can only be worked safely under stringent

regulations. I find, upon inquiry, that the Limerick and Waterford Company, by whom it is to be worked, contemplated running a ballast train in and out between the passenger trains, in the service of the contractor, and providing only by regulation that the ballast engine should be placed in a siding at one of the stations a quarter of an hour before the passenger trains were due; as well as that they contemplated having a third engine working on the line every Saturday, starting from Foynes on the arrival of the regular engine, and afterwards crossing the regular trains at Rathkeale. Believing both of these contemplated arrangements to contain elements of serious risk, I have recommended that the ballast trains should only be permitted to run at night, when there are no other trains, and that only one engine in steam should be allowed to be on the line, or on distinctly defined portions of it, at any one time. I beg to enclose a certificate which I have received from the Limerick and Foynes Company, by which it will be seen that this latter precaution will be carried out, and that the former precaution will be rendered necessary.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

H. W. TYLER,  
*Captain, R.E.*

7, Fitzwilliam Square, North,  
Dublin, April 23, 1858.

SIR, THE matters which Captain Tyler required to be done on the Limerick and Foynes line are now complete, viz., the fence on the road approach between Askeaton and Foynes, fencing at Askeaton and other places, the packing up of the road on Robertstown viaduct, the removal of the contractor's points, and the auxiliary signal and clock at Foynes station. Captain Tyler told me he had written to you to say that he saw no objection to our opening as soon as those things were done; and as the directors are most anxious to have the line open for the great Munster fair, which takes place next Thursday and Friday, I shall feel much obliged if you will let Mr. Carroll, the secretary, have the necessary authority for opening the line as soon as you can.

I am, &c.

*Captain Galton, R.E.  
&c. &c.*

W. R. LE FANU.

*Railway Department, Board of Trade,  
Whitehall, April 27, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of Mr. Le Fann's letter of the 23d instant, relative to the proposed opening of the Limerick and Foynes Railway between Askeaton and Foynes, and to inform you that my Lords will not object to the opening of the portion of line in question, provided that not more than one engine in steam, or two coupled together, be permitted to be upon the line, or on distinct portions of it, at one and the same time.

I am, &c.

*The Secretary of the  
Limerick and Foynes  
Railway Company.*

DOUGAS GALTON,  
*Captain, R.E.*

Limerick and  
Castle Connell  
Railway.

## LIMERICK AND CASTLE CONNELL RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, July 7, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Limerick and Castle Connell Railway.

Upon consideration of that report, my Lords direct the Limerick and Castle Connell Railway Company to postpone

the opening of the line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

*The Secretary of the  
Limerick and Castle Connell  
Railway Company.*

DOUGAS GALTON,  
*Captain, R.E.*

SIR, Dublin, July 2, 1858.  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in accordance with a request made to me by the Secretary of the Company at Limerick on the previous evening, I yesterday inspected the Limerick and Castle Connell Railway.

This is a single line 5 miles long, joining the Limerick and Waterford Railway at Killonan,  $4\frac{1}{4}$  miles from Limerick.

The only important work upon it is a wrought-iron lattice bridge, containing two spans of 55 feet each, upon masonry abutments and a masonry pier. This bridge is sufficiently strong and rigid.

There are two public road level crossings upon this line, which have already formed the subject of a correspondence between their Lordships and the Company. As the matter now stands, I believe that their Lordships have consented not to postpone the opening of the line on account of these level crossings, provided the Company obtain parliamentary sanction for them before the month of August next; and that the crossings have already received the sanction of a Committee of the House of Commons.

The permanent way is laid with a flat-bottomed rail, weighing 75 lbs. to the lineal yard, supported on transverse sleepers, 3 feet apart on the average, and secured to them by wood-screws.

I observe the following requirements upon the line:—

The junction at Killonan to be furnished with a stage, from which the points and main signals may be worked together; and with three distant signals, to be worked from the same stage.

A considerable quantity of extra ballasting.

A number of bolts to be inserted in the fish plates which secure the joints of the rails.

Red signals to be fixed on all the public road crossing gates, and boxes to be supplied for the gatemen.

A parapet to the iron bridge.

An extra signal at Castle Connell station, and the turn-table to be completed.

And on account of these requirements, I beg to report my opinion that the opening of the Limerick and Castle Connell Railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
Captain, R.E.

P.S.—In reporting upon this railway, I think it only right to add, that the Limerick and Waterford Company, who have been lately engaged in erecting a new station at Limerick, have lately, from economical motives, stopped the works at that station; and that the Limerick terminus, which is intended to be used for this railway, as well as for the lines to Foynes, Ennis, and Waterford, is now in a most unfinished state, and in one which, considering the position of the booking offices, the want of conveniences, and the general confusion of arrangements, cannot be considered as altogether unattended with danger to the public.

Limerick and Castle Connell Railway.

Guarantee for Board of Trade.

IT is hereby undertaken, for the satisfaction of the Lords of the Committee of the Privy Council for Trade, that this line shall be worked in such a manner that only one engine in steam, or two or more coupled together, and forming part of the train, shall ever be upon the single line between Killonan and Castle Connell at one and the same time.

RICHARD DE LEIGH,  
Chairman.  
E. WILLIAM MAUNSELL,  
Secretary.

Railway Department, Board of Trade,  
Whitehall, August 4, 1858.  
SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to re-inspect the Limerick and Castle Connell Railway.

Upon consideration of that report, my Lords direct the Limerick and Castle Connell Railway Company to postpone the opening of the line in question, for the public convey-

ance of passengers, for a further period of one calendar month from this date.

I am, &c.

The Secretary of the  
Limerick and Castle Connell  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

Appendix  
No. 1.

INSPECTIONS.  
Limerick and  
Castle Connell  
Railway.

SIR,

Limerick, August 2, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 22nd ultimo, I have re-inspected the Limerick and Castle Connell Railway.

A stage and the necessary signals have now been erected at the Killonan Junction, a considerable quantity of ballast has been added on the line, and the other requirements referred to in my report of the 2nd ultimo have been nearly completed. But some more lifting and ballasting are still required, and a few extra bolts in the fished joints have yet to be inserted.

Considering the nature of the line, and of the traffic which will come upon it, I should hardly have objected to its being now opened for traffic, were it not for the circumstance, which has just come under my notice, that a portion of the Limerick and Waterford Railway, between the old and the new terminus at Limerick, about half a mile in length, has been opened for traffic, and is now in use, without notice having been given to their Lordships, and without that portion of line having been inspected. But this being the case, and as the new station at Limerick is still, as stated in the postscript to my report of the 2nd ultimo, incomplete, I beg to report my opinion that the opening of the Limerick and Castle Connell Railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
Captain, R.E.

Waterford and Limerick Railway.

Secretary's Office, Waterford,  
August 3, 1858.

SIR, IN the course of Captain Tyler's inspection of the Castle Connell line on yesterday, he was informed that the new terminus at our Limerick station had not been inspected, and he recommended that we should apply and have it done; we had considered that it was unnecessary to do so, as it was merely an alteration of arrangements, and not an opening of a new portion of line.

I remain, &c.

Captain Galton, R.E.  
&c. &c.

JOHN O'CONNOR,  
Secretary.

Railway Department, Board of Trade,  
Whitehall, August 6, 1858.

SIR, THE attention of the Lords of the Committee of Privy Council for Trade having been called to the fact, by their inspecting officer, and by your letter of the 3rd instant, that the Waterford and Limerick Railway Company have opened the portion of their railway between the old and the new stations at Limerick without its having been inspected, or notices of the intention of the Company to open it having been received in this department, as required by the Act 5 & 6 Vict. cap. 55. s. 4.

My Lords request to be informed of the grounds upon which the Company have violated the Act for the regulation of railways by opening the line without giving the proper notices; and what reasons the Directors have to urge why my Lords should not put the Attorney-General in motion to sue for the penalties incurred by the opening.

I am, &c.

The Secretary of the  
Waterford and Limerick  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

Waterford and Limerick Railway.

Secretary's Office, Waterford,  
August 11, 1858.

SIR, I BEG to acknowledge the receipt of your letter of the 6th instant.

In reply to the question you ask as to why Her Majesty's Attorney-General should not receive directions from the Lords of the Board of Trade to proceed against this Com-

Appendix  
No. 1.

—  
INSPECTIONS.  
—  
Limerick and  
Castle Connell  
Railway.

pany for opening an additional portion of line without leave, I beg to state that this Company did not consider that they were opening an additional portion of line (although the position of the passenger platforms were altered), because lines to the present platforms had been previously inspected (at the opening of the railway in 1847) and authorized, and the mileage distance charged to passengers was not altered. I have also to observe that a portion of the Foynes line, working into this terminus, was authorized to be opened some weeks subsequent to this change of platforms at Limerick.

I trust that the Lords of the Board of Trade, will, as soon as possible, have an inspection made, as the former platforms are now removed.

I have, &c.  
JOHN O'CONNOR,  
Secretary.

Captain Galton, R.E.  
&c. &c.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, September 4. 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the report made by Captain Ross, R.E., of his inspection of the portion of the Waterford and Limerick Railway extending from the temporary to the permanent platform at Limerick.

My Lords trust that the inspecting officer's remarks will receive the attention of the Directors of the company.

I am, &c.

The Secretary of the  
Waterford and Limerick  
Railway Company.

DOUGLAS GALTON,  
Capt., R.E.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, September 1, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 17th August, I have inspected the portion of the Limerick and Waterford Railway extending from the temporary to the permanent platform at Limerick.

The passenger offices of the new station are in course of construction. They close the extremity of the railway on the side of Limerick, the carriage docks of the terminus being led close up to them.

The distance from the old to the new station, measured from an over bridge at the latter to the end of the carriage docks, in the new terminus, is about 540 yards, of which about 140 yards are covered by the roof of the new terminus, which will ultimately be employed for the accommodation of four companies, viz. of the Limerick and Waterford, the Limerick and Castle Connell, the Limerick and Ennis, and the Limerick and Foynes Companies.

The traffic of the three first of these companies will be worked in and out of the station on the main lines in the usual manner, to the arrival and from the departure platforms.

The Limerick and Foynes Company has a line to itself from the terminus, to a siding about 1,000 yards distance, whence it diverges to Foynes.

There, are therefore, on the portion of line I inspected, the up line from Waterford to Limerick, the down line from Limerick to Waterford, and the Limerick and Foynes line, and there are also two sidings, of which one on the right of the up main line, leads through a goods warehouse, which is now employed for general purposes, but which is destined ultimately for Foynes goods, and the other siding is to be devoted to the goods traffic of the other companies, for which, storehouses are, I understand, to be erected on the left of the up main line; a small storehouse already exists there.

I found these lines and sidings substantially laid with rails weighing 72 lbs. to the yard.

The engineer of the Limerick and Waterford Company has been its resident engineer since 1854, and on his taking over the charge of the line, he found of the two main lines, the one completed to a point within the present new terminus, and the other to within a short distance from it. He was, he says, under the impression that they had been duly inspected, and he appears to have had no misgivings (as the terminus was the only additional length), that a further inspection would be required. The arrangements which he proposed in anticipation of augmented traffic, are in course of being carried out, and the fortunate circumstance that a straight line of railway, upwards of two miles in length, leads to the terminus, on which the tested platform is distinctly in view at a distance of about

1,000 yards, renders it highly improbable that any accident should occur until all is complete. The traffic is also of no great extent, and even with the new lines will not be largely increased. I understand that only three or four passenger trains on each of the lines will be run in each direction, and time will be required to develop the goods traffic on the new lines.

It is, however, very desirable that the proposed store-houses on the left of the up main line should be proceeded with at once, as at present a great part of the traffic from the warehouse on the Foynes side of the railway has to cross the line to the most busy part of Limerick.

A proposed traversing frame through the carriage shed should also be taken early in hand to obviate the necessity of some shunting on the main lines, which now takes place.

The semaphore signal at the terminus should be immediately provided with lamps.

I think it would be better if means could be devised for keeping the Foynes line exclusively for Foynes departure trains, and locomotives should not be permitted to run over it between the terminus and the engine shed, as at present done.

The practice of backing the Foynes trains from the terminus to the junction sidings is objectionable.

The resident engineer had given his attention to these latter points, on which there are some difficulties in regard to the working of the traffic.

With the arrangements he has made in regard to the pointsman, there is no reason to apprehend any present danger, but it is very desirable that in completing the details of the terminus, all risks from neglect or mistake should be avoided. I consider, however, that with proper care the traffic as now conducted may be safely carried on. I enclose plans of the terminus and of the terminus building, with an undertaking as to the completion of the latter.

I have, &c.

Captain Galton, R.E.  
&c. &c.

GEORGE ROSS,  
Capt., R.E.

SIR,  
*Limerick, August 26, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that I have this day re-inspected the Limerick and Castle Connell line, from Killonan to Castle Connell, and that the requirements specified in previous reports have been complied with, the line being now properly ballasted, and the permanent way in good order.

I am, therefore, enabled to report that the Limerick and Castle Connell Railway, from Killonan to Castle Connell, may be opened without danger to the public using the same.

As connected with this railway, I have the satisfaction to state that there is the prospect of passengers by it meeting with proper accommodation at Limerick terminus; a contract having, as I am informed, been yesterday signed on the part of the Limerick and Waterford Railway Company, under which the contractor is bound to complete proper station buildings at Limerick terminus by the ninth of next May.

I have reason to expect no difficulty in coming to a satisfactory understanding in regard to the working of the traffic at Limerick terminus.

I have requested to be furnished with plans and details which I shall take time to consider. In the meantime, the traffic seems safely conducted.

I have, &c.

Captain Galton, R.E.  
&c. &c.

GEORGE ROSS,  
Captain, R.E.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, September 2, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to inform you that they have received a report from Captain Ross, R.E., the officer appointed by them to re-inspect the Limerick and Castle Connell single line of railway, between Killonan and Castle Connell.

My Lords direct me to state that they no longer object to the line in question being opened for public traffic, provided that not more than one engine in steam, or two or more coupled together, but forming part of the same train, be permitted to be upon the line at one and the same time.

I am, &c.

The Secretary of the  
Limerick and Castle Connell  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

## LONDON AND NORTH-WESTERN RAILWAY.

Appendix  
No. 1.

INSPECTIONS.

London and  
North-Western  
Railway  
(St. Albans to  
Watford,  
Primrose Hill  
Tunnel and  
Willesden,  
Willesden and  
Watford).*Railway Department, Board of Trade,*  
*Whitehall, April 27, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by their Lordships to inspect certain portions of the London and North-Western Railway, viz.:—

The branch from St. Albans to Watford ;  
Two additional lines of railway between the north end of Primrose Hill tunnel and Willesden ;  
A third line of rails extending from Willesden to Watford.

Upon consideration of that report, my Lords direct the London and North-Western Railway Company to postpone the opening of the above-named lines for the public conveyance of passengers for a period of one calendar month from this date.

I am, &amp;c.

The Secretary of the DOUGLAS GALTON,  
London and North-Western Captain, R.E.  
Railway Company.

*Railway Department, Board of Trade,*  
*Whitehall, April 24, 1858.*

SIR,  
In obedience to the instructions contained in your letter of the 14th instant, I have this day inspected the St. Albans branch of the London and North-Western Railway, extending from St. Albans to Watford, a length of 6 miles and 56 chains; two additional lines of railway between the north end of Primrose Hill tunnel and Willesden, a distance of 3 miles and 54 chains; and a third line of rails, extending from Willesden to Watford, a length of 11 miles and 39 chains, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the St. Albans branch and the additional lines between Primrose Hill and Willesden have been constructed under the authority of Acts of Parliament, but the third line between Willesden and Watford has been constructed without the sanction of a special Act of Parliament, and the Company now have a bill before Parliament, which, among other matters, will, if passed, give authority for doing away with a level crossing at Willesden, and sanction the substitution of an over bridge contiguous to it, which has already been built. It proposes also to sanction the abandonment of about 58 chains length of the St. Albans branch, which has not been constructed, at the St. Albans end of the branch line.

1. *The St. Albans Branch.*

This line is laid single throughout on the 4 feet 8½-inch gauge, with sidings only at Watford and St. Albans, but the land has been purchased, and the over bridges built, for a double line, if hereafter required. The width of line at formation level is 22 feet.

There are six under and seven over bridges, all built in brick and mortar, with one exception—an under bridge of 39 feet 6 inches span on the skew—which is built of brick in cement. The brick work is well executed, and the whole of the bridges are amply strong.

There are no unauthorized public level crossings on the line.

Stations have been erected at Bricket Wood, Park Street, and St. Albans, and the site of the station on the London and North-Western at Watford has been changed.

A turntable for turning engines has been put up at St. Albans.

2. *Additional Lines between Primrose Hill and Willesden.*

The additional works on this length, consist of an additional line of railway laid down on each side of the existing lines between the north end of Primrose Hill tunnel to Kensal Green tunnel, and of two additional lines laid down on the north side of the existing lines between Kensal Green tunnel and Willesden, and thus eventually, the two down lines will pass through the old tunnel at Kensal Green and the two up lines through a new tunnel constructed at Kensal Green, 320 yards in length—the same length as the old tunnel.

The width of these lines at formation level is 12 feet with side retaining walls, and 17 feet on embankments and excavations between Primrose Hill and Kensal Green, and 26 feet on embankments and excavations between Kensal Green and Willesden.

There are no under and ten over bridges on this length, which have been added to, for the two additional lines of

railway ; and of these the greater proportion consist of brick and mortar abutments, and cast or wrought iron girders. The work appears to be well executed and sufficiently strong.

The new tunnel at Kensal Green is well executed in brick and mortar.

To avoid the use of facing points at the enlargement into two down lines of railway at the north end of the Primrose Hill tunnel, the Company have determined to lay down an additional line of railway in the tunnel as close as it can be placed to the existing down line (about 4 inches between the rails), so that the down passenger trains will travel on one of these lines of railway and the down goods' trains on the other, keeping the space between the passenger lines still at 6 feet.

3. *Third Line between Willesden and Watford.*

This third line is laid down entirely on the north side of the old lines. The width at formation level is 12 feet with side walls, and 17 feet on embankments and in cuttings.

There are ten under and eleven over bridges; many of these have required to be widened out, and the under bridges are now capable of carrying four lines of railway, if a fourth line should hereafter be required. With the exception of a narrow opening of 8 feet, the whole of the under bridges are of brick and mortar, and the junction between the old and new work is well executed. The single exceptional bridge has cast-iron girders.

Of the over bridges, five are spanned by wrought-iron girders with cast-iron floors—the span being 50 feet. The remainder are in brick and mortar. The workmanship is very good, and all appear sufficiently strong.

Three viaducts have been widened, two in brick and mortar, and the third by wrought-iron girders with wooden floors, partly resting on the old brickwork, and partly on the wrought-iron girders. These last appear to be amply strong, and the brickwork has been very satisfactorily executed.

The permanent way for the St. Albans branch, for the two additional lines between Primrose Hill and Willesden, and for the third line between Willesden and Watford, is identical. It consists of double headed rails in lengths of 21 feet, averaging 80 lbs. to the yard. These rails are fixed in cast-iron chairs, each weighing 35 lbs., by compressed wooden keys—the chairs being fastened to the transverse sleepers—each by two wrought-iron spikes.

The sleepers are of Memel creosoted, 9 feet long by 10" × 5", the two sleepers next the joints being placed 2 feet apart, and the others at the average distance of 3 feet apart. The whole of the joints are fish-jointed.

The width between lines, where doubled, is 6 feet.

In making my inspection, I noticed the following :—

1. *St. Albans Branch.*

Clocks are required at St. Albans and Watford stations. The distant signal at St. Albans cannot be seen by the signalman from the site of the station signals. Permanent mile post and gradient boards are required. Double connecting rods are required to the facing points along the line.

A box or lodge for the gateman is required for the level crossing at Sloman's Lane (4 miles 45 chains).

The ends of the platforms at St. Albans, Bricketwood, and Watford stations to be sloped off.

The signal arrangements at Watford junction are not yet complete; distant signal on branch not yet connected; and there does not appear to be any provided for up trains on the main line.

There is no turntable at Watford.

The Company are about to try the omnibus system on this branch, which consists in allowing the guard to take money for passengers getting in at Bricketwood and Park-street, so that only a lean-to shed is provided at these stations. No policeman or stationmaster is to be kept at these two places. This will require the line to be very carefully worked, as there are no signals and no people to attend to them.

Looking to the manner in which the Company work their traffic at their other branches, I am of opinion that a turntable is essential at Watford, and I believe the Company recognize the necessity; but, until one is provided, which, in my opinion, should be within three months, they purpose to work the traffic with a tank engine.

2. *Additional Lines between Primrose Hill and Willesden.*

At Willesden, the distant signal for the down goods' line is not yet in working order.

Appendix  
No. 1.

INSPECTIONS.

London and North-Western Railway  
(St. Albans to Watford,  
Primrose Hill Tunnel and Willesden,  
Willesden and Watford).

The enlargement from two to four lines at the north end of Primrose Hill tunnel and the contraction to three at Willesden have not yet been completed; but I see no objection to the manner in which the engineer proposes to carry it into effect. The stone quoins at the north and south ends of Primrose Hill tunnel will require to be cut away in order to get width enough for the down goods' line.

3. *Third Line between Willesden and Watford.*

There are evidences of slips on some of the heavy embankments which will require to be carefully watched; and the brickwork of one of the large arches of a viaduct has, apparently many years since, slightly separated. It will be necessary to look frequently to the effect of the addition of the wrought-iron girders and the roadway for the third line on this crack.

The third line is intended solely for goods' traffic, and, in consequence, the Company have not provided platforms at any of their stations for this third line. They do not recognize Pinner or Sudbury as stopping places, and they have only station signals at Bushey, Harrow, and Willesden for this third line. Before their Lordships should, in my opinion, sanction the opening of this third line, the stopping places should be protected by distant signals.

At certain places along the line there are through roads connecting the two up lines. These are so laid out as not to present facing points to the up passenger line, and, in my opinion, these facing points on the goods' line should be kept locked.

The points leading to a ballast pit near Watford should be taken out.

As the result of my inspection, I should state that owing to the incompleteness of the works, the opening of the St. Albans branch, the additional lines between Primrose Hill and Willesden, and the third line between Willesden and Watford for traffic, cannot be sanctioned without danger to the public using the same.

I have not received the undertaking signed by the chairman and secretary to work the St. Albans branch by one engine in steam, &c.

Captain Galton, R.E.  
&c.

W. YOLLAND,  
&c.

I have, &c.

Lieut.-Colonel, R.E.

London and North-Western Railway.

*Engineer's Office, Euston Station,*  
*May 3, 1858.*

SIR,

In reference to my interview with you on the 28th ult., I hereby certify that the few small matters on the Branch Railway Station between Watford and St. Albans, reported by Colonel Yolland as being incomplete on his inspection on the 24th ult., have been attended to, and that your requirements are now all met. It is therefore proposed, with your sanction, to open this branch on the 5th inst.

As regards the last paragraph contained in Colonel Yolland's report, requiring an undertaking signed by the chairman and secretary, to work the St. Albans Branch by one engine in steam, &c., I beg to refer you to rules 341 to 352 of this company's regulations (book of which I enclose), which will explain the system of working the single lines of railway belonging to this company, and which have hitherto been found to work satisfactorily. It is therefore expected that the undertaking referred to will not be necessary.

I am, &c.

Captain Galton, R.E.  
&c.

WILLIAM BAKER,  
&c.

Engineer.

*Railway Department, Board of Trade,*  
*Whitehall, May 4, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of the letter of the 3rd instant, from the engineer of the London and North-Western Railway, stating that the St. Albans branch of that railway is now complete, and to inform you that my Lords will no longer object to the opening of this branch for the public conveyance of passengers, provided that the line be worked by a tank engine.

With respect to the regulations for working the single line, my Lords direct me to state that they will not require the company to depart upon this branch from the rules which they have adopted for their other single branch lines; but so long as the stations at Bricket Wood and Park Street are left without station masters and signals, my Lords direct me to point out that it will not be consistent with safety to allow any train to leave Watford for St. Albans, or vice

versâ, after a train timed to stop at those stations, until notice shall have been received by telegraph that the train has reached St. Albans, or vice versa.

I am, &c.

*The Secretary to the* DOUGLAS GALTON,  
*London and North-Western* Captain, R.E.  
*Railway Company.*

*Railway Department, Board of Trade,*  
*Whitehall, May 25, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council of Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to re-inspect the two additional lines of rails between the north end of Primrose Hill Tunnel and Willesden, and the third line of rails between Willesden and Watford, upon the London and North-Western Railway.

Upon consideration of that report, my Lords direct the London and North-Western Railway Company to postpone the opening of the third line of rails between Willesden and Watford for the public conveyance of passengers for a further period of one calendar month from this date.

My Lords do not object to the two additional lines of rails between the north end of Primrose Hill Tunnel and Willesden being opened for public traffic.

I am, &c.

*The Secretary of the* DOUGLAS GALTON,  
*London and North-Western* Captain, R.E.  
*Railway Company.*

*Railway Department, Board of Trade,*  
*Whitehall, May 24, 1858.*

SIR,

In compliance with the instructions contained in your letter of the 14th instant, I have this day re-inspected the two additional lines of rails between the north end of Primrose Hill Tunnel and Willesden, and the third line of rails between Willesden and Watford upon the London and North-Western Railway, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the whole of the requirements mentioned in my report of the 24th ult. respecting these lines have been complied with, and I recommend their Lordships' sanction may be given for the opening of the additional lines between the north end of Primrose Hill Tunnel and Willesden.

With reference to the third line of rails between Willesden and Watford, a heavy slip of the embankment on the east side of the Brent Viaduct has taken place since my inspection, and has carried the north-east wing wall of the viaduct with it. This wing wall is about forty feet in height; it is now shored up, but is apparently still in motion. The arch is not sensibly affected at the present time, but until the slip is stayed it is impossible to say what may occur.

I am therefore of opinion, that by reason of the incompleteness of the works, the opening of the third line of rails between Willesden and Watford cannot be sanctioned without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.* W. YOLLAND,  
*&c.* Lieut.-Col., R.E.

*Railway Department, Board of Trade,*  
*Whitehall, June 23, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council of Trade to transmit to you the accompanying copy of a report my Lords have received from Lieut.-Col. Yolland, R.E., of his re-inspection of the third line of rails between Willesden and Watford, on the London and North-Western Railway.

Upon consideration of that report, my Lords direct the London and North-Western Railway Company to postpone the opening of the third line of rails in question, for the public conveyance of passengers, for the further period of one calendar month from this date.

I am, &c.

*The Secretary to the* DOUGLAS GALTON,  
*London and North-Western* Captain, R.E.  
*Railway Company.*

*Railway Department, Board of Trade,*  
*Whitehall, June 21, 1858.*

SIR,

In obedience to the instructions contained in your letter of the 14th instant, I have this day re-inspected the third line of rails between Willesden and Watford on the London and North-Western Railway; and I have the honour

to report, for the information of the Lords of the Committee of Privy Council for Trade, that the slip of the embankment on the east side of the Brent Viaduct has not yet been made good, and a portion of the embankment on the west side of the viaduct has sensibly subsided since the date of my report of the 24th May.

I am therefore of opinion, that by reason of the incompleteness of the works, the opening of the third line of rails between Willesden and Watford on the London and North-Western Railway, for traffic, cannot be sanctioned without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lieut.-Col., R.E.

### London and North-Western Railway.

*Engineers' Office, Euston Station,*  
*June 29, 1858.*

SIR,

REFERRING to your note of the 23rd instant, addressed to the Secretary of the London and North-Western Railway, enclosing a report of Colonel Yolland of the 21st instant, stating that the slip of the embankment near the Brent Viaduct had not been made good, and that therefore the third line between Willesden and Watford was incomplete for traffic.

I hereby certify that the slip referred to is now made good, and that it is proposed to run the goods and mineral trains over the third line between Willesden and Watford on Thursday next the 1st of July.

I have, &c.

Capt. Galton, R.E.

Railway Department,  
Board of Trade.

WILLIAM BAKER,  
Engineer.

*Railway Department, Board of Trade,*  
*Whitehall, July 1, 1858.*

SIR,

In obedience to your reference of yesterday on the certificate given by the engineer of the London and North-Western Railway, that the slip of the embankment and the giving way of the wing wall of the viaduct over the Brent has now been made good, I beg to state that it should be distinctly understood that the Lords of the Committee of Privy Council for Trade, only assent to the opening of the third line of rails between Willesden and Watford for goods and mineral trains, and not for the regular passenger traffic, in consequence of the absence of platforms and the requisite signals at the various passenger stations, as detailed in my report of the 24th April.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lieut.-Colonel, R.E.

*Railway Department, Board of Trade,*  
*Whitehall, July 7, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of a further report which they have received from Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the third line of rails on the London and North-Western Railway between Willesden and Watford.

My Lords direct me to state that they assent to the opening of the line of rails in question for goods and mineral trains, but that they cannot consent that it be opened for passenger traffic, in consequence of the absence of platforms and the requisite signals at the various passenger stations, as detailed in Col. Yolland's report of the 24th April last.

I am, &c.

The Secretary of the  
London and North-Western  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

*Railway Department, Board of Trade,*  
*Whitehall, August 5, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the report made by Lieut.-Colonel Yolland, R.E., the officer appointed by them to inspect the London and North-Western Railway Company's Northampton and Market Harborough Branch.

Upon consideration of that report, my Lords direct the London and North-Western Railway Company to postpone the opening of the branch line in question, for the public

conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
London and North-Western  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

*Railway Department, Board of Trade,*  
*Whitehall, August 3, 1858.*

SIR,

I HAVE the honour to acquaint you, for the information of the Lords of the Committee of Privy Council for Trade, that in obedience to the instructions contained in your letter of the 29th ult., I yesterday inspected the Northampton and Market Harborough Branch of the London and North-Western Railway.

This line commences at a junction with the Northampton and Peterborough line, about 1,200 yards west of Northampton station, and ends at a junction with the Rugby and Stamford line, 700 yards west of the Market Harborough station. It is laid single, with sidings at the junctions and some of the intermediate stations, but the land has been purchased, and the whole of the over bridges have been built for a double line, if one should hereafter be required. Its length is 18 miles 29 chains.

The width of the line at formation level is 20 feet, the gauge is 4 feet 8½ inches, and the width between lines where two have been laid is 6 feet. The permanent way consists of double-headed rails weighing 80 lbs. to the yard, in lengths of 21 feet. These rails are laid in cast-iron chairs, each weighing 35 lbs., and secured in the same by compressed wooden keys; the chairs being fixed to the sleepers by iron spikes and wooden trenails, three to each chair. The joints are fished.

The sleepers are of Memel timber creosoted, 9 feet long, 10 inches × 5 inches, rectangular, seven in number being allowed for each rail.

The ballast is of ironstone, sand, and gravel, and stated to be 2 feet in depth.

There are five under and six over bridges on the line; of the former, three are of brick and two with brick abutments and cast-iron girders; and of the latter, three are of brick and three with brick abutments and cast-iron girders. There is also a wrought-iron bridge over the canal of 68 feet span on the skew, and upwards of 870 yards run of timber viaducts along the line. There is a sharp curve of 13 chains radius at the junction near Northampton, and as the heavy 8-wheeled coupled engine was passing off this curve on to the canal bridge, at about perhaps six miles an hour, to enable me to see the effect on this bridge, the engine mounted the rails and dropped off, and the wheels broke through the planking, but were fortunately borne up by the cross girders. I made the remaining part of the inspection on the contractor's engine, but its weight was not sufficient as a test for the bridges and viaducts.

There are two tunnels, one of 518 and the other of 460 yards in length, but only constructed for single lines of way. They are built partly in lime and partly in cement, and although there has been a good deal of difficulty experienced in the construction of one of them, they appear to have been substantially built.

An authorized level crossing, of what is stated to be a parish road in the details supplied by the resident engineer, has been made at 9 miles 45 chains. This road is an unfenced road through fields, with gates at the fields, and it is said to have very little traffic on it; and a road occurring at 12 miles 20 chains, and marked 35 in parish of Maidcote, is returned in the details as a private road, although it is authorized in the Company's Act to be crossed on the level as a public road, and as such should be provided with a lodge and appropriate gates. It has the appearance of a mere footpath.

In making my inspection I noticed the following:—

The signal arrangements at the two junctions are incomplete; the points and signals should work together, and be so arranged as to prevent the signalman making a mistake that will be dangerous to the safety of passing trains; the facing points should have double connecting rods. The distant signal at the Northampton junction cannot be seen from the stage.

At all the stations, Brampton, Brixworth, Lamport, and Kelmarsh, the station buildings and platforms are incomplete; and the handles of the levers for working the distant signals should be brought together, close to the station signals. Clocks are required at the stations and junctions.

The north distant signal at the Brampton station is not sufficiently removed away from the station; and at Brixworth a siding, said to be temporary, is placed too near the abutments of an over bridge; and that at Lamport is in an unfinished state, as well as the one at the Northampton

Appendix  
No. 1.

INSPECTIONS.

London and  
North-Western  
Railway  
(Northampton  
and Market  
Harborough  
Branch).

**Appendix  
No. 1.**

**INSPECTIONS.**

**London and  
North-Western  
Railway  
(Northampton  
and Market  
Harborough  
Branch).**

junction. A siding leading to a ballast-pit, at 3 miles 5 chains, must either be taken out, or be properly protected with signals. There are slight portions of fencing and a good many spikes and treenails requiring to be attended to and driven; and the roadways over the viaducts carefully looked to. The roads through the tunnels are, at the present time, in a rough and very crooked state, and some top ballasting at various parts of the line has yet to be done. The gates at some of the level crossings have not yet been erected, and a lodge is wanting at that at 2 miles 30 chains.

No turntables have been provided at either extremity of the line.

I understand the traffic is to be worked from Blisworth to Market Harborough; there are no turntables at either place, and if even local trains are to be worked between Northampton and Market Harborough, the present arrangements are insufficient to provide for the public safety, as the trains would require to be shunted about 1,200 yards.

I am therefore of opinion, that owing to the incompleteness of the works, the opening of the Northampton and Market Harborough branch of the London and North-Western Railway cannot be sanctioned without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*W. YOLLAND,  
Lt.-Col., R.E.*

*Railway Department, Board of Trade,  
Whitehall, September 4, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lt.-Col. Yolland, R.E., the officer appointed by them to inspect the Northampton and Market Harborough Branch of the London and North-Western Railway.

Upon consideration of that report, my Lords direct the London and North-Western Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for a further period of one calendar month from this date.

I am, &c.

*The Secretary of the  
London and North-Western  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, August 31, 1858.*

SIR,  
In compliance with the instructions contained in your letter of the 24th instant, I re-inspected the Northampton and Market Harborough Branch of the London and North-Western Railway on the 30th instant, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that considerable proportion of the requirements detailed in my report of the 3d August yet remain to be completed; and in addition thereto I should now mention the following, viz.:—

The parapet wall at the north-west angle of the bridge over the canal is too close to the rails. The wooden viaducts have generally not been completed in a satisfactory and workman-like manner; the junctions with the earthen embankments are not in good order; and on several, the lines of rails are not centrally placed over the baulks, so that the iron spikes securing the chairs in many cases only pass through the three-inch planking at one side, and the packing of the chairs has been very indifferently done.

The line requires ballast in places, and the drainage in the cuttings requires to be attended to.

I am therefore of opinion that by reason of the incompleteness of the works the opening of the Northampton and Market Harborough Branch of the London and North-Western Railway for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*W. YOLLAND,  
Lt.-Col., R.E.*

*32, Great George Street, Westminster,  
September 27, 1858.*

SIR,  
REFERRED to the objection which has been raised by the Board of Trade to the opening of the Northampton and Market Harborough Branch of the London and North-Western Railway, on the ground of an unauthorized level crossing of a public carriage road, I am instructed by the London and North-Western Railway Company to undertake that, on the next occasion of their making application

to Parliament, they will include in their bill the necessary powers to construct a bridge over the railway for the purposes of the road in question, on the assumption of its being, in fact, a public carriageway.

I am, &c.  
*S. CARTER.*

*Captain Galton, R.E.  
&c. &c.*

*Railway Department, Board of Trade,  
Whitehall, October 1, 1858.*

SIR,  
In compliance with the instructions contained in your letter of the 22nd ultimo, I have this day re-inspected the Northampton and Market Harborough Branch of the London and North-Western Railway, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the line is now in fair working order, with the exception of two of the wooden viaducts, one occurring at 0 miles 61 chains, and the other at 2 miles 43 chains. Both are built on the skew, and have openings of from 20 to 24 feet, and both, in their present condition, are unsatisfactory and unsafe structures, exhibiting considerable deflections and a large amount of lateral oscillation when traversed somewhat sharply by a heavy engine. A third viaduct, at 6 miles 3 chains, requires to have the roadway properly packed, but the defect is not of the same importance as that noticed in the two other viaducts. The resident engineer, since the date of my last report, had noticed the lateral oscillation of one of the viaducts, and had attempted to obviate it by cross-bracing, but without success.

The Directors of the London and North-Western Railway have, it appears, authorized Mr. Baker (the engineer of the southern division) to give an undertaking to complete the double junction at Market Harborough, and to put up engine turntables at Market Harborough and Blisworth within three months; and I understand that a communication is to be made to their Lordships on the subject of the unauthorized level crossing occurring at 9 miles 45 chains.

When I made my report of the 3d August, I was informed that the traffic was intended to be worked between Blisworth and Market Harborough, in which case trains would not call at the Northampton Station, situated at the south side of that town, on the line between Blisworth and Peterborough, and about 1,200 yards from the junction with the Northampton and Market Harborough Branch; and in consequence of that information I pointed out the necessity of having turntables put up at Blisworth and Market Harborough, so that engines should not be compelled to travel tender foremost either going or returning.

About the middle of last month the superintendent of the southern division of the London and North-Western Railway forwarded to me the enclosed copy of the regulations under which it was intended to work the single line between Northampton and Market Harborough, and a few days afterwards I personally pointed out the objections that existed to the opening of the line for passenger traffic, as adverted to in my report of the 3d August, viz., that all trains would require to be shunted from the junction to the station at Northampton, and *vice versa*.

I am now told that in consequence of that objection it is once more contemplated to run the trains between Blisworth and Market Harborough, and to establish another station at Northampton, west of the town and on the branch line. No such station exists at the present time, and I can scarcely imagine that two stations and two establishments belonging to the London and North-Western Railway Company will be maintained in Northampton; but if a second station is established, then it is probable that local trains, and not through trains, from Blisworth, will be run between Northampton and Market Harborough; and as regards the safety of the public, the turntable will be more required at this Northampton west station than at Blisworth, although I am still of opinion that one is required at that station.

It is not for me to point out in what manner the traffic should be worked, but I have no doubt their Lordships will be satisfied that the public safety is properly provided for if the Directors of the London and North-Western Railway will give an undertaking that the trains shall *not* be shunted over the 1,200 yards between the junction and the present Northampton station.

Owing to the incompleteness of the works, I am again compelled to report that the opening of the Northampton and Market Harborough Branch of the London and North-Western Railway for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*W. YOLLAND,  
Lt.-Col., R.E.*

(Enclosure.)

London and North-Western Railway.

In all cases of working over a single line, a train staff, or train ticket is to be carried with each train, to and fro, and without which no engine is to be allowed to pass. The following regulations are to be strictly observed on the Northampton and Market Harborough Branch.

Two train staffs will be employed, viz.:—

Northampton and Lamport.

Lamport and Market Harborough.

No engine or train is to be permitted to leave either of these stations unless the staff for the portion of line over which it is to travel is at the station.

If no second engine or train is intended to follow immediately, the staff is to be given to the guard or person in charge.

If another engine, or train, is intended to follow in succession, a train ticket, stating "staff following," will be given to the person in charge of the leading train, the staff itself being given to the last; after which, nothing more can leave the station, under any circumstances whatever, until the return of the staff.

The train staffs and ticket boxes of two adjoining stages of single line are painted different colours, red, and red and blue, the inside springs and the keys on the staffs being so arranged that the red staff cannot open the red and blue box, nor the red and blue staff the red box; this is to prevent mistake at the joint station.

The ticket boxes are fixed by two brackets, either in the station-masters' office or in the booking office, the brackets being turned up at the end to receive the train staff when at the station.

A ballast train having to work on the line, the staff is to be given to the guard in charge, and when the load is taken up or discharged, the train is not to return, but to proceed on to the terminal station of the staff, in order to open the line either for an expected train, or one that may be there in waiting.

The station-master or person in charge for the time, is the sole person authorized to receive and deliver the staff.

A guard or engineman taking the staff, or ticket, beyond the station to which it belongs, or leaving a station without the staff, or ticket, as herebefore explained, will be dismissed, although no accident may arise.

The engineman is not to start from a station until the guard has shown him the train staff or train ticket.

The usual special train tail signal is to be used as now, for the guidance of platelayers at work upon the line.

By order,

Superintendent's Office, Euston Station,

H. P. BRUYERES.

September, 1858.

Note.—Postponed opening 2nd October for a further period of one month.

Railway Department, Board of Trade,  
Whitehall, October 28, 1858.

SIR, In obedience to the instructions contained in your letter of the 20th instant, I have this day re-inspected the Northampton and Market Harborough branch of the London and North-Western Railway; and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that since the date of my last report, nothing has been done to remedy the defects existing in two of the wooden viaducts, but arrangements have been made for driving piles at the sides so as to increase the stability of the present structures; but it is questionable whether what is now proposed to be done will render them safe.

The construction of a platform for a road-side station at Northampton has been commenced, but it is still incomplete, and there are no station buildings.

The double junction at Market Harborough remains unfinished, but a commencement has been made towards the erection of the turntables at Blisworth and Market Harborough.

I have therefore to state, that, in consequence of the incompleteness of the works, the opening of the Northampton and Market Harborough branch of the London and North-Western Railway for traffic, cannot be sanctioned without danger to the public using the same.

I have, &amp;c.

Captain Galton, R.E.

W. YOLLAND,

&amp;c. &amp;c.

Lieut.-Col., R.E.

Note.—Postponed opening October 29, for a further period of one month.

Railway Department, Board of Trade,  
Whitehall, November 24, 1857.

SIR, In compliance with the instructions contained in your letter of the 17th instant, I had appointed this day for the re-inspection of the Northampton and Market Harborough branch of the London and North-Western Railway; but I have received the enclosed letter from the Secretary of that Company requesting me to postpone any further inspection of the line, until the second or ten days'

notice of their intention to open the line for traffic is repeated.

I have, &amp;c.

Captain Galton, R.E.

&amp;c.

W. YOLLAND,

&amp;c. Lieut.-Col., R.E.

(Enclosure.)

London and North-Western Railway.

Secretary's Office, Euston Station,  
London, Nov. 22, 1858.

SIR,

REFERRED to the letter of Mr. Booth, dated 29th ult., enclosing copy of your report, dated 28th ult., on the Northampton and Market Harborough Railway, I am instructed to request that you will postpone any further inspection of the line in question until we repeat the second or ten days' notice of our intention to open the line for traffic.

I am, &amp;c.

CHAS. STEWART,

Secretary.

Col. Yolland, R.E.,  
Railway Department, Board of Trade.

London and North-Western Railway.

Secretary's Office, Euston Station,  
London, January 27, 1859.

MY LORDS,

I AM instructed to give you notice that it is proposed to open the Northampton and Harborough branch line of this Company for public traffic on the 10th February next, and that the works will be ready for inspection on the 4th February or on any subsequent day.

I enclose plans of two timber bridges on the line, showing the extensions since the last inspection by the officer of the Board of Trade.

I have, &amp;c.

CHAS. STEWART,  
Secretary.The Right Hon. the Lords of the  
Committee of Privy Council for Trade  
and Foreign Plantations.

(Extract.)

Railway Department, Board of Trade,  
Whitehall, February 8, 1859.

Since the date of my last report on the 28th October, a considerable amount of work has been done on this branch in order to perfect it for opening. Thus engine turntables have been put up at Blisworth and Market Harborough, and are now in working order. A new station has been erected at Northampton to accommodate the local passenger traffic between Northampton and Market Harborough, and thus to do away with the necessity for shunting passenger trains out of and into the station on the Northampton and Peterborough Railway. An extension of the wooden viaducts to the amount of about 104 yards has been made in order to provide a larger extent of waterway in case of floods, and the wooden viaducts have been braced and strutted, and, with one exception, they are now in a satisfactory state.

The viaduct at 2 miles 43 chains over the River Nene has been braced, strutted, and tied to additional piles at the sides at every alternate bay, but there is still some horizontal oscillation; and the engineer, Mr. G. R. Stephenson, has engaged to drive additional piles opposite to the bays which were omitted and to strut them in the same manner as these already completed, and to cause a careful watch to be kept on this viaduct until these works have been completed.

The signals at the two junctions are now complete, and the ballast pit, which is kept open, is now protected by station and distant signals.

There are now on this branch upwards of 970 yards in length of wooden viaduct, entirely uncovered with ballast; and as the London and North-Western Railway Company now burn coal to a considerable amount in their engines, there is much greater risk of these viaducts taking fire; and I beg therefore to recommend that their Lordships should draw the attention of the Directors of the London and North-Western Railway Company to the necessity which exists for covering the viaducts with sheet iron, or of protecting them in some other way from fire.

I have, &amp;c.

Captain Galton, R.E.

&amp;c.

W. YOLLAND,

&amp;c. Lieut.-Col., R.E.

Railway Department, Board of Trade,  
Whitehall, February 9, 1859.

SIR, WITH reference to your letter of the 27th September last, undertaking, on the part of the London and North-Western Railway Company, to include in their next applica-

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INSPECTIONS.

London and  
North-Western  
Railway  
(Northampton  
and Market  
Harborough  
Branch).

Appendix  
No. 1.

## INSPECTIONS.

London and  
North-Western  
Railway  
(Northampton  
and Market  
Harborough  
Branch).

tion to Parliament the necessary powers to construct a bridge over an unauthorized level crossing on the Northampton and Market Harborough Branch, I am directed by the Lords of the Committee of Privy Council for Trade to request that their Lordships may be informed whether the Company have included the powers for the bridge alluded to in any of their bills of this session.

I am, &c.

S. Carter, Esq.,                    DOUGLAS GALTON,  
32, Great George Street,              Captain, R.E.  
Westminster.

SIR,  
32, Great George Street, Westminster,  
February 11, 1859.

In reply to your letter of the 9th instant on the subject of a level crossing on the Northampton and Harborough branch of the London and North-Western Railway, I beg to enclose the print of a Bill already introduced into Parliament, the 5th, 6th, and 7th clauses of which are intended to provide for the matter to which you refer.

I have, &c.

Captain Galton, R.E.  
&c. &c.

S. CARTER.

Railway Department, Board of Trade,  
Whitehall, February 15, 1859.

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed extract from the report made by Lieut.-Col. Yolland, R.E., of his last re-inspection of the Northampton and Market Harborough Branch of the London and North-Western railway.

My Lords direct me to inform you that they will not object to the branch line in question being opened for public traffic, provided it will be worked in the manner specified in the printed regulations furnished Colonel Yolland in September last by the superintendent of the southern division of the London and North-Western Railway.

I am, &c.

The Secretary of the                    DOUGLAS GALTON,  
London and North-Western              Captain, R.E.  
Railway Company.

Railway Department, Board of Trade,  
Whitehall, August 19, 1858.

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the Crewe and Shrewsbury Branch of the London and North-Western Railway.

Upon consideration of that report, my Lords direct the London and North-Western Railway Company to postpone the opening of the branch line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the                    JAMES BOOTH.  
London and North-Western  
Railway Company.

Railway Department, Board of Trade,  
Whitehall, August 18, 1858.

I HAVE the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that in obedience to the instructions contained in your letter of the 6th instant, I yesterday inspected the Crewe and Shrewsbury Branch of the London and North-Western Railway.

This line commences at a junction near Crewe station, and terminates at a junction with the Great Western Railway at Shrewsbury, a length of 32 miles and 31 chains. The line is laid single with sidings at all the stations, but the land has been purchased and the bridges and other works constructed for a double line, if one should hereafter be required. The gauge is 4 feet 8½ inches, and the width between the lines where double is 6 feet.

The width of the line at formation level is 30 feet in the cuttings and 33 feet in the embankments. It is laid with double-headed rails weighing 83 lbs. to the yard, in lengths of 21 feet, fixed in cast-iron chairs which weigh 35 lbs. each, by means of compressed oak keys, the chairs being fastened down to the sleepers on part of the line by two wrought iron spikes, and on the remainder by one wrought iron

spike and two compressed oak trenails. About 13 miles of the line have the joints fished, but on the remainder the joints are not fished, a great defect on an otherwise very superior permanent way, especially as no distinction is made in the chairs for the joints and for the intermediates. Either the line should be fished throughout at once, or joint chairs be substituted for those now laid down.

The sleepers are all transverse, 9 feet long by 10×5 rectangular, and where the line is fished they are two feet apart at the joints, and three feet two inches apart between the intermediates. Where the line is not fished the two first sleepers from the joints are respectively at two feet six inches and three feet apart, and the remainder are at three feet four inches apart.

The ballast is of sand, gravel, and broken stone, but mostly of sand, and it is stated to be two feet deep.

There are 32 over and 35 under bridges, in addition to five viaducts. Of the over bridges 31 are built in brick and mortar, the greatest span being 42 feet on the skew, and one has brick abutments built in mortar, with cast-iron girders 37 feet 6 inches on the skew. Of the under bridges eight of 12 feet span are built of brick and mortar; 12 of nine feet span, have brick abutments and timber tops; and 15 have brick abutments and cast-iron girders with the largest span of 30 feet. Of the viaducts, that over the river Weaver has the abutments built on piles, and the roadway is carried by cast-iron arched girders, 46 feet on the square and 62½ feet on the skew. Another over the Weaver and one over the river Roden are built in brick and mortar, and the longest in Shrewsbury consists of one opening, spanned by cast-iron girders 34 feet span, and three openings of 25 feet, built in brick and mortar.

The whole of these works are well executed and appear sufficiently strong.

There are turntables for engines at Crewe and Shrewsbury.

Stations have been erected at Willaston, Nantwich, Wrenbury, Whitchurch, Prees, Wem, Yarton, and Hadnall.

With the exceptions to which I shall shortly advert, the line is well finished off and in very good order.

In making my inspection I noticed the following:—

1. There is an unauthorized level crossing established at 14 miles 78 chains; the road at which it occurs appears to have very little traffic on it, and it is said to have been constructed in error, and from only looking to the plans deposited before Parliament.

2. Distant signals in both directions on the main line at the Crewe junction remain to be established, and the arrangements for working the points from this signal box are still incomplete.

3. The station buildings and platforms are unfinished at Wrenbury, Prees, Yarton, and Hadnall.

4. The handles of the levers for working the distant signals to be brought together at Willaston, Nantwich, and Wrenbury.

5. The signal arrangements at the Shrewsbury junction are incomplete, and do not at present place the whole control in the hands of one man.

6. There is a short portion of fencing on the same level as the soil in the field close to it, near Wrenbury; at present it is not a safe fence against cattle.

7. Two temporary water tanks and some of the contractors sheds require to be removed.

8. The platform of an under bridge near Yarton is only laid in a temporary manner, and the joints along that portion of the line which is not fished require to be carefully gone over, as the compressed oak keys do not fit the rails in all cases, and when that is the case the joints are bad.

9. The mile posts, though mostly put up, are not marked, and no gradient boards have been put up.

I have not received any undertaking showing the manner in which it is proposed to work this single line, and I am of opinion that by reason of the incompleteness of the works, the Crewe and Shrewsbury Branch of the London and North-Western Railway cannot be opened for traffic without danger to the public using the same.

I have, &c.  
Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lt.-Col., R.E.

SIR,  
32, Great George Street, Westminster,  
August 27, 1858.

I AM instructed by the Directors of the London and North-Western Railway Company to state, with reference to the order of the Board of Trade, suspending the opening of the Crewe and Shrewsbury Railway, and the report of Colonel Yolland, on which that order is founded, that the public road, the unauthorized level crossing of which is

stated as an objection by Colonel Yolland, appears, on investigation, to be not a public carriage road, but only a public bridle and footway. Under these circumstances a level crossing is, of course, all that the Company are called upon to provide.

The engineer of the Company (Mr. Errington) has now certified to Colonel Yolland that, in other respects, the whole of his requirements are complied with, and the Directors beg me to express their hope that the prohibition to the opening of the line may be now withdrawn. They are anxious, if possible, that the opening should take place on the first of next month.

Captain Galton, R.E.  
&c. &c.

I am, &c.  
S. CARTER.

SIR,  
*Railway Department, Board of Trade,*  
Whitehall, August 28, 1858.

MR. BRUYERES and Mr. Norris, of the London and North-Western Railway, called upon me to-day, and handed me the enclosed copy of the regulations under which it is proposed to work the single line of the Crewe and Shrewsbury Branch of the London and North-Western Railway, and I beg to state, for the information of the Lords of the Committee of Privy Council for Trade, that if these regulations are acted up to, it will place the traffic proceeding in either direction precisely on the same footing as the traffic on an up or down line of a double line of railway, for longer or shorter intervals of time, and effectually prevent a collision between trains proceeding in opposite directions on the single line. I consider that it is safer than working a single line by the aid of the electric telegraph.

I have, &c.  
W. YOLLAND,  
Lt.-Col., R.E.

(Enclosure.)  
London and North-Western Railway.

In all cases of working over a single line, a train staff is to be carried with each train, to and fro, and without which no engine is to be allowed to pass. The following regulations are to be strictly observed on the Crewe and Shrewsbury Branch.

Four train staffs will be employed, viz.:—

Crewe and Nantwich,  
Nantwich and Whitchurch,  
Whitchurch and Wem,  
Wem and Shrewsbury.

No engine or train is to be permitted to leave any of these stations, unless the staff for the portion of line over which it is to travel is then at the station.

If no second engine or train is intended to follow immediately, the staff is to be given to the guard or person in charge.

If another engine, or train, is intended to follow in succession, a train ticket, stating "staff following," will be given to the person in charge of the leading train, the staff itself being given to the last; after which, nothing more can leave the station, under any circumstances whatever, until the return of the staff.

A ballast train having to work on the line, the staff is to be given to the guard in charge, and when the load is taken up or discharged, the train is not to return, but to proceed on to the terminal station of the staff, in order to open the line either for an expected train or one that may there be in waiting.

The station-master, or person in charge for the time, is the sole person authorized to receive and deliver the staff.

A guard or engineman taking the staff, or ticket, beyond the station to which it belongs, or leaving a station without the staff, or ticket, as herebefore explained, will be dismissed, although no accident may arise.

The engineman is not to start from a station until the guard has shown him the train staff or train ticket.

The usual special train tail signal is to be used as now, for the guidance of the platelayers at work upon the line.

General Manager's Office,  
London, August, 1858.

By order,  
MARK HUISH

SIR,  
*Railway Department, Board of Trade,*  
Whitehall, August 28, 1858.

I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of Mr. Carter's letter of the 27th instant, on the subject of the postponement of the opening of the London and North-Western single line of railway between Crewe and Shrewsbury.

My Lords direct me to inform you that they will not object to the line being opened for public traffic provided it is worked in the manner specified in the regulations given to Col. Yolland by Mr. Bruyeres.

I am, &c.

The Secretary to the  
London and North-Western  
Railway Company. DOUGLAS GALTON,  
Captain, R.E.

### LUTON, DUNSTABLE, AND WELWYN JUNCTION RAILWAY.

SIR,  
*Railway Department, Board of Trade,*  
Whitehall, March 20, 1858.  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Lieut.-Col. Yolland, R.E., of his inspection of the Luton, Dunstable, and Welwyn Junction Railway, between Luton and Dunstable.

Upon consideration of that report, my Lords direct the Luton, Dunstable, and Welwyn Junction Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for the period of one calendar month from this date.

I am, &c.  
DOUGLAS GALTON,  
Captain, R.E.

The Secretary to the  
Luton, Dunstable, and Welwyn  
Junction Railway Company.

SIR,  
Birmingham, March 18, 1858.  
In compliance with the instructions contained in your letter of the 15th instant, I have this day inspected a portion of the Luton, Dunstable, and Welwyn Junction Railway, between Luton and Dunstable, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that this line commences at a junction with the London and North-Western Railway at Dunstable, and, at the present time, ends at Luton, a distance of 5 miles 45 chains. It is laid single throughout, with sidings at those two places; is on the 4 feet 8½ inch gauge, but the land has been purchased, and the over bridges have been constructed for a double line.

The width at formation level is 18 feet on the embankments. The line is laid with rails that weigh 65 lbs. per linear yard, in lengths varying from 15 to 18 feet, and they

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### INSPECTIONS.

London and  
North-Western  
Railway  
(Crewe and  
Shrewsbury).

are fixed in chairs, each weighing 22 lbs., by wooden keys placed outside the rails; the joints are fished by plates weighing 28 lbs. per pair. The chairs are fastened to transverse sleepers, each by two iron spikes. The sleepers are of larch and Memel creosoted; they are 9 feet long by 9" × 5" half-round, and laid 3 feet 9 inches apart from centre to centre.

The ballast is of gravel, and said to be 1 foot 8 inches deep, mostly laid on chalk.

There are six under and one over bridge, the latter built in brick, in addition to two wooden footpath bridges over the line.

Of the under bridges, two are constructed with wrought-iron girders, three with cast-iron girders, and one in brick. The whole of the iron girder bridges are amply strong by calculation; but, in consequence of the rails being too much sunk between the tops of the cast-iron girders for the heavy engine to pass over them, I was obliged to go over the line with a lighter engine, and could not in consequence subject them all to proper tests. This is to be remedied by raising the longitudinal timbers and rails nearer to the tops of the cast-iron girders.

There is a large culvert under the line, of which the side walls have slightly settled, but I am informed that no movement has been perceptible during the last twelve months. There is no reason to doubt its stability. There are no public level crossings on this portion of the line.

There are two stations on the line, one at Luton, the other at Dunstable; but no station buildings have yet been erected at the latter place, the London and North-Western station is to be used.

A turntable has been erected at Luton only.

In going over the line, I noticed the following requirements:—

1. A distant signal, to be worked from the Dunstable station signal-box, on the London and North-Western Railway towards Leighton Station.

Luton,  
Dunstable, and  
Welwyn Junc-  
tion Railway.

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## INSPECTIONS.

Luton,  
Dunstable, and  
Welwyn Junction  
Railway.

2. A clock at Luton Station.
3. A second connecting rod to a pair of facing points at Dunstable.

The London and North-Western Railway Company are to provide the rolling stock for working the line, and it is intended to continue the trains that run from Leighton to Dunstable on to Luton; but the London and North-Western Railway Company have no turntable at Leighton, and all their trains are run, at the present time, in one direction, with the tender foremost. They have a small turntable at Dunstable on which an engine and tender can be separately turned. Some arrangement will, therefore, require to be made, so that trains shall not travel tender foremost over the Luton and Dunstable line, but it is manifest that a turntable is required at Leighton Station to enable the traffic to be worked in a proper manner from that place to Dunstable.

I enclose an undertaking, signed by the Chairman and Secretary of the Luton, Dunstable, and Welwyn Junction Railway, that only one engine in steam, or two or more coupled together and forming part of one train, shall be upon the line at one and the same time. But I am of opinion that, by reason of the insufficiency of the works, the opening of the Luton, Dunstable, and Welwyn Junction Railway for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lieut.-Col., R.E.

I have, &c.

Captain Galton, R.E.  
&c. &c.

W. YOLLAND,  
Lieut.-Col., R.E.

Railway Department, Board of Trade,  
Whitehall, April 17, 1858.

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to inform you, that they have received a report from Lieut.-Col. Yolland, R.E., of his re-inspection of the Luton, Dunstable, and Welwyn Junction Railway between Luton and Dunstable.

My Lords instruct me to state that they will not object to the portion of line in question being opened for public traffic, provided that no passenger train be allowed to run with the tender first, and that only one engine in steam be permitted to be on the line at one and the same time, except when two or more are required for the same train.

I am, &c.

The Secretary of the  
Luton, Dunstable, and Welwyn  
Junction Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

Railway Department, Board of Trade,  
Whitehall, April 17, 1858.

SIR, IN obedience to the instructions contained in your letter of the 6th instant, I yesterday re-inspected the Luton, Dunstable, and Welwyn Junction Railway, between Luton and Dunstable, and I have the honour to report, for the

Manchester,  
Sheffield, and  
Lincolnshire  
Railway  
(Hyde  
Branch).

## MANCHESTER, SHEFFIELD, AND LINCOLNSHIRE RAILWAY.

Manchester, Sheffield, and Lincolnshire Railway (Hyde Branch).

24, Parliament Street, Westminster,  
April 19, 1858.

SIR, As solicitor of Francis Dukinfield Palmer Astley, Esq., I beg to inquire whether the Manchester, Sheffield, and Lincolnshire Railway Company have obtained the sanction of the Board of Trade for the opening of a portion of a railway for the conveyance of passengers from a point about a mile eastward of the Guide Bridge station of the Manchester and Sheffield main line, being about a mile in length, over lands intended to have formed part of a railway from the same point to Whaley Bridge and New Mills, which line was never completed; and the Company's powers for making the same expired in 1851. They have now, however, a bill before Parliament for the making a railway from the same point to Compstall; but in anticipation of such Parliamentary authority, they have, for several weeks past, been running trains for the carriage of passengers for hire from their intended junction with the main line to the town of Hyde.

The information therefore I respectfully seek for is, whether the usual permission of the Board of Trade has been obtained by the Manchester, Sheffield, and Lincolnshire Railway Company for the opening of a portion of railway for the conveyance of passengers to Hyde? and, if so, was the Board, previously to granting such permission, made aware that the company have not, at the present moment, obtained the authority of Parliament for using any lands for the purpose of making a railway from Newton to Compstall, or any intermediate places?

I am, &c.

JOSH. HIBBERT.

P.S.—Herewith I beg to send Bradshaw's Guide which shows the trains and hours of starting on the line in question,—page 139.

Captain Galton, R.E.  
&c. &c.

letter of the 19th instant, and in reply, to inform you that the Manchester, Sheffield, and Lincolnshire Railway Company have not received their Lordships' permission to open a portion of railway for the conveyance of passengers between Guide Bridge and Hyde.

I am, &c.

Joseph Hibbert, Esq.,  
24, Parliament Street.

DOUGLAS GALTON,  
Captain, R.E.

Railway Department, Board of Trade,  
Whitehall, April 21, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to request that their Lordships may be informed whether the Manchester, Sheffield, and Lincolnshire Railway Company have opened for traffic a portion of railway between Guide Bridge and Hyde without having given to this department the requisite notices.

I am, &c.

DOUGLAS GALTON,  
The Secretary of Manchester,  
Sheffield, and Lincolnshire  
Railway Company.

Captain, R.E.

Manchester, Sheffield, and Lincolnshire Railway.

Secretary's Office, Manchester,  
April 28, 1858.

SIR, IN reply to your letter of the 21st instant, I beg to inform you that this company have opened a short piece of line (under one mile in length) to a new station in the town of Hyde, the former station having been found very inconvenient to the locality, and the company being pressed by the district to give the present accommodation. I may explain, for your information, that the line is laid upon works, which were constructed ten years ago under the authority of an Act of Parliament passed in 1846, for powers to construct a line from Dukinfield to Whaley Bridge, but which have been allowed to lapse.

The Directors were advised that the small piece of line in question should be regarded in the light of a siding to a new station, rather than as a new line within the meaning of the general Act, and therefore not needing any inspection; but if they have been in error in their interpretation of the

Railway Department, Board of Trade,  
Whitehall, April 23, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your

meaning of the legislature, they will be happy to facilitate any inspection you may consider necessary, and in that case you will perhaps consider this as a formal notice of the line being ready for use by the public, and forward me the necessary forms you require to be filled up.

I am, &c.

Captain Galton, R.E.  
&c. &c.

CHAS. ROSS,  
Secretary.

Railway Department, Board of Trade,  
Sir, Whitehall, May 11, 1858.

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report of Captain Tyler, R.E., of his inspection of the Hyde branch of the Manchester, Sheffield, and Lincolnshire Railway.

Upon consideration of that report, my Lords direct the Manchester, Sheffield, and Lincolnshire Railway Company to close their Hyde branch for the public conveyance of passengers for the period of one calendar month from this date.

My Lords direct me to add that they will order a re-inspection of this branch when they shall have been informed that the requirements of the inspecting officer have been complied with.

I am, &c.

The Secretary to the DOUGLAS GALTON,  
Manchester, Sheffield, and Captain, R.E.  
Lincolnshire Railway Company.

Railway Department, Board of Trade,  
Sir, Whitehall, May 7, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 1st instant, I have inspected the Hyde branch of the Manchester, Sheffield, and Lincolnshire Railway.

This is a double line, a mile long, connecting the town of Hyde with the main line of the Manchester, Sheffield, and Lincolnshire Railway, near Newton, at six miles from Manchester.

The works have been completed for many years almost as far as the town of Hyde; but the permanent way has been recently laid down, and a temporary station has been erected at Hyde, upon a line which leads to the coal-drops, and which will eventually be used as a siding when the branch is continued, as is intended, to Compstall. The Company allowed their powers to lapse before completing the line, for which they obtained an Act of Parliament in 1846, from Dukinfield to Whaley Bridge, of which this formed a portion; but they have now been using the Hyde branch for passenger traffic for several weeks past, without their Lordships' permission, and without having given the notices required under the 5 & 6 Vict. c. 55., in anticipation of authority under a bill which they now have before Parliament for making a line between the present junction near Newton and Compstall.

The junction with the main line has been satisfactorily completed, a brick stage having been erected, from which the main signals, the distant signals, and the points are all worked.

The permanent way is laid with double-headed rails, 24 feet long, weighing 72 lbs. to the lineal yard, and "fished" at the joints with two wrought-iron fishing plates. The sleepers are square and creosoted, and they are laid 3 feet apart on the average. The rails rest on the sleepers in cast-iron brackets, which are bolted to the rails and spiked to the sleepers. The line was originally ballasted with stones and sand, and ashes and burnt brick having now been placed over these, the permanent way is in good order, though a little drainage is still required in a clay cutting.

There are several bridges of brickwork and masonry under and over the line, which have been standing for the last ten years; and there are two long culverts near Hyde which have been also completed for that length of time.

I understand that when the branch was first opened for traffic a double line was completed up to the Hyde platform; but the bank on which that platform is approached, and on which it is situated, has since been giving a great deal of trouble. It has slipped away from under one line of rails, and the sleepers of the other line are partially unsupported. The engine has therefore latterly been separated from the carriages at a short distance from the station, and the latter have been allowed to run by themselves up to the station platform.

This mode of working is not unattended with risk, as is proved by the collisions that have occurred in consequence of its adoption at the Victoria station at Manchester; and before the line can be used safely for traffic, this bank will have to be made good, and the double line to be re-established. The wing wall also of a bridge near the temporary station, by which a portion of the bank is supported, will require to be taken down and rebuilt, in consequence of a serious bulge having occurred in it since it was completed about three weeks since.

The company appear to be making every exertion to complete the requirements above specified, but it is my duty to report, that, in the meantime, the opening of this branch is attended with danger to the public using the same, by reason of the incompleteness of the works.

I have, &c.

The Secretary,  
Railway Department  
Board of Trade.

H. W. TYLER,  
Captain, R.E.

Railway Department, Board of Trade,  
Sir, Whitehall, May 22, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 19th instant, I have re-inspected the Hyde branch of the Manchester, Sheffield, and Lincolnshire Railway.

The requirements referred to in my report of the 7th instant upon the subject of this branch, have now been completed.

I enclose a certificate, signed by the secretary, on behalf of the company, to the effect that a tank engine will be used in the working of the traffic, unless a turntable should be supplied (which is not likely to be the case) at Hyde, and that a clock will be put up at the Hyde station on Monday morning next.

The gradient falls 1 in 150 towards Hyde, and I understand that all the trains will be brought to a stand, in the first instance, for the collection of the tickets, about 200 yards short of the temporary station.

I beg to report my opinion, that the Hyde branch of the Manchester, Sheffield, and Lincolnshire Railway may now be opened without danger to the public using the same.

I have, &c.

The Secretary,  
Railway Department,  
Board of Trade.

H. W. TYLER,  
Captain, R.E.

Extract sent to the Company.

Railway Department, Board of Trade,  
Sir, Whitehall, May 25, 1858.

I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed extract from the report made by Captain Tyler, R.E., the officer appointed by them to re-inspect the Hyde branch of the Manchester, Sheffield, and Lincolnshire Railway.

My Lords direct me to state, that they will not object to the branch line in question being opened for public traffic provided that a tank engine be used in the working of the traffic until a turntable is supplied at Hyde, and that a clock be put up at once at the Hyde station.

I am, &c.

The Secretary of the DOUGLAS GALTON,  
Manchester, Sheffield, and Captain, R.E.  
Lincolnshire Railway Company.

Railway Department, Board of Trade,  
Sir, Whitehall, October 21, 1858.

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R.E., the officer appointed by them to inspect the Lincoln Branch of the Manchester, Sheffield, and Lincolnshire Railway.

Upon consideration of that report, my Lords direct the Manchester, Sheffield, and Lincolnshire Railway Company to postpone the opening of the branch line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the DOUGLAS GALTON,  
Manchester, Sheffield, and Captain, R.E.  
Lincolnshire Railway Company.

Appendix  
No. 1.

INSPECTIONS.

Manchester,  
Sheffield, and  
Lincolnshire  
Railway  
(Hyde  
Branch).

**Appendix No. 1.**  
**INSPECTIONS.**  
**Manchester, Sheffield, and Lincolnshire Railway (Lincoln Branch).**

SIR,  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 13th inst., I have this day inspected the Lincoln Branch of the Manchester, Sheffield, and Lincolnshire Railway.

There are two railway stations at Lincoln, belonging respectively to the Great Northern and to the Midland Railway Companies; and the Manchester, Sheffield, and Lincolnshire Railway Company works into them both, viz.:—

Into the Great Northern Station by means of running powers over the Great Northern line from Saxilby on the north-west into Lincoln, and into the Midland Station by a line from the north-east, belonging to the Manchester, Sheffield, and Lincolnshire Company itself, and which, leading from Market Rasen, crosses the Great Northern line to the southward of Lincoln, and enters one end of the Midland Station at Lincoln, while the traffic of the Midland Company on its own line is worked from the other end of the station towards Newark.

The object of the Lincoln Branch now constructed by the Manchester, Sheffield, and Lincolnshire Railway Company is to establish a communication just to the north of Lincoln, between the Great Northern line on the one hand and the Midland line on the other, so that the passenger trains of the Manchester, Sheffield, and Lincolnshire Railway Company may work through from Saxilby (through the Midland Station at Lincoln) to Market Rasen, and that facilities may be given for the mutual interchange of traffic of the other companies by means of the Lincoln Branch.

Thus a Manchester, Sheffield, and Lincolnshire train leaving Saxilby will run over the Great Northern line to within a mile of Lincoln.

There it will enter on the new Lincoln Branch, the property of the Manchester, Sheffield, and Lincolnshire Railway Company. It will traverse this for its length of about 1,200 yards, and then proceed on the Midland line for about 300 yards, into the Midland Station; after which it will pursue its course on the Manchester, Sheffield, and Lincolnshire line to Market Rasen.

The Manchester, Sheffield, and Lincolnshire Railway Company have purchased and enclosed land for the Lincoln Branch for a double line, but they have only laid it as a single line doubled at the junctions.

It is about 57 chains in length, a great part of it level, and with no work whatever of any importance upon it.

It is therefore, in my opinion, much to be regretted that the branch, situated as it is, should not have been laid as a double line—a security in itself for safe working, which can never be given, under the best regulations, by a single line.

In this case the risks are multiplied, for the branch belongs to one company, and the junctions at either end, with the pointsmen to be employed, to a second and a third company.

The permanent way of the branch is in good order, and the junction and distant signals at either extremity are of a satisfactory description; but no means of communication have been provided between the pointsmen at each end of the branch. It is essential that the system under which the branch is to be worked, and the instructions which are to be given to the pointsmen, should be fully considered by the three companies concerned; and I have requested that the details, when agreed upon, may be submitted for their Lordships' consideration. The most satisfactory conclusion would doubtless be to double the line of rails; and I beg strongly to recommend to the Directors of the Manchester, Sheffield, and Lincolnshire Railway Company to adopt that course.

As I do not consider that the safe working of this branch is sufficiently provided for by the ordinary junction and distant signals, it is my duty to report that the opening of the Lincoln Branch of the Manchester, Sheffield, and Lincolnshire Railway Company cannot, in my opinion, be sanctioned without danger to the public using the same.

I have, &c.  
*Captain Galton, R.E.*      *GEORGE ROSS,*  
*&c.*      *&c.*      *Captain, R.E.*

Manchester, Sheffield, and Lincolnshire Railway.

*Secretary's Office, Manchester,*  
*November 17, 1858.*

SIR,  
I AM favoured with yours of the 16th instant.

The inspecting officer of the Board of Trade, Captain Ross, recommended that telegraphic communication should be established upon the Lincoln Branch, and certain other things should be done before it was opened.

These recommendations have been ordered by the directors to be carried out, but there has not yet been sufficient time to do so.

It therefore appears to me that the better way will be for us to give you notice when these matters are completed and the branch ready for reinspection, and unless I hear from you to the contrary I shall understand that this is agreed to.

I have, &c.  
*Captain Galton, R.E.*  
*&c.*      *&c.*

E. K. ROSS,  
*Secretary.*

Railway Department, Board of Trade  
Whitehall, November 18, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 17th instant, and in reply to inform you that upon receiving a fresh notice that the Lincoln Branch of the Manchester, Sheffield, and Lincolnshire Railway is ready for inspection, my Lords will at once order an inspection to be made.

I am, &c.  
*The Secretary of the*      *DOUGLAS GALTON,*  
*Manchester, Sheffield, and*      *Captain, R.E.*  
*Lincolnshire Railway Company.*

SIR,  
Lincoln, January 6, 1859.  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 30th ultimo, I have this day reinspected the Lincoln Branch of the Manchester, Sheffield, and Lincolnshire Railway.

Telegraphic communication has been established between the pointsmen's boxes at the extremities of the branch, and magnetic telegraph instruments placed in them; and the enclosed simple regulations, drawn up by the superintendent of the Manchester, Sheffield, and Lincolnshire Railway Company have received the approval of the Great Northern and of the Midland Railway Companies, and seem to me calculated to promote the safe working of the traffic.

I beg to recommend, therefore, that their Lordships' sanction be now given to the opening of the Lincoln Branch.

I have, &c.  
*Captain Galton, R.E.*      *GEORGE ROSS,*  
*&c.*      *&c.*      *Captain, R.E.*

RULES FOR WORKING THE LINCOLN NEW JUNCTION BRANCH TELEGRAPH.

1st. When a train or engine is ready to be passed over the new Branch Line, the signal-man at the entering junction must call the opposite junction signal-man's attention by ringing the telegraph instrument bell *once*, which he may repeat slowly till it is acknowledged by the instrument bell being once rung in return by the receiving signal-man.

2nd. The one ring acknowledgment denotes "wait."

3rd. When the receipt of a signal has been acknowledged by giving "wait," if the main line and branch are all clear, the receiving signal-man must "stop" the main line, then lower the branch line signals to "caution," and afterwards ring the telegraph bell *three times* slowly, as notice of permission for the waiting train or engine to be allowed to enter upon the branch.

4th. No engine must on any account be allowed to enter upon the branch till the signal-man has received the three-ring signal permission from the signal-man at the opposite end of the branch.

Lincoln, January 6, 1859.  
I HAVE received the official approval of the above, from both the Great Northern and Midland Companies.

T. HARGREAVES,  
*Superintendent of the Manchester, Sheffield, and Lincolnshire Railway Company.*

Railway Department, Board of Trade,  
Whitehall, January 8, 1859.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R.E., of his reinspection of the Lincoln Branch of the Manchester, Sheffield, and Lincolnshire Railway.

My Lords direct me to state that they will not object to the branch in question being opened for public traffic provided that the regulations for working the traffic, a copy of which was furnished to the inspecting officer, be duly observed.

I am, &c.  
*The Secretary of the*      *DOUGLAS GALTON,*  
*Manchester, Sheffield, and*      *Captain, R.E.*  
*Lincolnshire Railway Company.*

## MIDLAND GREAT WESTERN (OF IRELAND) RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, April 30, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Captain Tyler, R.E., of his inspection of the second line of rails between Mullingar and the Cavan Junction upon the Midland Great Western (of Ireland) Railway.

Upon consideration of that report, my Lords direct the Midland Great Western (of Ireland) Railway Company to postpone the opening of the second line of rails in question for the public conveyance of passengers for the period of one calendar month from this date.

I am, &c.

*The Secretary to the  
Midland Great Western  
Railway Company.*

DOUGLAS GALTON,  
*Captain, R.E.*

SIR,

April 26, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 22nd instant, I have inspected the second line of rails which has been laid between Mullingar and the Cavan Junction, on the Midland Great Western (of Ireland) Railway.

This portion of line, which is common, as it were, to the Longford and Cavan Branches, is  $10\frac{3}{4}$  miles in length. The permanent way, like that of the first line, is composed of bridge rails on longitudinal timbers, and it appears to be in good order.

At the Mullingar Junction, between the Longford Branch and the main line, an extra double semaphore signal is required, to apply to the main line; and both at that junction and at the Cavan Junction suitable stages should be constructed for the reception of the distant signal levers and point handles, and these should be so arranged as to be conveniently worked by the signalman, as well as the main signals, without his being obliged to leave his post. For this purpose it will be desirable to remove the semaphore signals of the Cavan Junction from the platform on which they are now situated to the actual point of junction between the Longford and Cavan Branches.

A wrought-iron lattice bridge over a canal near Mullingar is not, by any means, a satisfactory structure. On account of the great proportionate depth of the girders,—7 feet to a span of 57 feet,—the deflection is very moderate; but the workmanship is bad; several of the lattice bars are split at the ends, which are riveted to the top and bottom flanges; the middle girder, which has to support the halves of two lines of rails, is but very little stronger than the outside girders, which have only to support, each of them, the half of one line of rails; and allowing 90 tons for rolling load and stationary load (over a span of 57 feet), the strain per square inch on the bottom flange of that girder is upwards of seven tons. I am of opinion that this bridge should be thoroughly examined, that the defective portions should be replaced, and that the middle girders should be strengthened. The bridge is also an unsatisfactory one for another reason; the middle girder, extending to a height of between five and six feet above the rails, is only one foot from the outside of the carriages, and the life of a guard, opening a carriage door, or standing on a foot-step, or a driver stooping down to attend to his engine, might at any time be endangered in passing it.

The cattle passes under the line have been very roughly executed, and will require to be carefully looked after from time to time; and a wooden viaduct near the Cavan Junction, in which there is a considerable amount of oscillation, and of which it appears that the piles could not be driven to any great depth, from the rock being near the surface, will require more than ordinary attention. I have recommended that a system of bracing, which has been partially carried out in this viaduct, should be still further extended.

A distant signal is wanting in each direction from Multifarnham Station; some facing points are to be removed from the neighbourhood of Mullingar, and a return signal is required at that place, to indicate the action of the distant signal on the branch, which is hidden by a sharp curve from the view of the signalman.

I beg to report my opinion that the opening of this second line of rails would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.

*The Secretary,  
Railway Department,  
Board of Trade.*

W. H. TYLER,  
*Captain, R.E.*

Appendix  
No. 1.

## INSPECTIONS.

Midland Great  
Western (of  
Ireland) Rail-  
way.

*Railway Department, Board of Trade,  
Whitehall, May 25, 1858.*

SIR,  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 14th instant, I have re-inspected the second line of rails between Mullingar and the Cavan Junction on the Midland Great Western (of Ireland) Railway.

I find that all the requirements enumerated in my report of the 26th ultimo have been attended to.

The middle girder of the lattice bridge near Mullingar has been supported on piles, which reduce the span by about a quarter of its length. New lattice bars and rivets have been inserted, in places, in all three girders, and the bridge is in better condition. I have suggested a few further alterations in it, which the engineer has taken measures for at once carrying out.

The facing points near Mullingar have been removed, and a new semaphore signal, and a return signal from the distant signal towards the Cavan Junction, have been provided. The stage from which the points and signals are all to be worked is making satisfactory progress.

The distant signals from Multifarnham have been fixed, and the materials supplied for working them; but the wires have not yet been stretched.

The recommendations which I made in regard to the wooden viaduct have been carried out, and the work is all but completed.

The signals at the Cavan Junction have been moved to a more suitable spot, from which all the points and signals are to be worked, though it will take three or four days to complete the arrangements at this place.

The month for which their Lordships have postponed the opening of this second line of rails will expire on the 29th instant, and the company are anxious to open it on the 1st proximo; and looking to the state of the works, and the means prepared for their completion, I am of opinion that they may do so without danger to the public using the same.

I have, &c.

*The Secretary,  
Railway Department,  
Board of Trade.*

H. W. TYLER,  
*Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, May 31, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to inform you that they have received a further report from Capt. Tyler, R.E., the officer appointed by their Lordships to re-inspect the second line of rails between Mullingar and the Cavan Junction on the Midland Great Western (of Ireland) Railway, and to state that they no longer object to the portion of line in question being opened for public traffic.

I have, &c.

*The Secretary of the  
Midland Great Western  
(of Ireland)  
Railway Company.*

DOUGLAS GALTON,  
*Captain, R.E.*

## MORAYSHIRE RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, July 29, 1858.*

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Morayshire Railway between its junction with the Inverness and Aberdeen Junction Railway at Orton and the town of Rothes.

Upon consideration of that report my Lords direct the Morayshire Railway Company to postpone the opening of the line in question for the public conveyance of passengers for a period of one calendar month from this date.

I am, &c.

*The Secretary of the  
Morayshire Railway Company.*

DOUGLAS GALTON,  
*Captain, R.E.*

Morayshire  
Railway.

Appendix  
No. 1.  
—  
INSPECTIONS.  
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Morayshire  
Railway.

SIR,  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 22nd instant, I have inspected the Morayshire Railway, between its junction with the Inverness and Aberdeen Junction Railway at Orton and the town of Rothes.

This is a single line, 3 miles 14 chains long, which is immediately to be extended 2 miles and 14 chains further, to Craigallachie. It has been constructed by the company owning the line from Elgin to Lossiemouth, and it is intended to run through trains from Lossiemouth to Rothes and back, via Elgin and Orton; these trains passing for 10 miles over the line of the Inverness and Aberdeen Junction Company, which is also a single line. It will therefore be the more necessary strictly to enforce, by means of the telegraph, the rule that only one engine or train shall be at one time upon each of the portions into which that line may for the purposes of working be divided.

The station and signal arrangements at the Orton Junction, which is awkwardly situated on a gradient of 1 in 100, and the necessary siding accommodation for the working of the traffic, have yet to be completed. The details of these works formed a subject of difference between the two companies at the time of my inspection; but another site has now been decided on, and I believe that all difficulty in the execution of them has been removed.

The permanent way between Orton and Rothes is of a satisfactory and substantial description. It is constructed with flat-bottomed rails, weighing 68 lbs. to the lineal yard, fished at the joints, and secured by wrought-iron dog spikes, one on each side of each rail, to transverse sleepers, 2 feet 7 inches apart. The ballasting is also good.

There are six bridges and viaducts, varying in span from 12 to 30 feet, all of which are substantially constructed. The parapet of an occupation over-bridge is not yet, however, put up.

Locks will have to be provided for the siding at the Sworden timber yard, at the points, and on the chock block; and some contractor's points, and a contractor's water tank, will have to be removed before the line is opened for traffic.

I have not yet received the necessary certificate for ensuring the safe working of the single line.

These things might be done in a very short time, but the junction arrangements will take longer to complete, and in the meantime I can only report my opinion that the opening of this portion of the Morayshire Railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

In order to complete the through communication of the Morayshire Railway, a short piece of line has been recently laid down connecting the Morayshire Company's station with that of the Inverness and Aberdeen Junction Company at Elgin. It is about 400 yards long, and has been constructed, part of it by the one company, and part by the other; but neither of them had thought of giving formal notice to their Lordships for opening it.

I have inspected it, however, at their request, and have arranged that a passenger platform for the use of the Morayshire Company is to be added to the new line, and that certain signals are to be supplied for the safe working of the traffic at and between the stations of the two companies.

I may add, that this line passes under a second opening of the bridge to which I have referred in my report of the 24th instant, on the subject of the Inverness and Aberdeen Junction Railway, as being incomplete, and that the girders have not yet been supplied for either opening.

I have, &c.

Captain Galton, R.E.

&c.

H. W. TYLER,

Captain, R.E.

Railway Department, Board of Trade,  
Whitehall, August 18, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Morayshire Railway between Rothes and the Orton Junction with the Inverness and Aberdeen Junction Railway, and between the station of the Morayshire Railway Company and that of the Inverness and Aberdeen Junction Company at Elgin.

My Lords direct me to state, that they do not object to the portion between Rothes and Orton being opened for public traffic, provided that not more than one engine in steam, or two or more coupled together, but forming a portion of one train, be permitted upon the line between Rothes and Orton, at one and the same time.

With respect to the portion between the Morayshire and the Inverness and Aberdeen Junction Company's stations at Elgin, my Lords direct the Morayshire Railway Company to postpone the opening thereof for the public conveyance of passengers for the period of one calendar month from this date.

I am, &c.

The Secretary of the  
Morayshire Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

SIR,

Elgin, August 16, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 6th instant, I have re-inspected the Morayshire Railway between Rothes and the Orton Junction, and between the station of the Morayshire Company and that of the Inverness and Aberdeen Junction Company at Elgin.

In regard to the former portion of this railway, I beg to report, that, on inspecting it, on the 14th instant, I found the requirements referred to in my former report completed, but that the gate-posts of the occupation level crossings along the line were so near the rails that the open doors of the wide carriages in use on the Morayshire Railway would not quite swing clear of them.

I have been over the line again this evening, and I find that these have been altered; and as the Orton Junction is now completed, with the exception of a few hours' work, for the uses for which it is at present required, as I have explained at length in my report of this date upon the Inverness and Aberdeen Junction Railway, I beg now to report my opinion, that the portion of the Morayshire Railway between Orton and Rothes may be opened without danger to the public using the same.

With regard to the small portion near Elgin, I have to report that the arrangements for working it, to which I referred in my former report on the subject, though in a forward state, from the amount of work that has this day been bestowed upon them, are yet not completed, and that the permanent road has not yet been finished, for want of some switches which are expected from England. I am therefore of opinion that, by reason of the incompleteness of the works, this portion, about 400 yards in length, near Elgin, cannot be opened without danger to the public using the same.

I beg to enclose a certificate, signed by the chairman and secretary of the Morayshire Company, in regard to three points on which I thought it necessary to require such an undertaking.

1. That only one engine in steam, or two coupled together, should be allowed between Orton and Rothes at one time.

2. That the Morayshire Company's trains, which are intended to run over a part of the single line of the Inverness and Aberdeen Junction Railway, should conform to the rules of the Inverness and Aberdeen Railway Company in doing so.

3. That the arrangement, at first contemplated, of pushing the carriages in front of the engine between the two stations at Elgin, should be abandoned.

I have, &c.

Captain Galton, R.E.

&c.

H. W. TYLER,

Captain, R.E.

SIR,

Elgin, September 11, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for trade, that I have this day re-inspected the portion of the Morayshire Railway, about 400 yards in length, extending from their station at Elgin to the station of the Inverness and Aberdeen Junction Railway Company at that place.

The passenger platform, for the use of the Morayshire Company, alluded to in a previous report of the inspecting officer, is complete, the permanent way is in good order, and the safe working of the traffic effectually provided for by the signals that have been supplied.

I have to observe, however, that the Morayshire Company have not waited for their Lordships' permission, and that trains have been, and are running, upon this portion of the line.

I learn from Captain Tyler that he received a certificate from the engineer that the works above specified were completed, but that he had occasion to postpone transmitting it to their Lordships till he should have had some further

information, for which he wrote to the company, about an over-bridge crossing the line at this part.

This information was not sent to him, and the company seem, in the mean while, to have taken it for granted that the line might be opened, and to have commenced running trains upon it as soon as the certificate of the engineer was despatched.

They seem also to have been precipitate with reference to the question of the mode in which their running powers over the Inverness and Aberdeen Junction Railway are to be exercised; that question, as it relates to the safety of the public, being still, I am informed by the general manager of the latter company, under the consideration of their Lordships.

The over-bridge is apparently safe, being completed at the span covering the Morayshire line of railway, and I have therefore to state that there is, in my opinion, no danger in working the passenger traffic on the new line connecting the stations of the two companies at Elgin so far as relates to the works and permanent way.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*GEORGE ROSS,  
Captain, R.E.*

Lords should not enforce the penalties the Company have incurred thereby.

I am, &c.

*The Secretary to the  
Morayshire Railway Company.*

Appendix  
No. 1.

INSPECTIONS.

Morayshire  
Railway.

*Morayshire Railway, Secretary's Office,  
September 20, 1858.*

SIR,

I HAVE the honour to acknowledge the receipt of your letter of the 17th current. For the information of the Lords of the Committee of Privy Council for Trade I have to state that the circumstances connected with the opening of the junction between this line, at Elgin, and the Inverness and Aberdeen Junction Railway are simply these:—

A junction, for the exchange of roads only, having been made, and used by horse power, previous to the inspection and the passing of the extension of this line for public traffic to Rothes, by Captain Tyler, that gentleman, upon inspecting the junction at Elgin, recommended certain alterations, and certain signals to be put up, and requested the engineer to report to him when those requirements were completed. The engineer understood that the fulfilment of those requirements was all that was necessary, and that no second inspection of the junction would be required, and he proceeded to fulfil them with all possible despatch, and when completed, he reported so to Captain Tyler, and passengers were then allowed to keep their seats, in being drawn by locomotive power from the one line to the other, and in doing which the trains do not run more than at the rate of three to four miles per hour.

If, therefore, this company have erred, it arises entirely from misapprehension upon their part and that of their engineer, and in total ignorance that they were doing wrong, and they sincerely trust that in the circumstances the Lords of the Committee of Privy Council will overlook it.

I have, &c.

*T. H. Farrer, Esq.  
&c. &c.*

*THOS. HEN. BING,  
Secretary.*

North  
Yorkshire and  
Cleveland  
Railway.

*Railway Department, Board of Trade,  
Whitehall, September 17, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to request that you will inform their Lordships why the Morayshire Railway Company have opened that portion of their line extending from the station at Elgin to the station of the Inverness and Aberdeen Junction Railway Company at that place previously to its having been inspected by an officer of this department.

I am further to request that you will state what grounds the Morayshire Railway Company have to urge why my

NORTH YORKSHIRE AND CLEVELAND RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, September 30, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the portion of the North Yorkshire and Cleveland Railway extending from Stokesley to Kildale.

Upon consideration of that report, my Lords direct the North Yorkshire and Cleveland Railway Company to postpone the opening of the portion of line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

*The Secretary of the  
North Yorkshire and Cleveland  
Railway Company.*

*Railway Department, Board of Trade,  
Whitehall, September 29, 1858.*

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 21st instant, I have inspected the North Yorkshire and Cleveland Railway, between Stokesley and Kildale.

This is a portion of single line, 5 miles long, in continuation of the part of the railway which has been already opened.

The permanent way is laid with double-headed rails, 21 feet long, and weighing 75 lbs. to the lineal yard, the lower head being smaller than the upper one. The chairs are of cast-iron, and are secured by wrought-iron twisted spikes to the sleepers. The rails are fished at the joints by means of a fishing chair. Five sleepers of larch fir, 8' 6" long, have been placed under each rail, and two blocks, cut from similar sleepers, so that the supports of the rails are 3 feet apart from centre to centre. The use of blocks in this manner is stated to have been found to answer elsewhere, but it does not appear to me to be a desirable practice, as it effects but a small economy in the expense of construction, while it takes, to a certain extent, from the strength of the permanent way. The ballast is of gravel and sand.

The bridges are principally of masonry and brickwork, though, in a few cases, cast-iron girders on brick abutments

have been employed. These, and all the works of the line, have been substantially constructed, and they appear to be standing well.

A water crane at Stokesley, and some contractors' water-tanks in other parts of the line, are at present within less than 3' 6" of the rails, which is too near for the public safety; and an alteration requires to be made in some of the pieces of timber under the bridges to which the telegraph wires are attached, these being also too near the carriages passing on the railway.

The line is in progress beyond Kildale, and no turntable has, therefore, been supplied at the latter station; but I have requested that a certificate should be furnished by the Company, to the effect that the line should be worked by a tank-engine, and I have asked for a second certificate, to the effect that only one engine shall be allowed to be upon the line at any one time.

Pending the receipt of these certificates, and the removal of the obstructions above referred to, I beg to report that I am of opinion, that the North Yorkshire and Cleveland Railway between Stokesley and Kildale cannot, by reason of the incompleteness of the works, be opened without danger to the public using the same.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*H. W. TYLER,  
Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, October 28, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the North Yorkshire and Cleveland Railway, between Stokesley and Kildale.

Upon consideration of that report, my Lords direct the North Yorkshire and Cleveland Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for a further period of one calendar month from this date.

I am, &c.

*The Secretary of the  
North Yorkshire and Cleveland  
Railway Company.*

*JAMES BOOTH.*

**Appendix  
No. 1.**  
**INSPECTIONS.**  
North  
Yorkshire and  
Cleveland  
Railway.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, October 26, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 18th instant, I have re-inspected the North Yorkshire and Cleveland Railway, between Stokesley and Kildale.

I find that the obstructions at the side of the line which were referred to in my report of the 29th ultimo, have been removed; but I have not yet received the two certificates for which I have asked; the one undertaking that only one engine in steam, or two coupled together in one train, shall ever be upon the line between Stokesley and Kildale at one time; and the other, that in the absence of a turntable at the temporary terminus at Kildale, the traffic shall be worked by a tank engine; and I beg, therefore, to report my opinion, that the opening of this portion of line would, by reason of

the insufficiency of the establishment, be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c. &c.

H. W. TYLER,  
Captain, R.E.

*North Yorkshire and Cleveland Railway Company,  
Sir, 4, Market Street, York, November 20, 1858.*

I AM sorry that I was unfortunately out of the way when you did me the favour to call to-day.

The Directors withdraw their second notice given of the intention to open, for the public conveyance of passengers, the portion of the line between Stokesley and Kildale.

I have, &c.

Captain Tyler, R.E.  
&c. &c.

JOHN BROOKS,  
Secretary.

Portadown,  
Dungannon,  
and Omagh  
Junction Rail-  
way.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, March 15, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the portion of the Portadown, Dungannon, and Omagh Junction Railway extending from Portadown to Dungannon.

Upon consideration of that report, my Lords direct the Portadown, Dungannon, and Omagh Junction Railway Company to postpone the opening of the portion of railway in question for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
Portadown, Dungannon, and  
Omagh Junction Railway Co.

DOUGLAS GALTON,  
Captain, R.E.

joints of the Blackwater girders require to be carefully looked through, and strengthened by additional rivets and additional plates. Four rivets only on each side of the joint connect the horizontal plates of the bottom webs of the girders with their covering plates, and two on each side only are used for the vertical plates of the same webs, with thin covering plates; and these rivets are not always effective, from being either too near the joints or too near the edges of the covering plates. The joints also of the vertical and horizontal plates are sometimes close together, and form weak points in the girders; and these circumstances reduce materially their strength as obtained by calculation, which is otherwise, as I have already observed, sufficient.

The permanent way upon the smaller viaduct requires to be stiffened; and in all the girders the mode in which the rails are secured is not very satisfactory. The bridge rails are laid longitudinally upon half baulks of Memel timber across these viaducts, and are secured to them only by dog-spikes, except at the joints, where two through bolts are used; so that when the spikes are driven without holes being bored for them they split the timber, and when holes are bored for them they do not retain a firm hold in it. It is desirable that a better means of securing the rails on these viaducts should be adopted.

The rails over the whole line are as yet insufficiently spiked down, the "dogs" having been driven only on alternate sides of the rails into every other sleeper, instead of one on each side of each rail into each sleeper.

On some portions of the line the sleepers are very near the clay, and a good deal of additional ballasting is required.

A main signal and distant signal have been supplied for the junction at Portadown, to apply to the Dungannon Line; and I understand that negotiations have for a considerable period been carried on, with a view to the completion of the signals which are required for the other lines which run into that station. Now that the Dungannon line is constructed, a double junction is formed near this station, as the Dublin and Belfast Junction Line also joins the Ulster Railway at this point. A proper stage should now be supplied, from which a junction signal-man should be enabled to work his points and signals; and as many signals should be furnished for his use as will form a main signal and a distant signal, to apply to trains passing in each direction along each line.

On account of the requirements referred to in the last five paragraphs, I beg to report my opinion, that by reason of the incompleteness of the works, the Portadown, Dungannon, and Omagh Junction Railway cannot be opened without danger to the public using the same.

Whilst inspecting this line, I sent to Mr. Atkinson, a neighbouring proprietor, who has addressed certain complaints to their Lordships in regard to two culverts under the railway, to ask him to meet me on the spot. I had the pleasure, accordingly, of hearing all that he had to say on the subject, but as there is nothing to affect the safety of the railway in the culverts to which he refers, it will not be necessary for me to say more on the question in the present report.

I have, &c.

The Secretary of the  
Railway Department,  
Board of Trade.

H. W. TYLER,  
Captain, R.E.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, March 13, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 8th instant, I have inspected the Portadown, Dungannon, and Omagh Junction Railway, between Portadown and Dungannon.

This is a single line,  $1\frac{3}{4}$  miles long, with sidings 200 or 300 yards in length, at  $6\frac{1}{4}$ ,  $10\frac{1}{4}$ , and  $13\frac{1}{2}$  miles from the junction which has been formed with the Ulster Railway at Portadown.

At 9 miles 70 chains from the junction at Portadown, there is a horizontal deviation of 2 chains outside the limits permitted by Parliament, and there are numerous vertical deviations beyond the parliamentary limits.

The permanent way is laid with a bridge rail weighing 70 lbs. to the lineal yard, laid on transverse sleepers 2 ft. 9 in. apart, and secured by two fang bolts, two bolts and nuts, and four rivets, at each of the joints, and dog-spikes in the intermediate portions.

The steepest gradients are, about 3 miles of 1 in 100, 1 mile of 1 in 111, and 1 in 112, and a short gradient of 1 in 80 near Dungannon. There is a curve of 9 chains radius for 6 chains, and 19 chains radius for 16 chains, leading to the junction with the Ulster Railway; but there is no other curve of a less radius than 30 chains.

A turntable has been laid down at Portadown, and another at Dungannon.

There are several bogs on this line, and some bog embankments, which will require great attention and a good deal of labour for some time to come, and which will have to be used only at moderate speeds.

There are 18 viaducts and bridges under the line, of spans varying from 6 to 57 feet; and 19 bridges over the line, covering spans of from 28 to 36 feet.

Of these the principal work is a viaduct over the Blackwater, containing 5 spans of 57 feet each, and constructed with wrought iron lattice girders, supported on piles. A smaller viaduct, with three openings, and a bridge with a span of 30 feet, are also constructed with wrought iron lattice girders. The remainder are of timber and masonry.

All the iron girders themselves are sufficiently strong by calculation, and sufficiently stiff by actual test; but the

## Portadown and Dungannon Railway.

26, Duke Street, Westminster, S.W.  
March 31, 1858.

SIR,  
In reference to the report of Captain Tyler on the line between Portadown and Dungannon, and to your letter of the 15th instant, conveying the order of their Lordships of the Board of Trade to postpone the opening until the 15th proximo, I have now the honour to certify that all the requirements of Captain Tyler have been complied with, as follows, viz.:—

1. The line is now properly ballasted.
2. Double spikes secure the rail to sleepers throughout.
3. Rails have been securely bolted down, and timber work strengthened on iron girder bridges.
4. The joints of Blackwater Bridge girders have been strengthened.
5. The line over the bogs in soft spots has been secured by longitudinal sleepers bolted under the cross sleepers.

There remains only one requirement of Captain Tyler's—the erection of a stage at the Portadown Junction, from which semaphores and distant signals for each line, as well as points, can be worked by the same person, which has not been carried out. Many attempts have been made for some time to get the three companies to agree on the erection of such a stage, and I am now authorized to put one up that will be satisfactory to the inspecting officer.

But as the arrangement of it will require a length of time, during which it would be highly injurious to the interests of the Portadown and Dungannon line to remain closed to the public, it is now proposed that their trains shall stop short of the junction at the platform shown on the accompanying tracing point A, the passengers getting out and walking from A to C, the platform of the Ulster Company.

I am, therefore, now instructed by the Earl of Ranfurly, chairman, and the other directors of the line, to withdraw the ten days' notice to their Lordships of the intention to open the line between the points A and B at Portadown Junction, being a length of about 40 yards (measured along the line from its commencement at the points of the Belfast Junction Railway), as shown on the accompanying tracing, and respectfully to request that the remainder of the line, from the point A to Dungannon, being now certified by me as placed in the condition required by Captain Tyler, shall be allowed forthwith to be used for public traffic.

I have, &c.  
Captain Galton, R.E. G. W. HEMANS,  
&c. &c. Engineer.

P.S. I shall be much obliged by having an appointment with Captain Tyler, or any other officer, to ascertain distinctly what signals will be considered satisfactory, before I involve the three companies concerned in any expense.

## MEMORANDUM in reference to Mr. HEMAN'S Letter to Captain GALTON, dated March 31, 1858.

As the notice for opening the Junction of the Dungannon Railway with the Ulster, and Dublin and Belfast Junction Railways, is now withdrawn, pending the completion of the proper junction arrangements; and as the other requirements enumerated in my report upon the Dungannon Railway are now stated by Mr. Hemans to be satisfied, I am of opinion that this line may be opened without danger to the public using the same.

I have, &c.  
H. W. TYLER,  
Captain, R.E.

April 1, 1858.

SIR,  
Railway Department, Board of Trade,  
Whitehall, April 10, 1858.  
I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of Mr. Hemans' letter of the 31st ultimo, enclosing a plan, and withdrawing the second notice of opening given by the Portadown and Dungannon Railway Company, with respect

SIR,  
Railway Department, Board of Trade,  
Whitehall, February 12, 1858.  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Lieut.-Colonel

to a small portion of the line extending from a point, marked A on the plan, to Portadown.

My Lords direct me to inform you that they do not object to the opening of the above line between Dungannon and the point marked A on the plan, provided that not more than one engine in steam be permitted to be upon the line between Annaghmon and the point A, and between Annaghmon and Dungannon, at one and the same time, except when two (coupled together) may be required for the same train.

I am, &c.  
The Secretary of the DOUGLAS GALTON,  
Portadown and Dungannon Captain, R.E.  
Railway Company.

Appendix  
No. 1.

## INSPECTIONS.

Portadown,  
Dungannon,  
and Omagh  
Junction Rail-  
way.

Railway Department, Board of Trade,  
Whitehall, August 21, 1858.

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R.E. of his re-inspection of a portion of the Portadown, Dungannon, and Omagh Junction Railway at Portadown.

I am, &c.  
The Secretary of the DOUGLAS GALTON,  
Portadown, Dungannon, and Captain, R.E.  
Omagh Junction Railway Company.

SIR,  
Belfast, July 24, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that I have this day, in compliance with your instructions of the 20th instant, reinspected the small portion, left unopened, of the Portadown and Dungannon Railway.

The arrangements for the junction of the Railway in question at this spot with the Ulster Railway, and with the Dublin and Belfast Junction Railway, have been carried out under the directions of the engineer of the Portadown and Dungannon Railway, and the Junction is to be under the exclusive management of the Ulster Company, which owns the adjacent station.

The points and main signals are worked from a stage, as recommended by Captain Tyler, and so are the distant signals, with the exception of that towards Belfast, which, it seems to me desirable should be under the control of the station-master of Portadown Junction Station.

This station is little more than 100 yards to the northwards, towards Belfast, of the pointsman's stage at the junction; and northwards, again, of the station, are sidings which entail frequent shunting operations on the main line, and of these the pointsman, from his stage, would have no cognizance.

The station is protected, towards Belfast, by a station signal; and a man at a level crossing 800 or 900 yards from the station, towards Belfast, works a signal there for the protection of the sidings.

It appears to me that the station-master should have the power of using this signal as a distant signal to trains coming from Belfast, and that a wire should, with this object, be led from it to the station.

I have also to notice, that three of the semaphores should have a different arrangement of the counterweights, so that in case of accident to the wire the arms should necessarily fly to danger. In the remaining signals this has been properly attended to.

A small wire signal to prevent engines leaving the turn-table siding without permission, and an indicator to the points of the line to Dublin, would be of advantage.

The engineer of the line, to whom I pointed out these details, undertook that they should be at once attended to.

And as the junction is complete in all that is immediately essential to its safety, I have to report that the remaining portion, now unopened, of the Portadown, Dungannon, and Omagh Junction Railway may, in my opinion, be opened without danger to the public using the same.

I have, &c.  
Captain Galton, R.E. GEORGE ROSS,  
&c. &c. Captain, R.E.

## RHYMNEY RAILWAY.

Railway Department, Board of Trade,  
Whitehall, February 12, 1858.  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Lieut.-Colonel

Yolland, R.E., of his inspection of that portion of the Rhymney Railway situated between Rhymney and Hengoed.

Upon consideration of this report, my Lords direct the Rhymney Railway Company to postpone the opening of the portion of line in question for the public conveyance of

Rhymney  
Railway.

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No. 1.

passengers for the period of one calendar month from this date.

INSPECTIONS.  
Rhymney  
Railway.

*The Secretary of the  
Rhymney Railway Co.*

I am, &c.

DOUGLAS GALTON,  
*Captain, R.E.*

SIR,

*Cardiff, February 11, 1858.*

In compliance with the instructions contained in your letter of the 3d instant, I have this day inspected that portion of the Rhymney Railway situated between Rhymney and Hengoed, where it passes under the Newport, Abergavenny, and Hereford Railway, a length of 9 miles 527 chains, and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the line is single, with sidings at five different places; but the land has been purchased and the whole of the over and under bridges, with the exception of one under bridge, and one of the two viaducts, have been constructed, for a double line. The gauge of the line is 4 feet 8½ inches, and the width of the line at formation level is 18 feet on the single and 30 feet on the double portions. The rails are double headed, weighing 70 lbs. per linear yard, in lengths of feet. They are fastened in cast-iron chairs, weighing 23 lbs. each, by elm keys; the chairs are secured to transverse sleepers by two wrought-iron spikes. The sleepers are partly of Dantzic red wood, and partly of larch, placed 3 feet apart on the average, but at the joints, which are fished, they are 2 feet apart. The sleepers are 9 feet long, half-round 10 inches by 5 inches. The ballast is stated to be 2 feet in depth, and composed of gravel, and cinders from the iron works.

There are 24 bridges on the line, 18 under and 6 over. Of the former, 6 are constructed with timber tops, the greatest span being 15½ feet on the skew; the remaining 12 are built of rubble masonry, the greatest span being 20½ feet on the skew. Of the latter, the whole are of 28 feet span, and all constructed of rubble masonry, with one exception, which is of timber.

There are two viaducts on the line, one of 132 and the other of 119 yards in length; both are built in rubble masonry, with semicircular arches of 30 feet span.

The bridges and viaducts are well executed, and sufficiently strong.

There are no public level crossings on the line. There are five stations along the line, viz., at Rhymney, Tyr Phil, Bargoed, Pengam, and Hengoed.

The line is in very good order, but there are very many sharp curves which render it undesirable to work the traffic at a greater speed than 20 miles an hour.

In going over the line I noticed, 1st, that the signals and distant signals at all the stations, junction, and sidings were not yet in working order.

2. No permanent station buildings have yet been erected, and the temporary structures are not yet all on the ground.

3. Signal boxes are required to shelter the signalmen stationed at the sidings.

4. There is a temporary water tank too close to the line near Brithder.

5. The two sidings north of Tyr Phil are laid in too near to the main line, viz., 5 feet and 5 feet 6 inches, and not at the distance mentioned in the detail received from the company's engineer, 6 feet.

6. The line is not properly protected from three steep coal tramways belonging to Mr. Lawrence, Mr. Buchan, and Mr. Joseph. If waggons were to break away on these tramways they could not fail to be precipitated across the line.

7. There are no turntables at either extremity of the line, but one is to be erected at Rhymney; and as the traffic is to be entirely worked by tender engines, this is objectionable.

I am therefore of opinion, that by reason of the incompleteness of the works, the opening of that portion of the Rhymney Railway between Rhymney and Hengoed for traffic, cannot be sanctioned, without danger to the public using the same.

*Captain Galton, R.E.  
&c. &c.*

I have, &c.  
W. YOLLAND,  
*Lieut.-Col., R.E.*

SIR,

*6, Great George Street,  
February 15, 1858.*

WITH respect to the postponement of the opening of the portion of the Rhymney Railway between Rhymney and Hengoed, on the ground of non-compliance with the requirement of the Board of Trade that there be an engine turntable at each end of the said portion of line, I beg

to submit the following reasons why the portion of line above referred to should be considered exceptional as respects that requirement.

The passenger traffic of the line is to be carried at so slow a rate, viz., 18 to 20 miles an hour, as entirely to set aside the question of danger from running tender first, and as the gradients are falling all one way, and consequently rising on the other, it is proposed to place the engines so as to run tender first up the incline, and engine first down, in which latter direction only would it be possible to attain any high speed.

The line is a very short one, not above nine miles, and the southern extremity, viz., Hengoed, is not to be a terminal station for a longer time than is necessary for the completion of the remaining portion of the line, now in a state of great forwardness. After which Hengoed will become a simple wayside station, and no turntable of any kind will be required there, and none is provided.

As soon as the line is open its entire length, an engine table will be ready at each extremity.

I trust that the circumstances of the line which I have above mentioned, will carry conviction to your mind that all danger, or even objection in running tender first in the way proposed, viz., up hill only, is entirely obviated, and that the rule which is held necessary in longer and fast running lines, will be remitted for a short time in the very different case of the line in question.

I will give any assurance that the speed shall not exceed 18 miles an hour up hill, with tender first.

*Captain Galton, R.E.  
&c. &c.*

I have, &c.  
JOSEPH CUBITT.

SIR,  
*6, Great George Street,  
February 18, 1858.*

WHEN I wrote you, on the 15th instant, on the subject of the absence of engine turntables on that part of the Rhymney Railway which was lately inspected, I had not seen Colonel Yolland's report, and was not aware that he considered the coal inclines of Messrs. Lawrence and Joseph, and Buchan, as objections to the opening of the line, though he mentioned to me that he considered some protection would be necessary.

I write for the purpose of requesting a revision of the decision for postponement of the opening of the Rhymney Railway, owing to any assumed defects in these coal inclines, on the ground that these inclines are not yet in a state to be brought into operation, and may not be for some considerable time; and that as their works proceed there appears no difficulty in constructing them so as to avoid all danger to the railway. I enclose a sketch suggesting one mode of doing this, viz., by building at the lower end of the incline a massive buffer of earth and masonry, and placing a short distance above this a pair of switches leading to the tipping place above the waggons, on the railway siding.

The switches of this turn out to be strongly weighted, so as when not held, to remain always open to buffer, and closed to the turn out. Then, should any waggon break loose, and come down with a run, all the switchman has to do is to run away, and the waggons will come on to the buffer and be there effectually stopped. Or there may be other plans submitted to me by the colliery engineers, but at all events no danger yet exists, and it will be the duty of the Railway Company's engineer to take care that the coal inclines are not brought into operation till due provision for safety is made, and the Railway Company has of course power to refuse to permit the colliery owners to commence working till this be done. I submit it is not reasonable to prevent the line opening, it being in a safe state, merely on account of some collieries which are not in a state to commence work, not having yet completed their works in connexion with it; and particularly as the owners may abandon, or indefinitely postpone their workings and completion, a matter over which the Company have no power.

I trust that a consideration of these circumstances will induce the Commissioners to withdraw their objection to the opening of the railway.

*Captain Galton, R.E.  
&c. &c.*

I remain, &c.  
JOSEPH CUBITT.

SIR,  
*Railway Department, Board of Trade,  
Whitehall, February 23, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 18th instant, stating the mode in which it is proposed to work the Rhymney Railway as regards the coal

inclines, and requesting my Lords to withdraw their objection to the opening of the line, and to inform you that my Lords cannot sanction the opening until the line has been re-inspected.

*The Secretary of the Rhymney Railway Co.*

I am, &c.  
JAMES BOOTH.

6, Great George Street,  
March 4, 1858.

SIR,

UNDERSTANDING from you that Colonel Yolland was about to proceed to reinspect the Rhymney Railway, I beg to inform you that there are still no engine turntables at the extremities of the portion last submitted, and if that circumstance would cause the line to be again rejected, it appears useless to trouble him to take the journey, and on that supposition I beg to withdraw the ten days' notice. If, however, that circumstance would not cause postponement of the opening, I should be obliged by his appointing a day for the reinspection under the notice as it stands.

I remain, &c.  
JOSEPH CUBITT.

Captain Galton, R.E.  
&c. &c.

6, Great George Street,  
March 31, 1858.

SIR,

WITH this, I forward the undertaking of the chairman and secretary of the Rhymney Railway Company, that the line shall be worked in such a manner that there shall only be one engine in steam upon any defined portion of the single line at the same time, unless in cases of there being more than one engine in steam attached to a train.

I remain, &c.  
JOSEPH CUBITT.

Captain Galton, R.E.  
&c. &c.

Rhymney Railway.

Cardiff, March 30, 1858.

SIR,

ON the part of the Rhymney Railway Company, we hereby undertake that not more than one engine shall be in steam, unless attached to and forming part of one train, at any one time, on any of the following portions of the single line of the Rhymney Railway, viz.:—

Between Rhymney and Tyrphil;  
" Tyrphil and Bargoed;  
" Bargoed and Pengam;  
" Pengam and Hengoed;  
" Hengoed and Ystrad;  
" Ystrad and Caerphilly;  
" Caerphilly and Walnut Tree Bridge;  
" Crockerbtown Junction and Adam Street Station.

We are, &c.  
JOHN BOYLE, Chairman.

Captain Galton, R.E. JOHN B. SHAND, Secretary.  
&c. &c.

Railway Department, Board of Trade,  
Whitehall, April 7, 1858.

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Colonel Yolland, R.E., the officer appointed by them to inspect the Rhymney Railway between Rhymney and the junction with the Taff Vale Railway at Walnut Tree Bridge and from the junction with the last named railway at Crockerbtown, Cardiff, to the station at Adam Street, Cardiff.

My Lords direct me to state that, provided that not more than one engine in steam be allowed on either of the eight

defined portions of the line specified in your letter of the 31st ultimo, except in cases where two (coupled together) may be required for one train, and that the speed of the trains be not permitted to exceed twenty miles an hour, they will not object to the railway being opened for public traffic.

I am, &c.  
*The Secretary of the Rhymney Railway Co.* DOUGLAS GALTON,  
Captain, R.E.

Appendix

No. 1.

INSPECTION.

Rhymney  
Railway.

Gloucester, March 30, 1858.

In obedience to the instructions contained in your latter of the 24th instant, I have this day re-inspected that portion of the Rhymney Railway between Rhymney and Hengoed, and have inspected, for the first time, the portion between Hengoed and the junction with the Taff Vale Railway at Walnut Tree Bridge, and from the junction with the last-named railway at Crockerbtown, Cardiff, to the station at Adam Street, Cardiff, a total length of 18 miles and 40 chains; and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the nature of the permanent way is the same throughout, and is as described in my report of the 11th February, and the whole of the requirements therein pointed out have now been fully complied with. In the southern portion of the line, commencing at Hengoed, the works are heavy, one cutting alone containing 935,500 cubic yards of earthwork excavated, and there are twenty under and five over bridges and one wooden viaduct of 43 yards in length of trussed timber girders.

Of the under bridges six are of timber tops, resting on stone walls; three are of cast-iron, the greatest span being a segmental arch 53 feet wide; and the remainder are of masonry built in mortar.

The over-bridges are all of masonry built in mortar, and the whole of the bridges and the timber viaduct are all well constructed and sufficiently strong, with the exception of a bridge at 11 miles 66 chains, where the span is 15 feet on the square and 26 feet on the skew. This is covered by two sets of two 12-inch balks placed over each other and bolted together, one under each rail. Planking is spiked down on these balks, and then two longitudinal pieces are laid, one under each rail. The traffic has been worked over this bridge for some months, but it exhibited a greater deflection than is desirable, under the engine, and it is to be propped up from below at once until it can be regularly strutted, which is expected to be completed by the end of this week. Under these circumstances, I do not think it necessary to prohibit the opening of the line.

The only stations on the southern portion of the line are Ystrad, Caerphilly, and that at Adam Street, Cardiff; there are only temporary buildings at any of these places.

There are no unauthorized level crossings on the line and no deviations beyond the limits.

Turntables have been put up at Rhymney and at the Dock station in Cardiff, but I have not inspected the portion of the line between Adam Street and the Docks, which, however, is open for mineral traffic, neither have I inspected the branch joining the Rhymney with the Newport, Abergavenny, and Hereford Railway at Hengoed.

The line is in very good order throughout. I have not, however, received the undertaking that only one engine in steam, or two or more coupled together and forming part of one train, shall be upon the line or certain defined portions thereof at one and the same time; but I understand it is to be forwarded to you to-morrow or the following day. If that undertaking be given, I see no objection to their Lordships' consent for the opening of the Rhymney Railway for public traffic being given; but I would recommend, in consequence of the sharpness of some of the curves and the nature of the gradients, which in parts are severe, that the speed be limited to 20 miles an hour.

I have, &c.

Captain Galton, R.E. W. YOLLAND,  
&c. &c. Lieut.-Col., R.E.

Scottish  
Central Rail-  
way (Denny  
Branch).

### SCOTTISH CENTRAL RAILWAY.

Railway Department, Board of Trade,  
Whitehall, March 13, 1858.

SIR,

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Capt. Tyler, R.E., of his inspection of the Denny Branch of the Scottish Central Railway.

Upon consideration of that report, my Lords direct the Scottish Central Railway Company to postpone the opening

of the branch in question, for the public conveyance of passengers, for the period of one calendar month from this date.

I am, &c.  
*The Secretary to the Scottish Central Railway* DOUGLAS GALTON,  
Captain, R.E.  
Company.

Appendix  
No. 1.  
INSPECTIONS.  
Scottish  
Central Rail-  
way (Denny  
Branch).

SIR,  
*Edinburgh, March 10, 1858.*  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 6th instant, I have inspected the Denny Branch of the Scottish Central Railway.

This is a single line, of three miles and eleven chains in length, connecting the town of Denny with the Larbert Junction of the Scottish Central, and Edinburgh and Glasgow Railways.

It is laid with a permanent way similar to that on the Scottish North-Eastern Railway. The rails weigh 75 lbs. to the lineal yard, and are "double-headed;" the joint and intermediate chairs weigh, respectively, 33 and 25 lbs. each, and are secured in their places by wrought-iron spikes, six inches long, and three quarters of an inch in diameter; the sleepers are of larch, and are laid four feet apart on the average, there being a distance of three feet six inches between the joint sleepers and those on either side of them, and the intermediate sleepers being laid four feet six inches from centre to centre.

I should much prefer to see the sleepers three feet instead of four feet apart; and to see the joints of the rails better secured than they are, with the ordinary cast-iron chair and wooden key.

The ballast is excellent, and even the embankments are formed of the same mixture of gravel and sand of which it is composed.

There are no public road level crossings on this branch. A turntable has been laid down at Larbert junction, and another at Denny.

At a mile and ten chains from the junction, there is a viaduct 39 feet high, containing three openings, of 32 feet 6 inches each, and constructed with stone piers and abutments, and a timber top. There are six other bridges under the line with spans varying from 12 to 38 feet. I see every reason to be satisfied with all these works.

I have already stated that this branch runs into the junction which already exists near Larbert, between the Scottish Central and Edinburgh and Glasgow Railways; and it will thus be seen, that, when it is opened, three lines will converge into one at this point. It is very important that proper junction signals should under these circumstances be provided for the guidance of the drivers, comprising a main and distant signal in each direction for each line. To complete this, there are required, as I have pointed out to the engineer of the Scottish Central Company, two more semaphore arms and lamps, and an extra signal on the Edinburgh and Glasgow line. It is desirable, also, to remove the distant signals on the new branch, and on the Edinburgh and Glasgow line, to a greater distance from the junction.

The line is complete as regards the passenger traffic, in other respects; but, pending the completion of these signal arrangements at the junction, I must report my opinion that the opening of the Denny branch would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I may add that the only signal from the Larbert junction which at present applies to the Edinburgh and Glasgow line, is one to which I had occasion to refer in the case of a collision which occurred there some two or three years ago; and that, if I remember right, (for I am unable now to refer to my report,) it became my duty to recommend in reference to that collision, alterations very similar to those which I have above detailed.

A certificate, to the effect that only one engine, or two coupled together, would be allowed to be in steam upon the branch at any one time, was handed to me during my inspection, with the signature of the secretary attached to it; and the same certificate is to be forwarded by the company to their Lordships, with the addition of the signature of the chairman or deputy chairman, as soon as the signature of one of those gentlemen shall have been obtained.

I have, &c.

Captain Galton, R.E.  
&c.

H. W. TYLER,  
&c.

Capt., R.E.

SIR,  
*Denny Branch.*  
*Scottish Central Railway, Secretary's Office,*  
*Perth, March 16, 1858.*  
I BEG to acknowledge the receipt of your favour of 13th current, enclosing copy of report by Capt. Tyler, R.E., of his inspection of this branch. I note that their Lordships have postponed the opening of the branch for the public conveyance of passengers for the period of one calendar month.

Mr. Paterson, our engineer, has sent me the enclosed letter of this date, intimating that the junction signals, &c., have

been completed as desired by Captain Tyler, and, indeed, everything, on account of which their Lordships have deemed it right to postpone the opening; may I request, under these circumstances, the favour of their Lordships re-considering the matter, with a view to modifying the period during which the branch is forbidden to be opened. I have sent you Mr. Paterson's *holograph* letter to me, not a copy.

I am, &c.

Captain Galton, R.E.  
&c.

JOHN A. JAMIESON,  
Secretary.

(Enclosure.)

Denny Branch.

*Scottish Central Railway,  
Engineer's Department, Perth,*  
March 16, 1858.

SIR,  
I BEG to inform you that the alterations and additions to the signals at the junction of the Stirlingshire, Midland, and Denny Branch Railways with this line, are now made and completed, in accordance with the instructions and manner pointed out by Captain Tyler, R.E., when he inspected the Denny Branch Railway on Wednesday last, the 10th instant.

I am, &c.

John A. Jamieson, Esq.,  
Secretary, Perth.

W.M. PATERSON,  
Engineer.

*Scottish Central Railway, Secretary's Office,*  
Perth, March 12, 1858.

WE hereby certify, on behalf of the Scottish Central Railway Company, and undertake that no more than one engine in steam will be used on the Denny Branch of this Railway, at any one and the same time, so long as the Branch Railway remains a single line, except when coupled together, in which case they will be wrought as one engine.

ROBERT BRUCE,  
Deputy Chairman.  
JOHN A. JAMIESON,  
Secretary.

*Railway Department, Board of Trade,*  
Whitehall, March 23, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 16th instant, and in reply to inform you that my Lords no longer object to the Denny Branch of the Scottish Central Railway being opened for the public conveyance of passengers, provided that only one engine in steam be allowed upon the line at one and the same time.

My Lords direct me at the same time to call the attention of the Directors to the great distance between the sleepers in the permanent way, and to suggest the desirableness of the introduction, by degrees, of additional sleepers on this branch.

I am, &c.

DOUGLAS GALTON,  
The Secretary to the  
Scottish Central Railway  
Company.

Captain, R.E.

*Railway Department, Board of Trade,*  
Whitehall, December 20, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Lieut.-Col. Yolland, R.E., the officer appointed by them to inspect the Stoneywood and Inglislon extensions of the Denny Branch of the Scottish Central Railway.

Upon consideration of that Report, my Lords direct the Scottish Central Railway Company to postpone the opening of the extensions in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
Scottish Central Railway  
Company.

DOUGLAS GALTON,  
Captain, R.E.

SIR,  
*Aberdeen, December 18, 1858.*  
In compliance with the instructions of the 18th instant, I have this day inspected the Stoneywood and Inglislon Extensions of the Denny Branch of the Scottish Central Railway; and I have the honour to report,

for the information of the Lords of the Committee of Privy Council for Trade, that these extensions are respectively of the lengths of 1 mile 1' 6 chains and 1 mile 46' 2 chains, constructed upon the 4 feet 8½ inch gauge, as single lines, but the land has been purchased and the over-bridges built for a double line, if hereafter it be found necessary. The under-bridges only carry a single line of railway.

The width at formation level is 16 feet, and between the single line and the sidings at the extremities 6 feet. Double headed rails are used weighing about 75 lbs. per yard in 16 feet lengths; they are placed in cast-iron chairs weighing 32 lbs. for the joint chairs, and 24 lbs. for the intermediates. The chairs are spiked down to the sleepers with two ¼-inch spikes, and the rails are secured to the chairs in the ordinary manner by wooden keys. It is to be regretted that the joints are not fished.

The sleepers are of larch or of creosoted Scotch fir, their length being 9' by 10" × 5", and the smallest 9" × 4½", and they are placed 4 feet apart from centre to centre.

The ballast is of gravel, and is stated to be 9 inches in depth below the sleepers.

On the Stoneywood Branch there is one over-bridge built in brick set in mortar, with ashlar quoins of 28 feet span; and on the Ingliston Branch there are three over bridges of similar span on the square, and the largest of 37 feet on the skew, built of similar materials, besides one under-bridge of small dimensions with stone abutments and timber top. These are all very substantially constructed.

A viaduct over the Carron, consisting of two openings of 40 feet, is constructed with stone abutments and pier, and cast-iron arched girders bolted together at the centre; these girders exhibited a larger deflection than is desirable, amounting to  $\frac{3}{8}$  and  $\frac{7}{16}$  inch, and a considerable amount of lateral oscillation. The girders appear to require strengthening and cross-bracing. The packing of the rails, resting on timber baulks over a mill race, requires to be looked to.

There are no unauthorized level crossings on the extensions. Turntables are provided at the termini.

The minimum space allowed between the sides of the carriages in use upon the railway at the level of the windows and any fixed work is 3 feet.

In making my inspection, I noticed that the following would be required:—

On the Stoneywood Branch the signal arrangements are incomplete at the junction. The distant signal cannot be seen, so that a repeating signal is wanted. The signals and levers should be opposite to the facing points.

As there is a steep incline rising from the junction, a

blind siding should be put in, with the points weighted for the siding.

No arrangements for passengers have been made at Stoneywood station; there is neither platform nor station buildings. Mile posts require to be figured, and gradient boards put up.

On the Ingliston Branch. In addition to the viaduct to which I have already referred, no arrangements have been made for passengers at Ingliston station; there is neither platform nor station buildings; and a repeating signal is wanting, as the distant signal cannot be seen. A clock is required at the Ingliston Junction; mile-posts to be figured and gradient boards to be put up. Lodges are required, one on each extension, at the authorized level crossings; and as the two junctions on the Denny Branch are very near to each other, a reciprocating bell communication should be established, so that one junction may warn the other of an approaching train.

I am informed that it is not intended to carry passengers over these extensions; and I beg to remark that I have not inspected the extension to Denovan, although I believe it is nearly if not quite complete.

I have not received any undertaking showing the manner in which it is proposed to work these extensions, but beg to report my opinion that the opening of the extensions to Stoneywood and Ingliston, would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*W. YOLLAND,  
Lieut.-Col., R.E.*

#### Scottish Central Railway.—Denny Extension Branches.

*Secretary's Office, Perth,  
January 1, 1859.*

SIR,

REFERRING to my letters of 19th November and 8th December last, intimating the intention of this Company to open the above for traffic by a given date and also to your favour of 20th December enclosing report of Colonel Yolland to the Board of Trade, I now beg formally to withdraw the notices of 19th November and 8th December, as it is not intended to open the branches in question for passenger traffic, but to confine them exclusively to the conveyance of goods and minerals.

I am, &c.

*Captain Galton, R.E.  
&c. &c.* JOHN A. JAMIESON,  
*Secretary.*

#### STOCKTON AND DARLINGTON RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, June 23, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Captain Ross, R.E., of his inspection of the Tunnel Branch of the Stockton and Darlington Railway.

Upon consideration of that report, my Lords direct the Stockton and Darlington Railway Company to postpone the opening of their Tunnel Branch for the public conveyance of passengers for the period of one calendar month from this date.

I am, &c.

*The Secretary to the  
Stockton and Darlington  
Railway Company.* DOUGLAS GALTON,  
*Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, June 22, 1858.*

SIR, I HAVE the honour to acquaint you, for the information of the Lords of the Committee of Privy Council for Trade, that I have this day inspected the Tunnel Branch of the Stockton and Darlington Railway, 2 miles 69 chains in length.

It is a double line, opened for mineral traffic in September 1856, and the roadway and embankments are well consolidated and in good order. The gradients and curves are moderate, and the deviations trifling and within the parliamentary limits.

The most important work is a brick-arched viaduct 62 yards in length, and there are eight bridges of spans varying from 12' to 31' 3". Some have cast-iron girders, and all are of sufficient strength.

The sleepers are one yard apart, and "Burnettized," with the rail chairs fastened to them with oak pins.

The chairs weigh 31 lbs. and 21 lbs., and the rails 65 lbs. to the yard, chiefly in 21 feet lengths. Most of the ballasting is composed of small coal.

The Tunnel Branch was made to replace the Brusselton inclined planes worked by stationary engines; and the coal traffic of the Hagger Leases Branch, which was conveyed over the latter, is now carried on the Tunnel Branch, which also has collieries in immediate connexion with it.

The Company have formed a small passenger station at St. Helen's, where the Hagger Leases Branch joins (in continuation of) the Tunnel Branch, and where there is a colliery.

Their object in opening the line for passenger traffic is to be enabled to run morning and evening passenger trains, in connexion with the Wear Valley Railway from Darlington, for the accommodation of the colliery population of the district.

There is a turntable at St. Helen's, but the station wants a clock, and a re-arrangement of the signals is desirable viz.—

The signal staff, now not used, to be employed for the station signals towards Darlington and Hagger Leases. The distant signals in those directions to be removed to a distance of not less than 450 yards, and the second signal on the Hagger Leases line to be dispensed with, and made available for the adjacent colliery.

The old branch of the Brusselton inclined plane is now rarely used, and is considered as a siding. It should be kept carefully closed by a locked chock block, the key to be in the possession of the St. Helen's pointsman.

The gradient of the Hagger Leases Branch to St. Helen's is a descending one, but as engine drivers have always approached St. Helen's with caution on account of a level

Appendix  
No. 1.

INSPECTIONS.

Scottish  
Central Rail-  
way (Denny  
Branch,  
Stoneywood  
and Ingliston  
Extensions).

Stockton and  
Darlington  
Railway  
(Tunnel  
Branch).

**Appendix  
No. 1.**

**INSPECTIONS.**

**Stockton and Darlington Railway (Tunnel Branch).**

crossing, the working of the Hagger Leases Mineral Branch, in continuation of the Tunnel Branch traffic at St. Helen's, should not be attended with danger.

The junction of the Tunnel Branch with the Wear Valley line is at the north end of the Sheldon tunnel.

The signals are all worked from a box, and the signalman works from it also the levers of some contiguous sidings, and I should recommend the same course to be adopted with the points of the Tunnel Branch, with the aid of an indicator.

A return signal beyond the curve towards St. Helen's is also required.

Precautions are necessary in regard to the coal traffic from Mr. Reaves' colliery on the north of the Tunnel Branch.

It is connected with the Tunnel Branch at two spots by branches for the arrival of empty and for the departure of loaded waggons.

The former causes *facing points* to trains travelling from St. Helen's, and there was apparently no arrangement for the security of the traffic at either place. It may be sufficient, with one train each way morning and evening, to have a man on duty at each place at the hour the passenger train should pass, to hold the points at the one, and to prevent any mistakes as to time on the part of the engine drivers on the other branch; and huts should be provided for these men, to remove all inducement to neglect of duty in inclement weather.

On these accounts I am of opinion that the opening of the Tunnel Branch would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have also to call attention to the circumstance that there is only an interval of five feet between the lines of rails, instead of the distance of six feet required by the Memorandum now issued under their Lordships' authority to Railway Companies prior to the opening of new lines. As the Tunnel Branch was constructed before the issue of the Memorandum, and as the passenger traffic will be very limited, I have not included this in the deficiencies of the line; and the same observation applies to the existing facing points to which I have before alluded, which have been safely worked over by a large traffic since the opening of the line, but which, as a measure of precaution, I would strongly recommend the Company to remove, should they be enabled to do so without seriously interfering with the traffic of the line.

I have, &c.

*Captain Galton, R.E.*

*GEORGE ROSS,*

*&c. &c.*

*Captain, R.E.*

*Railway Department, Board of Trade,  
Whitehall, July 21, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Capt. Ross, R.E., the officer appointed by them to inspect the Tunnel Branch of the Stockton and Darlington Railway.

Upon consideration of that report, my Lords direct the Stockton and Darlington Railway Company to postpone the opening of the branch in question, for the public conveyance of passengers, for a further period of one calendar month from this date.

I am, &c.

*The Secretary of the  
Stockton and Darlington  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

SIR,

*Manchester, July 13, 1858.*

I HAVE the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that I have this day re-inspected the Tunnel Branch of the Stockton and Darlington Railway, and that the signals and other requirements specified in my report of the 22nd June are in progress.

I noticed in that report the circumstance of the branch being laid with rails at only an interval of five feet, and on consideration of the numerous casualties which have been occasioned by a too limited interval, I subsequently intimated to the Secretary of the Stockton and Darlington Railway Company, that on that account I should deem it my duty on re-inspection of the line to object to its being opened. On the receipt of your letter of the 10th instant, conveying instructions for re-inspection, I further wrote to recommend that the notice for opening should be withdrawn.

I find, however, that the question is one which the Directors wish to bring more fully before their Lordships,

with reference to the intervals of the lines with which this branch is in immediate connexion, and other circumstances; I shall, therefore, make no further observations at present, than that a line of double railway with less than six feet interval is generally considered unsafe, and that on this account and on that of the other requirements not yet complete, it is my duty to report that the opening of the Tunnel Branch of the Stockton and Darlington Railway would be attended with danger to the public using the same, by occasion of the incompleteness of the works and permanent way.

I have, &c.

*Captain Galton, R.E.*

*&c. &c.*

*GEORGE ROSS,*

*Captain, R.E.*

**MY LORDS,**

*Darlington, August 6, 1858.*  
I AM instructed to acknowledge the receipt of your letter, accompanied by Capt. Ross' report, relating to the opening of the Tunnel Branch of this Company. My Directors exceedingly regret that your Lordships should deem it right to postpone the opening of that branch for one month longer.

The urgent requirements of the population throughout that district induced the Directors (without much prospect of gain from passengers), to perfect the line so as to adapt it, in every way, for the conveyance of passenger trains; in doing so they unhesitatingly made the width of space between the lines about a foot more than it is in many parts of their original line, upon which they have conveyed, and are carrying regularly, vast numbers of trains, and have hitherto done so without complaint, and free from accident to passengers; moreover than this, many of the lines in this country, where the largest number of passenger trains run regularly, have the same space as the Tunnel Branch, some are even less; for instance, the Liverpool and Manchester with its immense traffic, is only 4 feet 8½ inches.

I have also to remind your Lordships that the adoption of an increased width on the said branch has been entirely voluntary on the part of this Company; they had no intimation whatever up to April last (when their work was done), from your Lordships that any regulation was proposed on the subject, and there exists no enactment or order relating thereto. Under those circumstances the Directors trust your Lordships will see it right to withdraw the restriction as to time of opening, and allow the public forthwith to have the benefits which they have been so long eagerly anticipating from the formation and completion of the branch in question.

I have, &c.

*To the Right Honourable*

*the Committee of Her Majesty's*

*Privy Council for Trade.*

*THOS. MAC NAY,*

*Secretary.*

*Railway Department, Board of Trade,  
Whitehall, August 16, 1858.*

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, on re-inspection this day of the Tunnel Branch of the Stockton and Darlington Railway, I found matters in the same state as at the date of my last report.

I have already brought to their Lordships' notice that an interval of five feet between two lines of rails, as it exists upon this branch, is considered unsafe; and that a six-feet interval has for some years been considered the least that is admissible, whether on main or on branch lines.

It is right that, on this point, I should draw attention to a circumstance, of which I did not apprehend the importance when I wrote my first report, viz., that the South Durham and Lancashire Union Railway is now in course of formation.

A reference to the map will show that, in connexion with it, the Tunnel Branch may at no distant period form a link in one of the leading through communications in the North of England, that, viz., between Liverpool and Newcastle-on-Tyne.

Its value cannot, therefore, be measured by the very small passenger traffic from the coal district, for the advantage of which its opening is now proposed.

There would be some expense in increasing the interval to six feet, owing to the bridges on the branch which must be altered. It would be to the amount (as I am informed by the resident engineer) of about 1,300*l.*

This would be but a small proportion of the cost of completing the through route in question in a satisfactory manner. And I should strongly recommend to the Directors to withdraw their notice of opening the Tunnel Branch till the time shall arrive for carrying out their arrangements for that traffic.

Under any circumstances, it is my duty to report that, in my opinion, the opening of the Tunnel Branch would be attended with danger to the public using the same, by reason of the incompleteness of the works and permanent way.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*GEORGE ROSS,  
Captain, R.E.*

Note.—Postponed opening for a further period.

*Railway Department, Board of Trade,  
Whitehall, September 13, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross of his re-inspection of the Tunnel Branch of the Stockton and Darlington Railway.

Upon consideration of that report, my Lords direct the Stockton and Darlington Railway Company to postpone the opening of the branch in question for the public conveyance of passengers for the further period of one calendar month from this date.

My Lords direct me to add, that provided the Company transmit a certificate, under the seal of the Company, undertaking that the interval between the adjacent lines of rails on the branch shall be altered to six feet before any further portion of line be opened in continuation of it, they will no longer object to the portion of line in question being opened for public traffic.

I am, &c.

*The Secretary to the  
Stockton and Darlington  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

SIR, *Edinburgh, September 9, 1858.*

I HAVE the honour to report for the information of the Lords of the Committee of Privy Council for Trade, that I have this day re-inspected the Tunnel Branch of the Stockton and Darlington Railway, and I have to state, with reference to my report of the 16th August, that I am led to expect that an undertaking will be given by the Directors to the effect that, should the opening of the Tunnel Branch be permitted, any part of it included at a future period in a through line of communication shall be previously altered to a six-feet interval between the rails.

This will, I believe, form the subject of a resolution at a meeting of the Directors to-morrow; and on receiving this authority, the general manager of the line will lose no time in transmitting the undertaking to their Lordships.

The question therefore now concerns only the opening of the line for present traffic at the five-feet interval, and to this, as stated in former reports, I have felt it my duty on general grounds to object.

I am, however, prepared to admit that the danger of accident is greatly diminished on the Tunnel Branch by the fact that a limit is imposed on the width of the carriages that can be used upon it, by reason of the narrow width of the Sheldon tunnel, three-quarters of a mile long (one of the earliest constructed in the railway system of Great Britain), which, with the existing line from Sheldon tunnel to Darlington, is laid with a double line of rails at a considerably smaller interval than five feet.

Their Lordships may perhaps be disposed to consider the case a peculiar one, and to take a favourable view of it; but pending their decision, I have only to repeat, that the interval at which the rails on the Tunnel Branch are laid is not one that is generally considered safe.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*GEORGE ROSS,  
Captain, R.E.*

Appendix  
No. 1.

INSPECTIONS.

Stockton and  
Darlington  
Railway  
(Tunnel  
Branch).

*Railway Department, Board of Trade,  
Whitehall, October 6, 1858.*

SIR, IN reply to your letter of yesterday's date on the subject of the Tunnel Branch of the Stockton and Darlington Railway, I beg to state that the only particular of those specified in my report of the 22nd June, to which I had occasion to draw the attention of the engineer of the line as being incomplete at the date of my last inspection, was the defect of an arm at the St. Helen's Station signal, to be worked in the direction of Darlington.

I have since had a certificate from the resident engineer that the St. Helen's Station signal is complete, with arms working in either direction, and I have, therefore, no ground of objection to the opening of the Tunnel Branch, except that of the interval between the rails.

I have, &c.

*Captain Galton, R.E.  
&c. &c.*

*GEORGE ROSS,  
Captain, R.E.*

Stockton and Darlington Railway.

*Darlington.*

THE Stockton and Darlington Railway Company hereby certify that, should their Tunnel Branch, or any part thereof, be hereafter required to form part of any extension line in connexion therewith, they will, prior to the opening of such extension, make that portion six feet space between the lines.

The seal of the Stockton and Darlington Railway Company affixed hereto, the 24th day of December 1858, in the presence of

*THOS. MACNAY.*

*To the Lords of the Committee  
of Her Majesty's Privy Council  
for Trade, &c.* *Secretary.*

*Railway Department, Board of Trade,  
Whitehall, October 8, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of the undertaking of the Stockton and Darlington Railway Company, dated the 24th ultimo, that they will widen the space between the rails on the Tunnel Branch to six feet, should the said branch at any future time be required to form part of any extension line in connexion therewith.

My Lords direct me to state that they no longer object to the branch in question being opened for public traffic.

I am, &c.

*The Secretary of the  
Stockton and Darlington  
Railway Company.* *DOUGLAS GALTON,  
Captain, R.E.*

### ST. GEORGE'S HARBOUR RAILWAY.

St George's  
Harbour Rail-  
way.

*Railway Department, Board of Trade,  
Whitehall, Sept. 9, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Ross, R. E., the officer appointed by them to inspect the St. George's Harbour Railway, from its junction with the Chester and Holyhead Railway to Llandudno.

Upon consideration of that report my Lords direct the St. George's Harbour Railway Company to postpone the opening of the portion of line in question for the public conveyance of passengers for a period of one calendar month from this date.

I am, &c.

*The Secretary to the  
St. George's Harbour  
Railway Company.*

*DOUGLAS GALTON,  
Captain, R.E.*

SIR,

*Conway, Sept. 8, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that I have this day inspected the St. George's Harbour Railway from its junction with the Chester and Holyhead Railway to Llandudno. The original Act, obtained, I believe, in 1853, included, as I am informed, the formation conjointly of St. George's Harbour and of this railway in connection with it; but an Act was subsequently obtained for proceeding with the railway as a separate undertaking, and it appears doubtful now whether the harbour will ever be commenced.

The terminus at Llandudno has therefore, at present, reference solely to the wants of that place, and principally to passenger and summer traffic.

The line from the junction to Llandudno is 3 miles 9 chains in length, laid single, on land purchased for a double line, with rails 16 feet long, weighing 58 lbs. to the yard,

Appendix  
No. 1.INSPECTIONS.  
St. George's  
Harbour Rail-  
way.

on transverse sleepers. The latter have intervals of 10" at the joints and of 2' 3" at the intermediate spaces, and the chairs, fixed to them by two spikes each, weigh 16 lbs. The rails have fished joints, and are of a pattern which has been used elsewhere by the engineer of the line, having thicker tables and thinner middle webs than usual.

They are secured to the chairs by oak keys. The roadway is in good order, the line being well ballasted.

The drainage has been generally well attended to, and the fencing is complete, with the exception of a few yards to separate the station at Llandudno from the roadway.

I observed the following deficiencies :

At Llandudno, a turntable; a signal from the station to the pointsman who works the points leading to the locomotive shed; a hut for the pointsman.

At a level crossing near Mr. Lloyd Jones's house; the gates to be completed; a distant signal and repeating signal required towards Llandudno, and a hut for the gate-man.

At the junction a stage for the signalman is required, from which to work the following : viz., the junction signals and distant signals for the main line; a signal to the gate-man at the adjacent level crossing, and the levers of the points of the St. George's Harbour line, and of a siding on the opposite side of the Chester and Holyhead line.

As regards the general features of the line, I have to remark, that considerable changes have been made in its execution from the details, as given in the parliamentary plan. The latter would seem to have been hastily got up, and the present engineer of the line, finding it wrong in many particulars, has furnished separate tracings of the line as made, preferring, he says, that course, to noting the deviations in the usual manner, on the incorrect parliamentary plan. The most important of these deviations is one near Mr. Lloyd Jones's house (made, it is said, at the request of that gentleman) by which the railway is carried near the shore in front of his house, instead of by a tunnel behind it. There is also a deviation beyond the parliamentary limits at the terminus at Llandudno, made likewise, I am informed, at the request of the owner of the land.

On the remainder of the line it would appear that the deviations are within the parliamentary limits; but I have to draw their Lordships' attention to the circumstance that an authorized level crossing, No. 3, at about 5½ furlongs from the fixed point on the parliamentary plan, has been avoided by a deviation seawards, and that the company have carried the railway on a level, across, as I understand it, the continuation along the shore of the same road, at a point below Mr. Lloyd Jones's house, about one mile two furlongs from the fixed point on the parliamentary plan, and here they propose to provide gates and a gatekeeper in substitution for the other level crossings. This is the crossing I have already referred to as requiring a distant signal, &c. It is situated on a curve of 15 chains radius, and I am informed will accommodate only one tenant of Mr. Lloyd Jones's, who has a right of way there, and I am further told in the original Act and parliamentary plans, it was considered a private road.

I have requested that a statement explanatory of the circumstances under which the deviation has been made and this level crossing substituted for the other, may be submitted to their Lordships.

The London and North-Western Company are to furnish the rolling stock for working the line, and the present proposal is, that the St. George's Harbour Company's carriages should be limited to their own line, and that passengers from or to Llandudno should be taken up and set down at the junction platform by the Chester and Holyhead trains, the passengers changing carriages there.

A tank engine is to be employed on the St. George's Harbour Company's line, and at the junction there is a siding for passing it from the front to the rear of the train; and the traffic may doubtless be worked in that way, but it seems that this is only a temporary expedient, and that the intention is to have the means of working St. George's Harbour carriages through from either direction on the Chester and Holyhead Railway to Llandudno. There appears to have been considerable discussion on the subject between the London and North Western, the St. George's Harbour, and the Chester and Holyhead Companies, the latter urging the difficulty of providing accommodation for the additional traffic in Conway station, which is contracted in space. The junction is upwards of three quarters of a mile from Conway Station, and about half a mile from the Eastern extremity of the tubular bridge.

As cover has not been provided for passengers at the junction on either platform, the arrangements being considered of a purely temporary character, I have thought it desirable to request from the manager of the Chester and

Holyhead Company a statement for the information of their Lordships as to the arrangements in contemplation for working the Llandudno traffic; at present, as a temporary measure, at the junction, and ultimately into the Conway station, in the regular working of the traffic; also the period at which the latter may be expected to come into effect.

For the reasons I have stated I have to report that the opening of the St. George's Harbour line, would, in my opinion, be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.

&c. &c.

GEORGE ROSS,

Captain, R.E.

St. George's Harbour Company.

5, Arundel Street, Strand, W.C.,  
September 16, 1858.

SIR,

I HAVE to acknowledge the receipt of your letter of the 9th instant, forwarding a report of Captain Ross, R.E., on the subject of the railway from the Chester and Holyhead line to Llandudno; and I am instructed by the directors of this company to inform you, with reference to that part of the report which relates to a deviation from the parliamentary line, in respect of a level crossing of a public road (No. 3), that the road in question is one over which there is a considerable traffic, the inclination being very severe (in some places not more than 1 in 8); in addition to which there is an almost rectangular bend near the authorized point of crossing.

Upon a full consideration of the matter prior to the commencement of the construction of the line, it appeared very desirable to obviate the public inconvenience which would result from such crossing, by deviating the line seawards, so as to avoid interference with the road in question. This altered plan was accordingly adopted, and possesses a very important additional feature of public advantage, as by such deviation, the railway embankment acts as a complete protection to that part of the road which lies along the shore from the action of a frequently heavy sea, by which the safety and comfort of travellers was formerly endangered.

With regard to the level crossing near Mr. Lloyd Jones's house, referred to in the report, as a substitution for the other, it would appear that the matter was not quite accurately represented to Captain Ross, inasmuch as, although it is true that any person approaching Mr. Lloyd Jones's house from the direction of Conway would pass along the public road until he reached the spot where the deviation referred to has been made, yet as at that point the public road abruptly leaves the seashore, the continuation towards Mr. Lloyd Jones's property becomes, in fact, a private right of way; and at the spot where such right of way is crossed by the railway, there is not the slightest appearance of any road or track, and the only use made of it is the very rare passage of a light cart to a cottage, or rather a hovel, occupied by a tenant-at-will of Mr. Lloyd Jones's, at whose instance the line was carried in its present position. The erection of the gates has reference rather to the future appropriation of the ground for building purposes, than the accommodation of any existing traffic.

Having now furnished the explanations desired by Captain Ross, and which I trust may be deemed satisfactory by their Lordships, I have only further to add, in accordance with my instructions, that the directors have given orders for the immediate supply of the deficiencies observed by Captain Ross, and set forth in his report.

I am, &c.

Captain Galton, R.E.

&c. &c.

ALGERNON STIDOLPH.

St. George's Harbour Railway.

5, Arundel Street, Strand,  
September 23, 1858.

SIR,

In the absence (on leave) of the secretary, I have the honour, by desire of the Board of Directors of the St. George's Harbour Railway, to enclose the following documents, viz.:-

1st. The engineer's explanation as to the temporary absence of a turntable at the Llandudno terminus, and his report that the three points of completion of signals have been attended to, and that they are now complete and in working order; the engineer's explanation of the delay in the eventual intention to work into Conway Station, vouched by an extract from the letter of the secretary of the Chester and Holyhead Railway.

2nd. The certificate of the deputy chairman (Mr. Macartney, M.P., the chairman, being travelling), and of the manager, as to engines in steam.

The explanation as to the level crossing at Mr. Lloyd Jones's has been already forwarded.

These complete all the requirements which are supposed to have been your consideration in desiring (under date the 9th instant) that the opening of the railway should be postponed; and I am desired by the directors to express their hope that this restriction will now be at once removed, as the public have been anxiously waiting for the improved accommodation.

Mr. Mortimer, one of the directors, has been requested to wait upon you as a deputation, in the hope of avoiding delay.

I am, &c.

Capt. Galton, R.E.  
&c. &c.

W. S. MOORSOM,  
Pro. Sec.

St. George's Harbour Railway.

17, Great George Street,  
September 22, 1858.

GENTLEMEN,

WITH reference to the letter of Captain Galton, R.E., Secretary to the Railway Department of the Board of Trade, and in which is enclosed the report of Captain Ross, R.E., giving his notes upon inspection of the above railway, and dated respectively the 9th and 8th instants, I have now to report, with regard to the requirements referred to therein,—

- 1st. As to the absence of a turntable at Llandudno station. The agreement with the London and North Western Railway Company, who work the branch, is to the effect that a tank engine is to be used. A tank engine has been the only kind of engine used, and the engine on the road on the day of inspection was of that class, and framed and wheeled so as to run equally well and safely either way without turning. No turntable is therefore practically required; but as in times hereafter more traffic may arise to require a different class of engine, the contract with Mr. Bird, the contractor, does comprise a turntable, which he is bound to supply before his contract balance can be paid.
- 2nd. As to the connexion between the signal near the Llandudno station and the station itself, in the propriety of which I concurred with Captain Ross, I have the resident engineer's report that this has been completed.
- 3rd. As to the private level crossing near Mr. Lloyd Jones's house, and the distant and repeating signals required (as Captain Ross thought) there, I have the resident engineer's report that the gates have been erected and the signals completed.
- 4th. As to the signals (or rather the additions to those already existing) at the junction, I have the resident engineer's report that all the parts of them required from this Company are erected, and that the Chester and Holyhead Company are in charge of the whole at that spot.
- 5th. As to the explanation of the deviation at Mr. Lloyd Jones's, Mr. Bird, who, on behalf of the Company, made the arrangements for the land, will particularly explain that. But generally, I may say, as affects the public, that the gradient has been improved, a disagreeable tunnel avoided, a private road now crossed once only instead of twice, and on the other hand, a curve of 15 chains radius has been incurred in place of one easier, I believe, on the parliamentary line, but how much easier no one can tell by the parliamentary plans, as they are wholly incorrect at that spot, except to designate fields somewhat resembling the reality.
- 6th. As to the more permanent arrangements with the Chester and Holyhead Railway Company, about which so much space is occupied in Captain Ross's report, I can hardly understand what "explanation" can be necessarily wanted by the Board of Trade. The facts are these: Parliament authorized the St. George's Harbour Railway Company to make the branch without authorizing the Company to run

trains into Conway. It has been found, after much conference, that the public interests will be better served by trains running into and out of Conway station rather than to work those trains to and from the junction of the branch only. But Conway station is so full of traffic and workshops that the Holyhead Company cannot receive the Llandudno trains until some expensive alterations in the station are made. Both Companies are poor, and dislike the expenditure of capital, and the Llandudno Company has not yet hit upon a finally decided plan, in accord with the views and means of the Holyhead Company, by which this expenditure may be accomplished. The last letter of the Secretary (who is the only authorized officer of the Holyhead Company), dated 15th September, states, " notwithstanding a sincere desire to give the Llandudno Company the benefit of every possible facility, my directors do not feel in a position to undertake the outlay required at the Conway station for the accommodation of the Llandudno traffic, and until this is arranged I presume there is no alternative but to interchange traffic at the junction."

(Signed) "R. S. MANSEL, Secretary."

These, being the facts, are the only "explanation" this Company can offer, and I conclude it will be satisfactory, as it is evident we are endeavouring to improve that which Parliament left undone for public accommodation.

I have, &c.

The Directors  
of the St. George's  
Harbour Railway.

W. S. MOORSOM,  
Engineer.

St. George's Harbour Company,  
5, Arundel Street Strand, W.C.

In compliance with the requisitions of the Board of Trade we hereby undertake that there shall not be at any one time more than one engine in steam, or two engines coupled together, on the St. George's Harbour Railway Line.

G. B. COLE,  
Deputy Chairman.  
EDWARD PRESTON,  
Manager.

St. George's Harbour Railway.

17, Great George Street,  
September 23, 1858.

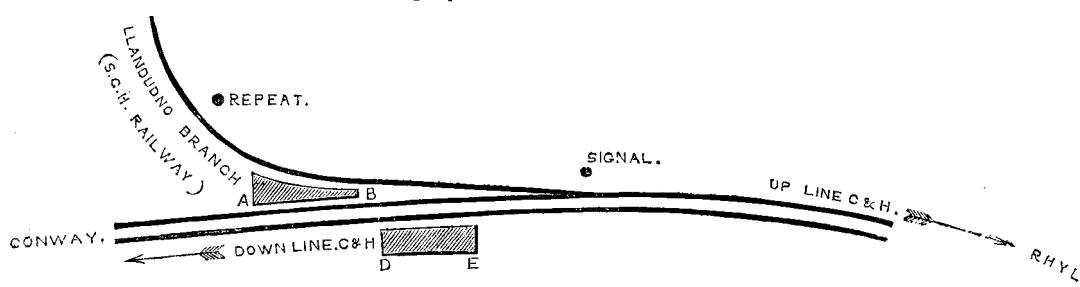
SIR,

It did not occur to me, until pointed out to day by an officer of the railway department, that in writing on behalf of the secretary of the St. George's Harbour Railway on the 22nd instant (yesterday), an explanation was omitted as to the "temporary" working of traffic at the junction with the Chester and Holyhead Railway. In fact, this is so simple that it seemed to require no explanation until my attention was drawn to the peculiar wording of the paragraph in Captain Ross's report of 8th instant.

The "signal" is in charge of the Chester and Holyhead police. The "repeat" is barred until all main lines are clear. When the bar is off the Llandudno train runs up to the platform A B and delivers its load; the passengers for the up train get in from the platform A B; the passengers for the down train cross to the platform D E, and there wait the arrival of the down train to get in; and the converse movements when going to Llandudno.

I beg this may be made supplementary to the papers sent yesterday.

I am, &c.  
The Secretary, W. S. MOORSOM, Engineer,  
Railway Department, And, by order of the Board,  
Board of Trade, Pro-Secretary.



Appendix  
No. 1.

INSPECTIONS.

St. George's  
Harbour Rail-  
way.

**Appendix  
No. 1.**

**INSPECTIONS.**

**St. George's  
Harbour Rail-  
way.**

*St. George's Harbour Company,  
5, Arundel Street, Strand, W.C.*

*September 27, 1858.*

SIR,  
In compliance with the requisition of the Board of Trade, we hereby undertake that a turntable (being a deficiency pointed out in Captain Ross's report) shall be constructed at the Llandudno terminus within two months from this date.

G. B. COLE *Deputy Chairman.*  
W. H. MORTIMER, *Director.*

(Countersigned) ANDREW GIFFORD, *Secretary.*  
*Captain Galton, R.E.*  
&c. &c.

(L.S.)

SIR,  
*Railway Department, Board of Trade,  
Whitehall, September 27, 1858.*

WITH reference to the correspondence which has taken place with respect to the proposed opening of the

St. George's Railway, I am directed by the Lords of the Committee of Privy Council for Trade to inform you that they will not object to the line being opened for public traffic provided the following conditions be observed, viz.:—

That not more than one engine in steam, except when two or more are coupled together and forming part of one train, be permitted to be upon the line at one and the same time.

That a turntable be constructed at the Llandudno terminus within two months from this date, and that tank engines only be used until the turntable is constructed.

I enclose an extract from Captain Ross's last report with respect to the providing of cover for passengers at the Conway junction.

I am, &c.  
*The Secretary of the  
St. George's Harbour  
Railway Company.*

T. H. FARRER.

**Ulster  
Railway.**

SIR,  
*Railway Department, Board of Trade,  
Whitehall, May 14, 1858.*

I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., of his inspection of the Extension line of the Ulster Railway from Armagh to Monaghan.

Upon consideration of that report, my Lords direct the Ulster Railway Company to postpone the opening of the line in question for the public conveyance of passengers for the period of one calendar month from this date.

I am, &c.

*The Secretary to the  
Ulster Railway Company.*

DOUGLAS GALTON,  
*Captain, R.E.*

### ULSTER RAILWAY.

There are also the following requirements:—

At Armagh, some fencing is wanted between the line and the station yard; and a wire signal should be supplied, to be worked by the gatekeeper who has charge of the signals towards Monaghan, in the direction of Belfast, so as to give him the means of showing "danger" towards the latter place when he admits a train from the former, and thus of preventing two trains from running up to the Armagh platform from opposite directions at the same time.

Some fencing is required also on the approach to an over-bridge near Armagh, as well as at the Caledon and Glasslough stations, and on some other portions of the line.

Contractor's points and sidings have to be removed from different localities.

The signal and distant signal for Monaghan, though on the spot, have to be erected; a distant signal is required towards Monaghan from Glasslough; a signal should be furnished at the termination of the crossing place north of Glasslough; a station signal is wanted at Caledon, and the distant signal towards Armagh should be removed to a greater distance from that station.

Signals on the public road level crossing gates have to be fixed, and small signals should be attached to the points, at the different sidings or crossing places.

Clocks are required at the different stations.

The permanent way is not quite completed at the crossing place for the trains at Glasslough; and the junction between the double-headed rail which forms the standard rail at the switches, and the Barlow rail, should be improved; the short pieces of bridge rail by which they are connected together being taken away.

A certificate has yet to be furnished, signed by the chairman and secretary of the company, setting forth some safe method of working the single line, and providing that only one engine in steam shall be upon the whole line, or upon strictly defined portions thereof, at one time.

On account of the requirements contained in the last nine paragraphs, I beg to report my opinion that the opening of this line would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

In conclusion, I would beg to recommend the Directors of the Ulster Railway Company to lose no time in establishing a telegraph for the better working of the single line.

I have, &c.  
*Captain Galton, R.E.*

H. W. TYLER,  
*Capt., R.E.*

SIR,  
*Armagh, May 11, 1858.*

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with the instructions contained in your letter of the 6th instant, I have inspected the Extension of the Ulster Railway from Armagh to Monaghan.

This is a single line 16 miles long, with works constructed for a double line.

There is a deviation of 4 chains in length outside the parliamentary limits, at 9 miles and 3 chains from the fixed point at Armagh.

The permanent way is laid for about 8 miles with the Barlow rail, riveted at the joints to saddle-plates, in the usual manner, with 12 rivets, and weighing 91 lbs. to the lineal yard. The remainder is laid with bridge rails, weighing 80 lbs. to the lineal yard, on longitudinal wooden sleepers, which rest on, and are united by, transverse sleepers, placed 10 feet apart. These rails are secured to the sleepers by means of fang-bolts.

This permanent way is of a substantial character, and is in good order.

The steepest gradient is 1 in 100, and the sharpest curve of 20 chains radius.

The works are very heavy, and some of the cuttings and embankments will require a good deal of attention from time to time, though they are now in fair condition.

There are 30 bridges and viaducts under, and 11 bridges over, the railway. The latter are all of masonry and brick-work, with spans varying from 28 to 43 feet. The former are principally of the same materials; but there are amongst them a number of openings covered by wrought-iron lattice girders, resting on masonry piers or abutments, with spans of 39, 48, 64, 68, and 98 feet. All these works appear to have been carefully and substantially constructed. The ironwork is everywhere of ample strength, and the deflections of the lattice beams are very moderate. With a rolling load of about 100, and a stationary load of 60 tons, the 98 feet girders only yielded  $\frac{1}{8}$  of an inch. The deflections of the other girders were within  $\frac{1}{4}$  of an inch, and those of the 39 feet girders amounted only to  $\frac{1}{16}$  of an inch.

In one viaduct, I have recommended the insertion of a few bolts and nuts in some angle-iron covering pieces, in place of some loose rivets, in parts where, as the girders were forwarded in pieces, for erection on the spot, the rivetting could not be properly executed.

### Ulster Railway.

SIR,  
*Secretary's Office, Belfast, May 14, 1858.*

I HAVE the honour to enclose herewith the necessary undertaking, signed by the Chairman and myself, that not more than one engine at a time shall be on the single line of the Monaghan Extension.

I remain, &c.  
*Captain Galton, R.E.*

F. BROUGHTON,  
*Secretary.*

(Enclosure.)

Ulster Railway.

*Secretary's Office, Belfast, May 14, 1858.*  
 WE, the undersigned, Chairman and Secretary of the Ulster Railway, hereby undertake that not more than one engine (or two engines coupled together) in steam shall be at one time on the single line between Monaghan and Glasslough, or between Armagh and the point where the line is doubled, about one mile east of the Glasslough Station.

W.M. COATES,  
*Chairman.*  
 F. BROUGHTON,  
*Secretary.*

SIR,

Belfast, June 2, 1858.  
 I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that I have this day, in compliance with your instructions of the 29th ultimo, re-inspected the Extension line from Armagh to Monaghan.

With the exception of *one* signal, which was being erected, all the requirements noticed in Captain Tyler's report of the 11th May have been executed, and the line is in complete order.

The usual certificate in regard to only one engine in steam on defined portions of the line, and the proposed

regulations for working the line, were submitted to the inspecting officer on the 15th of last month, and I find that trains have been running on the line since the 24th ultimo.

I did not see the general manager (who is in London), but I was informed, in explanation, by the engineer, that the required certificate having been supplied, and the suggestions of the inspecting officer carried into effect (or in progress), as reported in Mr. Godwin's letter of 24th ultimo, it was not understood that any formal withdrawal of their Lordships' prohibition to open the line was necessary.

In respect to the proposed regulations, a copy of which I enclose, they may not, if rigidly adhered to, be inadequate under ordinary circumstances, and I consider that the opening of the line may be safely sanctioned; but I would remark that the distance from Armagh to the crossing place at Glasslough is about *eleven* miles, and with no means of ready intelligence, any unaccountable delay in the arrival of a train might lead to another engine being admitted on the single line either from forgetfulness, or by intentional infringement of the regulations,—a contingency which can be best met by the employment of the electric telegraph, the early establishment of which I would, with Captain Tyler, most strongly urge on the immediate consideration of the Directors.

I have, &amp;c.

Captain Galton, R.E.  
 &c. &c.

GEORGE ROSS,  
*Captain, R.E.*

Appendix  
No. 1.

INSPECTIONS.

Ulster  
Railway

## VALE OF CLWYD RAILWAY.

Vale of Clwyd  
Railway.

Railway Department, Board of Trade,  
 Whitehall, September 25, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Capt. Ross, R.E., the officer appointed by them to inspect the Vale of Clwyd Railway.

Upon consideration of that report my Lords direct the Vale of Clwyd Railway Company to postpone the opening of the line in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I am, &amp;c.

T. H. FARRER.

The Secretary to the  
 Vale of Clwyd  
 Railway Company.

SIR,

Holyhead, September 22, 1858.  
 I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 18th inst., I have this day inspected the Vale of Clwyd Railway, 10 miles 2 chains in length from its junction with the Chester and Holyhead Railway to the temporary terminus at Denbigh.

The junction is one mile to the westward of Rhyl, and the temporary station at Denbigh is about 100 yards short of the projected terminus.

The line is laid single throughout on land purchased for a double line, with sidings and stopping places at the stations. The width at formation level is 18 feet on the earth works, and the masonry of the bridges is built for a double line.

The rails are flat bottomed, with chairs and fish plates at the joints, and the rails and chairs are fixed to transverse sleepers by dog spikes, four to each chair, and one on each side of the rail at the intermediate sleepers.

The sleepers are of larch, 9 feet long, the area of their section averaging 50 inches, and they are laid at distances apart of 3 feet.

The rails weigh 70 lbs. per yard, and the chairs 6 lbs each.

The line is well ballasted with shingle from the sea beach, averaging 2 feet in depth, and the fencing and drainage have been generally well attended to.

The stations on the line are as follows:—

	M.	CH.	
Fordy station	-	-	0 25 from the junction.
Rhyddlan station	-	-	2 24 "
St. Asaph station	-	-	4 65 "
Trefnant station	-	-	7 24 "
Denbigh temporary station	-	10 2	"

There is a considerable ascent from the junction to Denbigh, and the incline past St. Asaph is heavy, varying

for a distance of about 2½ miles, from 1 in 77 to 1 in 146; but the station itself is on a level. There are several curves of half a mile radius and less.

The embankments and cuttings are generally moderate, but some are heavy, and an embankment 21 feet high at 3 miles 50 chains from the junction had given considerable trouble. It appears now to be firm.

The bridges and viaducts are 14 in number, and there are several culverts.

The under bridges of small span and culverts are of timber, with brickwork abutments.

The viaducts, three in number, are of timber on piles, the most important being that crossing the river Elwy, 35 yards in length, with 20 feet spans.

Two of the under bridges, respectively of 25 feet and 34 feet span, are constructed with wrought-iron plate girders, and one under bridge of 15 feet span, with cast-iron girders.

There is one level crossing of a public road which is authorized.

The deviation on plan at the junction is considerable, but it was made, I am informed, with the consent of the proprietors, and the curve is improved by it.

The Vale of Clwyd Company propose to work their line with tank engines, and on the principle adopted, I believe, on some of the London and North-western branches, viz., by dividing the line into sections controlled by pilot men with coloured staffs, which, it is said, preclude the possibility of mistake.

Till I have seen the details, which are to be submitted to their Lordships, I am not prepared to offer an opinion upon this mode of working a single line. The company have not yet received the tank engines, though they are expected in a day or two.

The trains are to work through to Rhyl on the Chester and Holyhead line, where there is a turntable. The junction is to be entirely under the control of the Chester and Holyhead Company, and it is duly protected by signals and distant signals worked from a box, from which also the levers of the points are worked.

The junction is situated about 100 yards on the further side from Rhyl of a swing bridge of considerable span on the Chester and Holyhead Railway over the Clwyd river. The resident engineer of that line is, I am told, most anxious not to dispense with the protection to the swing bridge from bridge, main, and distant signals which now exist. A duplicate system of signals so near each other is objectionable, but I am not at present prepared to say that it can be avoided, and I have written to the engineer of the Chester and Holyhead Railway on the subject.

As regards the execution of the works on the Vale of Clwyd Railway, the viaduct at 73 chains from the junction will need careful watching, the bed of the stream having been, I am told, a stiff clay, which caused some difficulty in driving the piles. Some of the bolts on this viaduct are

Appendix  
No. 1.  
INSPECTIONS.  
Vale of Clwyd  
Railway.

not of sufficient length, and are unprovided with washers. They should be replaced, and the screws generally tightened up.

With this exception the bridges and viaducts seem well and solidly constructed, and the deflections with the longest plate girder bridge were little more than 1-10th inch when covered by a heavy engine and tender.

Temporary station buildings, with clocks, exist at all the stations except Trefnant, where a station building is still required.

At the curves of half a mile radius and under, the rails should be double spiked on the outside of the curve to each sleeper, instead of single spiked as at present.

At St. Asaph the distant signal towards Denbigh has to be removed to a distance of 1,000 yards (on the incline) from St. Asaph station.

Stationary buffers are required at Denbigh. The turn-table there is unfinished, and the main signal platform still in progress.

Some fencing is required at Trefnant, and a signal has to be attached to the gates of the authorized level crossing.

The surveyor of the trustees of the Denbigh and Rhuddlan road accompanied me on my inspection, and pointed out what were the matters objected to by the trustees, as stated in the letter to their Lordships of the 7th instant from Messrs. Wyatt and Sisson. I propose to report upon them hereafter, only observing now that they do not generally appear to me to involve the dangers supposed by the objectors; but that one of the questions, that of substituting a foot-bridge for the crossing of the footpath from Cilowen, in my opinion, merits the consideration of the directors, as the position of the crossing is certainly not a safe one, and a foot-bridge may be expedient there.

On account of the deficiencies to which I have called attention I have to report, that in my opinion the opening of the Vale of Clwyd Railway would be attended with danger to the public using the same.

I have, &c.

Captain Galton, R.E.  
&c.

GEORGE ROSS.  
Captain, R.E.

SIR,  
Dublin, September 25, 1858.  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that in compliance with your instructions of the 18th inst., I was accompanied, on my inspection of the Vale of Clwyd Railway, by the surveyor of the trust of the turnpike road from Denbigh to Rhuddlan, and that he showed me on the spot the railway works objected to by the trustees of the road, as specified in Messrs. Wyatt and Sisson's letter of the 7th instant, herewith returned.

The surveyor appeared to be unaware of the protection given to the trustees of the turnpike road under certain Railway Clauses of 8 Vict. cap. 20., which provide for the restoration of works interfered with by a railway. Most of the objections applied to matters provided for by those clauses, and I was informed by the company that the periods prescribed by the Act for the restoration or substitution of roads had not expired. I have, therefore, only to state, so far as the safety of the public is concerned, that I do not consider that the trustees have any just cause for apprehension, except on the one question alluded to in my report on the Vale of Clwyd Railway of the 22d instant, viz., the footpath leading to Cilowen Bridge, which crosses the railway obliquely at a spot where a curve of 40 chains through a cutting commences, and where the railway falls with a gradient of about 1 in 100.

The path seems to lead from some farm-houses to the poor-house of St. Asaph, and then into that town, and I should judge by its appearance that the traffic on it is considerable. The surveyor could give me no information upon this subject.

The trustees of the turnpike road had not complied with the provisions of the Act in regard to giving 14 days' notice to the company before addressing their representations to their Lordships. But it appears that in the case of this footpath, the railway company had also neglected to take the course prescribed by Clause 59, in respect to the level crossing of a highway, that, namely, of obtaining the consent of two justices after due public notice given of its intended formation.

My opinion is, that the footpath in its present position is unsafe, and should their Lordships consider that the case is not one which calls at present for their intervention, I should beg to recommend that the attention of the company should be at once called to the necessity of complying with Clause 59, with a view to the decision of the justices being obtained upon it.

The company seemed unaware of the existence of the clause in question till I pointed it out to them, and have probably already taken steps to comply with it.

I found every disposition on the part of the railway company to attend to any suggestions I might offer in regard to screens. With a line newly opened undue anxiety is frequently felt upon this subject, and I am not prepared at present to recommend that screens should be erected except at each end of the parapets of Rhuddlan and Trefnant Bridges, 10 feet in length and 5 feet in height.

As no notice had been given to the company by the trustees, I presume that a certificate from their Lordships will be unnecessary.

The engineer undertook that the screens should be at once proceeded with, and they are probably, ere now, put up. I have, &c.

Captain Galton, R.E.  
&c.

GEORGE ROSS,  
Captain, R.E.

Railway Department, Board of Trade,  
Sir, Whitehall, October 8, 1858.

WITH reference to my letter to you of the 11th ultimo, I am directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the enclosed copy of the report made by Captain Ross, R.E., of his inspection of the works on the Vale of Clwyd Railway, objected to by the trustees of the turnpike road from Denbigh to Rhuddlan.

I am, &c.

Messrs. Wyatt and Sisson,  
County Court Hall,  
St. Asaph; and  
The Secretary of the  
Vale of Clwyd  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

Vale of Clwyd Railway.

SIR,  
September 28, 1858.  
I HAVE the honour to acknowledge receipt of your communication dated 25th instant, enclosing copy of the report made by Captain Ross, R.E., the officer appointed by the Lords of the Committee of Privy Council for Trade, to inspect this railway, and directing the postponement of the opening of the line for the public conveyance of passengers for one month.

I beg to acquaint you, for the information of their Lordships, that I am advised that since the inspection of the line by that gentleman, the bolts and washers required in the viaduct at 73 chains have been replaced, and the screws tightened up as directed.

The station building at Trefnant has been completed.

At the curves of half a mile radius and under, the contractor is actively engaged in double spiking the rails on the outside of the curve, and the parts pointed out by Captain Ross as most requiring it have been done. The engineer undertakes that the whole shall be completed this week.

The distant signal at St. Asaph towards Denbigh, has been removed to a distance of 1,000 yards from the St. Asaph station.

The stationary buffers, turn-table, and main signal platform at Denbigh have been completed.

The fencing required at Trefnant is now completed and the signal attached to the gates of the authorized level crossing.

The screens on the Rhuddlan bridge have been put up.

The foot bridge suggested by the inspecting officer for the crossing of the path from Cilowen bridge, is therefore the only work remaining to be executed, and the timbers for this are ready and the bridge will be erected in a few days.

As regards the working of the line, I beg to enclose the declaration required by their Lordships that it shall be done in such a manner as that only one engine in steam, or two or more when coupled together and forming part of one train, shall ever be upon the portion of the line defined therein at the same time, and I undertake that the train staff regulations shall be so modified as to insure this end.

Under these circumstances, I trust their Lordships will reconsider their decision in this matter, and will sanction the immediate opening of the line.

I beg to enclose the certificate of the engineer of the company as to the state of the works referred to.

I have, &c.

Captain Galton, R.E.  
S.c. &c.

ROBERT ROBERTS,  
Secretary.

(Enclosure.)

Vale of Clwyd Railway,

September 28, 1858.

I HEREBY certify that the bolts and washers required in the viaduct at 73 chains have been replaced, and the screws tightened up as directed.

That the station building at Trefnant has been completed.

That at the curves of half-a-mile radius and under the contractor is actively engaged in double spiking the rails on the outside of the curve, and the parts pointed out by Captain Ross as most requiring it have been done; the whole will be completed this week.

That the distance signal at St. Asaph, towards Denbigh, has been removed to a distance of 1,000 yards from the St. Asaph station.

That the stationary buffers, turntable, and main signal platform at Denbigh, have been completed.

That the fencing required at Trefnant is now complete, and the signal attached to the gates of the authorized level crossing.

That the screens on the Rhuddlan bridge have been put up.

That the foot-bridge suggested by the inspecting officer for the crossing of the path from Cilowen bridge is in the course of erection, and will be complete in a few days.

BENJAMIN PIERCY.  
Engineer of the Vale of Clwyd Railway.

(Enclosure.)

Vale of Clwyd Railway.

September 28, 1858.

DEAR SIR,  
I SEND YOU annexed a certificate of the state of the works referred to in the report of Captain Ross, R.E.

I think it would be desirable to call the particular attention of Captain Ross to the fact that for the last six months the heavy goods' engines of the London and North-Western Company have been passing along our line, in ballasting, at high speeds at the time when the subsidence of the banks was greatest, and that no tendency of the departure of the rails from the gauge is to be observed where the rails are fastened down with single spikes, although upwards of 100,000 tons of ballast and other materials have passed over the line in the time.

The subsidence is now very trifling, and the engines that will in future traverse the line are comparatively light.

I remain, &c.

BENJAMIN PIERCY.

(Enclosure.)

Vale of Clwyd Railway.

Denbigh, September 25, 1858.

WE hereby declare that this line shall be worked in such a manner that only one engine in steam, or two or more when coupled together and forming part of a train, shall ever be upon the portions of the line defined below, viz:—

Between Denbigh and St. Asaph, and between St. Asaph and Foryd.

TOWNSHEND MAINWARING,  
Chairman.  
ROBERT ROBERTS,  
Secretary.

Board of Trade, Whitehall,

September 29, 1858.

SIR,  
WITH reference to the papers on the subject of the Vale of Clwyd Railway, referred to me by your minute of yesterday's date, I have to state that, by the certificate of the engineer dated the 28th instant, it appears that the works necessary for the safe working of the line, as specified in my report of the 22nd instant, have been completed, and that a footbridge is being erected at Cilowen crossing, on which subject I reported to their Lordships on the 25th instant.

The safety of the public appears to be provided for by the guarantee given by the company that not more than one engine in steam, or two coupled together, shall be on either section of the line at the same time, and as I learn that the project of working by "train staff" is indefinitely postponed, the amount of traffic expected for some months being too small to render that system expedient, I have only to observe that should the company hereafter wish to adopt it, the regulations should, in my opinion, be submitted to their Lordships, and that by the enclosed letter from the secretary it would appear that the company are prepared to adopt that course.

I have been in communication with the engineer of the Chester and Holyhead Railway on the subject of the junction near the swing bridge, and on consideration, it does not seem expedient that the bridge signals should be done away with.

I have, therefore, to state, that in my opinion there is now no reason why the consent of their Lordships should not be given to the opening of the Vale of Clwyd Railway.

I have, &c.

The Secretary,  
Railway Department,  
Board of Trade.

GEORGE ROSS,  
Captain, R.E.

(Enclosure.)  
Vale of Clwyd Railway.

September 29, 1858.

SIR,  
REFERRED to my conversation with you as to the working of this line, I beg to inform you that only one engine in steam will be used on the line. The ballast engine is about to be taken off the line by the contractors, and will not therefore interfere with this arrangement. The object of issuing the train staff regulations was to accustom the station masters and others to the system, so that when it shall become necessary to use more than one engine there will be no difficulty. I have agreed for the erection of a telegraph on the line, which will be complete by 31st October.

I am, &c.

ROBERT ROBERTS, Secretary.

I shall be glad to attend to any suggestion which you may hereafter offer as to the working of the train staff system.—R. R.

Vale of Clwyd Railway.

SIR,  
London, October 2, 1858.  
I HEREBY certify that the outside of the curves pointed out by Captain Ross as requiring it, have been double spiked.

I have, &c.

BENJ. PIERCY, Engineer.

Railway Department, Board of Trade,  
Whitehall, October 2, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to inform you that they have received a further report from Capt. Ross, R.E., the officer appointed by them to inspect the Vale of Clwyd Railway.

My Lords direct me to state that they will not object to the line being opened for public traffic, provided that not more than one engine in steam, or two or more coupled together but forming part of one train, shall be permitted to be upon the line between Denbigh and St. Asaph, and between St. Asaph and Foryd at one and the same time.

I am, &c.

The Secretary of the  
Vale of Clwyd Railway.

DOUGLAS GALTON,  
Captain, R.E.

Vale of Clwyd Railway.

Secretary's Office, Denbigh,  
November 1, 1858.

SIR,  
I AM instructed by the directors of this company to inquire whether it would be deemed inconsistent with the conditions upon which the Lords of the Committee of Privy Council for Trade, gave their consent to the opening of this line for passenger traffic, if a ballast engine were employed between the distant signals protecting Trefnant station at the same time that the passenger traffic is being conveyed.

I have, &c.

Captain Galton, R.E.  
S.c. &c.

ROB. ROBERTS,  
Secretary.

Railway Department, Board of Trade,  
Whitehall, November 11, 1858.

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade, to acknowledge the receipt of your letter of the 1st instant, requesting to be informed whether it would be consistent with the undertaking given by the Vale of Clwyd Railway Company, as to the manner of working their line, if a ballast engine were employed during the passenger traffic.

My Lords direct me in reply to inform you that as the responsibility of working rests upon the directors, they must use their discretion as to the sections into which they divide their single line for working purposes.

I am, &c.

The Secretary of the  
Vale of Clwyd  
Railway Company.

DOUGLAS GALTON,  
Captain, R.E.

Appendix  
No. 1.

INSPECTIONS.

Vale of Clwyd  
Railway.

**Appendix  
No. 1.**

**INSPECTIONS.**  
**Vale of Towy  
Railway.**

*Railway Department, Board of Trade,  
Whitehall, January 26, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the Vale of Towy Railway.

Upon consideration of that report my Lords direct the Vale of Towy Railway Company to postpone the opening of the railway in question, for the public conveyance of passengers, for a period of one calendar month from this date.

I have, &c.  
The Secretary of the Vale of Towy Railway Company. DOUGLAS GALTON, Captain, R.E.

*Railway Department, Board of Trade,  
Whitehall, January 23, 1858.*

SIR,  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 16th instant, I have inspected the Vale of Towy Railway.

This is a single line, eleven miles and a quarter long, from Llandilo to Llandovery, and is intended to be worked in connexion with the Llanelli Railway.

The permanent way is formed with a flat-bottomed rail, weighing 69 lbs. to the lineal yard, laid upon half-round sleepers, 10" x 5", and 3 feet apart. The joints are fished, and the rails are secured to the sleepers by means of square dog spikes six inches long. I should, myself, prefer to see a proportion of bolts used in connexion with these spikes, passing through the rail as well as the sleeper; but similar spikes to these appear to have been successfully employed on the Llanelli Railway, and there is not the same objection to their use in this case as when the joints are not fished.

On certain bridges and viaducts, the unevenness of the planking has been compensated for by thin wedges inserted under the bottom of the rail. Longer dog spikes are used in these cases, but the rails are sometimes as much as three inches from the planking, and the spikes are sometimes uncovered to the same extent. I recommend that this means of securing the rails to the planking be improved.

The ballast is generally ample in quantity, but it requires a little more breaking up on portions of the line.

There are five wooden viaducts over the river Towy, consisting, altogether, of forty-three openings, of 26 feet 6 inches each, spanned by double balks, placed one under the other, and bolted together; and one opening of 50 feet, covered by wrought-iron girders.

Having been unable to procure more than a light engine for testing these while on the spot, I propose to test them more fully on a future occasion. I may remark, however, that there was a considerable difference in the stiffness of the viaducts, some of the timber beams yielding half an inch, and others nearly twice as much, when the engine passed over them. The deflections are likely to increase as the viaducts grow older, and some of them are considerably on the skew; and I think that to prevent undue oscillation to engines and trains passing over them, it is desirable that means for stiffening some of them should be adopted.

I have not yet received the necessary certificate in regard to the working of the single line. Lamps are required at the three public road level crossings; a stationary buffer is wanted at Llandovery; and no turntable has as yet been fixed at that station. On these accounts, I am of opinion that the opening of this line would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.  
Captain Galton, R.E. &c. H. W. TYLER, Captain, R.E.

*Railway Department, Board of Trade,  
Whitehall, February 24, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the accompanying copy of a report their Lordships have received from Captain Tyler, R.E., the officer appointed by them to re-inspect the Vale of Towy Railway.

Upon consideration of that report my Lords direct the

**VALE OF TOWY RAILWAY.**

Vale of Towy Railway Company to postpone opening the line in question for the further period of one calendar month from this date.

I am, &c.  
The Secretary of the Vale of Towy Railway Company. DOUGLAS GALTON, Captain, R.E.

*Railway Department, Board of Trade,  
Whitehall, February 22, 1858.*

SIR,  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 13th instant, I have re-inspected the Vale of Towy Railway.

The wooden viaducts to which I referred in my former report upon this line, have been stiffened by the addition of extra longitudinal timbers, bolted through to the side beams, and by wedge pieces inserted between the planking. This process is nearly completed on all the viaducts, and the bridges of similar construction to them; and the defects in the permanent way have been rectified. Having had an opportunity of testing these works with heavier engines, I am now satisfied with those which are completed.

The stationary buffer at Llandovery, however, has not yet been supplied, and the turntable at that place is some three weeks from its completion. The lamps at the level crossings, also, are still wanting, and I have not yet received the necessary certificate to ensure the safe working of the single line.

Under these circumstances, I beg to report my opinion, that the opening of the Vale of Towy Railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

I have, &c.  
Captain Galton, R.E. &c. H. W. TYLER, Captain, R.E.

*Railway Department, Board of Trade,  
Whitehall, March 19, 1858.*

SIR,  
I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 10th instant, I have re-inspected the Vale of Towy Railway.

The requirements referred to in my former reports have been completed with one exception, namely, that the rails are as yet insufficiently secured upon one of the viaducts, which is situated on a curve, near Llandovery. This will now be done in a few days, but until they are more securely fixed, I am of opinion, that by reason of the incompleteness of the works, the line cannot be opened without danger to the public using the same.

I caused a lime shed near Lampeter, which was dangerously near the rails, to be pulled down during my inspection.

I beg to enclose certificates from the Vale of Towy Company, and from the Llanelli Company, by whom the line is intended to be worked, to the effect that only one engine, or two coupled together, will be allowed to be between any two telegraph stations at one time; and I may add, that telegraph wires have been erected and instruments supplied, in readiness for the opening of the line.

I have, &c.  
Captain Galton, R.E. &c. H. W. TYLER, Captain, R.E.

Note.—Postponed opening for a further period on 22d March.

*Vale of Towy Railway, Llandovery,  
March 23, 1858.*

SIR,  
I HAVE the honour to report, that the rails on Llyn Jack Bridge are now fixed in the improved method required by the inspector.

All the requirements of the Board of Trade having therefore been complied with, I beg to be furnished with the necessary certificate for permission to open the line for passenger traffic.

I have, &c.  
Captain Galton, R.E. &c. VAL. L. LEWES.

MEMORANDUM on Captain LEWES's letter, dated March 23, 1858.

As Captain Lewes reports that the requirement referred to in my report of the 19th instant, on the Towy Valley Railway, has been completed, I beg to report my opinion that that line may now be opened without danger to the public using the same.

March 24, 1858.

H. W. TYLER,  
*Captain, R.E.*

Railway Department, Board of Trade,  
March 27, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 23rd instant, and to inform you that my Lords no longer object to the Vale of Towy Railway being opened for public traffic, provided that not more than one engine in steam, or two coupled together attached to the same train, be allowed to be on the same line between any two telegraph stations at one and the same time.

I am, &c.

The Secretary of the  
Vale of Towy  
Railway Company.

DOUGLAS GALTON,  
*Captain, R.E.*

Appendix  
No. 1.

INSPECTIONS.  
—  
Vale of Towy  
Railway.

## WEST END OF LONDON AND CRYSTAL PALACE RAILWAY.

Railway Department, Board of Trade,  
Whitehall, March 24, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report made by Captain Tyler, R.E., the officer appointed by them to inspect the portion of the West End of London and Crystal Palace Railway extending from the temporary terminus on Wandsworth Common to Battersea.

Upon consideration of that report, my Lords direct the West End of London and Crystal Palace Railway Company to postpone the opening of the portion of line in question for the public conveyance of passengers for a period of one calendar month from this date.

I am, &c.

The Secretary of the  
West End of London and  
Crystal Palace Railway Company.

West End of  
London and  
Crystal Palace  
Railway  
(Wandsworth to Battersea).

and at the junction of these lines a stage has been erected, from which the points and signals are to be worked. Some points at a considerable distance from this stage are to be connected with it in the course of a week; but in the meantime they are complete, and ready to be worked in the ordinary manner.

There are, however, three requirements which should be attended to before the line is opened for traffic, namely, a distant signal to be furnished, 800 yards or so to the west of the Wandsworth station; a crossing place to be removed, which presents facing points unnecessarily to each line of rails near that station; and a number of contractors or shifting points to be done away with, which are connected with some sidings in the neighbourhood of Battersea.

Until these requirements are completed, I am of opinion that the opening of this portion of railway would, by reason of the incompleteness of the works, be attended with danger to the public using the same.

A part of this line runs for a short distance by the side of the South Western Railway, and, as before explained, it runs under that railway near Battersea. At these points, —where the two lines come into proximity, and where the one runs under the other,—there appeared to me to be some danger of the drivers of the West End and Crystal Palace line being misled by the signals of the South-Western line; and I have therefore arranged with the engineer of the latter line that screens shall be so fixed before the lamps of these signals as to prevent them from interfering with the drivers on the former line.

I have, &c.

The Secretary,  
Railway Department,  
Board of Trade.

H. W. TYLER,  
*Captain, R.E.*

Railway Department, Board of Trade,  
Whitehall, March 23, 1858.

SIR, I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that, in compliance with the instructions contained in your letter of the 20th instant, I have this day inspected the West End of London and Crystal Palace Railway, between the temporary station on Wandsworth Common and the Battersea Terminus.

This portion of line is three miles long, and is laid double, to serve for the West End traffic of the Brighton Company, as well as for the traffic to and from the Crystal Palace.

The permanent way is of a substantial character. It is laid with double headed rails, weighing 75 lbs. to the lineal yard, fished at the joints. The chairs weigh 24 lbs. each, and are secured in their places by  $\frac{1}{4}$ -inch spikes. The sleepers are laid transversely, 3 feet apart on the average. The ballast is ample in quantity, and excellent in quality.

Near Battersea, there is a bridge which carries the London and South-Western Railway over this line, constructed with wrought iron plate girders, covering a span of 43 feet on the skew, on brick abutments. This bridge is constructed for three lines of rails, with two outside girders, to support each of them the half of one line, and two intermediate girders to support each of them the half of two lines of rails, or the half of one on either side of them. With a moving load of  $1\frac{1}{2}$  tons to the lineal foot on each line of rails, in addition to the weight of the girders and roadway, the strain per square inch on these outside beams is  $4\frac{1}{2}$  tons at the bottom in tension, and  $3\frac{1}{2}$  tons at the top in compression; but the strain per square inch on the middle beams, under similar weight, on both sides of them, would be 6·3 tons at the bottom and 5·6 at the top. I should have preferred to see this strain kept under 5 tons in the case of the larger girders as well as in the side girders. The deflection of the main girders, with a heavy goods' engine on one line of rails, is not much more than three-sixteenths of an inch; and this bridge appears to be otherwise a very satisfactory structure.

There are a number of other bridges over the line, of brickwork, and wrought, and cast iron; and a few of brick-work under the line. They all appear to have been substantially and carefully built.

Separate lines have been laid down, and separate platforms constructed, at the Battersea station, for the accommodation of the Crystal Palace and the Brighton trains;

West End of London and Crystal Palace  
Railway Company.

24, Old Broad Street, City, E.C.  
London, March 25, 1858.

SIR, REFERRING to the report of Captain Tyler on the portion of this line between the temporary station at Wandsworth Common and the Battersea Park terminus, inspected by him on the 23rd, I beg to say that the requirements which Captain Tyler considered should be attended to before the line could be opened for public traffic have been complied with; and I hereby certify—

1. That the through crossing at Wandsworth temporary station which presented facing points to each line of rails has been taken up.
2. That the distant signal required to the west of the same station has been put up; and
3. That the contractors rails and shifting points connected with the sidings at Battersea terminus have been entirely removed.

I am, &c.

GEO. H. PHIPPS,  
*Captain Galton, R.E.*  
&c. &c.

Engineer, W.L. & C.P.R.

Railway Department, Board of Trade,  
Whitehall, March 27, 1858.

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 25th instant, and to inform you that my Lords

**Appendix  
No. 1.**

**INSPECTION.**

West End of London and Crystal Palace Railway (Wandsworth to Battersea).

no longer object to the portion of the West End of London and Crystal Palace Railway Company extending from the temporary station on Wandsworth Common to Battersea being opened for public traffic.

I am, &c.

**DOUGLAS GALTON,  
Captain, R.E.**

*The Secretary of the  
West End of London and  
Crystal Palace Railway Company.*

*Railway Department, Board of Trade,  
Whitehall, April 30, 1858.*

SIR, I AM directed by the Lords of the Committee of Privy Council for Trade to transmit to you the enclosed copy of the report which they have received from Lieut.-Colonel Yolland, R.E., of his inspection of the West End of London and Crystal Palace Railway between Norwood and the junction with the Mid Kent Railway, near Beckenham station, and from Beckenham station to Shortlands station, near Bromley.

Upon consideration of that report, my Lords direct the West End of London and Crystal Palace Railway Company to postpone the opening of these portions of their line for the public conveyance of passengers for the space of one calendar month from this date.

I am, &c.

**DOUGLAS GALTON,  
Captain, R.E.**

*Crystall Palace Railway Company.*

*Railway Department, Board of Trade,  
Whitehall, April 28, 1858.*

SIR, IN compliance with the instructions contained in your letter of the 20th instant, I have this day inspected that portion of the West End of London and Crystal Palace Railway situated between the bridge on the down line over the Brighton Railway at Norwood and its junction with the Mid Kent Railway near Beckenham station, which portion is double throughout, and from Beckenham station to Shortlands station, near Bromley, which is only laid at the present time as a single line, but the land has been purchased, and the works are constructed for a double line, the total length being 3 miles 43 $\frac{1}{2}$  chains; and I have the honour to report, for the information of the Lords of the Committee of Privy Council for Trade, that the width of the line at formation level is 30 feet, the gauge is 4 feet 8 $\frac{1}{2}$  inches clear, and the space between the lines where the permanent way is double is 6 feet clear.

Double headed rails weighing 71 lbs. per yard in lengths of 21 feet, are fixed in cast-iron chairs by creosoted compressed elm keys, one key to each intermediate chair weighing 21 lbs., and three keys to each joint or "fishing chair" weighing about 90 lbs.

The joint chairs are fixed to the two transverse sleepers adjacent to the joint by four compressed oak trenails to each chair, and the intermediate chairs to the sleepers by two wrought-iron pins weighing 1 $\frac{1}{2}$  lbs. each.

The transverse sleepers are 8 feet 6 inches long, some of them 9 feet 4 $\frac{1}{2}$  inches rectangular, and others half round with an equal area; they are placed 1 foot 9 inches apart at the joints, and 3 feet 2 $\frac{1}{2}$  inches apart between the intermediates.

The ballast is of gravel laid on the average of 5 cubic yards per linear yard where the line is double, and 3 $\frac{1}{2}$  cubic yards per linear yard where the line is single. The level of the rails is 1 foot 8 inches above the surface of formation at the centre, and 2 feet at the sides.

There are six under and three over bridges; the latter and three of the under bridges are built in brick and mortar or cement, and the remaining three under bridges have brick abutments and cast-iron girders, the largest span being 33 feet. All of which appear to be sufficiently strong.

In addition to these there are two viaducts consisting each of a single arch, one built in brick and mortar, and the other is spanned by cast-iron girders. All the masonry is well constructed and sufficiently strong.

There are no public level crossings on the line for vehicles.

Stations have been constructed at Penge and Shortlands. The Beckenham station was opened, I believe, when the Mid Kent was inspected.

The line is in very good order.

In making my inspection I noticed the following:—

1. Clocks are required at Penge and Shortlands stations.
2. The handles of the distant signals to be brought together at Penge station and the distant signals to be connected.

3. The signal arrangements at the junction with the Mid Kent, near Beckenham, are not yet in working order, and the same may be said as regards the Shortlands station.

4. The rails are not properly laid down over the under bridge on the down line at Shortlands. The chairs are only secured by single spikes, and not properly seated on the longitudinal timbers.

5. The ends of the platforms at Penge and Shortlands stations to be sloped off. The engineer to the line has promised that all these things shall be immediately attended to.

6. There is no turntable at Shortlands station, and the Company state as their reason for not placing a turntable at this place, that they expect to open a further portion of line to Southborough about the 1st June next, and they propose to work the portion of single line between Beckenham and Shortlands with a tank engine, until that portion of line is opened, when a turntable will be provided at Southborough station.

There is, however, a peculiarity connected with this portion of the West End of London and Crystal Palace Railway, to which I must call their Lordships' attention. During 1857, a double line of railway from the Crystal Palace to a junction with the London, Brighton, and South Coast Railway, at Norwood, was opened; the down line separating from the upper when near Norwood, and being carried over the Brighton Railway, by a wrought-iron girder bridge, and thence joining the down line of the Brighton Railway without crossing the up lines on the level, which arrangement was a very satisfactory one as regards the junction with the London, Brighton, and South Coast Railway. But the double line I have inspected this day joins the down line leading to the Brighton Railway, on the east side of this wrought-iron bridge, and thus there is a short portion of single line of railway interposed between the other double portions of the West End of London and Crystal Palace Railway at this over-bridge; and although it is very well covered by signals, it is so objectionable in principle, that I am obliged to recommend that their Lordships' sanction for the opening of this line be withheld unless an undertaking be given by the company to double the line over the London, Brighton, and South Coast Railway within the space of three calendar months, or submit to the alternative of working this piece of single line, on the conditions usually stipulated for single lines, which would require all trains to be stopped for a pilot man or staff to be sent with each train. I have not received the undertaking from the chairman and secretary respecting the working of the single line between Beckenham and Shortlands, and I am of opinion that by reason of the incompleteness of the works the opening of the West End and Crystal Palace Railway between Norwood and Shortlands for traffic cannot be sanctioned without danger to the public using the same.

I have, &c.

**Captain Galton, R.E.  
&c. &c.**

**W. YOLLAND,  
Lieut.-Col., R.E.**

*The West End of London and Crystal Palace Railway Company,*

*27, Great George Street, Westminster,  
London, S.W., April 30, 1858.*

SIR, WITH reference to the requirements of Colonel Yolland on the portion of this company's line inspected by him on the 28th, I beg to say that the company will engage to widen the bridge over the Brighton Railway so as to carry a double line of rails within the space of six months, in fact, as quickly as it can be done; and also to work the line between Beckenham and Bromley, so long as it remains a single line, with one (tank) engine.

The other minor requirements on the line have been already complied with.

The Directors therefore trust that their Lordships will permit the portion of line referred to to be opened for public traffic on the 3rd proximo, as proposed.

I have, &c.

**SAMUEL BEALE,  
Chairman.**

**EDWARD BELLAMY,  
Secretary.**

**Captain Galton, R.E.  
&c. &c.**

*Railway Department, Board of Trade,  
Whitehall, May 1, 1858.*

SIR,  
I HAVE to acknowledge the receipt of your letter of the 30th ultimo, stating that the company will engage to widen the bridge over the Brighton Railway so as to carry a double line of rails within the space of six months, and also to work the line between Beckenham and Bromley so long as it remains a single line with one (tank) engine, and that the other minor requirements on the line have been already complied with.

In reply my Lords direct me to inform you that under these circumstances they will no longer object to the opening of this line for public traffic, provided the company forward a certificate undertaking that the bridge in question shall be completed in six months, under the seal of the company, and signed by the chairman and secretary of the company.

I have, &c.

The Secretary to the DOUGLAS GALTON,  
West End of London and Captain, R.E.  
Crystal Palace Railway Company.

*Railway Department, Board of Trade,  
Whitehall, June 2, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to remind you of the letter from this department of the 1st ultimo, in which it was stated that my Lords would not object to the opening of the portion of the West End of London and Crystal Palace Railway therein specified, provided that an undertaking would be forwarded from the company under their seal, and signed by the chairman and secretary, that the bridge over the Brighton Railway would within six months be widened so as to carry a double line of rails.

To that letter no reply has been received, and I am, therefore, now to request that the undertaking with respect to the bridge in question may be transmitted without delay.

I have, &c.

The Secretary of the DOUGLAS GALTON,  
West End of London and Captain, R.E.  
Crystal Palace Railway Company.

*The West End of London and Crystal Palace  
Railway Company.*

SIR,  
27, Great George Street,  
Westminster, S.W., June 10, 1858.

I BEG to enclose herewith the certificate of this company under seal for the widening of the bridge over the Brighton Line.

I have, &c.

Captain Galton, R.E. EDWARD BELLAMY,  
&c. &c. Secretary.

(Enclosure.)

We, the West End of London and Crystal Palace Railway Company, in consideration of the Lords of the Committee of Privy Council for Trade having given their consent to the opening of the portion of the Farnborough Extension of the West End and Crystal Palace Railway between Norwood Junction and Shortlands, do hereby undertake, in accordance with the desire of their Lord-

ships, that the bridge carrying the down line of the West End and Crystal Palace Railway over the Brighton Railway shall, within six months, be widened so as to carry a double line of rails.

Dated this 8th day of June 1858.

SAMUEL BEALE, Chairman, (L.S.)  
EDWARD BELLAMY, Secretary.

*Railway Department, Board of Trade,  
Whitehall, June 16, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 10th inst., transmitting an undertaking under the seal of the West End of London and Crystal Palace Railway Company to widen, within six months, the bridge carrying their down line over the London, Brighton, and South Coast Railway, at Norwood, so that it shall carry a double line of rails.

I have, &c.

DOUGLAS GALTON,  
Captain, R.E.  
The Secretary to the  
West End of London and  
Crystal Palace Railway Company.

SIR,  
Bromley, June 1, 1858.  
HAVING occasionally travelled over the West London and Crystal Palace Railway since its opening (with, as I am informed, your previous sanction), I beg to call your attention to a portion of it which I conceive is highly objectionable. I allude to where it crosses over the London, Brighton and South Coast Railway by a bridge; at this part the railway having a double line on either side crosses by a single line, leaving and re-entering by points. The trains pass by this place, which is on a curve, at a considerable velocity, and on passing over it I have found that a very awkward jerk is experienced. I have been told by several persons that this frequently happens. I do trust that if the arrangement is capable of alteration, that you will cause such a representation to be made as will ensure its speedily being carried into effect.

I have, &c.

Captain Galton, R.E., JAMES WM. ILOTT.  
&c. &c.

*Railway Department, Board of Trade,  
Whitehall, June 4, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of the 1st inst., complaining of the manner in which the West End of London and Crystal Palace Railway crosses over the London, Brighton and South Coast Railway, and to inform you that before my Lords gave their sanction to the opening of this line for public traffic, they required the West End of London and Crystal Palace Railway Company to undertake to double the portion of line complained of in six months, and in the meanwhile to work it under special regulations.

I have, &c.

DOUGLAS GALTON,  
Captain, R.E.  
J. W. ILOTT, Esq.  
Bromley, Rent.

#### WHITEHAVEN AND FURNESS JUNCTION RAILWAY.

*Railway Department, Board of Trade,  
Whitehall, July 2, 1858.*

SIR,  
I AM directed by the Lords of the Committee of Privy Council for Trade, to transmit to you the inclosed copy of a report which their Lordships have received from Captain Ross, R.E., of his inspection of the Foxfield curve near Broughton, forming a junction between the Furness Railway and the Whitehaven and Furness Junction Railway.

Upon consideration of that report, my Lords direct the Whitehaven and Furness Railway Company to postpone

the opening of the curve in question for the period of one calendar month from this date.

The Secretary of the I am, &c.

Whitehaven and Furness DOUGLAS GALTON,  
Junction Railway Company. Captain, R.E.

Whitehaven  
and Furness  
Junction  
Railway  
(Foxfield  
Curve).

SIR,  
Manchester, June 30, 1858.

I HAVE the honour to report, for the information of the Lords of the Committee of Privy Council for Trade,

## APPENDIX NO. 2.

### THE CLAUSES IN THE RAILWAY ACTS OF SESSION OF 1858, GIVING POWERS TO THE BOARD OF TRADE, ARE TO THE FOLLOWING EFFECT :

#### CONSTRUCTION OF WORKS.

*Aylsh Railway Act*, 1858, c. 43. s. 28., &c.—Provides that the junction with the Scottish North-Eastern Railway, in case of difference, is to be made according to a plan approved of by an engineer appointed by the Board of Trade previously to the commencement of such work; and any difference as to the nature or necessity of the signals and other works at the junction, the same to be referred to arbitration or the decision of an engineer, to be appointed by the Board of Trade, at the option of the Scottish North-Eastern Company.

*Andover and Redbridge Railway Act*, 1858, c. 82. s. 22., &c.—Provides that the Company are not to proceed with any works affecting the Bishopstoke and Salisbury Railway, or any of the works of the London and South-Western Railway Company, until they shall have delivered to that Company a plan, &c. of the proposed works, and obtained the approval thereof of the principal engineer; but if he shall not certify his approval within one calendar month of the delivery of such plan, &c., and shall fail to furnish within such period a plan of executing the works satisfactory to that Company, the Andover Company may submit a plan, &c., to the Board of Trade, and on the same being certified, proceed to the execution of the works, &c.

The Company shall also so make and maintain the Branch Railway as to enable the London and South-Western Company to make a convenient junction between it and the Southampton and Dorchester Railway; and any difference with reference thereto is to be settled by the arbitrator of the Board of Trade, and the Company are not to open the railway between Romsey and Redbridge, or any part thereof, for public traffic, unless they simultaneously open for traffic the branch railway.

*Banbridge, Lisburn, and Belfast Railway Act*, 1858, c. 46. s. 32.—Provides that in case of difference with respect to any works for effecting the communication with the Ulster Railway and the Banbridge Junction Railway, the same is to be determined by an engineer, to be appointed by the Board of Trade.

*Caledonian Railway (Branch to Port Carlisle Railway) Act*, 1858, c. 66. s. 5.—Provides that all communications between the Branch

Railway authorized by this Act and the Port Carlisle Railway, in case of difference, are to be effected by means of connexion rails, and points of such construction, and laid in such manner as shall be determined by an engineer to be appointed by the Board of Trade.

*Devon Valley Railway Act*, 1858, c. 122. s. 26., &c.—Provides that in case of difference, the junctions of the railway with the Tillicoultry Branch of the Stirling and Dunfermline Railway, and with the Fife and Kinross Railway, are to be made according to a plan to be approved of by an engineer to be appointed by the Board of Trade; and any difference as to the nature or necessity of the works to be constructed at such junctions shall be referred to arbitration, or the decision of an engineer to be appointed by the Board of Trade, at the option of the Stirling Company or the Fife and Kinross Company respectively.

A certain road in the parish of Dollar is to be carried over the railway by a stone bridge, to the satisfaction of the engineers of the Company and the landowners named in the Act, or in case of difference, of an engineer to be appointed by the Board of Trade.

*Dublin and Meath Railway Act*, 1858, c. 119.—Provides that communications between the railways authorized by the Act and the railway of any other Company, shall be made to the satisfaction of the engineer of the Company with whose line such communication is to be made; and if such Company shall have no engineer, or the engineers shall differ, then such communications shall be made in the manner directed by an engineer to be appointed by the Board of Trade.

*East Kent Railway (Western Extension) Act*, 1858, c. 107. s. 7., &c.—Provides that all communications between the railway and the Mid Kent Railway (Bromley to St. Mary Cray), in case of dispute, shall be made in such manner as shall be directed by an engineer to be appointed by the Board of Trade. Before the Company open the railway for public traffic, they are to make a station at Sole Street at which all trains are to stop (except on Sundays), for the purpose of taking up and setting down passengers, goods, &c., special or express, or mail trains, only excepted.