

Public Works (1895) Department.

RAILWAY BRANCH.

G.O., No. 388

DATED 20th April

[Despatch Abstract.]

Mayanaraw - Mutapet Railway. — Ordered that the final issue of the Revenue revised and budget estimates for 1894-95 and 1895-96, be forwarded to the Govt of India.

Forwarding the final issue of the Revenue revised and budget estimates of the for 1894-95 and 1895-96.

Rules regarding brake power in connection with the vacuum brake on passenger trains on the North Western railway—contd.

Proposed rules.				Government Inspector's suggestions.		Manager's Remarks.	
3. On gradients of 1 in 100 and steeper the following table shall apply :—				3. The Government Inspector recommends that this rule be altered to read as follows :— “On gradients of $\frac{1}{100}$ and steeper the proportion of vacuum braked vehicles be at least $\frac{2}{3}$ rds of the whole. Of the rest a fraction shall be hand-braked vans in the proportion shown in the following table :—		3. The Manager states that except for the $\frac{1}{100}$ grade he has proposed a very small proportion of unbraked vehicles on mixed trains, but for the reasons given against rule 2, he is unable to agree to only one-third unbraked on $\frac{1}{100}$ grades. He, however, proposes to add the following words after the word “apply,” “To the portion of the train not worked with the vacuum brake.”	
Gradient.		Number of loaded 4 wheeled vehicles or their equivalent for every hand-braked vehicle weighing 10 tons.	Maximum number of unbraked vehicles that may be attached for each engine on the train.	REMARKS.			
$\frac{1}{100}$	6	15					
$\frac{1}{75}$	4	4					
$\frac{1}{50}$	3	3					
$\frac{1}{25}$	2	2					
4. On the grade of $\frac{1}{100}$ one brakevan weighing 10 tons will control 6 vehicles and one brakevan weighing 15 tons will control 9 vehicles on all gradients. The brakes referred to in the above table will always be attached immediately in rear of the vehicles which they control.				4. Agreed.			
5. Any one of the gradients detailed above may be held to include short lengths of a slightly steeper gradient by special permission of the Government Inspector and Manager.				5. Agreed.			
6. The Government Inspector proposes the following additional rule :— In approaching terminal stations, or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used, except in cases of emergency, but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.				6. The Government Inspector proposes the following additional rule :— In approaching terminal stations, or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used, except in cases of emergency, but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.		6. The Manager states that this is already embodied in the drivers instructions for working the Automatic Vacuum Brake.	

Memorandum by Senior Government Inspector on the rules regarding brake power in connection with the vacuum brake on trains carrying passengers received with letter No. 144 I. O., dated 3rd December 1895, from the Manager, North Western railway.

Rule 1. Fast Passenger Trains.—The only point which appears to need consideration in this rule is that no limit is fixed to the number of vehicles piped but not braked, which may be attached. As it stands there might be a minimum of unbraked vehicles or none at all and yet the brake power might be insufficient. The following addition to the rule would meet the case :—

“The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake, and the former should always have two braked vehicles behind them.”

Rule 2. Mixed Trains.—The rule as drafted would permit of the use of the vacuum brake being dispensed with where shunting of goods wagons has to be done on the road, and in such cases the goods vehicles would be placed in front and coaching vehicles behind, and applies to mixed trains run at speeds not exceeding 30 miles an hour. On page 66 of the working instructions, paragraph 4, it is laid down that mixed trains should not as a rule exceed a maximum speed of 35 miles an hour between stations, and when making up time a maximum speed of 40 miles an hour must on no account be exceeded. The foot note on same page limits the driver of a mixed train to 35 miles an hour. These rules appear to require modification before they can apply to the rules under discussion.

The latter part of rule 2 would permit of coaching vehicles fitted presumably with the vacuum brake, being placed next the engine and connected with it by the brake pipe and unbraked goods vehicles placed in rear to the extent of two-thirds of the total vehicles in the train or two unbraked goods to one braked vehicle but limits the number of unbraked vehicles to fifteen with a brakevan in rear of the train.

In cases where goods vehicles are in front of coaching vehicles, it appears desirable to fix the maximum speed at 25 miles an hour and perhaps 30 miles an hour when making up time, but no more under any circumstances.

The maximum load allowed for mixed trains shown on page 65 of the working instructions, is 25 vehicles; and if 15 goods vehicles as proposed by the rule were permitted, these would constitute three-fifths of the vehicles which might prove most dangerous if the vacuum brake were suddenly applied, especially if the heavy goods vehicles were fully loaded and the passenger carriages only partially so.

The proportion of unbraked goods vehicles proposed by this rule is therefore considered excessive, and it is suggested that the latter part of rule should be altered to read as follows :—

“Unbraked goods vehicles may be placed in rear of such vehicles to the extent of *one-third* of the total number of vehicles in the train, that is, *one* unbraked goods vehicle for every *two* braked vehicles provided, provided that not more than *eight* unbraked goods vehicles shall be attached in all and that there shall be one brakevan in rear of the train.”

Rule 3.—It is recommended that this be altered to read as follows :—

“On gradients of $\frac{1}{100}$ and steeper the proportion of vacuum braked vehicles shall be at least $\frac{3}{4}$ of the whole; of the rest, a fraction shall be hand braked vans, in the proportion shown in following table :—

GRADIENT.	Number of loaded four-wheeled vehicles for which an extra 10-ton hand brakevan must be provided.
$\frac{1}{100}$	6
$\frac{1}{75}$	4
$\frac{1}{50}$	3
$\frac{1}{40}$	2

Rules 4 and 5.—Agreed.

In addition it is recommended that the following should be added.

Rule 6.—In approaching terminal stations or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used except in cases of emergency but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.

Rules regarding brake power in connection with the vacuum brake on passenger trains on the North-Western railway.

Proposed rules.	Government Inspector's suggestions.	Manager's Remarks.
1. Fast passenger trains run at speeds exceeding 30 miles an hour shall be composed of vehicles, either braked or piped throughout the train, except only that two vehicles not so fitted may be attached immediately in front of the rear brakevan. This does not affect the rules under which an inspection or other vehicle may be attached outside the rear brakevan. This rule shall be worked to at once as far as possible and shall come in force in its entirety as soon as in the opinion of the Government Inspector and the Manager sufficient stock has been fitted for the purpose.	1. The Government Inspector suggests the following addition to rule 1:— "The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake, and the former should always have two braked vehicles behind them."	1. The Manager accepts the Government Inspector's suggestion with the omission of the condition that piped vehicles should always have two braked vehicles behind them, as this would cause inconvenience in the case of a piped horse box which it might be desired to put next within the rear brakevan.
2. Mixed trains run at speeds not exceeding 30 miles an hour may be run without the use of the vacuum brake when the traffic is so small that the shunting at roadside stations has to be done by the train engine. In such cases the goods vehicles shall be placed in front of the train. But whenever such shunting by these trains can be dispensed with, the coaching vehicles shall be placed next the engine and be connected with it by the brake pipe. Unbraked goods vehicles may be placed in rear of such vehicles to the extent of two-thirds of the total number of vehicles in the train; that is two unbraked goods vehicles for every one braked vehicle provided that not more than fifteen unbraked goods vehicles shall be attached in all, and that there shall be one brakevan in rear of the train.	2. The Government Inspector considers that the proportion of unbraked goods vehicles is excessive and suggests that the latter part of the rule should be altered to read as follows:— "Unbraked goods vehicles may be placed in rear of such vehicles to the extent of <i>one-third</i> of the total number of vehicles in the train, that is <i>one</i> unbraked goods vehicle for every <i>two</i> braked vehicles provided, provided that not more than <i>eight</i> unbraked goods vehicles shall be attached in all, and that there shall be one brakevan in rear of the train."	2. The Manager is entirely at variance with the Government Inspector's suggestion, and points out that the proposal to restrict the proportion of unbraked vehicles to one-third of the total number of vehicles composing the train is impracticable, and would mean the entire abolition of mixed trains. The Manager proposes to add the following at the end of the rule:— "Trains worked under this rule shall not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 26 miles an hour."

Rules regarding brake power in connection with the vacuum brake on passenger trains on the North Western railway—contd.

Proposed rules.		Government Inspector's suggestions.		Manager's Remarks.
3. On gradients of 1 in 100 and steeper the following table shall apply :—		3. The Government Inspector recommends that this rule be altered to read as follows :— "On gradients of $\frac{1}{100}$ and steeper the proportion of vacuum braked vehicles be at least $\frac{2}{3}$ rds of the whole. Of the rest a fraction shall be hand-braked vans in the proportion shown in the following table :—		
Gradient.	REMARKS.	Gradient.	REMARKS.	
$\frac{1}{100}$	Number of loaded 4 wheeled vehicles or their equivalent for every hand-braked vehicle weighing 10 tons.	Number of loaded 4 wheeled vehicles for which an extra 10 ton hand-brakevan must be provided.		
$\frac{1}{75}$	6	6		
$\frac{1}{50}$	4	4		
$\frac{1}{25}$	3	3		
$\frac{1}{20}$	2	2		
4. On the grade of $\frac{1}{100}$ one brakevan weighing 10 tons will control 6 vehicles and one brakevan weighing 15 tons will control 9 vehicles on all gradients. The brakes referred to in the above table will always be attached immediately in rear of the vehicles which they control.		4. Agreed.		
5. Any one of the gradients detailed above may be held to include short lengths of a slightly steeper gradient by special permission of the Government Inspector and Manager.		5. Agreed.		
		6. The Government Inspector proposes the following additional rule :— In approaching terminal stations, or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used, except in cases of emergency, but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.		6. The Manager states that this is already embodied in the drivers instructions for working the Automatic Vacuum Brake.

G. G. Press, Simla.—No. 464 P. W. D.—27-6-36—400.

If as is usual 8 or 10 passenger vehicles were sufficient for the passenger service only 4 or 5 goods vehicles respectively could be added, and this would involve loss. I think it is absolutely necessary to have power to run up to 15 vehicles in rear of such a train and think one brakevan behind them sufficient.

Rule 3.—Except for the $\frac{1}{100}$ grades. I have proposed a very small proportion of unbraked vehicles on mixed trains, but for the reasons already given I am unable to agree to only one-third unbraked on $\frac{1}{100}$ grades.

Rule 6.—Proposed by the Government Inspector is already embodied in the driver's instructions for working the automatic vacuum brake to be found on page 51 of the working instructions.

Rules regarding brake power in connection with the vacuum brake on trains carrying passengers.

1. Fast passenger trains run at speeds exceeding 30 miles an hour shall be composed of vehicles either braked or piped throughout the train, except only that two vehicles not so fitted may be attached immediately in front of the rear brakevan. This does not affect the rules under which an inspection or other vehicle may be attached outside the rear brakevan.

This rule shall be worked to at once as far as possible and shall come in force in its entirety as soon as in the opinion of the Government Inspector and the Manager sufficient stock has been fitted for the purpose.*

*"The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake."

2. Mixed trains run at speeds not exceeding 30 miles an hour may be run without the use of the vacuum brake when the traffic is so small that the shunting at road side stations has to be done by the train engine. In such cases the goods vehicles shall be placed in front of the train. But wherever such shunting by these trains can be dispensed with, the coaching vehicles shall be placed next the engine and be connected with it by the brake pipe. Unbraked goods vehicles may be placed in rear of such vehicles, to the extent of two-thirds of the total number of vehicles in the train, that is two unbraked goods vehicles for every one braked vehicle provided that not more than fifteen unbraked goods vehicles shall be attached in all and that there shall be one brakevan in rear of the train.†

†"Trains worked under this rule not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 26 miles an hour."

‡"To the portion of the train not worked with the vacuum brake."

3. On gradients of one in 100 and steeper the following table shall apply.‡

Gradient.	Number of loaded four wheeled vehicles or their equivalent for every hand braked vehicle weighing 10 tons.	Maximum number of unbraked vehicles that may be attached for each engine on the train.	REMARKS.
$\frac{1}{100}$	6	15	
$\frac{1}{75}$	4	4	
$\frac{1}{50}$	3	3	
$\frac{1}{25}$	2	2	

4. On the grade of $\frac{1}{100}$ one brakevan weighing 10 tons will control 6 vehicles and one brakevan weighing 15 tons will control 9 vehicles on all gradients. The brakes referred to in the above table will always be attached immediately in rear of the vehicles which they control.

5. Any one of the gradients detailed above may be held to include short lengths of a slightly steeper gradient by special permission of the Government Inspector and Manager.

Additions and alterations in draft rules.

Paragraph (1) add at end of paragraph after "purpose." "The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake."

Paragraph (2) add at end of paragraph after "train." "Trains worked under this rule shall not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 26 miles an hour."

Paragraph (3) after "apply" add "to the portion of the train not worked with the vacuum brake."

Rules regarding brake power in connection with the vacuum brake on passenger trains on the North Western railway—contd.

Proposed rules.			Government Inspector's suggestions.		Manager's Remarks.
3. On gradients of 1 in 100 and steeper the following table shall apply :—			3. The Government Inspector recommends that this rule be altered to read as follows :— “ On gradients of $\frac{1}{100}$ and steeper the proportion of vacuum braked vehicles be at least $\frac{2}{3}$ rds of the whole. Of the rest a fraction shall be hand-braked vans in the proportion shown in the following table :—		
Gradient.	Number of loaded 4 wheeled vehicles or their equivalent for every hand-braked vehicle weighing 10 tons.	Maximum number of unbraked vehicles that may be attached for each engine on the train.	REMARKS.		
$\frac{1}{100}$	6	15			
$\frac{1}{75}$	4	4			
$\frac{1}{50}$	3	3			
$\frac{1}{25}$	2	2	4. Agreed.		
4. On the grade of $\frac{1}{100}$ one brakevan weighing 10 tons will control 6 vehicles and one brakevan weighing 15 tons will control 9 vehicles on all gradients. The brakes referred to in the above table will always be attached immediately in rear of the vehicles which they control.					
5. Any one of the gradients detailed above may be held to include short lengths of a slightly steeper gradient by special permission of the Government Inspector and Manager.			5. Agreed.		
			6. The Government Inspector proposes the following additional rule :— In approaching terminal stations, or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used, except in cases of emergency, but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.		
			6. The Manager states that this is already embodied in the drivers instructions for working the Automatic Vacuum Brake.		

G. C. Press, Simla.—No. 464 P. W. D.—27 6 96.—400.

No. 483 R.T.
GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.
RAILWAY TRAFFIC.

To

THE JOINT SECRETARY TO THE GOVERNMENT OF MADRAS, PUBLIC WORKS DEPARTMENT, RAILWAY BRANCH.

THE SECRETARY TO THE GOVERNMENT OF BOMBAY, PUBLIC WORKS DEPARTMENT, RAILWAY BRANCH.

Simla, the 25th June 1896.

SIR,

I am directed to forward, herewith, a copy of the undernoted documents regarding the brake power necessary on passenger and mixed trains fitted with the vacuum brake, and to request that, with the permission of His Excellency the Governor in Council, the Government of India may be favoured with an expression of opinion on the proposed rules by the Senior Government Inspector, Madras, and by the Railway Administrations under the control of the Government of Bombay.

I have the honour to be,

SIR,

Your most obedient Servant,

G. A. ANDERSON,
Offg. Under Secretary.

Documents accompanying.

Copy of Director General of Railways' letter No. 233-T., dated 11th May 1896, and enclosures.

G. C. Press, Simla.—No. 464 P. W. D.—27 6 96.—400.

Enclosure to letter No. 483 R.T. of 1896.

No. 233 T., dated 11th May 1896.

From—COLONEL T. GRACEY, R. E., Director General of Railways,
To—The Secretary to the Government of India, Public Works Department.

I have the honour to forward, herewith, for the orders of the Government of India, a letter from the Manager, North Western railway, submitting a copy of his draft rules on the subject of brake power in connection with the vacuum brake on trains carrying passengers, with certain alterations and additions (shewn in italics) which have been adopted from the recommendations of the Government Inspector, a copy of whose memorandum on the subject is attached. For ready reference I also submit a statement showing in tabular form the proposed rules, the suggestions of the Government Inspector, and the Manager's remarks thereon.

2. As regards rule 1, I agree with the Manager, North Western railway, that it is not necessary that piped vehicles should always have two braked vehicles behind them as this arrangement would cause inconvenience in the case of a piped horse-box which it might be desired to put next within the rear brakevan.

As regards rule 2, I would suggest that all railway administrations and Government Inspectors should be consulted before any orders are issued on this point. The matter involved in rule 2 is of great importance as the question of the economical working of mixed trains, which now form the bulk of the trains in India by which passengers are carried, will depend on the decision arrived at. If the number of unbraked goods vehicles, which can be placed behind the braked passenger vehicles is not to exceed $\frac{1}{3}$ rd of the number of vehicles on the train, the running of mixed trains with 6 to 12 braked passenger vehicles attached to them will no longer be economically possible; and either the running of mixed trains by which the bulk of the short distance 3rd class passengers are carried, must be discontinued, or the use of the automatic vacuum brake on mixed trains must be given up.

Personally, I am of opinion that of the two the latter is the more desirable; indeed I am not certain that in any case it is desirable to attach heavy goods vehicles behind coaching vehicles, as in case of a collision the coaching stock will be broken up between the hammer consisting of heavy goods vehicles behind and the anvil in front, and in case of derailment the coaching vehicles in front will have the heavy goods vehicles behind heaped on the top of them.

No. 358 D. G. R., dated 6th April 1896.

From—COLONEL G. BOUGHEY, Manager, North Western Railway,
To—The Director General of Railways.

In reply to your No. 283 T., dated 6th July 1895, I have the honor to submit for approval, a copy of my draft rules on the subject of brake power in connection with the vacuum brake on trains carrying passengers, with certain alterations and additions in italics which I have been able to adopt from the recommendations of the Government Inspector a copy of whose memorandum on the subject I attach.

Rule 1.—The Government Inspector's recommendation that piped vehicles should always have two braked vehicles behind them has not been adopted as it would cause inconvenience in the case of a piped horse-box which it might be desired to put next within the rear brakevan. It is not vital, and the one brakevan in rear may be accepted as sufficient.

Rule 2.—I am entirely at variance with the Government Inspector on the question of the proportion of unbraked to vacuum braked vehicles; as already explained, the proposal to restrict the proportion of unbraked vehicles to one-third of the total number of vehicles is impracticable and would mean the entire abolition of mixed trains.

If as is usual 8 or 10 passenger vehicles were sufficient for the passenger service only 4 or 5 goods vehicles respectively could be added, and this would involve loss. I think it is absolutely necessary to have power to run up to 15 vehicles in rear of such a train and think one brakevan behind them sufficient.

Rule 3.—Except for the $\frac{1}{100}$ grades. I have proposed a very small proportion of unbraked vehicles on mixed trains, but for the reasons already given I am unable to agree to only one-third unbraked on $\frac{1}{100}$ grades.

Rule 6.—Proposed by the Government Inspector is already embodied in the driver's instructions for working the automatic vacuum brake to be found on page 51 of the working instructions.

Rules regarding brake power in connection with the vacuum brake on trains carrying passengers.

1. Fast passenger trains run at speeds exceeding 30 miles an hour shall be composed of vehicles either braked or piped throughout the train, except only that two vehicles not so fitted may be attached immediately in front of the rear brakevan. This does not affect the rules under which an inspection or other vehicle may be attached outside the rear brakevan.

This rule shall be worked to at once as far as possible and shall come in force in its entirety as soon as in the opinion of the Government Inspector and the Manager sufficient stock has been fitted for the purpose.*

*"The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake."

2. Mixed trains run at speeds not exceeding 30 miles an hour may be run without the use of the vacuum brake when the traffic is so small that the shunting at road side stations has to be done by the train engine. In such cases the goods vehicles shall be placed in front of the train. But wherever such shunting by these trains can be dispensed with, the coaching vehicles shall be placed next the engine and be connected with it by the brake pipe. Unbraked goods vehicles may be placed in rear of such vehicles, to the extent of two-thirds of the total number of vehicles in the train, that is two unbraked goods vehicles for every one braked vehicle provided that not more than fifteen unbraked goods vehicles shall be attached in all and that there shall be one brakevan in rear of the train.†

†"Trains worked under this rule not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 26 miles an hour."

‡"To the portion of the train not worked with the vacuum brake."

3. On gradients of one in 100 and steeper the following table shall apply.‡

Gradient.	Number of loaded four wheeled vehicles or their equivalent for every hand-braked vehicle weighing 10 tons.	Maximum number of unbraked vehicles that may be attached for each engine on the train.	REMARKS.
$\frac{1}{100}$	6	15	
$\frac{1}{75}$	4	4	
$\frac{1}{50}$	3	3	
$\frac{1}{25}$	2	2	

4. On the grade of $\frac{1}{100}$ one brakevan weighing 10 tons will control 6 vehicles and one brakevan weighing 15 tons will control 9 vehicles on all gradients. The brakes referred to in the above table will always be attached immediately in rear of the vehicles which they control.

5. Any one of the gradients detailed above may be held to include short lengths of a slightly steeper gradient by special permission of the Government Inspector and Manager.

Additions and alterations in draft rules.

Paragraph (1) add at end of paragraph after "purpose." "The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake."

Paragraph (2) add at end of paragraph after "train." "Trains worked under this rule shall not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 26 miles an hour."

Paragraph (3) after "apply" add "to the portion of the train not worked with the vacuum brake."

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In cases where goods vehicles are in front of coaching vehicles, it appears desirable to fix the maximum speed at 25 miles an hour and perhaps 30 miles an hour when making up time, but no more under any circumstances.

The maximum load allowed for mixed trains shown on page 65 of the working instructions, is 25 vehicles; and if 15 goods vehicles as proposed by the rule were permitted, these would constitute three-fifths of the vehicles which might prove most dangerous if the vacuum brake were suddenly applied, especially if the heavy goods vehicles were fully loaded and the passenger carriages only partially so.

The proportion of unbraked goods vehicles proposed by this rule is therefore considered excessive, and it is suggested that the latter part of rule should be altered to read as follows :—

"Unbraked goods vehicles may be placed in rear of such vehicles to the extent of *one-third* of the total number of vehicles in the train, that is, *one* unbraked goods vehicle for every *two* braked vehicles provided, provided that not more than *eight* unbraked goods vehicles shall be attached in all and that there shall be one brakevan in rear of the train."

Rule 3.—It is recommended that this be altered to read as follows :—

"On gradients of $\frac{1}{100}$ and steeper the proportion of vacuum braked vehicles shall be at least $\frac{2}{3}$ of the whole; of the rest, a fraction shall be hand braked vans, in the proportion shown in following table :—

GRADIENT.	Number of loaded four-wheeled vehicles for which an extra 10-ton hand brakevan must be provided.
$\frac{1}{100}$	6
$\frac{1}{75}$	4
$\frac{1}{50}$	3
$\frac{1}{40}$	2

Rules 4 and 5.—Agreed.

In addition it is recommended that the following should be added.

Rule 6.—In approaching terminal stations or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used except in cases of emergency but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.

If as is usual 8 or 10 passenger vehicles were sufficient for the passenger service only 4 or 5 goods vehicles respectively could be added, and this would involve loss. I think it is absolutely necessary to have power to run up to 15 vehicles in rear of such a train and think one brakevan behind them sufficient.

Rule 3.—Except for the $\frac{1}{100}$ grades. I have proposed a very small proportion of unbraked vehicles on mixed trains, but for the reasons already given I am unable to agree to only one-third unbraked on $\frac{1}{100}$ grades.

Rule 6.—Proposed by the Government Inspector is already embodied in the driver's instructions for working the automatic vacuum brake to be found on page 51 of the working instructions.

Rules regarding brake power in connection with the vacuum brake on trains carrying passengers.

1. Fast passenger trains run at speeds exceeding 30 miles an hour shall be composed of vehicles either braked or piped throughout the train, except only that two vehicles not so fitted may be attached immediately in front of the rear brakevan. This does not affect the rules under which an inspection or other vehicle may be attached outside the rear brakevan.

This rule shall be worked to at once as far as possible and shall come in force in its entirety as soon as in the opinion of the Government Inspector and the Manager sufficient stock has been fitted for the purpose.*

*"The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake."

2. Mixed trains run at speeds not exceeding 30 miles an hour may be run without the use of the vacuum brake when the traffic is so small that the shunting at road side stations has to be done by the train engine. In such cases the goods vehicles shall be placed in front of the train. But wherever such shunting by these trains can be dispensed with, the coaching vehicles shall be placed next the engine and be connected with it by the brake pipe. Unbraked goods vehicles may be placed in rear of such vehicles, to the extent of two-thirds of the total number of vehicles in the train, that is two unbraked goods vehicles for every one braked vehicle provided that not more than fifteen unbraked goods vehicles shall be attached in all and that there shall be one brakevan in rear of the train.†

†"Trains worked under this rule not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 20 miles an hour."

‡"To the portion of the train not worked with the vacuum brake."

3. On gradients of one in 100 and steeper the following table shall apply.‡

Gradient.	Number of loaded four wheeled vehicles or their equivalent for every hand braked vehicle weighing 10 tons.	Maximum number of unbraked vehicles that may be attached for each engine on the train.	REMARKS.
$\frac{1}{100}$	6	15	
$\frac{1}{75}$	4	4	
$\frac{1}{50}$	3	3	
$\frac{1}{40}$	2	2	

4. On the grade of $\frac{1}{100}$ one brakevan weighing 10 tons will control 6 vehicles and one brakevan weighing 15 tons will control 9 vehicles on all gradients. The brakes referred to in the above table will always be attached immediately in rear of the vehicles which they control.

5. Any one of the gradients detailed above may be held to include short lengths of a slightly steeper gradient by special permission of the Government Inspector and Manager.

Additions and alterations in draft rules.

Paragraph (1) add at end of paragraph after "purpose." "The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake."

Paragraph (2) add at end of paragraph after "train." "Trains worked under this rule shall not be allowed to run faster than 30 miles an hour or be timed without allowance for starting and stopping faster than 20 miles an hour."

Paragraph (3) after "apply" add "to the portion of the train not worked with the vacuum brake."

Memorandum by Senior Government Inspector on the rules regarding brake power in connection with the vacuum brake on trains carrying passengers received with letter No. 144 I. O., dated 3rd December 1895, from the Manager, North Western railway.

Rule 1. Fast Passenger Trains.—The only point which appears to need consideration in this rule is that no limit is fixed to the number of vehicles piped but not braked which may be attached. As it stands there might be a minimum of unbraked vehicles or none at all and yet the brake power might be insufficient. The following addition to the rule would meet the case :—

“The proportion of vehicles fitted with continuous pipes only shall not exceed one such vehicle to four vehicles fitted with the brake, and the former should always have two braked vehicles behind them.”

Rule 2. Mixed Trains.—The rule as drafted would permit of the use of the vacuum brake being dispensed with where shunting of goods wagons has to be done on the road, and in such cases the goods vehicles would be placed in front and coaching vehicles behind, and applies to mixed trains run at speeds not exceeding 30 miles an hour. On page 66 of the working instructions, paragraph 4, it is laid down that mixed trains should not as a rule exceed a maximum speed of 35 miles an hour between stations, and when making up time a maximum speed of 40 miles an hour must on no account be exceeded. The foot note on same page limits the driver of a mixed train to 35 miles an hour. These rules appear to require modification before they can apply to the rules under discussion.

The latter part of rule 2 would permit of coaching vehicles fitted presumably with the vacuum brake, being placed next the engine and connected with it by the brake pipe and unbraked goods vehicles placed in rear to the extent of two-thirds of the total vehicles in the train or two unbraked goods to one braked vehicle but limits the number of unbraked vehicles to fifteen with a brakevan in rear of the train.

In cases where goods vehicles are in front of coaching vehicles, it appears desirable to fix the maximum speed at 25 miles an hour and perhaps 30 miles an hour when making up time, but no more under any circumstances.

The maximum load allowed for mixed trains shown on page 65 of the working instructions, is 25 vehicles; and if 15 goods vehicles as proposed by the rule were permitted, these would constitute three-fifths of the vehicles which might prove most dangerous if the vacuum brake were suddenly applied, especially if the heavy goods vehicles were fully loaded and the passenger carriages only partially so.

The proportion of unbraked goods vehicles proposed by this rule is therefore considered excessive, and it is suggested that the latter part of rule should be altered to read as follows :—

“Unbraked goods vehicles may be placed in rear of such vehicles to the extent of *one-third* of the total number of vehicles in the train, that is, *one* unbraked goods vehicle for every *two* braked vehicles provided, provided that not more than *eight* unbraked goods vehicles shall be attached in all and that there shall be one brakevan in rear of the train.”

Rule 3.—It is recommended that this be altered to read as follows :—

“On gradients of $\frac{1}{100}$ and steeper the proportion of vacuum braked vehicles shall be at least $\frac{3}{4}$ of the whole; of the rest, a fraction shall be hand braked vans, in the proportion shown in following table :—

GRADIENT.	Number of loaded four-wheeled vehicles for which an extra 10-ton hand brakevan must be provided.		
$\frac{1}{100}$			6
$\frac{1}{75}$			4
$\frac{1}{50}$			3
$\frac{1}{40}$			2

Rules 4 and 5.—Agreed.

In addition it is recommended that the following should be added.

Rule 6.—In approaching terminal stations or stations at which other trains may be standing on the same line of rails, the vacuum brake must not be used except in cases of emergency but the speed of the train must be so reduced that it may be brought to a stand by means of the hand and steam brakes alone.

No. 483 R.T.

GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.
RAILWAY TRAFFIC.

To

THE JOINT SECRETARY TO THE GOVERNMENT OF MADRAS, PUBLIC WORKS DEPARTMENT, RAILWAY BRANCH.

THE SECRETARY TO THE GOVERNMENT OF BOMBAY, PUBLIC WORKS DEPARTMENT, RAILWAY BRANCH.

Simla, the 25th June 1896.

SIR,

I am directed to forward, herewith, a copy of the undernoted documents regarding the brake power necessary on passenger and mixed trains fitted with the vacuum brake, and to request that, with the permission of His Excellency the Governor in Council, the Government of India may be favoured with an expression of opinion on the proposed rules by the Senior Government Inspector, and by the Railway Administrations under the control of the Government of ^{Madras} ^{Bombay} ^{Madras} ^{Bombay}.

I have the honour to be,

SIR,

Your most obedient Servant,

G. A. ANDERSON,
Offg. Under Secretary.

Documents accompanying.

Copy of Director General of Railways' letter No. 233-T, dated 11th May 1896, and enclosures.