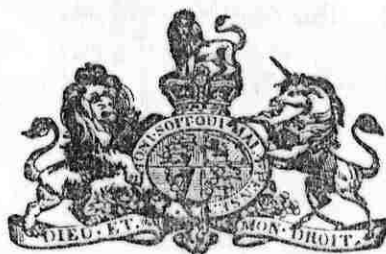


REQUIREMENTS, &c.
OF THE
BOARD OF TRADE
IN REGARD TO
THE OPENING OF RAILWAYS.

- A.—Documents to be furnished.
- B.—Important requirements.
- C.—Modes of working single lines.
- D.—Recommendations.



LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY EYRE AND SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

A.

**DOCUMENTS TO BE SENT TO THE RAILWAY
DEPARTMENT, BOARD OF TRADE,
PREVIOUSLY TO THE SECOND NOTICE OF THE INTENTION
TO OPEN A RAILWAY BEING GIVEN.**

I. ~~A copy~~ *Copies* of the Parliamentary Plans and Sections, with any deviations which may have been made during construction marked thereon in red; and with the corrections in the distances, levels, inclinations, sections of ground, and radii of curves, rendered necessary by such deviations, also marked in red. ~~As well as~~ The positions of the several stations, and the lengths and heights of the platforms; ~~and the widths of cuttings and embankments on each side of the railway to be also given.~~

II. A table of Gradients and level portions, with the positions of the Stations distinctly shown.

III. A table of Curves and straight portions.

IV. A table of Cuttings and Embankments.

V. A table of *all* Bridges *either under or over for roads and railways crossed by* the Railway.

VI. A table of ~~the~~ Bridges and Viaducts *carrying the railway over watercourses and valleys.*

VII. A table of all Level Crossings, public, occupation, private and bridle roads, or footways.

VIII. A table of Tunnels.

IX. A table of Aqueducts and of Culverts 3 feet or more in diameter *or width.*

According to the forms forwarded herewith, ~~observing that~~ The situations of Works, &c., should be described in each by reference to the same fixed point, and ~~that~~ it will be convenient if the Station nearest to the *Head Quarters of the Company, Metropolis* for a main line, or the junction with the main line for a branch Railway, be adopted as such point of reference.

X. ~~A statement affording~~ Detailed information under the following heads:—

1st. Permanent Way.—Whether the line be double or single ~~throughout~~, or partly double and partly single ~~throughout with sidings~~; the distances from the fixed point adopted in the tables, at which the single portions, *if any*, commence and terminate—or, for a single line, at which *the passing places* or the sidings commence and terminate; whether the land has been purchased for an additional line of rails, or whether any other arrangements have been made with a view to adding an additional line at a future period; the width ~~of the line~~ at formation level; the gauge;

the ~~space width~~ between the lines, *and between the lines and sidings where double*; the description of rails employed, with a diagram section, their length, and weight per yard; the description and weight of the chairs, where these are employed; the mode of fixing the chairs and securing the rails; the fastenings adopted for the joints of the rails; the description of sleepers, with their smallest and average scantling and length, their distances from centre to centre if transverse, and if longitudinal the details of any ties by which they are connected; the nature of the ballast, and its depth below the under surface of the sleepers; the description of points adopted; the number and positions of all facing points connected with the main line; and the names of the Stations or other places at which Engine-turntables are provided.

2nd. Fences.—Description of fencing adopted for ~~on each portion of the line~~, *giving in the case of post and rail fencing especially the height of the top rail of the rails, and the distance between posts, if post and rail; and in the case of wire fencing, the height, number of wires, distance between supports, and means of straining.*

3rd. Drainage.—General description of the drainage employed; and if, on any part of the line, it has been attended with peculiar difficulty, a detailed description should be given.

4th. Stations.—Their names, and their distances, at the commencement and termination, respectively, from the fixed point; the gradients on which they are situated and approached; the length of the Platforms ~~and their Height above the Level of the Rails~~; and the positions of and distances between the home and the distant signals.

5th. Width of Line.—The minimum space allowed from a height of 2 feet 6 inches above the rail level, between the sides of the widest Carriages ~~to be used in use upon the Railway~~ and any fixed works, such as Pillars and Walls at Stations, Abutments, Piers, Supports, Arches, Girders, Telegraph and Signal Posts, Sheds, &c., along the Line. The minimum section of each tunnel should be appended, showing within it a section of the widest carriage to be used on the line.

6th. Bridges and Viaducts.—Drawings in detail of all Bridges, ~~and~~, either over or under the Railway, *and Viaducts*, accompanied by sufficient information to ~~allow of enable~~ the probable strength of each being to be ascertained by calculation, and showing by sections the distances between the girders and the sides of the widest carriages to be used on the line, when the girders are more than 2 feet 6 inches above the level of the rails. *The weight of each main girder and the total weight of the superstructure (including ballast if used) of all girder spans to be stated on the plans.*

7th. Diagrams of all Junction and Station arrangements, *including plans and sections of the Stations, platforms, buildings, approaches, &c.*

B.

MEMORANDUM OF IMPORTANT REQUIREMENTS.

1. The requisite apparatus to be provided should be provided at the period of inspection for ensuring by means of the block telegraph system an adequate interval of space between following trains, and, in the case of junctions, between converging or crossing trains. In the case of single lines worked by one engine under steam (or two or more coupled together) and carrying a staff, no such apparatus will be required. *Block telegraph.*

2. Home-signals and distant-signals for each direction should to be fixed *Signals.* supplied at stations and junctions; with extra signals for such dock or bay lines sidings as are used either for the arrival or for the departure of trains, and starting signals for each direction at all passenger stations which are also block posts. On passenger lines all cross-over roads and all connexions for goods or mineral lines and sidings to be protected by home and distant-signals, and as a rule at all important running junctions, a separate distant-signal in connexion with each home-signal to be provided.

Signals may be dispensed with on single lines under the following conditions:—

- (a.) At all stations and siding connexions upon a line worked by one engine only (or two engines coupled together) carrying a staff, and when all points are locked by such staff.
- (b.) At any intermediate siding connexion upon a line worked under the train staff or ticket system, or under the electric staff or tablet system, where the points are locked by such staff or tablet.
- (c.) At intermediate stations, which are not staff or tablet stations, upon a line worked under the **Electric Staff or Tablet System.**

3. 6. ~~It being necessary that a uniform system of signals should be adopted on all railways, the semaphore arms should,~~ The signals at junctions, be to be on separate posts or on brackets; and the signals at stations, when there is more than one arm on one side of a post, they should to be made to apply,—the first or upper arm to the line on the left, the second arm to the line next in order from the left, and so on; but in cases where the main or more important line is not the one on the left, separate signal posts should to be provided, or the arms should to be on brackets. The Distant-signals should to be distinguished by notches cut out of the ends of the semaphore arms where such are employed, and to be controlled by home or starting signals for the same direction, when on the same post. ~~In no case should a~~ A distant-signal arm be must not be placed above a home or starting signal arm on the same post for trains going in the same direction. ~~In the case of sidings, a low and short arm, distinct from the arm or arms for the passenger lines may be employed.~~

In the case of sidings, a low short arm and a small signal light, distinguishable from the arms or lights for the passenger lines, may be employed, but in such cases disc signals are, as a rule, preferable.

Every signal arm to be so weighted as to fly to and remain at danger on the breaking at any point of the connexion between the arm and the lever working it.

4. On new lines not forming portions of existing lines and worked independently, and not run over by the trains of other companies, the front signal lights to be green and red, and the back lights (to be visible only when the signals are at danger) to be white.

Points.

5. 5. Facing points should to be avoided as far as possible, but when used they should be secured by facing-point locks and locking bars; the length of the locking bars should exceed the greatest distance between the adjacent wheels of passengers' carriages, and the stock rails should be tied to gauge with iron or steel ties. When facing points they cannot be dispensed with, they must should be placed as near as practicable possible to the levers by which they are worked or bolted. The limit of distance from levers working points to be 180 yards in the case of facing points, and 300 yards in the case of trailing points on the main line, or safety points of sidings, and in no instance at a greater distance than 180 yards from these levers. All points, whether facing or trailing, should be worked or bolted by rods and not by wires.

In order to ensure that the points are in their proper position before the signals are lowered, and to prevent the Signaller from shifting them, while a train is passing over them, all facing points must be fitted with facing-point locks and locking bars, and with means for detecting any failure in the connexions between the signal-cabin and points. The length of the locking bars to exceed the greatest wheel-base between any two pairs of wheels of the vehicles in use on the line, and the stock rails to be tied to gauge with iron or steel ties. All points, whether facing or trailing, to be worked or bolted by rods and not by wires, and to be fitted with double connecting rods.

Interlocking.

6. 3. The levers by which points and signals are worked to be interlocked and, as a rule, should be brought close together, into the position most convenient for the person working them, in a signal cabin, or on a properly constructed stage and should be interlocked. The points should be provided with double connecting rods. Point levers should be sufficiently long to enable the pointsman to work them without risk or inconvenience and should not be placed on the ground between the lines of rails. Any signal which is worked by a wire or rod should be so weighted as to fly to or remain at "danger" on the fracture of the wire or rod.

7. 4. The levers by which points and signals are worked should, as a rule, be brought together under cover upon a properly constructed stage, with glass sides inclosing the apparatus. They should be so arranged that while the signals are at danger the points shall be free to move. The interlocking to be so arranged that the signaller shall be unable to lower a signal for the approach of a train, until after he has set the points in the proper direction position for it to pass; that it shall not be possible for him to exhibit at the same moment any two signals that can lead to a collision between two trains; and that, after having lowered his the signals to allow a train to pass, he shall not be able to move his any points connected with, or leading to, the line on which the train is moving so as to cause an accident, or to admit of a collision between any two trains. The facing points should be provided with apparatus which will ensure the points being in their proper positions before the signals are lowered, and which will prevent the signaller from shifting the points whilst a train is passing them, and, as an additional precaution, means should generally be provided for detecting any failure in the connexions between the signal cabins and the points. Every signaller should be able For the protection of trains when shunting, points to be also, if possible, so interlocked as to avoid the risk of a collision. The signal-cabin to be commodious, and to be supplied with a clock, and with a separate block instrument for signalling trains on each line of rails. The point levers and signal levers, to be so placed in the cabin, that the signaller when working them shall have the best possible view of the railway, and the cabin itself to be so situated as to enable the signaller to see the arms and the lights of the home as well as

of the distant signals, and the working of the points or of the indicators showing their position. The back lights of the *signal* lamps being made as small as possible, having regard to efficiency *and* when the front lights are visible to the signalman in his cabin no back lights *should to be* provided. The fixed lights in the signal-cabins *should to be* screened off, so as not to be mistakeable ~~during fogs~~ for the signals exhibited to control the running of trains. If, from any unavoidable cause, the arm ~~or~~ *and* light of any signal cannot be seen by the signalman *they must be repeated* a ~~repeater~~ *should be provided* in the cabin. ~~Clocks should be placed in conspicuous positions for the use of the signalmen.~~

Home or starting signals next in advance of trailing points, when lowered, to lock such points in either position.

A distant signal must not be capable of being lowered unless the home and starting signals in advance of it have been lowered.

8. 7. ~~The junctions between passenger lines and goods and mineral lines and sidings~~ *Sidings.* ~~should be protected by home and distant signals.—The~~ Sidings *should to be* so arranged that the shunting operations ~~carried on at~~ upon them shall ~~cause present~~ the least possible obstruction to the passenger lines. There ~~should be~~ Safety points *to be provided* upon each goods and mineral lines and sidings, *at their junctions with passenger lines* with the points closed against the passenger lines and interlocked with the signals. ~~In the case of sidings joining single lines on favourable gradients, where the train staff and ticket system is in use for working the traffic, a key attached to the staff may be used for opening the siding, and signals may be dispensed with.~~

9. 8. When a junction is situated near to a passenger station, ~~or is~~ *Junctions.* ~~connected with goods or mineral sidings,~~ the platforms ~~to end sidings~~ should be so arranged as to prevent, as far as possible, any necessity for *standing any trains on the junction shunting over the junction.*

10. 9. The junctions of all *single lines to be, as a rule,* ~~railways should, in ordinary cases,~~ be formed as double-line junctions.

11. 10. The lines of railway leading to the passenger platforms ~~should~~ *Stations.* ~~to be~~ so arranged that the engines shall always be in front of the passenger trains as they arrive at and depart from a station; and so that, in the case of double lines or of passing places on single lines, each line shall have its own platform. *at terminal stations a double line of railway must not end as a single line.*

12. 11. Platforms ~~to should~~ be continuous, and not less than 6 feet wide for stations of small traffic, nor less than 12 feet wide for important stations; the descents at the ends of the platforms ~~should to be~~ by ramps, and not by steps. Pillars ~~or Columns,~~ for the support of roofs *and* ~~or~~ other fixed works, ~~should not to be less than 6 feet from nearer to~~ the edges of the platforms ~~than 6 feet.—It is considered desirable that~~ The height of the platforms above rail level ~~the rails should not be to be~~ 3 feet, *save under exceptional circumstances and in no case less than 2 feet 6 inches.* *The edges of the platforms to overhang not less than 12 inches.* ~~The lines should be laid down so as to leave~~ As little space as possible *to be left* between the edges of the platforms and those of the ~~continuous~~ footboards on the carriages. Shelter ~~should to be~~ provided on every platform, and conveniences where necessary. *Names of stations to be shown on boards and on the platform lamps.*

13. ~~12.~~ When stations are placed ~~near~~ on or near a viaduct or bridge under the railway, a parapet or fence on each side to ~~should~~ be provided of sufficient height to prevent passengers who may, by mistake, leave the carriages when not at the platform, from falling from the viaduct or bridge in the dark. ~~Viaducts under the railway should be provided with handrails and with projecting platforms for the protection and escape of the platelayers. — Viaducts of timber and iron should be provided with manholes and other facilities for inspection.~~

14. ~~13.~~ Foot-bridges ~~over~~ or subways ~~under the line~~ should to be provided for passengers to cross the railway at all *exchange and other important stations of any importance.* staircases or ramps leading to or from platforms to be at no point narrower than at the top, and the available width to be in no case curtailed by any erection or fixed obstruction whatever below the top.

At all stations where crowding may be expected, the staircases or ramps to be of ample width, and barriers for regulating the entrance of the crowd at the top to be erected. If in such cases there are gates at the bottom, a speaking tube or other means of communication between the top and bottom to be provided, and in all cases such gates to be open outwards. For closing the openings at the top sliding bars or gates are considered best.

The steps of staircases ~~approaching stations, and of foot-bridges over the lines, and of foot-subways~~ should to be ~~not~~ never less than 11 inches in the tread, nor more than 7 inches in the rise, and midway landings to be provided where the height exceeds 10 feet.

In subways, where ramps are used, the inclination not to exceed 1 in 7, and efficient handrails ~~all such staircases~~ should to be provided. ~~with~~ on both staircases and ramps.

15. ~~14.~~ A Clocks ~~should~~ to be provided at all every stations, in some conspicuous positions visible from the platforms ~~visible from the line.~~

16. ~~15.~~ No station to ~~should~~ be constructed, and no siding to ~~should~~ join a passenger line, on a steeper gradient than 1 in 260, except where it is unavoidable. When the line is double, and the gradient at a station or siding-junction is necessarily steeper than 1 in 260, and when danger is to be apprehended from vehicles running back, a catch-siding, with points weighted for the siding, or a throw-off switch, ~~should~~ to be provided to intercept runaway vehicles ~~further down the incline than the passenger platform, siding junction, or goods yard, at a distance outside the home signal for the ascending line, greater than the length of the longest train running upon the line.~~ Under similar circumstances, when the line is single, ~~in the case, 1st, of a station, a second line should be laid down, a second platform should be constructed, and a catch siding similarly provided; and in the case, 2nd, of a siding junction, means should be provided for placing the whole train in sidings, clear of the main line before any shunting operations are commenced provision for averting danger from runaway vehicles to be made—~~

(1.) At a station in one of the following manners :

- a. A second line to be laid down, a second platform to be constructed, and a catch-siding or throw-off switch to be provided on the ascending line inside the loop points.
- b. A loop line to be constructed lower down the incline than the station platforms, with a similarly placed catch-siding or throw-off switch.

(2.) *At a siding junction, in one of the following manners, except where it is possible to work the traffic with the engine at the lower end of a goods or mineral train, in which case, an undertaking to do so, given by the company, will be accepted as sufficient :*

- a. *A similar loop to be constructed, as in the case of a station.*
- b. *Means to be provided for placing the whole train on sidings clear of the main line before any shunting operations are commenced.*

17. +6. Engines-turntables ~~for the~~ of sufficient diameter to enable the longest engines and tenders in use on the line to be turned without being uncoupled, ~~to should~~ be erected at terminal stations, and at junctions and other places at which the engines require to be turned, except in cases of short lines not exceeding 15 miles in length, where the stations are not at a greater distance than 3 miles apart, and the Railway Company ~~is willing to~~ gives an undertaking to stop all trains at all stations. Care ~~should to~~ be taken to keep all turntables at safe distances from the adjacent lines of rails, so that engines, waggons, or carriages, when being turned, may not foul other lines, or endanger the traffic upon them. *Turntables.*

18. +7. Cast-iron must not be used for railway under-bridges, except in the form of arch-ribbed girders, where the material is in compression. *Bridges and viaducts.*

In a cast-iron arched bridge, or in the cast-iron girders of an over-bridge, the breaking weight of the girders ~~should be~~ not *to be* less than three times the permanent load due to the weight of the super-structure, added to six times the greatest moving load that can be brought upon it.

In a wrought-iron or steel bridge the greatest load which can be brought upon it, added to the weight of the super-structure, ~~should~~ not *to* produce a greater strain *per square inch* on any part of the material than five tons, where wrought-iron is used, or six tons and a half, where steel is *used employed-per-square-inch.*

The Engineer responsible for any steel structure ~~should to~~ forward to the Board of Trade a certificate to the effect that the steel employed is either cast steel, or steel made by some process of fusion, subsequently rolled or hammered, and of a quality possessing considerable toughness and ductility, together with a statement of all the tests to which it has been subjected.

19. +8. *In cases where bridges or viaducts are constructed wholly or partially of timber, a sufficient factor of safety depending on the nature and quality of the timber to be provided for.*

N.B.—The heaviest engines, boiler trucks, or travelling cranes in use on railways afford a measure of the greatest moving loads to which a bridge can be subjected. ~~These rules apply~~ *The above rules apply* equally to the main and the transverse girders *and rail bearers.*

20. +9. It is desirable that viaducts should, as far as possible, be wholly constructed of brick or stone, and in such cases they *must should* have parapet walls on each side, not under 4 feet 6 inches in height above the ~~level of the~~ rail level, and not less than 18 inches thick.

Where it is not practicable to construct the viaducts of brick or stone, and iron or steel girders are made use of, it is considered best that in important viaducts the permanent way should be laid between the main girders. *In all cases substantial parapets with a height of not less than 4 feet*

6 inches above rail level must be provided by an addition to the girders, unless the girders themselves are sufficiently high. ~~If, however, in such viaducts the main girders are placed below the level of the rails, substantial parapets not under 4 feet 6 inches in height must be provided.~~ In *On* important viaducts where the superstructure is of iron, steel, or timber, substantial outside wheel guards should to be fixed outside, above the level of and as close to the outer rails as possible, but not so as to be liable to be struck by any part of an engine or train running on the rails. ~~interfere with the steps or any of the working parts of the engine or trains.~~

~~Where iron is made use of for~~ In the construction of the abutments or piers which are intended to support or carry the iron girders of high bridges and viaducts, it must be distinctly understood that these abutments or piers should not consist of cast-iron columns of small size *must not be used such as 12, 15, or 18 inches in diameter.*

In all large structures a wind pressure of 56 lbs. per square foot is to be assumed for the purpose of calculation, which will be based on the rules laid down in the report, dated 20th May 1881, of the Committee appointed by the Board of Trade to consider the question of wind pressure on railway structures. (See Appendix.)

21. ~~21.~~ The upper surfaces of the wooden platforms of bridges and viaducts ~~to should~~ be protected from fire.

22. ~~22.~~ All castings for use in railway structures should, *to be*, where practicable, be cast in a similar position to that which they are intended to occupy when fixed.

23. ~~23.~~ The joints of rails ~~to should~~ be secured by means of fish-plates, or by some other equally secure fastening. ~~The weight of the cast-iron chairs on branch lines, or lines on which the traffic will be small and light, and where it will be worked by engines of ordinary construction, should not be less than 26 lbs. each; but on main lines, and where heavy traffic may be worked at high speeds, the chairs should weigh not less than 35 lbs. On main lines and lines where heavy traffic may be worked at high speed, the chairs not to weigh less than 40 lbs., but on branch lines or lines on which the traffic is light, chairs weighing not less than 30 lbs. may be used.~~

24. ~~23.~~ When chairs are used to support the rails they ~~must should~~ be secured to the sleepers, at least partially, by iron spikes or bolts. With flat-bottomed rails, when there are no chairs, or with bridge rails, *the fastenings at the joints, and at some intermediate places, to consist of fang or other through-bolts; should be used, at least at the joints and at some intermediate places. and such rails, on curves with radii of 15 chains or less, to be tied to gauge by iron or steel ties at suitable intervals.*

25. ~~24.~~ In *any* all curves where the radius is 10 chains or less, a check-rail ~~to should~~ be placed inside the inner rail of the curve.

26. *The diamond crossings at junctions not, as a rule, to be flatter than 1 in 8.*

27. ~~24.~~ No standing work (other than a passenger platform) ~~to should~~ be nearer to the side of the widest carriage in use on the line than 2 feet 4 inches, at any point between the level of 2 feet 6 inches above the rails and the level of the upper parts of the highest carriage doors. This applies to all arches,

Permanent
way.

Width of
line.

abutments, piers, supports, girders, tunnels, bridges, roofs, walls, posts, tanks, signals, fences, and other works, and to all projections at the side of a railway constructed to any gauge.

28. 25. The intervals between adjacent lines of rails, *where there are two lines only*, or between lines of rails and sidings, *should not to be less than 6 feet. Where additional running lines of rails are alongside the main lines, an interval of not less than 9 feet 6 inches to be provided, if possible, between those additional lines and the main line.* *Intervals between lines.*

29. 26. At all level crossings of public roads the gates *should to be so constructed that they may be closed either as-to-close across the railway, as-well as or across the road at each side of the crossing, and a lodge or-station-house should to be provided, as-is-required-by-Act-of-Parliament.* *Level crossings.* The gates *must should not be capable of being opened at the same time for the road and the railway and must be so hung as not to admit of being opened outwards towards the road. Stops to be provided to keep the gates in position across the railway, and all-sidings and-connexions should be placed so that the shunting can be done without interfering with the level crossing.* When a level crossing occurs at a station, there *must should be a box, if there is not a lodge, at the gates, for the use of the gate-keeper, unless the gates are worked from a signal cabin. Wooden gates are considered preferable to iron gates for closing across the railway, and single gates on each side to double gates.*

Gates must be fitted with red discs or targets, and with lamps for night use, and semaphore signals in one or both directions interlocked with the gates, may be required. At all level crossings of public roads or footpaths, a footbridge or a subway may be required. At occupation and field crossings, the gates must, in accordance with the Act of Parliament, be hung so as to open outwards from the line.

30. 27. Sidings connected with the main lines near a public road level crossing to be so placed that shunting may be carried on with as little interference as possible with the level crossing; and, as a rule, the points of the sidings to be not less than 100 yards from the crossing.

31. At public road level crossings in or near populous places, the lower portions of the gates to be either close barred or covered with wire netting.

32. 28 Mile-posts and quarter and half-mile posts and gradient-boards *should to be provided along the line.* *Mile posts, &c.*

33. 29. Tunnels and long viaducts *to be should in all cases be constructed with recesses or other provision for the safety escape of the platelayers. Viaducts of steel, iron, or timber to be provided with manholes or other facilities for inspection. On under-bridges without parapets, handrails to be provided.* *Refuges.*

34. 31. Continuous brakes, complying with the following requirements, to be provided on all trains carrying passengers, viz. :— *Continuous brakes.*

- (1.) The brake must be instantaneous in action and capable of being applied by the engine driver and guards;
- (2.) The brake must be self-applying in the event of any failure in the continuity of its action;
- (3.) The brake must be capable of being applied to every vehicle of the train, whether carrying passengers or not;

- (4.) *The brake must be in regular use in daily working ;*
 (5.) *The materials of the brake must be of a durable character, and easily maintained and kept in order.*

C.

Modes of working Single Lines.

In the case of a line being single, a certificate, under the seal, and signed by the Chairman and Secretary, of the Company, *must* ~~should~~ be sent to the Board of Trade, through the Inspecting Officer, to the effect that one of the ~~three two~~ following modes of working single lines will be adopted, namely :—

- I. ~~That The line shall be worked~~ BY TRAIN-STAFF *and train tickets* in the mode described in the following ~~amended--regulations~~ *rules*, combined with the absolute block-telegraph system :—

RULES for WORKING the SINGLE LINE between A., B., C., &c.

1. Either a train-staff or a train-ticket is to be carried with each engine or train to and fro, and for this purpose [one, two, or more] train-staffs and sets of train-tickets will be employed, *e.g.*, ~~viz~~ :—

	Colour of Staff and Ticket.	Form of Staff and Ticket.
One between A. and B.	Red.	Square.
One between B. and C. - - - - .	Blue.	Round.
&c. &c. - - - - .	&c.	&c.

2. NO ENGINE OR TRAIN IS TO BE PERMITTED TO LEAVE OR PASS EITHER OF THE STAFF-STATIONS, A., B., or C., &c., UNLESS THE STAFF FOR THE PORTION OF LINE OVER WHICH IT IS TO TRAVEL IS THEN AT THE STATION ; AND NO ENGINE ~~MAN~~ DRIVER IS ON ANY ACCOUNT TO LEAVE OR PASS A STAFF-STATION WITHOUT SEEING SUCH TRAIN-STAFF.

3. If no second engine or train is intended to follow, the staff is to be given to the engine *driver* ~~man-or-guard~~.

4. If other engines or trains are intended to follow before the staff can be returned, a train-ticket, stating "staff following," is to be given to the engine *driver* ~~man~~ of the leading *first* engine, ~~or the engineman or guard of the leading train,~~ and so on with any other except the last, the staff itself being sent with the last. After the staff has been sent away, no other engine or train is to leave the staff-station under any circumstances whatever until ~~its return~~ *the return of the staff*.

5. The train tickets are to be kept in a box fastened by an inside spring, and the key to open the box *must be* ~~is~~ the train-staff, so that a ticket cannot be obtained without the train-staff. *The removal of the* ~~The~~ train-staff ~~is to~~ *must* lock the box ~~in-being-taken-out-of-it~~.

6. The train-staffs, the train-tickets, and the ticket-boxes are to be painted or printed in different colours, *e.g.*, red for the line between A. and B. ;

blue for that between B. and C., &c.; the inside springs and the keys on the staffs being so arranged that the red staff cannot open the blue box, nor the blue staff the red box, and so forth. ~~This is to prevent mistakes.~~

7. The ticket-boxes are to be kept in the signal cabins or fixed by brackets in the booking-offices at the staff-stations. ~~the brackets being turned up at the ends to receive the train-staffs when they are at the stations.~~

8. The sole person authorised to receive, exhibit, or deliver the staff or ticket is ~~t~~The station master, ~~the clerk-in-charge~~, the inspector, ~~the signaller~~, or the person in charge for the time at a staff-station.

9. The usual special train tail-signal, "engine or train following," must be used ~~when a ticket is given~~ by every engine or train carrying a ticket for the ~~information~~ guidance of the platelayers, and gatekeepers and others ~~upon the line.~~

10. When a ballast train has to do work on the line, the staff ~~is to be given to the engineman or guard in charge of it~~ only and no tickets to be used by such train. This will close the line whilst the ballast train is at work before the ordinary traffic can be resumed. The ballast train must proceed afterwards to one of the two staff-stations in order to open the line.

11. In the event of an engine or train breaking down between two staff-stations, the fireman or guard is to take the train-staff *if with the train* to the staff-station in the direction whence assistance may be expected, so that the staff may be at that station on the arrival of an engine. Should the engine or train that fails be in possession of a train-ticket instead of the staff, assistance can only come from the station at which the train-staff has been left. The fireman will accompany any assisting engine to the place where ~~he left his own~~ the engine, or train broke down.

II. 4.—That with only one engine in steam, or two or more engines coupled together, shall be allowed to be upon the single line or any section thereof at one and the same time.

Such engine or engines to carry the staff belonging to the line or section thereof on which the train is travelling.

(N.B.—No tickets to be allowed under this mode of working.)

III. By the electric train tablet or electric train-staff system, under which only one of the tablets (or staffs) applying to any section can be in use at the same time.

(N.B.—The approval of the Board of Trade to be obtained for the apparatus proposed to be used, and for the rules of working, which should be of a somewhat similar character to those detailed under mode of working, No. I.)

(Any undertaking or certificate furnished by a railway company, to be under the seal, and signed by the Chairman and Secretary, of the Company.)

D.

RECOMMENDATIONS AS TO THE WORKING OF RAILWAYS.

1. There should be a *brake break-vehicle* with a guard in it at or near the tail of every train; this vehicle should be provided with a raised roof and extended sides, glazed to the front and back; and it should be the duty of the guard to keep a constant look-out from it along his train.

2. All passenger carriages should be provided with continuous footboards extending throughout the whole length of each carriage and as far as the outer ends of the buffer castings. As passenger carriages now pass from one company's line to another's, it is essential for the public safety that although the widths of the carriages on the different lines may differ from each other, the widths across the carriages from the outside of the continuous footboard on one side to the outside of the continuous footboard on the opposite side should be identical for the carriages of all railway companies, so that the lines of rails may be laid at the proper distance from the edges of the passenger platforms.

3. There should be *efficient* means of intercommunication between the a guard or guards at the tail of every passenger train and the engine driver, and between the passengers and the servants of the company, in charge of the train, as required by the Legislature.

~~4. Continuous breaks under the control of the engine driver and each guard should be employed with all passenger trains. In the opinion of the Board of Trade, which has been fully expressed in recent correspondence, due security will not have been taken for the public safety until some system or systems of continuous breaks has or have been universally adopted, instantaneous in action, capable of being applied by engine driver or guard, and automatic in case of accident.~~

4. 5. The tyres of all wheels should be so secured to the rims of the wheels as to prevent them from flying open when they are fractured.

5. 6. The engines employed with passenger trains should be of a steady description, with not less than six wheels, with a long wheel-base, with the centre of gravity in front of the driving wheels, and with the motions balanced. They should not as a rule be run tender or tank first in front.

6. 7. Records should be carefully kept of the work performed by the wearing parts of the rolling stock, to afford practical information in regard to them, and to prevent them from being retained in use longer than is desirable.

7. In addition to the block-telegraph instruments it is desirable that there should be speaking instruments or telephones for communication between signalmen, and books for recording the running of the trains.

8. 9. When drovers or other persons are permitted to travel with goods or cattle trains, suitable vehicles should be provided for their accommodation near the front of such trains.

9. It is considered that, in fixed signals, the front lights should show—

Green for all right,
Red for danger,

and that back lights, visible only when the signals are at danger, should show white.

10. *Refuge sidings should be provided at all main line stations where slow trains are liable to be shunted for fast trains to pass them. If at such stations it is impossible to provide refuge sidings, and slow trains have to be shunted from one main line or the other to allow of fast trains passing them, some simple arrangement should be supplied in the signal cabin to help to remind the signalman of the shunted train.*

~~10. Luggage should not be carried on the roofs of railway carriages.~~

~~11. The names of the stations should be marked on the lamps, besides being shown on other conspicuous places.~~

Board of Trade,
(Railway Department),
December 1885.

HENRY G. CALCRAFT.

APPENDIX.

EXTRACT from the REPORT of the COMMITTEE appointed to consider the QUESTION of WIND PRESSURE ON RAILWAY STRUCTURES.

From the information acquired, from the inquiries made, and from the consideration given to the subject, the Committee reported their opinion that the following rules will sufficiently meet the cases referred to:—

- (1.) That for railway bridges and viaducts a maximum wind pressure of 56 lbs. per square foot should be assumed for the purpose of calculation.
 - (2.) That where the bridge or viaduct is formed of close girders, and the tops of such girders are as high or higher than the top of a train passing over the bridge, the total wind pressure upon such bridge or viaduct should be ascertained by applying the full pressure of 56 lbs. per square foot to the entire vertical surface of one main girder only. But if the top of a train passing over the bridge is higher than the tops of the main girders, the total wind pressure upon such bridge or viaduct should be ascertained by applying the full pressure of 56 lbs. per square foot to the entire vertical surface from the bottom of the main girders to the top of the train passing over the bridge.
 - (3.) That where the bridge or viaduct is of the lattice form or of open construction, the wind pressure upon the outer or windward girder should be ascertained by applying the full pressure of 56 lbs. per square foot, as if the girder were a close girder, from the level of the rails to the top of a train passing over such bridge or viaduct, and by applying in addition the full pressure of 56 lbs. per square foot to the ascertained vertical area of surface of the ironwork of the same girder situated below the level of the rails or above the top of a train passing over such bridge or viaduct. The wind pressure upon the inner or leeward girder or girders should be ascertained by applying a pressure per square foot to the ascertained vertical area of surface of the ironwork of one girder only situated below the level of the rails or above the top of a train passing over the said bridge or viaduct, according to the following scale, viz.:—
 - (a.) If the surface area of the open spaces does not exceed two-thirds of the whole area included within the outline of the girder, the pressure should be taken at 28 lbs. per square foot.
 - (b.) If the surface area of the open spaces lie between two-thirds and three-fourths of the whole area included within the outline of the girder, the pressure should be taken at 42 lbs. per square foot.
 - (c.) If the surface area of the open spaces be greater than three-fourths of the whole area included within the outline of the girder, the pressure should be taken at the full pressure of 56 lbs. per square foot.
 - (4.) That the pressure upon arches and the piers of bridges and viaducts should be ascertained as nearly as possible in conformity with the rules above stated.
 - (5.) That in order to ensure a proper margin of safety for bridges and viaducts in respect of the strains caused by wind pressure, they should be made of sufficient strength to withstand a strain of four times the amount due to the pressure calculated by the foregoing rules. And that, for cases where the tendency of the wind to overturn structures is counteracted by gravity alone a factor of safety of 2 will be sufficient.
-