

Minutes of Meeting  
held at 125, High Holborn W.C., on 8<sup>th</sup> August 1900  
at the conclusion of the General Meeting.

Present.

Sir Henry Oakley in the Chair,

Mrs. Algernon H. Mills

Lord Rathmore

Henry Tennant Esq.

Mr. E. C. Cunningham, General Manager; and

Mr. R. O. Graham, Secretary

The Minutes of last Meeting were read and confirmed.

The question of the desirability or otherwise of making public the weekly earnings of the Company was considered, and it was resolved that a Statement of the weekly traffic should be prepared by the Accountant and posted on the Tuesday evenings of each week to the various Stock Exchanges and to the principal newspapers.

The Secretary submitted the Certificate from the Board of Trade sanctioning the opening of the line for public traffic and the same was ordered to be recorded as follows:—

Copy R9652

Railway Department  
Board of Trade

Whitehall. S.W.,

28<sup>th</sup> July 1900.

Sir,

I have the honour of Report for the information of the Board of Trade, that in compliance with the instructions contained in Your Minute of 14<sup>th</sup> June, I have inspected the Central London (Technical) Railway.

The line, so far as passenger traffic is concerned,

Amount

5300	
831	6
170	10 6
232	15
163	15
166	14 9
295	18 9
122	6 6
85	11 6
78	10
71	10
59	7 7
46	13 1
20	
19	3 9
16	13 4
15	2 1
9	12 8
7	4
7	
5	10
4	6 7
3	16 1
3	7 6
3	3
£ 7937 12 7	

Board of  
Trade  
Certificate



Col. Yorkes Report

Commences at the West end of Shepherd Road Station, and terminates at the East end of the Bank Station, its length being rather more than  $5\frac{1}{4}$  miles (the actual length of the up line being 5 miles 65.63 chains, and that of the down line 5 miles 66.6 chains).

### Tunnels

The up and down lines are carried in two separate tunnels, each 11' 6" in diameter, which widen out to 21 ft. in diameter at the stations. The depth of the line below the surface varies approximately from 50 feet to 100 feet.

The tunnel is cylindrical in section and formed of six cast iron segments with a clamping piece or key. Generally speaking the tunnels may be said to be along side each other, but in some places they are on different levels and overlapping each other.

The gauge is 4' 8.5". The steepest gradient on either line is 1 in 30 (the inclination occurring at the departure end of each platform). The sharpest curve on the up line has a radius of 5 chains, and on the down line of 4.54 chains. These curves and all other of less radius than 10 chains are fitted with 'check rails.'

### Permanent Way

The permanent way consists of steel bridge rails & weighing 100 lbs. per yard, fastened to longitudinal oak timbers (11" x 5" in section) by tang bolts; the timbers being tied together by oak transoms  $5\frac{1}{2}$ " x  $5\frac{1}{2}$ " at intervals of 17 feet 6 inches. The timbers are bedded in concrete. The electrical conductor is carried on the transoms between the rails, and there is a footway formed of two planks (9" x 3") between one rail and the electrical conductor.

### Stations

There are 13 stations viz: Shepherd Road, Millers Park, Notting Hill Gate, Queen's Road, Lancaster Gate, Marble Arch, Bond Street, Oxford Circus, Tottenham Court Road, British Museum, Chancery Lane, Post Office, and the Bank.

The general features of the stations are the same in all cases. Each station consists of two platforms 325 feet long and 1 foot 8 inches high. The entrances to the stations from the streets are wide and commodious and the waiting offices which are spacious, are on the street level, except at the Bank Station where they are in

Shepherd

Right



the subway.

Platforms

Access to the platforms from the booking halls is afforded by staircases and electrical lifts, and the arrangements by means of gates and barriers for regulating the flow of passengers from the street to the platforms seem to be satisfactory. The staircases have hand rails and landings at vertical intervals of ten feet. Telephones are provided between the platforms and booking halls. The stations are well lighted. At the Bank Station an elaborate system of subways has been constructed close under the surface of the street forming access to the Central London Railway and to the City and Waterloo Railway, and also providing a means of crossing from one street to another.

Lifts

The lifts which are of American design and manufacture, form a very important and interesting feature at the various stations. I attach to this report as an appendix a description of these appliances, which was given in "Engineering" in the issues of March 3 and 10, 1899. My account may be useful for future reference. At the Bank Station there are 5 lift shafts 20 feet in diameter, each containing one lift - total 5 lifts. At the Post Office Station there are two lift shafts, 23 feet diameter, each containing two lifts, and one shaft 18 feet in diameter containing one lift. - total 5 lifts.

At Chancery Lane there are two 23 feet shafts each containing two lifts, - total 4 lifts.

At the British Museum, Tottenham Court Road, and Oxford Circus, the number of lifts is the same as at Chancery Lane.

At Bond Street there is a 30 ft shaft containing 3 lifts, - total 3 lifts.

At Marble Arch there are 2 shafts of 23 feet each containing 2 lifts - total 4 lifts.

At each of the remaining 5 stations there is a 30 feet lift shaft containing 3 lifts.

The following details of the weights and areas of the cars have been supplied to me by the Engineers of the Central London Railway Company:-



Col. Foster Report  
Cont

Shaft	No. of Cars	Area Sq. ft.	Weight of car	Weight of Passengers	Total weight
18 ft.	1	172	5½ tons	5 tons	10½ tons
20 "	1	250	6 "	7½ "	13½ "
23 "	2	140	5 "	4 "	9 "
30 "	2	145	6 "	4½ "	10½ "
	1	117	4½ "	3½ "	8 "

The weights of passengers in the above table is taken as 66 lbs per square foot of floor area, which I am informed by the Engineer of the Company has been found by experiment both in England and America to be the equivalent of the packed crowd of passengers when it is possible to get into a lift. But even if the load per square foot be taken as 100 lbs, the total weights will still be moderate as compared to the theoretical strength of the ropes attached to each car or cage.

All the lifts except those at the Bank have four lifting steel ropes ¾" in diameter, and four ⅞" counter weight ropes; the ultimate breaking strain of each cable being specified at not less than 25 tons. Each of the lifts at the Bank Station has six lifting ropes, each ¾" in diameter, and six similar counter weight ropes; each rope having an ultimate breaking strain of not less than 16 tons.

The lifts have safety appliances of a novel description. These safety clutches are fixed below the car, and they are operated by means of a small rotary governor, which can be so adjusted, that when the speed of the car exceeds an agreed limit, a trigger is released which causes two strong springs to bring the clutches into operation.

I saw the safety apparatus tested at No. 3 lift at the Bank Station, and at No. 2 lift at Shepherd's Bush Station, each lift being loaded with weights equal to 66 lbs per square foot. The tests, for which special arrangements were made, were satisfactory; the empty car being instantaneously brought into action, and holding the car securely.

For all the foregoing reasons it is difficult to test the safety gear of every lift, but from the experiments referred to, it may be assumed that the safety clutches are satisfactory. They should however



be periodically examined, so as to ensure that they will be kept in working order. The general maintenance of the lift will also require unremitting attention.

Forty one of the lifts were tested in my presence with the loads given in the following table viz.:-

Post Office	No 1 lift. 2, 4 and 5 3 safety clutch tested with 16000 lbs. No 1, 2 and 3	82 men 80 " each
Chancery Lane	No 1, 2 and 3 4	55 " " 57 " "
British Museum	No 1 and 2 3	50 " " 57 " "
St. James Court Road	No 1, 3 & 4 2	55 " " 55 " "
Oxford Circus	No 1 2, 3 and 4	54 " " 56 " "
Marble Arch	No 2, 3 and 4 (No 1 lift, Mark 3, Arch is not yet ready for use.)	55 " " 55 " "
Lancaster Gate	No 1 2	50 " " 55 " "
Queens Road.	(No 3 lift not yet ready for use) No 1 and 2 3	45 " " 50 " " 50 " "
Notting Hill Gate	No 1 2 and 3	52 " " 50 " "
Holland Park	No 1 and 3 (No 2 lift not yet ready for use.)	50 " " 50 " "
Shepherd Bush	No 1 2 & 3 3 (Second test)	56 " " 50 " " 60 " "

No 2 safety clutch tested also with 8000 lbs. July 10.

The lifts at Bond Street Station are not yet ready and were not examined by me. All the lifts except those at the Bank have emergency doors, so that if for any reason a cage should become fixed in a shaft, the adjacent cage can be brought along side of it, and the passengers transferred from one to the other. This cannot be



Mining

done at the Bank as there is only one lift in each shaft.

The shafton tunnels are lined with white glazed tiles and are well lighted with electric (arc) lamps. A few gas lamps are also provided in case of failure of the electric current.

If Bond Street Station is brought into use before the lifts are ready, to which course I see no objection, care must be taken to fix barricades across the openings to the lifts at the top of the shafts, so as to prevent any risk of persons falling down the shaft.

The signalling of the lines is similar in principle to that existing on other electrical railways. There are no distant railways; all signals are stop signals, and the signals are electrically interlocked with the block instruments on the Spagnoletti system.

The distance between the stations varies from 1288 yards to 692 yards, and each station is provided with a starting house, and an outer house signal.

And the arrangements are such that the starting signal at any station cannot be lowered for a train until that train has been accepted by the signal box ahead, nor until the outer house signal has been placed at danger; and the outer house signal cannot be lowered until any previous train has passed out of the station and over an electric trolley placed in advance of the starting signal, or has been placed in a siding clear of the main line.

The system if properly used, should ensure the existence of an adequate interval of space between succeeding trains. But I noticed during my inspection that some of the signals in the tunnels were, owing to the fracture of the colored glasses, showing white lights, instead of green or red. Whenever this happens, the white light should in accordance with the well known rule, be treated as a danger signal.

The cars are very commodious and comfortable. They are carried on four wheeled bogies, and are smooth running, quiet and well lighted. They have of course no side doors, but are entered by means of end gangways, with side gates. Each train will

CarsSignallingLocomotivesSpecimen



Consist of 6 or 7 cars, and passengers will be allowed to travel upon the gangways or platforms between the cars. A guard will be stationed on every gangway, and it will be his duty among other matters, to call out the names of the stations, to open and close the side gates, and to prevent any passengers from standing upon the gangway during the time the train is in motion. This arrangement is

necessary, as an incautious passenger might, if permitted to remain on the gangway, receive serious injury through his head or arms coming in contact with the side of the tunnel.

Each locomotive weighs 43 tons and is carried on two four wheeled bogies. The controlling gear is placed in the centre of the locomotive, and is surrounded by a 'cub' (similar to that on a steam engine) under which the driver and his assistant stand. The engine can be driven with equal facility in either direction.

Electrical energy is conveyed to the motors by means of a shoe or slipper which slides along the conductor rail. The trains and engines are fitted throughout with Westinghouse brakes, the air for which is compressed by means of an air pump worked by an auxiliary electric motor on the engine.

The Company have, I understand, 28 electric locomotives and 108 cars. It is proposed to commence working with a 5 minutes service, each train consisting of an engine and 6 cars. Should the traffic require it a three and a half minutes service will be put on hereafter.

If necessary each train may consist of 7 cars, the platforms being sufficiently long for the purpose. The fare is to be 2<sup>d</sup> for the whole or any portion of the journey.

The average speed will be 14 miles an hour, which will make a running speed of from 18 to 20 miles an hour. But on the 5 chain curves the speed should not at any time exceed 15 miles an hour, and to this the Company have agreed.

The inspection occupied four days, & the few matters which appeared to me to require attention have all been dealt with by the Company, so that on the occasion of my last visit, everything was in perfect order, except a few signal lamp repeaters in the signal boxes,

Locomotives

Speed



Col. Voke Report which required adjustment, and one or two coloured signal glasses in the tunnels, which required renewal.

The work throughout appeared to be of a very substantial nature, and no money or effort has been spared to render the railway as complete as possible in every detail.

I can therefore recommend the Board of Trade to sanction the opening of the Central London Railway for passenger traffic.

I have &c

(sig) H. A. Voke.

41 Col. Rk.

To the Assistant Secretary

The Board of Trade. S.D.

Copy R. 8347.

8. Richmond Terrace  
Whitehall.

June 27. 1900

Mr. Voke's Report Sir,

I have the honour to report for the information of the Board of Trade, that I inspected on the 13<sup>th</sup> inst. and on the 21<sup>st</sup> inst. the electrical equipment of the Central London Railway.

The electrical equipment of the line consists of a third rail, above the Liverpool Overhead Railway, the City and South London, and the Watlington & City Railways; the working pressure is 500 volts. The return is by the rails which are not intentionally connected to the lining of the tunnels, but are more or less insulated by the sleepers. The rail is nowhere accessible to passengers.

The current is supplied to the rail by generators in substations, driven by three phase alternating current motors. The three phase supply is at high pressure, 2000 volts. The motors and transformers are suitably protected and the switchboard is satisfactory construction but owing to the confined position and the necessity for artificial illumination at all times, I recommend that hinged or other movable panels should be provided for the purpose of clearing in the high pressure switches, as

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Electrical Equipment

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order that, in case of failure of the light, an assistant  
working in the dark, might not be liable to touch the high pressure  
terminals.

Switch Boards

The low-pressure switch boards are of the usual  
type and are well constructed.

Lifts

The lifts are worked electrically, from an  
independent supply. The apparatus for controlling the lifts  
is worked electrically from the car, instead of mechanically.  
This introduces mechanisms of very great complexity. Very  
ingenious contrivances are employed to avoid possible  
contingencies, and at the same time intricate apparatus  
is thus added which increases the probability of something  
going wrong.

The best that can be said for this apparatus  
is that it has been found to work in America, and careful  
examination of it leaves me with the impression that the  
worst that can happen is to imprison a load of passengers in  
the shaft.

In most of the lifts, emergency doors are  
provided so that if one lift jams, an adjacent lift can  
be brought along side and the passengers can be transferred.  
But at the lifts at the Bank, this cannot be done, and an  
hour or two might elapse before the passengers could be  
released.

Mains

The high pressure mains are carried in  
the tunnels in steel casing, and are nowhere accessible.  
The mains connected with the motor power and lighting  
in the substations are lead covered, but those for the  
lifts are insulated covered, but are finished with hard &  
compound. This is satisfactory under ordinary conditions,  
but the result of even a very small outbreak of fire might  
be serious, since the compound is of a very inflammable  
character.

I am reluctant to recommend that these  
cables should be boxed in and the boxes filled with sand,  
for this would prevent inspection, and I consider that  
careful periodic inspection would be better.

Locomotives

I have inspected a locomotive, and have  
recommended that the terminals on the roof should be  
boxed in, since a driver might inadvertently, or in the  
case of an unusual jerk, bring his hand in contact  
with it.

I have inspected the generating works and



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Mr. Prother's Report

Considers the plant and equipment to be satisfactory so far as relates to the danger of electric shocks.

When the ordinary service is commenced I will make an inspection of the instruments which indicate the fall of potential and leakage.

Subject to the Report of Colonel Porter, I recommend that the electrical working of this line be sanctioned.

I have &c

(sig) Alex. P. Prother.

To the  
Assistant Secretary  
Board of Trade. S.W.

Certificate of the Board of Trade.

J. Whitehall Garden  
S.W.  
3. August 1900.

Sir, I am directed by the Board of Trade to transmit to you the enclosed copy of Colonel Porter's Report of his inspection of the Central London Railway, together with a report by Mr. Prother on the electrical equipment of that Railway.

I am at the same time to inform you that, subject to the observations and conditions contained in these Reports, the Board sanction the use of the line for passenger traffic.

I am Sir

Your obedient servant

By Francis J. S. Hopwood

To the Secretary  
Central London Railway

General Manager's  
Report.

The following Report as to the working of the line during the first week of its opening was submitted by Mr. Cunningham, the General Manager, and ordered to be recorded as follows:-



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August 1900.

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General  
Manager's  
Report

## Central London Railway

347.

125. High Holborn W.C.

To the Directors.

My Lord & Gentlemen,

We have now had an experience of one week's work on the Central London Railway, and I beg to put before you a few figures and remarks upon the service.

On Monday the 30. July the line was opened for traffic, and the trains were running at an interval of 5 minutes from 5.15 am to 12.30 at night. This service was continued throughout the week and on Sunday a 7½ minute service was worked from 8 o'clock in the morning till 11.30 at night. The 5 minutes service required 12 trains in each direction, each train consisting of 6 cars, while another train was kept at the Bank to facilitate the crossing over of the trains at the terminus.

On Sunday the 7½ minutes service was worked with trains of the same size. The number of passengers carried was very large and exceeded our expectations, and with the exception of a few stoppages which were of vital importance, the service went with remarkable smoothness. The number earned on the first day were £2.99, on Thursday August 2<sup>nd</sup>, 95.875; and on Saturday August 4<sup>th</sup> the figures rose to £104.703. The total carried for the week was 606,003. These large numbers were transported safely and without any accident. The total amount earned for this traffic was £4,845.44.4 being 1.92 d. per passenger. This is a higher average than stated in the estimate that I made previously to the Board.

The Board may perhaps recollect the average of the Metropolitan system is 1.7 d. per passenger, and that they will remember was assumed as being the probable average to be obtained on this line.

This service was performed with 16,006 train miles or 96036 car miles. The receipts are an average 72.6 d. per train mile. These receipts are considerably higher per train mile than those previously estimated; the estimate I placed before the Board on 13 December last was 57.8 d. per train mile, so that it will be seen that our actual figures have considerably exceeded this. There is every indication of the traffic continuing at this rate, and with the increased

average 72.6 d. per train mile. These receipts are considerably higher per train mile than those previously estimated; the estimate I placed before the Board on 13 December last was 57.8 d. per train mile, so that it will be seen that our actual figures have considerably exceeded this. There is every indication of the traffic continuing at this rate, and with the increased



service, large numbers of passengers may be expected to be carried. During the present week, I expect to be able to increase the train service to 4 minute trains and in the week following to bring it up to 3 minute trains.

The experience which we have already had has shown that the lift accommodation at Shepherd's Bush is insufficient to deal with the large number of passengers going there. In one day we bashed over 26,000 passengers from Shepherd's Bush Station. When the electric lines of the London United Tramways system are opened, and the large number of passengers that will be carried by that system brought to the Shepherd's Bush Station, our passengers from there will doubtless greatly increase.

At present, we have only 3 small lifts, and on various occasions during the past week these were quite unable to deal with the swarms of people, and the staircase itself became blocked in a dangerous manner, so that it was necessary to clear the outer gates and prevent others from entering. So apparent and pressing is the need for increased lift accommodation at the place that I at once took up the matter with Mr. Henry Oakley, and the Engineer has submitted a rough scheme for increasing the lift accommodation there by constructing a new lift shaft at the back of the station on property which we now control. The cost of this will be about £12,000, and I would press upon the Board the necessity for taking this work in hand without delay. At other stations on the line the lift accommodation is fairly capable of dealing with the traffic, and after a short time of working, I expect the lifts will work smoothly and without trouble.

In the locomotive department I would suggest to the Board that it is necessary to obtain some spare trucks with motors on them to replace those under the locomotives that might be impaired or require repairs in the service, so as not to keep locomotives in the yard while repairs are being carried out. I think to such trucks should be obtained, & the cost of these will be about £1,000 each. We have only 28 locomotives in the



General Managers Report

Service, and when we run a 2 1/2 minute service it will require 26 in actual use, and this does not leave a sufficiently large margin. The trucks I have spoken of will enable us to repair locomotives quickly, but I think it would be prudent to obtain at least 2 additional locomotives to those that we now have. The cost of these is I understand about £3500 each.

I beg to report to the Board, that with the concurrence of the Chairman, I have made a Contract with Messrs Stephenson Clarke & Coy for a supply of 600 tons per week for a period of 2 months of coal, for use in the Powerhouse, at 15/6 per ton. This is a coal of a quality that has been tested in our Power House and found thoroughly suitable, and it was necessary to close the Contract at once so as to ensure the stated supply.

This is in addition to the supply of coal that has been purchased by the British Thomson Houston Company for use in the Power House, and these quantities will give us a surplus of coal to be stored in the Yard. The quantity that is being consumed in the service that we are at present running is about 90 tons per diem. I ask the Board to approve of this Contract.

Wm. Granville C. Cunningham.  
General Manager.

Accounts for payment

The following list of accounts for payment was submitted and ordered to be paid

Name	Particulars	Amount
Richman & Coy	As per usual service	155
Whitehorn Bros.	Coal Prices	34 13
Willing & Coy.	Advertising	39 14
A. Jones	Housekeeping	5 4 8
Wm. Kaye & Co.	20 28th July	896 9 9
		£ 1131 15

990



DocumentsSealed

The Secretary reported that Share Certificate was sealed on 21<sup>st</sup> & 28<sup>th</sup> July; and the 2<sup>nd</sup> August; also an agreement with Messrs. Withering & Co. in regard to Advertising for the 2<sup>nd</sup> inst. The Register of Shareholders for the Half Year ending 31<sup>st</sup> June 1900 was sealed on 8<sup>th</sup> August, and the same was approved.

W. Oakesley  
Chairman.

General  
Main  
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