

Memoranda of Comparative Examination of Annual Reports to  
Railroad Commissioners.

New York, March 11th 1895.

While the data at hand is too limited to permit of a complete and careful analysis of the expenditures of the several Companies in all departments, I submit herewith statements giving estimate of the reductions that it would have been plainly possible to have made in the operating expenses of the Northern Pacific Railroad for the fiscal year ending June 30th 1894.

The estimates and comparisons are based upon the sworn statements of the several Railroads as appearing in the 1894 report of the Commissioner of Railroads of North Dakota.

Exhibit "A" -- Comparative statement of the operating expenses as classified in said reports by the Commissioner.

Exhibit "B" -- Sundry statistics taken from the reports.

Exhibit "C" -- This statement shows approximately the reduction in train service that could have been made and still handle the traffic in a thoroughly efficient manner. It should be borne in mind that the results arrived at could be considerably improved with time as the employees in the different branches of the service became familiar with the changed methods of operation. This statement shows that on the basis of handling per train only 200 tons per freight train and allowing for a passenger service 25% in excess of that afforded the patrons of the Great Northern, a saving was practicable during the last year of at least \$1,962,536.87. With a greater density of traffic to be handled under careful administration the saving would in all probability have amounted from two and one quarter to two and one half millions of dollars.

Exhibit "D" -- For the purpose of verifying the practicability of securing net results at least as good as those covered by the statements in Exhibit

"C", details are here given showing the direct effect of the improved efficiency in train service upon some of the principal items of expenditure. With the data at hand no attempt has been made to go beyond what can be done with accuracy. The saving here located and itemized, amounts to \$1,943,813.29. In this connection attention is called to the item "Other Expenses" \$366,064.25 reported by the Northern Pacific under the head of "Maintenance of Way and Structure." ^ The fact that it was not distributed to show the nature of this expense, creates the suspicion that the whole amount might have been saved.

Exhibit "E" -- In order to more clearly show the effect of the policy pursued by the different freight Companies in handling freight traffic, the following statements show the effect, in the immediate cost of train service exclusively, of increasing or diminishing the average load per train upon the several lines. In this connection reference to Exhibit "F", giving the average density of traffic, will show the density of traffic lighter on the Great Northern, making it easier to haul as heavy a train load by the other lines.

Exhibit "F" -- A statement showing the density of traffic and the comparative train movement per mile of road upon the several lines.

Exhibit "G" -- This statement shows the extent to which certain of the branches have been a drain upon the net earnings of the Northern Pacific under the present organization of the properties.

EXHIBIT "C".

	Northern Pacific	Gt. Northern.
Tons of freight-one mile	1,027,149,848	799,306,864
Revenue freight train miles	7,084,925	3,374,367
Tons of freight one mile per mile of road	228,517	212,283
Average number tons of freight per train per mile	144.98	227.04
Average cost per train per mile for all revenue trains	\$1.10	\$1.16

Assuming that for the first year it would not have been practicable to have increased the efficiency of the Northern Pacific freight train service to the present standard of the Great Northern, with the greater density of the traffic it was surely possible to have increased the efficiency to an extent that could have permitted of transporting at least 200 tons per train per mile or 90% of that handled by the Great Northern.

On the basis of 200 tons per train per mile, the freight train miles of the Northern Pacific would have been reduced to 5,135,749 miles, a saving of 1,949,176 train miles.

Granting that this service, although less efficient than the Great Northern, would have increased the average cost per mile of all revenue trains to \$1.16 per train per mile, the same as the Great Northern, this reduction in freight train mileage only would have reduced the operating expenses of the Northern Pacific - - - - - \$1,610,300.93

The total miles run by Northern Pacific trains on account of passenger service was 3,796,051 equal to 1.15 trains per day each way over all lines and branches, carrying an average of 42 passengers per train per mile. The Great Northern passenger train service equaled 8/10 trains per day each way over all lines.

A reduction of 500,000 passenger train miles on the Northern Pacific would still have provided one train per day each way over all lines with an average of only 48 passengers per train per mile.

Assuming that with a saving of 500,000 passenger train miles the cost of the remainder would have increased to an average of \$1.16 per train mile would still have resulted in a further reduction of expense

amounting to - - - - -	\$352,236.94
Reduction of expenses from increased efficiency of freight train service - - - - -	\$1,610,300.93
Reduction of expenses account of passenger train service - - - - -	<u>352,236.94</u>
Increase of net earnings on above basis - - - - -	\$1,962,536.87
Add net earnings from operation as per Northern Pacific report - - - - -	<u>\$4,793,119.63</u>
Net earnings possible to have obtained - - - - -	<u>\$6,755,656.50</u>

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# EXHIBIT "D"

In answer to the question, as to where the reduction as per Exhibit "C" might be looked for, the following is submitted:

## Repairs of Roadway (See Exhibit "A".)

Item 1. That portion of this expense representing the work of removing weeds and brush and repairing damage caused by the action of the elements is not materially effected by the number of trains run. Being in the nature of a fixed expense (so far as traffic is concerned) the fewer trains that are run the greater the average cost per train per mile for this portion of the above expenditure, and vice versa.

Item 2? The fact is clearly established, however, that the amount of expense incurred in the keeping of the track ballasted and in line and surface is effected in direct proportion to the increase or decrease in the number of trains run over the track.

An increased train movement, therefore, will decrease the average cost per train mile for Item 1; and though it may not decrease the average cost per train mile for Item 2, it would result in a decrease in the average aggregate cost per train per mile for all the expenditures included under the heading Repairs of Roadway. This is illustrated by the following:

## Statement of Cost of Repairs of Roadway.

	Per mile of road	Per 1000 train miles (All trains)	Train miles per mile of road.
Northern Pacific - - - - -	\$347.25	\$140.33	2,474
Great Northern - - - - -	255.00	140.66	1,813
Ch.M. & St. P. - - - - -	280.77	65.06	4,315
C. & N.W. - - - - -	424.09	62.96	6,735

It certainly is fair to assume, that had the train mileage of the Northern Pacific been reduced by increased efficiency, as per Exhibit "C", the cost to that Company per 1000 train miles for repairs of roadway should not have been higher than that of the Great Northern. This would have made a reduction of expense amounting to - - - - - \$374,819.09

In addition to the above there would be a saving in the renewals of rails and fastenings.

## Conducting transportation (See Exhibit "A".)

In this account there are some items to a certain degree fixed at least to an extent that is not materially effected by the change in the number of train miles run--for instance: On the Northern Pacific and other Western lines at a majority of the stations only one or two men are employed, and the reduction in trains would not necessarily permit of a reduction in this force at such points; neither would it make a reduction in the cost of station supplies, car mileage balance, loss and damage, injury to persons.

On the other hand, the items--wages of engine men, train-men and switch men, fuel and other supplies for locomotives, and the other items directly incidental to the train movement, increase or decrease with the fluctuations in the number of train miles run.

Statement of Cost of Conducting Transportation per  
1000 Revenue Train Miles.

	Train and other expense. (Fluctuating with train movement)	Station and other Expense. (Fixed)	Total.
N.P. - - - - -	\$427.24	\$101.86	\$529.10
G.N. - - - - -	446.14	104.19	550.33
C.M. & St P. - - - - -	341.00	121.67	462.67
C. & N.W. - - - - -	333.06	121.02	454.08

Had the decrease of 2,449,176 train miles as per statement in Exhibit "C", resulted in the increase of the total average cost to the Northern Pacific per 1000 train miles for Conducting Transportation to a rate as high as that shown above for Great Northern, there would still have been a reduction in the gross expenditure for this item amounting to \$1,116,389.10

However, assuming that there could have been no reduction in the gross expense for the so-called "fixed" items in the above statement and had the saving in train mileage been followed by an increase in the cost of "fluctuating" items to the average as given for the Great Northern, the reduction in train mileage would have caused a reduction in the total expense of conducting transportation amounting to - - - - - \$886,591.75

Renewal of Locomotives (See Exhibit "A".)

The average cost per 1000 train miles for the repairs and renewals of locomotives on the several roads was as follows:

Northern Pacific - - - - -	\$54.06
Great Northern - - - - -	46.45
C.M. & St P. - - - - -	41.06
C. & N.W. - - - - -	34.11

Handling as they did, a smaller average number of cars per train per mile, this expense on the Northern Pacific should naturally have been less than upon the Great Northern, where the heavier work done by the locomotive would be expected to increase the extent of the repairs required. With proper economy there should be no increase above the present average cost to the Northern Pacific, as above, even with the increased efficiency of service as per statement in Exhibit "C".

The saving in revenue train miles, as per Exhibit "C", amounted to 2,449,176 miles. This at \$54.06 per 1000 miles would have made a reduction in Expense of Repairs and Renewals of Locomotives of \$132,402.45.

General Expenses (See Exhibit "A".)

Having more miles of railroad and a greater density of traffic, there should, perhaps, be a greater gross expenditure for general expenses than that shown for the Great Northern R.R. The figures given in red ink on Exhibit "A" indicate the amounts in the items--salaries of officers and clerks, general office expense and agencies, which certainly would be ample for the administration of the present business, and the reduction in the other items leave them still higher in proportion than the same items for the Great Northern. The saving here, it would be observed, amounts to, say, - - - - - \$550,000.

RECAPITULATION OF REDUCTION SHOWN IN THIS  
EXHIBIT.

Repairs of Roadway - - - - -	\$374,819.09
Conducting Transportation (Fluctuating) - - - - -	886,591.75
Repairs and Renewals of Locomotives - - - - -	132,402.45
General Expenses - - - - -	<u>550,000.00</u>
Total reduction accounted for, as above, - - - - -	<u>\$1,943,813.29</u>

This leaves a difference of only \$18,723.58 between the reduction located as above and the estimate contained in Exhibit "C". It will be readily understood that the effect of the reduced train mileage would extend to many other accounts not mentioned above.

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EXHIBIT "E".

While it must be recognized that the price of fuel, supplies and labor is higher upon the lines West of St Paul than upon the lines West of Chicago, the amount of labor and the quantity of fuel and supplies consumed per train per mile should not differ materially upon the several lines when hauling trains of the same size. Ignoring entirely the effect on other items of cost by an increase or decrease in train miles from an increase or decrease from the number of tons hauled per train per mile, the following statements will illustrate the result of a proper loading of trains in connection with train expenses, including therein only the following items: wages of engine men, train-men and switchmen, fuel and other supplies for locomotive and trains, telegraph service, repairs and renewals of locomotives.

Statement A.

Handling the freight traffic of the Northern Pacific on the basis of an average load per train per mile of the different Companies, at the average cost to those Companies for the above items of train expenses.

	Average No. tons per train.	Total mileage of Revenue Frt. trains required to handle bus- iness.	Cost per 1000 Train Miles for items above named.	Total Cost for items named.
N.P. as per Report	144.98	7,084,425	\$481.30	\$3,409,971.99
G.N.	227.04	4,324,092	492.59	2,228,521.49
C.M. & St P.	161.46	6,861,636	382.06	2,430,526.65
C. & N.W.	122.68	8,372,694	367.17	3,074,132.29
200 ton basis	200	6,135,749	492.59	2,529,818.59

Statement B.

Handling the freight traffic of the Great Northern on the basis of an average load per train per mile of the different Companies at the average cost to those Companies for the above items of train expenses.

Great N.	227.04	3,374,367	492.59	1,662,179.44
N.P.	144.98	5,513,221	481.30	2,653,513.26
C.M. & St P.	161.46	4,950,494	382.06	1,890,585.73
C. & N.W.	122.68	6,515,380	367.17	2,392,352.07

Statement C.

Handling the freight traffic of the C.M. & St Paul on the basis of the average load per train per mile of the different Companies at the cost to those Companies for the above items of train expenses.

C.M. & St P.	161.46	13,610,260	382.06	5,199,935.93
C. & N.W.	122.68	16,937,312	367.17	6,218,872.84
N.P.	144.98	14,332,042	481.30	6,898,011.81
G.N.	227.04	9,151,997	492.59	4,503,182.20

Statement D.

Handling the freight traffic of the C. & N.W. on the basis of the average load per train per mile of the different Companies at the cost to those Companies for the above items of train expenses.

C. & N.W. as reported	122.68	15,992,035	367.17	5,871,795.49
C.M. & St P.	161.46	12,151,340	382.06	4,642,540.96
N.P.	144.98	13,532,593	481.30	6,513,237.01
G.N.	227.04	8,641,454	492.59	4,256,693.82

EXHIBIT "B".

Density of Traffic.

	N.P.	G.N.	C.M. & StP.	C. & N.W.
Passenger 1 mile per mile of road	35,828	20,361	54,822	93,998
Tons of Frt. do.	228,517	212,283	335,900	400,032
Average Revenue Train Mile per mile of Road.				
Passenger,	844	588	1,308	1,980
Freight,	1,576	896	2,200	3,260
Average number of trains per day each way over entire line				
Passenger	1.15	.80	1.79	2.71
Freight	2.15	1.25	3.01	4.46
Average number passengers per train per mile	42	35	42	47
Average number tons freight per train per mile	144.98	227.04	161.46	122.68
Average earnings per train per mile	\$1.54	\$2.03	\$1.45	\$1.23
Average expenses per train per mile	\$1.10	\$1.16	\$ .88	.77