





MICHIGAN

CANADA

TORONTO

BUFFALO

ERIE RR

ERIE

DUNKIRK

CENTRAL R.R.

DETROIT

TOLEDO

SANDUSKY

CLEVELAND

DAYETTE

INDIANA

INDIANAPOLIS

OHIO

COLUMBUS

BEEVER

PITTSBURG

CINCINNATI

WHEELING

BALTIMORE & OHIO RR

DAVENPORT & IOWA CITY RAILROAD

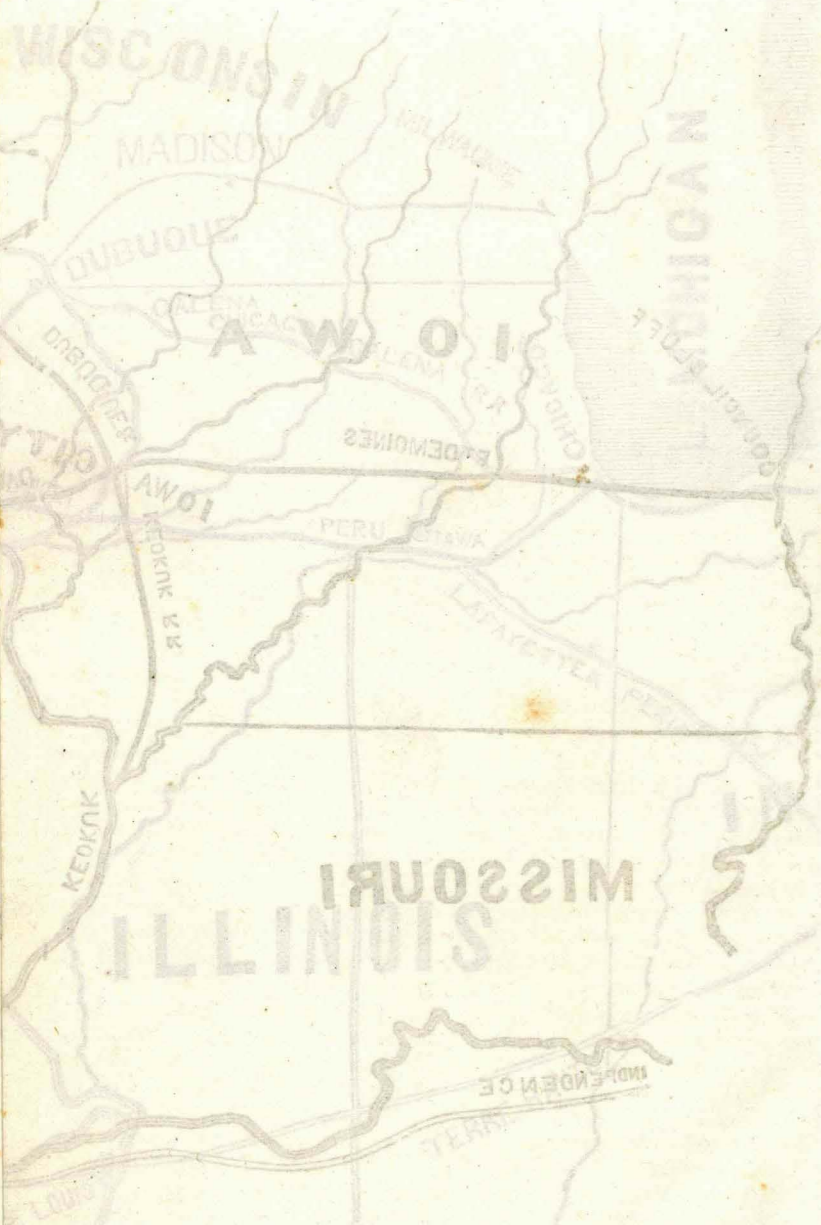
ENGINEER'S REPORT.

To Le Grand Byington and others, Directors of the Davenport and Iowa City Rail Road Company:

GENTLEMEN:—It is a very common and natural impression amongst persons who possess but a superficial knowledge of the subject, that a route for a Rail Road can be established wherever their peculiar interests lead them to desire it. When, however, a great line has to be located, there is but one course for an engineer to pursue. Unless restricted by his employers he must be governed by those mechanical principles upon which the efficiency of a Railroad depends.—What appears to others perfectly feasible, he frequently regards as injurious to the objects of his survey. The Davenport and Iowa City Railroad is one of unbounded importance, and involves in its operation, not merely benefits to the immediate district through which it passes, but the interests of a wide spread country, and the welfare, at no distant day, of an immense population. It seems therefore, perfectly reasonable and necessary, that the route upon which it may be built, should be selected where its grades and direction might be in strict conformity to those fundamental rules which experience has established. It may be considered very fortunate that a line has been found so well adapted to the immediate objects of your enterprise, and so remarkably fitted, in every respect, to the magnificent prospective improvements hereafter to be undertaken. My examinations, corroborated by subsequent measurements, have

enabled me to decide that there is no other route that is in any respect comparable to the one selected. On the north side of the route which is here reported, the approaches to the Cedar river were very objectionable, whilst between that river and Iowa city, the country was too much broken up into ridges and hollows. On the south side of the line, it is wholly impracticable for such a route as I have deemed essential, and the nearer to the Mississippi my examinations extended, the more forbidding was the form of the country.

The surveyed line, after leaving the landing at Davenport, proceeds near and along the bluff in a westerly direction, and passing through a ravine two miles below town, rises to the prairie over ground considerably broken and rolling, and presenting the characteristic features of all the lands in the vicinity of the great river. The grade is here thirty-five feet to the mile for three and a half miles, but does not exceed twenty feet in a mile on any other part of the line. A different location near Davenport is also practicable, and will probably be hereafter deemed expedient, by which the grade from the river will also be reduced to twenty feet per mile. The survey further west, was continued along the valley of Duck Creek, and by a ravine extending from it to the highest ground between the Mississippi and Cedar rivers. From this summit along the depression formed by Mud Creek favorable ground presented itself, and a very light grade was pre-



served. At Moscow, a little above the ferry, a rocky bottom in the stream can be made available for the abutments and piers of a bridge. The measurement for its length is 740 feet between the extreme banks, which are above high water mark. *Stone suitable for masonry, can be procured on the river a little above, and easily floated on scows to the work.*

From Cedar river the route winds around a bluff upon an extensive flat, and following the valley of the Wapsenonoc for many miles, diverges by one of its branches along a beautiful and level valley to section 15 of Township 79 in Range 5. Here the dividing ridge between Cedar and Iowa rivers must be passed, involving the heaviest cutting in the route, whereby an opening is made from the last named valley into a deep hollow on the west. The survey was continued along this hollow until it intersected the South line of section 17; thence it follows the section line for a mile and a half, on ground nearly level, and winding gradually to the northwest, reaches its western terminus at Market Square in Iowa City. The distance is fifty-four miles, over ground generally very favorable for construction. The map and profile which accompany this report, will exhibit in detail the character of the line, which, in its general and essential features preserves admirably that uniformity of light grades and easy curves which will render it superior to a majority of Railroads; and will hereafter, in connection with its course, establish its claims as part of the line of the contemplated National Railroad to the Pacific.

A statement exhibiting in five divisions a summary of the quantity and cost of excavation, embankments, bridges, culverts &c., on different parts of the route, is annexed. By this it will appear that the total cost of grading is estimated at \$215,723, or nearly \$4 000 per mile. The superstructure, with a wide gage and a good T rail of sixty pounds to the yard, will cost \$6,000 per mile. Engines, Cars, Work shops, Engine houses, Water

Stations, and the various apparatus at the Depot, will add two thousand dollars per mile; and therefore to put the road into complete operation will cost \$12,000 per mile. From this data, the probable success and effect of this Railroad, may be calculated. In order however fully to illustrate this subject, and to show why this route which has been surveyed, will have the preference over any other, as forming part of the great line which, within a short time will be extended to the Council Bluffs, at the mouth of the great Platte valley, I will direct your attention to some of the primary principles upon which the efficiency of Railroads depends, and, what is more essential, to the circumstances under which the utmost perfection attainable by their location and structure is secured. The direct benefits of Railroads arise, *first*, from the cheapness with which they transport the products of the farmer, miller and artisan to market, and bring back the goods and merchandise which are required in exchange. And *second* from the great saving of time, and from the ease and comfort they afford to passengers. And collectively, from the influence they exercise by these means, upon the prosperity of the country through which they pass.—The charges for the transportation of freight and passengers on most Railroads are low in comparison with the prices on common roads; but low as they usually are, if the business of a large agricultural district is dependent upon them, a still greater reduction, if attainable, is of vast importance if not indispensable to the prosperity of such districts. Cases sometimes occur in which a whole crop is kept out of the market, because a Railroad upon which it is dependant for transportation, has been located where heavy grades compel the company to keep up their prices to the prohibitory point.—The same effect will occur from unnecessary increase of distance or from imperfect rails or machinery. On a grade of 19 feet in a mile, double the power is re-

quired which is needed on a level; on 38 feet in a mile, three times the power must be used; four times at 57 feet, and five times at 76 feet in a mile. To this must be added the force requisite to overcome a similar increase of resistance occasioned by the augmented weight of the locomotive, and by the extra friction of all the working parts. Circumstances may exist in the practical operation of some particular railroads, which compensate to some extent, for the adoption of heavy grades. Where passengers constitute the principal part of the business the evil is least felt, because a full train does not absorb one fourth of the power which a locomotive can exercise by slackening speed, and the loss of time is partially made up by increasing the velocity of the train upon descending grades. It is by this means that the New York and Erie railroad is operating with so much success. In the transportation of freight, however, that company, with all the aid which their broad gage and powerful engines enables them to command, will forever feel the effects of their sixty feet grades. Where the traffic of a road demands a maximum load to reduce the charges on produce to the lowest rate, every grade becomes a serious obstacle, and the extra expense in consequence of bad location becomes an unnecessary tax upon the prosperity of the community.

It is for these, among other reasons, gentlemen, that I congratulate you upon the ascertained existence of a route where a Railroad can be cheaply constructed, adapted to the wants of this community, and upon which, in connection with the Rock Island and Chicago road, the agricultural products of Iowa, will find their way to the best market, at the least cost—where high speed may be adopted with more safety and economy than on most railroads—and on a line susceptible of receiving every advantage from mechanical improvements which can never be applied to railroads with high grades.

There is another reason which militates

greatly in favor of this route. It is exactly adapted for the extension westward of the Rock Island and Chicago railroad, to be connected at first by a ferry, but within a few years, by a high bridge across the Mississippi, opening an uninterrupted communication at all seasons of the year, with the great system of railroads in Illinois and the other states, and in consequence, *establishing the Davenport and Iowa City railroad as part of the great National trunk railroad from the Atlantic by way of Council Bluffs, the Platte valley and the South Pass to the Pacific.*

Without occupying too much of your time with these promises of the future, however, it may be well to inquire into the immediate resources of the country, and the present inducement for the construction of your railroad. I have endeavored in reference to this subject, to collect statistical information in relation to the traffic which might be assumed as seeking the Davenport and Iowa city railroad. It is very well understood that the amount of produce accumulated annually at Iowa city, offers no approximate basis upon which the business might be estimated that would collect at the railroad terminus as soon as it should be put in operation. Nine tenths of the products of the country which would be attracted to this road, the moment it commenced operating, now passes off in as many different channels and directions. The most obvious way of computing, with reasonable certainty, the amount of business to be done on it, is by comparison with other roads under similar circumstances, and from which, by careful investigation, positive facts may be drawn. The general effects of railroads have gone far beyond any thing that was anticipated. In Europe and the eastern states, it has been universally found that where the cost of transportation has been diminished one half, the amount of business has increased four times, and frequently ten fold. But if the results abroad are astounding, a still mightier revolution will be brought

about in this western world. Here the economy of labor is rendered doubly effective from the general fertility of the soil, and from the facility with which it is brought into a state of cultivation. It is no extravagance to assert that the problem has already been solved which proves that there is hardly a district of country so new in these prairie states—at least where the principal market is fifty miles distant—that does not present sufficient inducements for the construction of a railroad. The length of a railroad is always a consideration—the area of country from its terminus within which a farmer can go to market and return the same day, affords it but little business—beyond this distance a rapid increase takes place—and at fifty miles it will command all the traffic from the country beyond it, as well as that immediately about it. Such a railroad is capable of extending its influence over an area of country of 3000 square miles, and of saving on an average to each farmer within this space, at least seven cents on each bushel of wheat or its equivalent he sends to market. Allowing that one third of this land was under cultivation, there would be 4000 farms of one hundred and sixty acres, of which, taking the present state of agriculture as a guide, at least fifty acres on each farm would be cultivated in wheat, oats, corn and other products, a large portion of which would become marketable. This land, suppose it produced an average crop of fifteen bushels per acre, would supply the market with 3,000,000 bushels, or 88,235 tons, and whilst it would bring in an income of \$88,235 for the railroad, the farming community would gain \$2,117,54 or an extra profit to each farmer of \$51.50 on his wheat crop alone. In addition to this, the market would always be a certain one, and the whole produce of his crop would be realized in cash, which is far from being the case in Iowa at present. There is a similar district of country which would be accommodated by the Davenport and Iowa city railroad,

containing however double the number of square miles above stated. Its population is at present much scattered, and numbers about 60,000. If however the means were in hand, and the contemplated railroad should be commenced immediately, by the time it could be put in operation, the number of inhabitants in this district would considerably exceed 100,000. It is well known that the annual influx of emigrants into Iowa is very great—the location of a railroad would not only increase this number, but would give a new direction and great impetus to improvement. The wants of this population, locating in a country of great fertility, well provided with fine water power, and under the stimulus of a railroad, would soon attract the presence of men of enterprise and capital.

A practical example, however, can be cited, to corroborate these conclusions. I refer to the Chicago and Galena railroad, which is similar in the circumstances affecting its business. It has been in operation to Elgin, 42 miles for one year. It is supported by nine counties, containing a population of 90,000, two of which lie contiguous to the Mississippi river, and do not furnish much business for the railroad. The number of passengers during the past season has been 200 daily—before the railroad was constructed two stages afforded sufficient accommodation to the public, and similar increase of travel has been invariably experienced over every great line of railroad that has been even in part constructed. The fare of the whole has averaged one dollar each, and the receipts of the company have amounted from this source, to \$62,200 per annum, one half of which has been clear profit to the company. They have had five Locomotives constantly at work during the summer, and yet there is, at the present time, an accumulation of freight at the depot in Chicago, which will require several weeks to transport to its place of destination. The freight traffic will yield at least an equal amount

with that derived from passengers; and hence a practical example is presented, of the operation of the first railroad constructed in Northern Illinois, which yields an annual profit of \$62,100, and which has already made to its stockholders a dividend of 16 per cent per annum upon the cost of constructing and using it. It may be objected that Chicago being one of the termini, this does not apply to the Davenport and Iowa city railroad; but it should be remembered that by the time it could be constructed, if the means were in hand, there will be a railroad communication, not only to Chicago, where a connection will take place with a continuous line from the great eastern cities, but by the Illinois central road, to St. Louis, and by the Peru and Lafayette railroad, through the interior of Indiana and Ohio to Cincinnati. The success of the Chicago and Galena railroad, and the facts recently developed in relation to the Rock Island and LaSalle road have attracted the attention of eastern capitalists. Money is abundant in the Atlantic cities, and an envying field is opening for investments in the west.—The offers made at Rock Island by two gentlemen of unquestionable responsibility from the east, prove most decisively this tendency. These gentlemen, who are perfectly able to command the capital, offer to build the railroad from Rock Island to Chicago within the term of two years!—They agree to take, in stock, half the amount requisite to grade the road, and to procure for the bonds of the company and upon their own responsibility, the iron and equipments necessary to put the road into complete operation. The numerous propositions, also, which are about to be made to the Legislature of Illinois in reference to her great central railroad, show conclusively that eastern capital is seeking this kind of investment. One company it is understood, will agree to give the state ten per cent of the gross earnings of the road forever, if they can have the lands and a fair charter to build it.

Were it practicable to put the Daven-

port and Iowa city railroad into operation simultaneously with the railroad from Rock Island to Chicago, it would not by any means, be a premature measure. The supplies of merchandise, salt, coal, iron, lumber, fish &c., for the whole interior of Iowa, would instantly pass over the road, and thus the basis of an immense increase of traffic would be so effectually established, that the trains bringing in this merchandise and these staples from abroad, would be constantly loaded with agricultural productions on their return.

The number of passengers who passed over the Chicago and Galena railroad during the past year, was more than equal to two thirds of the whole population who inhabit the counties within its influence. That the Davenport and Iowa city railroad would be able to command an equal ratio of traffic, after two years, there cannot be a shadow of a doubt.

If this railroad is considered simply as a medium to hasten the settlement of the country, it is quite plain that it will exercise an immense influence, but it will also contribute to the wealth and progress of the State, with still more particular effect, by forming the first division west of the Mississippi, of the great National Avenue, which is, eventually, to stretch across this immense continent. This first effectual impulse which is given to the rapid development of the resources of Iowa, will soon be followed by a second which will not stop short of the Missouri.—These results can now be predicted with absolute certainty, for they have, in fact, become a necessary consequence, and should Congress even delay the expected donation of public lands, which is scarcely to be apprehended, private enterprise will, ere long, carry through this important undertaking.

It has been asserted that without a charter, created by special legislative enactment, capitalists would not engage in it. Experience, however, coming to the aid of reason, has shown that this opinion is not well founded. The objection

might possibly be raised by factious persons, but the men who are likely to build this road, investigate very closely, and base their determinations more upon the capacity of the work to make returns than upon the mere parchment by which the common enterprise is designated.— This is proven by the fact that railroads are being built under the operation of general laws, in many of the States of the Union. The law of Iowa, to promote public improvements, amply provides all the essential powers and privileges, usually contained in charters, and the good faith of the State, under the mandatory requirement of her constitution, is as effectually pledged in the first instance as it possibly could be in the last.

The Davenport and Iowa City railroad is, without doubt, the first work of the character, that is likely to be undertaken in Iowa. I am aware that other railroads are in contemplation, in which some particular sections of the State take a more immediate interest. It is very evident, however, that it is their true interest first to support your efforts. *Public attention East is directed to a great western railroad*, and the whole line from Buffalo and Dunkirk, along the southern shore of Lake Erie, through Ohio, Michigan and Indiana to Chicago, is in a state of rapid progress towards completion. Another rail road through Canada West, to connect Toronto and Niagara falls with Detroit, there to unite with the Michigan central rail road, which is in profitable operation, is being pushed forward with much spirit.

From the south-east the same spirit is manifest. Philadelphia is extending the Pennsylvania central rail road from Pittsburgh to Cleveland, and the various companies in Ohio and Indiana are extending their works to the west. Two great points on the Mississippi are already fixed upon, at St. Louis and Rock Island, and this vast interest will concentrate its influence for the purpose of further extension. The natural advantages of Rock

Island, of the line which you have had surveyed, and of the extensive country west of Iowa City: will create more and more interest as they become more thoroughly known. Lying directly west of Chicago, being on the nearest and best route, possessing facilities for bridging the Mississippi, no where else to be found in the whole course of that mighty river, and in connection with the suspension of navigation in the winter, the Rock Island road is now commanding in the great eastern cities the attention and decided preference to which its multitudinous advantages entitle it. It is not, however, the Mississippi alone which is the source of interest. The "far west" is also sought for. Soon Council Bluffs will be the point, and still the march of improvement will be onward, up the great valley of the Platte. It is time for the State of Iowa to be alive to her interests, and to appreciate the great movement which is now agitating the eastern world. If a railroad is once in progress to the westward, other lines will sooner be constructed.— The Dubuque and Keokuk road is probably the next in importance. It is quite apparent that those places, by sustaining your enterprise, can promote the interests of their own road most effectually, for besides the advantage they derive from the general prosperity of the State, they will, at the same time, hasten the period when they may partake in immediate benefits. These results have been generally viewed, prospectively, as remote objects, but they are approaching so rapidly and with such unerring certainty, that you have the strongest inducements, as a company, not to relax your efforts. *Your railroad route is not only exceedingly favorable in itself, but is in the direct line of the great national thoroughfare*—and there is no instance upon record, of a rail road upon a great public line, however, expensive, which has not, when properly managed, paid enormous dividends, and promoted to a wonderful degree, the prosperity of the country through which it

passed. Your undertaking can be accomplished for a sum comparatively small, and every circumstance connected with its operation will contribute to render it profitable.

I trust, gentlemen, that your efforts for the construction of the first rail road in Iowa will be properly appreciated. It is an undertaking in which all the people of the State are, directly or by indirection; deeply interested for the whole population must collectively, if in different degrees, feel its benefits. I consider it, therefore, my duty to repeat in conclusion, the convictions heretofore expressed, that the surveyed route of your road, as a section of the great central road through Iowa, is far superior to all others, because it is so strongly marked by the hand of nature, that there could be no hesitation in the selection—and that in addition to its physical superiority, the same circumstances which are establishing the Rock Island and Lasalle railroad high in the estimation of all the world, must inevitably fix the Davenport and Iowa City road as a continuation of that great line. The inference, therefore, is in accordance with the dictates of common sense—that if the interests of the whole State of Iowa demand the adoption of the best possible route, whilst the united claims of the immense population eventually destined to pass over it are taken into consideration—the idea that sectional interests are to turn it aside, becomes preposterous. I have only to add, gentlemen, that having entertained these views in reference to the general interests to be promoted by your railroad, the survey, so far as my experience and ability extend, has been made agreeably to them.

Very respectfully, your ob't Servant,
RICHARD P. MORGAN.

ESTIMATES OF THE COST OF GRADUATION AND BRIDGES—FIRST DIVISION.
From station 0 to station 490, 9 miles,
Excavation and embankments 600,131 yds.
at an average of 14 cts
per yd. - - - - - \$84,018 00
15 culverts one bridge over

Duck Creek. - - - - - 2,400 00
\$86,418 00

SECOND DIVISION.

From station 490 to station
1500 19 miles.
Excavation and embankments
292,000 yds at an average of
12 cts - - - - - \$36,500 00
14 culverts and 5 small bridges 3,200 00
\$39,700 00

THIRD DIVISION.

From station 1500 to station
2416 17 miles.
Excavation and embankments
258,932 yds. at an average
of 8 cts. - - - - - \$20,714 56
Bridge across Cedar River, - 17,000 00
16 culverts 8 small bridges, - 3,200 00
\$40,714 56

FOURTH DIVISION.

From station 2416 to station
2600 3 miles.
Excavation 210,000 yds at 12 cts \$25,200 00
3 culverts, - - - - - 150 00
\$25,350 00

FIFTH DIVISION.

From station 2600 to station
2872 5 miles.
Excavation and embankments
159932 yds. at 14 cts. - - \$22,390 48
8 large culverts, - - - - - 1,150 00
\$23,540 48
\$215,723 04

COST OF SUPERSTRUCTURE PER MILE.

2112 ties 9 feet long equal in
measurement to 33 feet,
board measure 33 cts each - \$696 96
94 tons of T rail 60 lbs to the
yard at \$45 per ton deliver.
ed at Davenport, - - - - - 4,230 00
1400 lb of spikes at 7 cts. - - 98 00
754 joint plates of wrought
iron at 25 cents, - - - - - 188 50
Laying track, - - - - - 320 00
Transportation of material
partly by the company cars, - 466 54
\$6,000 00

ROLLING STOCK—DEPOT BUILDINGS AND EXTRA TRACK.

5 Locomotives at 7,000, - - \$35,000 00
4 first class passenger cars,
at \$1200 each, - - - - - 4,800 00
4 second class at \$800 each, - 3,200 00
2 baggage cars \$800 each, - - 1,600 00
50 freight cars at \$800 each, - 40,000 00
\$84,600 00
2 Depot buildings, - - - - - \$6,000 00
Work shops, - - - - - 3,000 00
Engine houses, - - - - - 2,000 00
2 turning platforms, - - - - - 1,000 00
4 water stations, - - - - - 2,000 00
4 wood sheds, - - - - - 500 00
\$14,500 00
Contingent expenses, - - - - - 8,900 00
54 miles at \$2,000 per mile, - - - - - \$108,000 00