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SENATE.....

.....No. 59.

R E P O R T

ON THE

HOOSAC TUNNEL AND TROY AND
GREENFIELD RAILROAD,

BY THE

JOINT STANDING COMMITTEE

OF

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BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
No. 4 SPRING LANE.
1867.

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REPORT

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1866.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
No. 4 SPRING LANE.
1867.
Commonwealth of Massachusetts.

Hon. JOSEPH A. POND, *President of the Senate.*

SIR:—I herewith transmit to the legislature the Report of the
Joint Standing Committee of 1866 on the Hoosac Tunnel and
Troy and Greenfield Railroad.

I am very respectfully
Your obedient servant,

TAPPAN WENTWORTH, *Chairman.*

REPORT.

The Joint Standing Committee of 1866 on the Hoosac Tunnel and the Troy and Greenfield Railroad, authorized to visit the tunnel and railroad, examine into the condition and progress of the work, and to report fully the result of such examination respectfully

REPORT:

That since the adjournment of the legislature the Committee in a body visited the tunnel and railroad in June, and again in October, and they continued their examination of the condition and progress of the work by sub-committees in the months of July, August, September, November and December; (one of the examinations being exclusively devoted to the operations on the railroad which were commenced late in October;) the others to the tunnel and the various structures and mechanical operations connected therewith, including an examination of the existing contracts, and an inquiry into the general organization adopted to carry out the laws and purposes of the State in regard to the enterprise.

The Committee have also examined the records and the doings of the directors of the Troy and Greenfield Railroad from the organization of the corporation until the surrender of the railroad to the State, and have made extracts from the records to show the financial condition of the corporation, its dealings with the contractors for constructing the road and tunnel, and also the embarrassed condition of the contractors and corporation from 1855 to 1861, which finally led to the practical abandonment of the contract on the part of Messrs. H. Haupt & Company, and the surrender of the road to the State under the mortgages which had been given to secure the loan advanced by the Commonwealth in aid of the road and tunnel. These extracts from the records, with extracts from some of the laws passed upon the subject of the railroad and tunnel, together with remarks of the Committee upon the legislation of the State, the doings of the directors, and their efforts and those of the contractors to prosecute the enterprise being too long for the body of this Report, will be found in the Appendix at A. And a synopsis of the action and condition of the corporation at the time of, and previous to the surrender of the road, and the relation of the contractors to the corporation and to the State, will be stated before entering upon the particular description of the condition and progress of the work the present year, as observed by the Committee.

The charter of the Troy and Greenfield Railroad was granted in 1848, authorizing the construction of a railroad from a "point on the Vermont and Massachusetts Railroad, at or near Greenfield," to the line of the States of New York or Vermont, to connect with any railroad that might be constructed from or near the city of Troy in New York. Its capital stock was limited to \$3,500,000. Authority was given in the charter to contract with any contiguous railroad leading from either of the above-named States, for the use of the same or any part thereof, or for operating the two roads conjointly, or for hiring such other railroad, or for letting their own railroad to the owners of any other road which should compose a part of the railroad line between Troy and Boston, of which the Troy and Greenfield Railroad should be a part.

The corporation was organized June 1, 1848. April 11, 1849, the directors voted an assessment of three per cent. upon its capital stock, and this assessment was the only one that was substantially collected, and on the first day of October, in the same year, they voted to put the construction of the road under contract as soon as sufficient subscription should be obtained therefore, commencing at Pownal, Vermont, and Greenfield. In January, 1850, \$2,203.94 had been received into the treasury, and \$2,203.57 had been expended with the approbation of the president of the corporation, leaving in the treasurer's hand \$0.37.

Sundry assessments was voted from time to time, the last vote being in May, 1852, amounting in all to 75 per cent. upon the subscriptions, but they were rescinded in July, 1858, and a new series of assessments were afterwards made which the Committee understand were as unproductive of beneficial results as were the former, upon which only partial payments had been made by a portion of the subscribers.

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A contract for constructing the road was made with Messrs. Gilman and Carpenter in October, 1850. At the close of the year 1850, stock to the amount of \$250,800 had been subscribed, of which \$72,000 was payable in land damages, and \$50,000 was taken by the contractors.

At this period in the history of the corporation, with \$138,800 of available cash subscription, of which three per cent. had been paid, the corporation applied to the State for aid by a loan to enable it to prosecute the enterprise it had assumed, and this application was continued without success until 1854, when the legislature passed the Act authorizing a loan of \$2,000,000, upon conditions which are particularly set forth in the Loan Act, (see Appendix A and B,) which, modified by subsequent legislation, discloses the policy of the State in granting its assistance to the undertaking.

It is proper to state, that at the time this loan was granted, there was no prospect of opening this line of travel by individual efforts, and the amount of the loan, taking into consideration the then assumed estimates of its probable cost, shows that the State assumed to defray the cost of an enterprise to the completion of which available individual means had proved inadequate.

In 1855, a contract for the construction of the road and tunnel was made with E. W. Serrell. The capital stock of the corporation was fixed at \$1,500,000. This contract was changed two or three times, and finally ended in one executed by H. Haupt and Henry Cartwright. For an account of these changes, and of the votes and transactions of the directors and the contractors, reference is made to Appendix A, where the same will be found in detail.

Upon a careful examination of these votes and transactions, the Committee come to the conclusion that the financial embarrassments of the corporation from the year 1855, when the first contract with E. W. Serrell was made to the time of the suspension of the works under the last contract with H. Haupt & Co., are apparent. And it is also apparent that during the same time, the contractors assumed, to a very great extent, the control and responsibility of the enterprise.

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Under the first contract, and on the day of its acceptance, the direction of the engineering operations within the tunnel was left with the contractor; excepting measuring for estimates and the final acceptance of the work; and on his subscribing \$600,000 to the capital stock, \$800,000 (less the new subscriptions,) was added to the contract prices for the work.

Under the second contract with Serrell, Haupt & Co., the directors voted to substitute bonds for stock in payment of the work until 2,000 feet of the tunnel was completed, and to pay the discounts and losses to which the contractors might be required to submit, not exceeding fifteen per cent. per annum; and also, to issue to the contractors bonds to the amount of \$100,000 in addition to payments. Said bonds were to be sold or pledged by Haupt & Co., to enable them to raise means to carry on their operations under the contract.

On the dissolution of the firm of Serrell, Haupt & Co., in July 1856, Serrell resigned his office as director and was chosen consulting engineer. At the same time, W. A. Galbraith, one of the contractors in the following contract, was chosen a director. Thereupon a new contract was made with H. Haupt, W. A. Galbraith, C. B. Duncan and Henry Cartwright. Under this contract the estimates were to be made by the company's engineer. In July, 1857, the records show that no payments had been made the contractors for more than a year, and that the work could be carried on only by the continued efforts and personal credit of the contractors.

In February, 1858, the contract was again changed, and Messrs. Haupt and Cartwright engaged with the corporation to complete the road and tunnel. At this time, the records show that no payments had been made under the previous contracts "for more than two years; that the work could only be carried on by the continued efforts, increased expenditures, and personal credit of the contractors."

By a provision of this contract, any revenue arising from the use of the road, or any portion of it, was assigned to the contractors until their claims upon the company were adjusted; and the payment of all the company's debts was to be deferred until that of the contractors was satisfied; and Haupt & Co. agreed to maintain the organization of the corporation, pay its bills for printing, and advance therefore a sum not less than \$500,000.

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The same year the Rensselaer Iron Company was allowed a lien on the iron delivered to the contractors until the same was paid for. In 1859, H. Haupt relinquished his pecuniary interest in the contract, and was appointed chief engineer of the corporation. (See Appendix A, page 62.) These transactions in which the contractors participated, (one of whom was on the board of directors,) show conclusively that they were fully apprized of the condition of the corporation, from the date of their first connection with the work to the time of its "suspension," no claim during the whole period having been made by them against the Commonwealth for any work done for the corporation.

The existence of the mortgages to the State were of course well known to the contractors. They were given in pursuance of laws passed by the legislature, and for security of the payments received by the contractors for their services. The right of the Commonwealth to take possession of the railroad under the mortgages, must have been well understood. Further, the corporation, in surrendering the road to the State, did no injury to the contractors, for the act of surrender did not take place until after the contractors had suspended work upon both road and tunnel, and practically abandoned the enterprise; thus leaving to the State the alternative, either to take possession of the work and complete the road and tunnel, or to abandon it; and, in addition to the loss of the advances already made, forego the anticipated benefits of an additional avenue for Western traffic.

The treasurer's books do not show any settlement between Haupt and Company and the corporation. The account standing upon the ledger shows a large balance against the contractors; but the Committee are informed that subsequent to May 30, 1863, a settlement was made upon the basis of Mr. Stevenson's report (see Appendix A,) and that Mr. Haupt received, in conformity with the contract of H. Haupt & Co. with the Troy and Greenfield corporation, payment for all labor done and material furnished by said H. Haupt & Co., for the corporation, and that all matters between the parties have been adjusted.

Although the accounts between the contractors and the corporation are understood to be settled, it may be interesting to examine the account of the Commonwealth with the enterprise and compare the value of the work done by the contractors at the time of its abandonment by them, with the payments made to them therefore, from the treasury of the State.

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The amount paid from the State treasury for work and materials upon the tunnel,	\$170,131 95
Amount paid upon the road west of the tunnel,	50,000 00
Amount paid upon the road east of the tunnel,	505,256 92
	<u>725,388 87</u>
Amount earned by contractors under the contract upon the tunnel,	\$129,475 00
Amount earned by contractors under the contract, upon the road west of tunnel,	50,000 00
Amount earned by contractors under the contract, upon the road east of tunnel, including temporary work,	410,204 00
	<u>589,679 00</u>
	<u>\$135,709 87</u>
Overpayment in reckoning sterling exchange, say,	44,000 00
Overpayment when the work stopped in July, 1861,	<u>\$179,709 87</u>

Further payments made upon the work by the State from July 1861 to January 1867,

140,226 95

Total amount paid more than earned,

\$319,936 82

From the foregoing statement it appears that the contractors with the Troy and Greenfield Railroad corporation, have received from the State, three hundred and nineteen thousand nine hundred and thirty-six dollars and eighty-two cents more than the value of the work which the corporation surrendered under the mortgage, and that the State has lost that amount of money in its efforts to assist in the construction of the work. It is proper to add as the judgment of the very intelligent chairman of the commissioners (Mr. J. W. Brooks,) from whose statement to the Committee the foregoing figures are taken, that the loss to the State in the transaction by the failure of Messrs. B. Haupt & Co., to perform their contract in a proper manner, will reach the sum of three hundred and fifty thousand dollars. (See statement, Appendix C.)

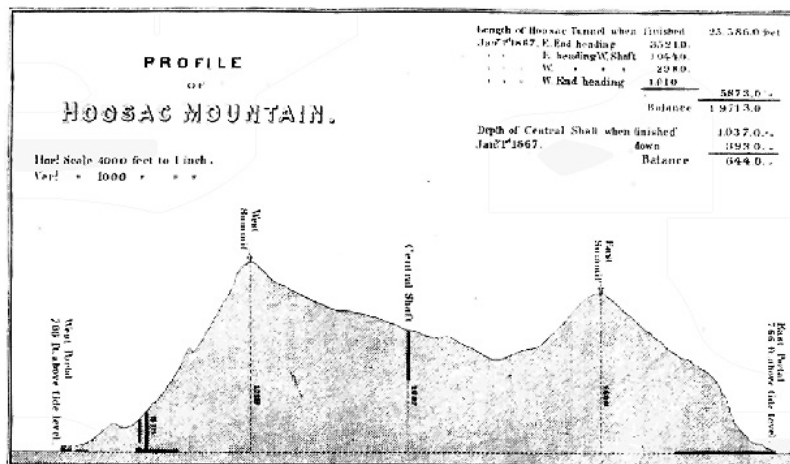
[10]

The Commonwealth having taken possession of the road and tunnel, and by the legislation of 1862 and 1863 undertaken their construction with the free consent of the corporation, the directors by an appropriate vote, expressed their concurrence with the proceeding, and their reliance upon the "good faith of the legislature" to complete the enterprise which had exhausted the resources of its immediate projectors. The last act of the corporation, as appears by the records, was the choice of officers in August, 1865, when Alvah Crocker was chosen president and Wendell T. Davis, clerk and treasurer.

DESCRIPTION OF THE TUNNEL.

The tunnel enters the eastern side of the Hoosac Mountain, in the town of Florida, a few rods from the right bank of the Deerfield River. The eastern summit of the mountain is 2,210 feet above tide-water, 1,499 feet above the Deerfield River, 1,429 feet above the grade of the railroad, and is distant from the East Portal of the tunnel 6,100 feet. The western summit is 2,510 feet above tide-water 1,788 feet above the Hoosac River, 1,718 feet above the grade of the railroad, and 6,700 feet distant from the West Portal. Each portal of the tunnel is 766 feet above tide-water. The summits are 2 4/100 miles distant from each other, and the valley between them at its lowest depression is 801 feet above the grade of the railroad.

The length of the tunnel, from the East End to the West End, as commenced by Mr. Haupt, is 4 84/100 miles. Its base is, at the East End, 70 feet above the Deerfield River, and at the West End, 70 feet above the Hoosac River. Its grade, from the East End to the Central Shaft, is 18 feet per mile; from the West End to West Shaft, 26 4/10 feet per mile; and from the West Shaft towards the Central Shaft, 21 12/100 feet per mile. These grades are calculated to allow the free passage of water from the centre. Should the quantity of water found in the tunnel render feasible a reduction of this grade, a change is contemplated.



Click on image to view larger sized. [Click here](#) for transcription of table's data.

The dimensions of the tunnel areas follows: The rock cutting is 24 feet high and 24 feet wide. The brick-work is 26 feet high and 26 feet wide. The bottom of the tunnel will contain a culvert three feet deep at the centre. Through this culvert the water from the tunnel is to be discharged. It now receives, in addition to the water accumulating in the tunnel, a 12-inch pipe, to carry air at a low pressure for ventilation; an 8-inch pipe to carry air for driving the drilling machines; and a 3-inch pipe for carrying water for use in the holes which are being drilled. Should it be found advisable to use gas in carrying on the work, provision is made for a 4-inch pipe to carry the gas from the place of manufacture. The track is to be placed 3 1/2 feet above the bottom of the rock tunnel, and 4 1/2 feet above the bottom, where lined with brick.

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The distance by the highway, from the town of North Adams, or from the West End to the East End of the tunnel, is about nine miles. From the first named points to the Central Shaft is about five miles, and from the Central Shaft to the East End the distance is six miles.

The time necessary to travel from the West End to the East End, is two hours. Loaded teams from either end to the other perform the distance and return in a day.

Organization of the forces employed in the construction of the Hoosac Tunnel, June, 1866.

Chief engineer Thomas Doane, salary,	\$4,000 00
Two assistant engineers, salary each,	1,350 00
One " " "	1,017 25
One " " "	900 00
[The assistants were assigned to different points upon the work.]	
One messenger,	469 50
One man in the stable,	626 00
Paul Hill, superintendent, salary,	2,400 00
One clerk,	1,200 00
One master mechanic,	1,800 00
One mechanical draftsman,	1,350 00
One pattern maker,	939 00
<i>For Materials and Supplies:</i>	
One cashier and paymaster,	\$1,200 00
One purchasing agent,	1,200 00
One freight clerk and assistant paymaster,	1,000 00

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One store-keeper at East End,	1,200 00
One assistant store-keeper at East End,	780 00
One store-keeper at West End,	1,000 00
One assistant store-keeper at West End,	900 00
One helper for do. at West End,	469 50
One store-keeper at Central Shaft,	720 00

The above were contained on the engineer's pay-roll.

Since the first visit of the Committee to the tunnel, many important changes have been made in the force above mentioned, to wit: The salary of the chief engineer was reduced to \$3,600, he to provide his transportation to various points upon the work. One of the assistant engineers resigned and retired, and the office of two of them has been abolished. The salary of the superintendent has been increased to \$3,000. The office of freight clerk has been abolished, and its duties transferred to that of paymaster and cashier. The salaries of store-keepers and their assistants were not a charge to the State, but were paid from the profit of their respective stores.

At the commencement of the work, it was deemed necessary to provide stores at the three points where the operations were carried on, to supply the workmen readily with necessaries, so that no time might be lost by them in the important duty of making provision for their families. But in the present state of the enterprise, it is probable that private individuals would readily establish such stores, and relieve the State from a duty which, although it involved no pecuniary charge, diverted to some extent the attention of officers from their more legitimate avocations.

FOREMEN AND OTHERS UNDER THE SUPERINTENDENT.

At West End.

One foreman of labor,	\$3.00 per day.
" of brickyard,	5.82 " "
" of carpenters,	3.00 " "
One time-keeper,	2.50 " "

West Shaft.

One captain,	\$3.50 per day.
Two statisticians, who keep an account of articles delivered to the workmen, and also perform the electrical firing,	2.50 " "

Central Shaft.

One captain,	\$5.00 per day.
One time-keeper—acting statistician,	2.25 " "

East End.

One time-keeper,	\$3.00 per day.
One statistician,	2.50 " "
One "	8.00 " "
One foreman of masons at the East End, and inspector of do. at West End,	5.00 " "
One foreman of carpenters,	3.00 " "

[13]

Of this list the foreman of the brickyard is a temporary appointment. The foreman of carpenters at the West End has finished his work and retired. The foreman of masons was discharged by the commissioners, and has entered into the employ of Mr. Farren at the West End.

There are nine foremen of the heading gangs, two of whom have \$100 per month, and the remainder \$3.00 per day.

The heading gangs consist of eleven drillers each, including the foreman, and from three to five rockmen for removing stone. They work by shifts of eight hours, relieving each other at 8 A. M., 4 P. M., and 12, midnight. The blasts are made about the time of relief. The men working on the enlargement under private contractors make two shifts a day, each shift working ten hours. The Committee made a special examination of the number of men employed under the engineer and superintendent, with a view of considering whether the force actually engaged was necessary to an economical prosecution of the enterprise, intending to suggest any reform that might occur to them as essential; but learning that the engineer would in the course of the year make some reduction in the number of the men as well as of the teams employed upon the work, the Committee deferred taking up the subject until the anticipated reductions should have been made. And now understanding that the commissioners have the whole matter under consideration, and that they have already to some extent, acted thereon, the Committee for reasons that would be obvious, withhold any recommendations or remarks upon this point.

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SYSTEM OF OPERATIONS.

The general superintendence of the labor on the work is vested in Mr. Hill. The reports are made to the engineer. The captains in the tunnel report weekly the proceedings of each day under the following heads, as follows:—

- Number of days' work.
- of holes drilled.
- of inches of holes drilled.
- of drills dulled.
- of pounds of powder used.
- of feet of fuse used.
- of sheets of paper used.
- of pounds of soap used.
- of pounds of candles used.
- of quarts of oil used.
- of lamps used.
- of pounds of wicking used.

The captain at the shafts four times a month reports,—

- The days' work of the engine-men.
- The revolutions of the engine.
- Number of pounds of coal used.

of feet of wood used.
 of gallons of sperm oil used.
 of gallons of kerosene oil used.
 of pounds of tallow used.
 of pounds of waste used.
 of pounds of tar used.
 of cages raised.
 of cars of stone raised.
 Size of pump-plunger used.
 Length of stroke.
 Number of strokes.
 of gallons of water raised.
 of boilers in use.

[15]

The materials furnished for the construction of the work are charged in their distribution to twenty-three accounts, as will be seen by the tabular statement of its cost. Requisitions for materials are signed by the immediate overseer, captain or foreman; they are handed to the superintendent for approval, and by him forwarded to the engineer. If the requisition is approved by both, the materials are ordered, and when furnished the applicant signs upon a duplicate his receipt for the same. This course is pursued as well for materials taken from the State lands as for those purchased. Suitable blanks for returns, requisitions, &c., are furnished to the several points, and the evidence of all the transactions is preserved in the office of the engineer. In addition to the above, a return of all material broken, or laid aside, is made to the engineer, at whose office a substantial account of all materials on hand, either in use, or out of use, may be found.

The organization of the working force, and the mode adopted for supplies and expenditures at the various points, appear well adapted to an efficient and economical prosecution of the enterprise.

DIVISIONS OF THE WORK.

EAST END.

Deerfield Dam.—This structure is completed. Flashboards to be used in low stages of water may have to be occasionally renewed.

The canal is finished as far as wheelpit No. 3. The machine-shop is about 72 feet long, and 36 feet wide. It has three turbine wheels. A fourth wheel is designed, but is not required at the present time, and the pit to receive it is not completed.

In the basement of the machine-shop are two compressors. The first was put in January, 1866. It has four cylinders 13 inches in diameter, and 20 inches stroke. This compressor is used to drive the drills, and furnish air for the blacksmith shop. The second compressor was put in some time in October. It has four cylinders 25 inches in diameter, and 24 inches stroke, and is used for ventilation one-fourth of the time, two hours after each blast, viz., from 8 to 10, A. M., from 4 to 6, P. M., and from 12 to 2, A. M. The compressors work satisfactorily. The loss of power in the transmission of air from the machine-shop to the drills, a distance of 4,500 feet, being hardly perceptible.

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In addition to the compressors, there is in the machine-shop the following machinery, viz.: three lathes, one of them worked by hand; a drilling machine; a planer; a bolt-cutting machine and a saw-table. Sixty horse-power is required to carry the machine-drills, the machines in the shop, and to furnish air for the blacksmith shop. When the large compressor is used, 75 additional horse-power is required. A circular saw at the east end of the machine shop, is occasionally used, driven by power derived from the turbine wheels.

The blacksmith shop, near the entrance of the tunnel, contains three forges. The hand-drills are made, and, together with the machine drills, sharpened at this shop. The ordinary repairs of the drilling machines are done in the machine shop. New parts of the same are furnished from Fitchburg.

The heading in the tunnel at this end when driven by hand was about 15 feet wide by 6 feet high. When driven by the machines it is 16 feet wide and 8 feet high. Its location is in the centre of the tunnel, 4½ feet above subgrade, and 1½ feet above the road bed.

The force employed at this point in July last was—

Mechanics in iron,	4
Engine-men,	2
Masons,	10
Manual labor,	58
Engine and compressor men, including firemen,	6
Carpenters,	5
Blacksmiths and helpers,	8
Statisticians,	2
Runners of machine-drills,	6
Sawyer,	1
Manual laborers,	63
Total in July,	165

The first day of November there were employed here 115 men. There are at this point, besides the shops and saw mill above mentioned, 2 small offices, 1 boarding-house, 2 carpenters' shops, 2 powder-houses, 1 temporary blacksmith's shop, 1 temporary horse-stable, 3 sheds, 1 engine-house, 1 barn, 1 instrumental station-house (all used by the State,) and 2 cottages; 6 first-class shanties, 13 common shanties, 10 temporary shanties, 1 store under school-room; with 1 cottage, 1 old store and 8 shanties, built by H. Haupt & Company, which are rented.

[17]

The cost of the shanties at the East End, excluding the Deerfield Dam, was, in July, 1866,	\$28,052 94
In November, 1866,	31,688 99
The rents at the East End received by the State from shanties are, per annum. All rents are collected monthly.	1,698 00

A resident engineer was stationed at the East End in charge of the work.

The progress of the excavations at the East End heading for the year ending December, 1866, has been 569 feet; at the rate of 47.42 per month.

The progress during the six months ending May, 1866, was 338 feet; an average per month of 56 feet 4 inches. One week was lost in June in introducing the machine-drills, in consequence of which the progress that month was reduced to 50 feet 6 inches. During the five months ending November 30, the progress has been 219½ feet; being an average of 43.9 feet per month. It will be seen by the table, that in July, the first month after the introduction of

the drill machines, the progress attained was only 26.5 feet. As the men became better acquainted with them, the progress was increased to 48 feet in August, and in September it rose to 54.5, having nearly attained the average progress of the six months preceding their introduction. Had there been an adequate supply, there can be little doubt that the progress would have continued to increase, and would have shown the superiority of the machine-drill over hand-labor; but the supply fell off, and the progress in October was reduced to 34 feet and 6 inches.

Table showing the progress at East End Heading, from November 1, 1865, to January 1, 1867.

[18]

DATE.	Distance from Portal.	Progress.
Nov. 1, 1865,	2,839.0	
Dec. 1, 1865,	2,904.0	65.0
Jan. 1, 1866,	2,950.5	46.5
Feb. 1, 1866,	3,005.0	54.5
Mar. 1, 1866,	3,052.0	47.0
April, 1, 1866,	3,115.0	63.0
May 1, 1866,	3,176.5	61.5
June 1, 1866,	3,227.0	50.5
July 1, 1866,	3,253.5	26.5
Aug. 1, 1866,	3,301.5	48.0
Sept. 1, 1866,	3,356.0	54.5
Oct. 1, 1866,	3,394.5	38.5
Nov. 1, 1866,	3,431.0	36.5
Dec. 1, 1866,	3,473.0	42.0

THE CENTRAL SHAFT.

There is at this point, used by the State in the prosecution of the work, the shaft-building, a carpenter's shop, a blacksmith's shop, a saw-mill, powder-house, gas-house, ash-house, wood-shed, and a barn; and in connection with the work, a store, a boarding-house, the Thacher farm-house and out-buildings, 4 first-class and 7 common shanties. The cost of buildings at the Central Shaft in July, 1866, was \$11,080.13. The cost in November, 1866, was \$12,026.83. The annual rent of that portion leased to operatives is \$736.

A farm, containing 250 acres of land, with a dwelling-house and barn, has been purchased, adjoining the Central Shaft, for the sum of \$3,000. The land was well covered with timber, about one-half of which has been cut for the purposes of the shaft and tunnel. There is estimated to be one million feet of hemlock timber still standing, which will be wanted in the progress of the work. This purchase was an advantageous one for the State, there having been already realized from it an amount equal to its cost.

The working force at the Central Shaft in July, 1866, was comprised of—

Engine-men and firemen,	5
Mechanics in iron,	4
Carpenters,	5
Blacksmiths and helpers,	4
Pump men,	1
Manual laborers,	39
Total in July,	58

[19]

On the first day of November there were employed at this point, in all, 81. Of this number, 40 were engaged out of the shaft, and 41 in the shaft.

The above enumeration does not include the resident engineer and time-keeper, stationed here in November.

The depth of Central Shaft, when completed, will be 1,037 feet from the surface; its form is an ellipse, whose axes are 27 and 15 feet. On the fifth day of May it had reached the depth of 300.5 feet. At this time the hoisting apparatus was removed from the shaft, and the work of excavation ceased. The new hoisting apparatus was fitted on the first day of August, and the drilling commenced at midnight on that day.

Previous to the change in the hoisting apparatus, the monthly progress had averaged about 18½ feet per month. The advance in October and November was 46 feet; the gain over the previous rate of progress is attributable to the practice of simultaneous blasting.

On the first day of January, 1867, the shaft had been sunk 393 feet, leaving for excavation 644 feet.

Table showing the progress at Central Shaft from November 1, 1865, to December 1, 1866.

[20]

DATE.	Distance	Progress.
Nov. 1, 1865,	200.8	
Dec. 1, 1865,	220.1	19.3
Jan. 1, 1866,	232.5	12.4
Feb. 1, 1866,	250.7	18.2
Mar. 1, 1866,	264.1	13.4
Apr. 1, 1866,	280.9	16.8
May 1, 1866,	297.1	16.2
May 5, 1866,	300.5	3.4
June 1, 1866, [A]	300.5	
July 1, 1866, [A]	300.5	
Aug. 1, 1866, [A]	300.5	
Sept. 1, 1866,	311.9	11.4
Oct. 1, 1866,	331.1	19.2
Nov. 1, 1866,	354.0	22.9
Dec. 1, 1866,	377.0	23.1

[A] Work suspended to put in new hoisting apparatus.

The present hoisting apparatus is expected to be sufficient to finish the shaft. It has two wire ropes, each 1,260 feet long. The time for a round trip is seven minutes. The engine here is of 100 horse-power. The blacksmith shop contains two forges. At the small machine shop the repairs required here are made, as also some repairs for the West Shaft.

The Central Shaft, though designed to aid in ventilating the tunnel, was intended also to accelerate its

construction by affording to the process of excavation four faces instead of two during some portion of the work; and the former chairman of the commissioners expected by the aid of machine-drilling, the shaft might be completed in one year from the time such drilling should commence within it. In this anticipation, ten vertical drilling machines were constructed to work in the shaft area and a compressor with two cylinders was provided to furnish the power for operating them. The want of drilling machines at the East End became so urgent, that these vertical ones were changed to horizontals, and used at that point, and the sinking of the shaft by hand-drilling still continues. But if the experiments now in progress at the East End with the new drilling machine shall demonstrate its superiority over hand labor, the machine will doubtless be introduced into the shaft.

[21]

WEST SHAFT.

This shaft has an area of about 8 by 13 feet, and was excavated by Messrs. H. Haupt & Co. Its depth is 316 feet.

The buildings here used by the State are the West Shaft house, the New Shaft building, a blacksmith shop containing two forges, a powder-house, a horse-shed, ash-house and tank-house. The buildings owned by the State and leased to operatives are a boarding-house and four old shanties built by H. Haupt & Co., four first-class shanties, eight common shanties, and a double cottage. The buildings at the West End, are connected on the books with those at the West Shaft, and will be here enumerated. They consist of a carpenter's shop, time-keeper's office, a blacksmith shop containing one forge, tool-house, powder-house, horse-shed, brickyard shed, brickyard, engine-house, artesian wells Nos. 3 and 4, buildings, and two-thirds of a barn, which are occupied by the State. One boarding-house, store, one-third of a barn, the Harrington farm-house, barn and out-buildings, twenty-seven common shanties and brickyard boarding shanty. These buildings, with part of blacksmith shop, part of carpenter's shop and time-keeper's office, are rented to operatives and to Mr. Farren, the contractor for constructing the brick arch.

The cost of the structures, as reported in July,	
at both places, was	\$35,550 94
As reported in November,	40,010 13

This large increase was mainly occasioned by the construction of a double cottage and necessary buildings at the brickyard and West End.

The amount of rents at these two points is \$2,462.60 per annum. Fifteen of the tenements at the West End are leased to Mr. Farren, in accordance with his contract.

The working force at the West Shaft in July was,—

Engine-men and firemen,	4
Carpenters,	2
Blacksmith and helpers,	8
Masons,	2
Truckman,	1
Pump-man,	1
Manual laborers,	<u>105</u>
Total,	<u>123</u>

[22]

November 1st the working force at this point, including one resident civil engineer, was 103

At this point there is one engine of 100-horse power and one of 40-horse power, and one compressor having four cylinders of a diameter of 13 inches and 24 inches stroke. The West heading from this shaft was advanced 293 feet, and the East heading 1,042, on the first day of December, 1866. The progress for the year ending November 1, 1866, at the heading at this point was 636.7, being a fraction over 53 feet per month. For the last four months, ending December 1, 1866, the progress was 322.1, being a fraction over 64 feet per month, which exceeds by four feet per month the highest estimate for hand-drilling by the engineers in 1862, and by thirty and one-third feet the estimate of Mr. Latrobe. The progress of the work at this heading during the last six months, making allowance for the influx of water in November, having exceeded the highest estimate for hand-drilling, should be regarded as evidence alike of the skill of the miners and the good management of the engineer and his subordinates.

Table showing the progress at West Shaft, East Heading, from November 1, 1865, to December 1, 1866.

DATE.	Distance from shaft, feet.	Progress, feet.
Nov. 1, 1865,	367.5	
Dec. 1, 1865,	414.4	46.9
Jan. 1, 1866,	459.4	45.0
Feb. 1, 1866,	503.0	43.6
Mar. 1, 1866,	546.5	43.5
April 1, 1866,	584.8	38.3
May 1, 1866,	623.3	38.5
June 1, 1866,	682.1	58.8
July 1, 1866,	746.1	64.0
Aug. 1, 1866,	810.5	64.4
Sept. 1, 1866,	871.4	60.9
Oct. 1, 1866,	945.4	74.0
Nov. 1, 1866,	1,004.2	58.8
Dec. 1, 1866,	1,042.0	37.8

The West heading at this shaft was at first driven 6 feet by 11. It has been found advisable to enlarge it to the dimension of 10 feet 6 inches by 15 feet. This work has been performed by contract. The first letting was at the rate of four dollars per cubic yard, the State furnishing the materials used and removing the stone. The contractors at this rate could not pay their expenses. It was raised to six dollars per yard which was found not to pay, and in July the price was advanced to seven dollars and fifty cents. The State pay the men, charging the same to the contractors, and keep their time. Good progress is made and the work is done to the satisfaction of the engineer.

[23]

The East heading at this point was being enlarged also by contract, from 6 feet by 15, to 10½ by 15. The work commenced on the 15th of July, 1866; the price paid is seven dollars per cubic yard; the contractors load their own stone and also that coming from the heading. The State provides the materials used, and hoist the stone to the surface. While the work of the miners at the East heading and of the contractors upon both enlargements was progressing in a very satisfactory manner, the whole was arrested by an unexpected and somewhat sudden influx

WATER IN THE TUNNEL.

On the 27th of November the miners working east from the West Shaft struck a seam running across the stratification of the mountain. Water soon issued from the seam at the rate of twenty-three gallons per minute. On the 29th, the water had risen at the foot of the shaft to two and a half feet above grade, and the work was stopped. The usual speed of the engine working the pump was forty-two revolutions per minute; it was increased to fifty-six, and at that rate it succeeded in preventing any further rise of the water. It became necessary to increase the power of the pumps. The plunger was enlarged from eight to ten inches, and a third lift pump was added. To affect this arrangement the pumps were stopped from 9 o'clock, A. M., December 7th, to 3 ½ P. M. on the 8th. At this time the water was four feet and eight inches above grade. On the 12th the water was so much reduced that the miners recommenced work. The next day, at 2 P. M., the water was struck in large quantities, the whole flow from the heading being 100 gallons per minute. On the 14th, the work was again suspended, and unsuccessful attempts made to stop the water by means of wooden plugs driven into the seam. The pumps working with the longest stroke and at increased speed, were just able to keep the water from rising.

[24]

On the 19th, at 10.30 A. M., one of the trunnions of the pump-bob broke, and seriously injured the pump gearing and boxes. On the 21st a new trunnion was put in, and the pump was attached to the small hoisting engine, the water now being seven feet above grade. On the 28th, at noon, the breakages being all repaired, the large engine was again attached to the pumps, the water then being nine feet and eight inches above grade. And, on the first day of January, at 4 P. M., the water stood nine feet ten inches above grade at the foot of the shaft. [A]

[A] At the time of the presentation of this Report, the Committee understood that the water was entirely removed from the shaft and tunnel.

THE NEW SHAFT.

This shaft is located about 264 feet westerly of the West Shaft. Its dimensions are six feet by thirteen in the clear. The rock to be removed from an area of eight feet by fifteen. The labor is done by contract. The first price was \$40 per foot; increased July 1, 1866, to \$50 per foot. The State furnishes all the materials for construction, and the power to raise the stone and water from the shaft. The depth of the shaft will be 277 feet when open to grade. On the first day of December, the miners working down had progressed 180 feet, and those working from the tunnel up 45 feet. It was then calculated that the shaft would be excavated in two months. Plans for permanent pumps had been prepared; to furnish the pumps according to the plans, would take several mouths. In the meantime, a temporary pump was to be made at North Adams, under the direction of the engineer.

On the first day of January, about thirty-eight feet of stone remained for excavation in this shaft. The water in the tunnel stopped the work from below, and the work is driven upon one face only at the present time.

There are two small engines at this point, one of fourteen and one of ten horse power. The pumps at this shaft, if constructed agreeably to the design of the engineer, will discharge sixty-five gallons to a stroke and are to be worked by a bull engine. The lift of the water will be eighty feet less than at West Shaft, being discharged about 40 feet below the surface.

[25]

THE WEST END.

The work at the West End of the tunnel is under contract. Mr. B. N. Farren of Doylestown, Bucks County, Pennsylvania, by an agreement dated May 1, 1866, contracted to put in a stone and brick arch of the dimensions before stated, 26 feet by 26, for the following prices, viz.:—Earth excavation \$3.50 per yard; brick masonry, \$12 per perch; stone masonry, \$6 per perch. Contractor planks the bottom and sides when necessary at \$15 per lineal foot. The State furnishes the bricks at \$9 per thousand and the timber at \$16 per thousand for hemlock, and \$18 for spruce and hard-wood. The length of arch contracted for is 174 feet, the whole of which is open. The State also furnishes the cement, which costs in Troy, New York, from \$1.65 to \$1.70 per barrel, to which is to be added the freight at 30 cents per barrel. A barrel of cement is used for a perch of masonry.

The contractor agrees to construct two hundred feet of under ground tunnel, and as much more as he can before August 1, 1867, at the following prices, viz.:—Earth excavation at \$6.50 per yard; brick masonry at \$13 per perch; stone masonry at \$6.50 per perch. The timbering, from \$40 to \$50 per foot, lineal, depending upon the thickness of the wall. He may, under permission from the engineer, take stone and sand from the State's premises, without making compensation.

Payments are to be made about the 12th of each month for the work done the preceding month, at the rate of 80 per cent. of the finished work.

The decision of the engineer as to the method, quality, quantity and classification of the work to be final and conclusive. In order to facilitate the progress of the work and with a due regard to economy, the State has purchased the following lots of land in the vicinity of the West End, to wit:—A wood lot, containing sixty acres, at a cost of \$9,900; the Harrington Farm; 130 acres with the buildings, inclosing the West End and West Shaft; and running half way up the mountain. This purchase was made January 26, 1866, price \$3,000. The Kingsley lot, purchased March 16, 1866, at \$2,793.87.

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The timber used by Mr. Farren is obtained from these lots. The tops of the trees are cut into wood and used at the brickyard. About five hundred cords of wood has been cut on the Harrington, and one thousand cords on the Kingsley lot, for the use of the brickyard, and is now on hand.

The necessity of making the bricks required for the arch tunnel is apparent. They could not be furnished by individuals at North Adams. 120,000, before the yard at the West End was fitted up, were purchased at Springfield at \$9 per thousand; the freight of which to North Adams was \$6, and the teaming to the West End \$2 per thousand. If to these prices be added the depreciation and waste from handling, the cost will reach \$18 for all that could be used in the work. It is the opinion of the engineer and superintendent of labor, that the bricks made by the State will cost less than \$9 when delivered to the contractor.

Mr. Farren began work under his contract June 7, 1866, and early in December the brick-work at the top of the arch had entered the mountain. The masonry was commenced about, twenty-five feet west of the point first selected, so that the open masonry will in fact be 200 feet long. About thirty feet of invert is left uncovered the present season, under an apprehension that the bricks on hand will only supply what will be wanted in the drift, in order to prosecute the work with dispatch. The invert has been properly protected, and its preservation may be expected.

At the beginning, the invert and the sides to the spring of the arch was laid with five courses of brick, and the arch with six. The masonry has been strengthened to meet the effect of the soft ground and increased pressure to eight bricks thick all round. Where rocks are found, it will be reduced at the bottom, and perhaps at the top.

The excavation of the drift is in progress and is carried on with two galleries. The lower one is of timber, and is at the bottom three feet below the grade of the road. This gallery is ten feet wide and ten feet high.

The upper gallery, also of timber, is ten feet wide and four feet high, and the space between the galleries is

about ten feet. As the arch is driven in, the top of the invert is 4 ½ feet below the grade of the road, and 18 inches below the timber of the lower gallery. The top timbers of the upper gallery constitute the top timbers of the tunnel during the excavation. They are supported above the masonry and the arch is turned under them.

Side drains, six feet high and four feet wide, are excavated ahead of the galleries, to assist the drainage of the ground through which the galleries and tunnel are driven. The water from these drains is let into the tunnel through its sides, and runs out with the general drainage upon the invert below the road-bed. Holes are left in the invert at proper intervals to facilitate this drainage.

The side drains are hereafter to be filled with stone, which will constitute a blind drain, and also afford a proper support to the masonry.

The work at this point is of difficult prosecution, but the performance of the contract may be confidently expected.

THE BRICKYARD.

The expenditures at the brickyard on the first day of July, 1866, had reached,	\$15,091 98
Of this amount the brick machines, shafting, gearing, &c., cost	\$5,048 68
And the engine,	<u>2,255 50</u>
	\$7,304 18

Twenty-four thousand bricks can be moulded daily. The drying yard is 300 feet long and 120 feet wide. The kiln shed is 300 feet long and 50 feet wide, and of capacity to burn all the bricks that can be moulded. There are six brick machines, four of which are in use. They are driven by an engine, and used alternately, two each day. The making of bricks at the yard commenced June 26 and closed October 24, 1860. About 1,700,000 bricks were made, of which 80 per cent. are sufficiently hard for use in the tunnel, which is estimated to be sufficient to complete the 374 feet of tunnel now under contract.

The clay for the bricks is found near the yard, and hitherto a sufficiency of sand has been found in the vicinity; but it is less abundant than the clay.

MISCELLANEOUS.

In addition to the property enumerated under the preceding heads, the State has at North Adams, a freight house, cashier's office, engineer's office, stable and two coal sheds, and opposite the West End on the Pittsfield and North Adams Railroad, an additional freight house. There are also two instrumental station houses on the east and west summits respectively, all of which are occupied by the State for the purposes of the enterprise. There is also one seven-horse engine and three small compressors. Tho State has also four mule teams, three of four, and one of two animals, making fourteen in all. There were also used on the work in the early part of the year, twelve or fourteen horses, employed in hauling clay, sand, wood, &c. Six of these have been sold to Mr. Farren, and the remainder are to be disposed of. To this enumeration should be added five horses and three or more carriages kept at the stable at North Adams for the transportation of the engineers, superintendent, master mechanic, &c., from point to point along the line of operations wherever their presence and services might be needed.

The expense of the stable, including the pay of the keeper, for the past year, was,	\$1,900 00
which covers the price of three carriages,	\$500 00
and one harness,	<u>40 00</u>
	540 00
Leaving,	\$1,360 00

for the expense of keeping five horses, and the repairs; which is about five dollars per week in all. The charge for keeping horses at the stable in North Adams, is five dollars per week for feed; and the cost for the use of one horse and wagon from North Adams to the East End, is four dollars. These horses were also used to transport the commissioners and the committee visiting the tunnel, when required for that purpose.

THE ROAD BETWEEN THE TUNNEL AND NORTH ADAMS.

It is proposed to change the course of, the road as it emerges from the tunnel, and two lines have been surveyed, which, diverging near the approach cut, unite again about midway from thence to the village. The difference in length is about thirty feet. The northerly line is the least expensive to construct, and best favors the landholders on the route. It has the recommendation of the engineer, and the approval of the consulting engineer, and will probably be selected. There are reasons for an early location of this portion of the road which call for a prompt action in this behalf on the part of the commissioners, which will undoubtedly be taken.

The following table shows the expense of the tunnel and the land and works connected therewith under the administration of the commissioners, as found November 1, 1866:—

Deerfield Dam,	\$127,982 80
Race,	23,417 54
Excavation and Masonry at	
East End of Dam,	12,802 46
Wheel pits,	70,723 23
Gates and Overflow,	<u>9,986 26</u>
	\$244,912 29
East End Heading,	103,731 45
East End Enlargement,	80,317 10
East End Heading Enlargement,	17,559 46
Central Shaft,	144,423 75
West Shaft,	179,041 69
West Approach,	247,900 75
Building East End,	31,688 99
Building West End and Shaft,	40,010 13
Building Central Shaft,	12,026 83
Building General Account,	9,537 37
Engineering and Superintendent,	84,840 48
Machinery West Shaft,	57,111 73
Machinery East End,	87,032 38
Machinery Central Shaft,	51,364 01
Machinery Deerfield Dam,	10,820 93
Machinery General Account,	62,600 76
Machinery West End,	539 89

Land and Land Damages,	17,513 21
	<u>\$1,482,973 20</u>

The following table shows the cost of the works under the classification of outside and inside expenditures, as given by the consulting engineer.

<i>Outside Expenditures.</i>		[30]
Deerfield Dam,	\$244,912 29	
Buildings East End,	\$31,688 99	
Buildings West End and West Shaft,	40,010 13	
Buildings Central Shaft,	12,026 83	
Buildings General Account,	<u>9,637 37</u>	
	93,263 32	
Machinery East End,	\$87,032 38	
Machinery West End,	539 89	
Machinery West Shaft,	57,111 73	
Machinery Central Shaft,	51,364 01	
Machinery Deerfield Dam,	10,820 93	
Machinery General Account,	<u>62,600 76</u>	
	269,469 70	
Land Damages and Land,	17,513 21	
Engineering and Superintendence,	<u>84,840 48</u>	
Total outside expenditures,	<u>\$709,999 00</u>	
<i>Inside Expenditures.</i>		
East End Heading,	\$103,731 45	
East End Enlargement,	17,559 46	
East End Bottom,	<u>80,317 10</u>	
	\$201,608 01	
Central Shaft,	144,423 75	
West Shaft Headings, &c.,	179,041 69	
West End approach cut, drifting and arching,	<u>247,900 75</u>	
Total inside expenditures,	772,974 20	
Total expenditures to November 1, 1866,	<u>\$1,482,973 20</u>	

The exact correctness of any classification of the expenditures is not very important, inasmuch as the sum total is chargeable to the construction of the tunnel; but the Committee do not see the propriety of charging the engineering and superintendence exclusively to the outside expenditure. They have seen a classification which gave,—

Amount put into buildings machinery, &c.,	\$673,531 24	[31]
Spent in the work,	<u>809,441 96</u>	
Total,	<u>\$1,482,973 20</u>	

GENERAL SUMMARY OF THE FORCE EMPLOYED ON THE TUNNEL,

November 1, 1866.	
Thomas Doane, Chief Engineer, salary,	
He providing his horses.	\$3,600 00
Paul Hill, Superintendent of Labor,	
His horse furnished to him.	3,000 00
<i>In the Chief Engineer's Office.</i>	
H. G. Burgess, Master Mechanic, soon to leave,	\$1,800 00
John Christiansen, Mechanical Draftsman,	1,500 00
Austin Bond, Clerk, &c.,	1,500 00
Edward Stowell, temporarily engaged in making fuse,	1,000 00
Roswell Houghton, hostler in village, \$2.00 per day.	
Charles P. Bradley, hostler at T. Doane's house, \$18 per month.	
Roger Tappan office boy and rod-man for Mr. Granger, \$1.50 per day.	
<i>West End.</i> —Wages from \$1.25 to \$3 per day,	5
<i>Brick-Yard.</i> —Wages from \$2 to \$5.89 per day,	13
<i>New Shaft.</i> —Wages from \$1.78 to \$3 per day,	31
<i>West Shaft.</i> —Wages from \$1.50 to \$3.50 per day,	102
W. P. Granger, civil engineer, is resident in charge of	
West Shaft, New Shaft and West End. Salary \$1,350,	1
<i>Central Shaft.</i> —Wages from \$1.50 to \$5,	83
This number includes the time-keeper and H. G. Coolidge, resident engineer.	
<i>East End.</i> —Wages from \$1.50 to \$1.25,	115
F. W. D. Holbrook, resident engineer, in charge at a Salary of \$1,350,	1
Add force in general charge and not confined to any particular point,	<u>8</u>
Total in the employ of the State,	359
Add at the West End in Mr. Farren's employ, about	<u>100</u>
Total employed upon the tunnel,	<u>459</u>

The interest awakened by the magnitude of the undertaking to tunnel the Hoosac Mountain, and the anxiety manifested for its early completion, prompted the commissioners to the discovery of means to accelerate the progress of the work. Their attention was naturally directed to the operation of drilling, and with a view of improving upon the machine drill used at Mont Cenis; scientific mechanics have been employed to devise and construct a drill that should attain that end.

As a first step Gouch's patent of the hollow piston-rod, was purchased for New England, for the sum of five hundred dollars. After which, a Mr. Gardner was employed to construct a drill; but his efforts failed of success after an expenditure of thirteen hundred dollars. A Mr. Butler was engaged to devise a machine, but in the course of studying the subject, his health failed and his services were lost.

A Mr. Hanson completed a machine which promised some success; but on trial it proved a failure.

A second machine called the Brooks, Burleigh and Gates drill, was made under the direction of the commissioners at Fitchburg. This machine was put upon the works and used for several months.

A third machine, called the Burleigh drill, an improvement upon the preceding one, was next produced, which is now at the works on the East Heading.

About \$13,000 was spent upon these experiments, resulting in the construction of the Brooks, Burleigh and Gates drill, and the manufacture of four of them. About one-half of this expenditure may be charged to these last drills; the other was unproductive of anything of value.

The Brooks, Burleigh and Gates drill was patented, but the Commonwealth has the right to use them in the construction of the tunnel.

These machines will now be described.

THE HANSON MACHINE.

This machine has a cylinder and valve motion, similar to a steam-engine. The piston is hollow, the drill-bar which may be of any required length, passing through it, is moved with the piston, by means of four wedges or cams on each end of the piston; these cams are pressed on the drill-bar by means of sliding collars forced upon them by a complex arrangement operating alternately. The drill-bar is rotated by means of a ratchet operated by a spiral groove in the shield of the machine. The main difficulty in this machine was in the complex arrangement for forcing the collars upon the cams or wedges. It did not work well in a horizontal position. The machine consisted of one hundred and twenty pieces, and weighed five hundred and ninety-five pounds.

[33]

THE BROOKS, BURLEIGH AND GATES MACHINE.

This machine has a hollow piston, the drill-holder being a screw passing through the piston, moving with it, and fed through it, by means of a nut on the end of the piston-rod. This nut is held by means of a cap or union nut, as it is called, the union nut being screwed on to the coupling, and the coupling nut screwed to the piston-rod. The feed-nut protrudes through the union nut, and is allowed to turn round in it. On the end of this feed-nut is a ratchet gear covered by a ratchet-band with an arm upon it, all moving with the piston. The ratchet arm moves up and down in a spiral groove, the groove being in a shield attached by screws to the cylinder; on the ratchet-band there is a pall and two springs, one under the other. One of the springs holds the pall in gear, the other holds it out of gear. As the piston moves down, the outer spring comes in contact with a trip which is on the shield and is lifted up, allowing the under spring to throw the pall into the ratchet, and as the piston is moved back, turns the nut round, thereby feeding the screw forward. At the extremity of its backward stroke, the pall comes in contact with another trip on the shield which lifts it out of gear, the outer spring having a catch upon it which holds the pall when thus lifted out. The rotary motion is given by a ratchet on the coupling-nut, covered by a ratchet-band the arm of which moves in a spiral groove in the shield similar to the other, only having a spring to hold the pall in the ratchet; this rotates all the parts on the piston except the ratchet-bands and cross-head. The latter is held between two check-nuts on the coupling-nut. To this cross-head is attached a bar which communicates with a valve which opens the port when the piston moves back, and shuts it when it moves forward; the air is always on during its backward stroke. The piston having a greater area on the forward than on the backward stroke, overcomes the backward pressure and moves the piston ahead, and when cut off, the continued pressure forces the piston back.

[34]

This machine is automatic; generally running until some portion of it is destroyed. No part of the machine has been found strong enough to withstand the friction upon it for any considerable portion of time. The union nut has proved its weakest point, and the breaking of this generally destroys that part of the piston to which it is attached. Another point of weakness is the feed ratchet-band, the springs of which are almost continually breaking.

The machine consists of eighty pieces; twenty-three of which are screws, fifteen pins, and seven pieces of cast iron. It weighs 240 pounds, runs about 200 strokes per minute, and costs about \$400. Its longest run without breaking has been five days. The run of one of them two days without breaking during the time, is considered fortunate. The average breaking is more than one a day. A table showing the list of breakages will follow this description.

The piston-head of this machine has a diameter of $4\frac{5}{8}$ inches. The diameter of the piston-rod is 4 inches at the large end and $2\frac{1}{4}$ at the small end.

So there are $12\frac{87}{100}$ square inches of air area to drive the drill ahead into the rock, and $4\frac{23}{100}$ to draw it out; but as the air is not taken off from the front end, the actual pressure is upon an area of the difference between the two, or $8\frac{64}{100}$ square inches.

Table showing Number of Drilling-Machines Broken, &c.

[35]

1866	No. Machines Broken.	Cross Heads.	Cylinder Flanges.	Coupling Nuts.	Feed Springs.	Feed Palls.	Ratchet Covers.	Valve Stems.	New Packing.	Tapper Bars.	Screw Spindles.	Union Coupling Nuts.	Feed Nuts.	Shields.	Pistc Head
July 21,	32	5	2	4	3	2	2	1	10	7	-	-	-	-	-
31,	67	7	2	1	10	4	5	2	18	14	2	3	-	-	-
Aug. 7,	75	4	1	-	18	15	8	4	39	6	4	-	-	-	-
14,	76	6	-	5	25	17	11	3	-	10	1	6	1	1	-
21,	65	7	1	3	28	15	13	7	-	12	-	1	2	-	-
31,	102	1	1	9	64	7	18	2	-	10	2	4	5	1	-
Sept. 7,	65	1	1	-	27	4	24	-	-	5	2	1	1	-	-
14,	60	2	5	-	23	2	12	2	-	10	-	3	2	1	1
21,	56	1	1	1	28	6	13	-	-	3	-	1	2	2	-
30,	56	3	2	1	31	3	16	2	-	4	-	1	9	1	-
Oct. 7,	54	7	-	-	39	2	7	1	-	9	3	-	1	2	-
14,	53	5	1	2	28	5	10	1	-	9	1	4	6	2	-
21,	58	3	-	-	28	4	13	-	-	9	3	-	4	2	-

31,	77	7	1	2	63	4	11	2	-	12	1	2	6	2	-
Nov. 7,	38	2	-	2	19	3	13	-	-	8	2	-	3	4	-
14,	40	1	1	-	17	2	9	-	-	8	3	2	4	-	-
21,	44	-	1	-	32	1	4	-	-	7	-	1	1	1	-
31,	66	-	-	-	34	2	11	-	13	8	1	1	-	1	-
	1,084	62	20	30	517	98	200	27	80	151	25	30	47	20	1

About forty of the Brooks, Burleigh and Gates machines have been used at the tunnel; of these eight or ten were originally vertical, and intended for use at the Central Shaft. At the commencement of their use, the machines were new and had their best wear in them; there were from twenty to twenty-four at the beginning. In a short time they began to break down, but by putting on a large repair force and converting the vertical machines into horizontal ones, a fair supply was kept up for from two to three months, at the end of which time the greatest machine progress was attained, viz., fifty-four feet and six inches, in September. After that the progress diminished very much, and in proportion to the giving out of the machines. It is the opinion of the engineer that if a constant supply of machines could have been furnished, that the progress would have reached a point much beyond that obtained by hand labor; but with the stoppage of the supply, the number of machines that could be kept in working order was daily reduced, and at last it fell down to two or three, and finally, at times, none were in condition to work. The frames were, however, kept in the tunnel to await the completion of the Burleigh machine, the reception of which was retarded till late in October; much beyond the time anticipated by the commissioners, although the work of their construction was carried on continuously night and day. They came at intervals of several weeks, two at a time; the first of which were put into the tunnel on the thirty-first day of October. Through the month of December, four of these machines were at work.

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THE BURLEIGH MACHINE.

Has a solid piston (so called,) which has a hole in its back end to allow the feed-screw to pass in without touching; the drill is secured to this piston. On the back end of the piston is a section of a ball used as a cam, which works the valve and the feed-motion. The valve is rotated by a rod lying on the band of the cylinder; upon this rod are two cams which perforate the band of the cylinder. The action of the piston brings the ball on its end in contact with these cams, rocking them up and down; the rod to which they are secured being connected with the valve, imparts to that its motion. This machine is fed altogether on ways, or a bed-piece, upon which is the feed-screw; the feed-nut is upon the end of the cylinder-band. To this feed-nut is attached a feed-ratchet, which is held between two collars, allowing it to turn round. Upon the cylinder-band is a lever, one end of which passes through the band; upon the other end is a pall. The motion of the piston raises the lever up, pressing the end containing the pall against the ratchet which turns the nut on the feed-screw, thus moving the machine forward. The rotating ratchet is in the band of the cylinder and has a spline in it, and a pall on its outside. The piston having a spiral groove is turned by this ratchet as it moves down. On the return of the piston, the pall drops into the ratchet and then the piston is turned. The piston is not encumbered with any machinery, and moves alone; its area of air is greater on the forward than on the backward stroke; the alternation of the valve admits the air. The machine, like the one last described, contains eighty pieces; it has the same number of screws and pins, and weighs 372 pounds including the ways or bed-piece; without the ways its weight is 212 pounds. Its number of strokes is about 300 per minute, and its blow somewhat lighter than that of the other. This machine is not entirely automatic; the feed-motion not working regular; when it does not, it is fed by hand, which is a simple process.

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These machines stand the work much better than those first made at Fitchburg. Their average time in the tunnel without repairs in the interval, is about five days; they have needed repairs in two days; one remained at work fourteen days. They accomplish double the work without repairs that those do which were made after the previous pattern. There is a further advantage in using the Burleigh machines; their breaking, when it occurs, is not very serious, the injured parts consisting mainly of cams, can generally be replaced at the tunnel; whereas for the repairs on the Brooks, Burleigh and Gates machine, the dependence to a very great extent has been upon the machine shop at Fitchburg.

The piston-head of this machine has a diameter of $4\frac{25}{100}$ inches. The diameter of the piston-rod is at the large end, 3 inches, at the small end, $2\frac{75}{100}$ inches.

So the number of inches of air area, is $8\frac{20}{800}$ when the drill is propelled upon the rock, and $7\frac{7}{100}$ when returning from it.

A full complement of men to work the machines first used, would be, perhaps, thirteen. Mr. Gates, who superintended their operation in the first instance, began with fourteen, but they were reduced to thirteen. The Burleigh machine practically requires feeding, and a full set at work would probably demand fifteen men for their successful operation.

The value of these machines has not yet been ascertained. The Committee are of opinion that when a full complement shall have been obtained, so that the workmen can have at all times a full supply upon the frames, that greater progress can be obtained by them than by hand drilling; and after a few months operation, the cost of using them, in comparison with hand labor, can be fairly tested. But as the Brooks, Burleigh and Gates machine has been abandoned, no useful results would be obtained by comparing the expenses within the tunnel during the months of July, August and September, with three corresponding months when hand drilling was carried on, and no satisfactory comparison can be made between the working of the Burleigh machine and hand drilling, until a sufficient number of machines has been introduced into the tunnel to keep the men fully employed. It is to be hoped that machines sufficient to make the test may be soon obtained, and that this desirable information may be made known.

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The introduction of the first machine into the tunnel, before its capacity, strength, and expense of working had been fully tested, was unfortunate, inasmuch as its use there delayed the progress of the work. The second machine gives such promise of success, that it will be continued in use in the tunnel until a fair test has been made. But should the Burleigh machine prove unsuccessful, and further attempts with machines be attempted, the Committee recommend that their usefulness be tested outside of the tunnel, and meanwhile the excavation with hand drills be resumed.

EXPERIMENTS WITH DR. EHRHARDT'S POWDER.

The first blast was fired in the tunnel at the East End on the 20th of November, but owing to the presence of charcoal or some other substance in the article, a poisonous gas was evolved which effected the miners disagreeably, and drove them from the work. The subsequent experiments at this point were not satisfactory, and were discontinued, and subsequently resumed at the Central Shaft, where it was used most of the time for a week, varying its composition from time to time. At the close of the week, while preparing for the last blast, a premature explosion took place, resulting in the death of one of the miners, and the injury of three or four others.

The material result of this experiment was as follows:—With 261 days' work and $139\frac{1}{2}$ lbs. of powder, 202 buckets of stone were removed; while in the preceding week, using common powder (schaghticoke) with $251\frac{3}{4}$ days' labor and 236 lbs. of powder, 168 buckets of stone were taken out. The cost of the experimental powder is

EXPERIMENTS WITH NITRO-GLYCERINE.

During the summer, some experiments have been made with this explosive agent. A quantity, costing \$934.29, was brought to the works by Colonel Schaffner, who exhibited the action of the material in various ways, with a view of testing its power, and the comparative safety of introducing it instead of powder. After repeated trials outside of the works, during which about three-fifths of the material was consumed, it was introduced into the tunnel at the West Shaft with the following result: It was used for three days at the East heading of the West Shaft; the advance made in the heading was for the time, 14 ½ feet;—being an advance of 4.82 feet per day, and at the rate of 125.33 feet per month.

In these three days there were taken out of the enlargement	
151.76 yards of stone. To remove this quantity with powder would	
cost, on an average, per yard,	\$9 84
Actual cost with glycerine,	<u>6 20</u>
Difference,	\$3 64
Multiplied by 151.76, gives.	\$552 40
In the same time there was removed of heading 60.15 yards.	
To remove an equal amount by powder costs, per yard,	\$16 25
Actual cost with glycerine, per yard,	<u>6 05</u>
Difference,	\$10 20
\$10.20 multiplied by 60.15, gives	<u>613 53</u>
	\$1,165 93
Cost of the glycerine used during the three days, being 2/5 of	
\$934.29,	<u>350 36</u>
Saved, by using glycerine, in three days,	\$815 57
Which is a saving by the use of glycerine, per day, of	<u>\$276 85.4</u>
and allowing three hundred successful working days in the year,	
an annual saving of	\$81,557 40

The progress made at the West Shaft on the East heading the present year, ending December 31, 1866, is 626 feet and 8 inches. This progress was somewhat lessened by the influx of water in December. The monthly advance has been 52 feet and 2 inches. The average of the eleven months ending with November is 53 feet and 6 inches. Assuming the progress made with glycerine during the three days of its use to be obtainable throughout the year, the monthly progress, using that material, would be 120 feet and 10 inches, on a calculation of twenty-five days to a month, which would give an annual advance of 1,450 feet.

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Without vouching for results so favorable to the progress of the work, it is impossible to overlook the importance of the experiment; and the Committee are of opinion that this material, if it can be procured, should be introduced into the tunnel and shafts, and a thorough experiment made, in order to determine whether it can be used with an advantage even approximating to that shown by the first trial.

Experience has proved that the rock at the Hoosac Mountain is of a peculiar character: comparatively easy to drill, but extremely hard to displace, and that its advantageous excavation requires a strong explosive agent. The difference in the use of weak and strong powder is at once observed, and the effect of simultaneous blasting, by the aid of electricity, is proved by the increased progress of the work since it has been used. It would seem evident, then, without the aid of experiment, that an explosive agent, possessing eight times the power of common powder, would be a valuable auxiliary to this undertaking; and that if such an one could be obtained, and safely used, no time should be lost in procuring a supply.

The use of nitro-glycerine in England is not uncommon; its components are well known; and the Committee are informed that it might be advantageously manufactured at any point where it is used.

ELECTRICAL FIRING.

The experiment of simultaneous blasting by electricity has been made with admitted success. The increased progress in the Central Shaft from an average of about 18 ½ to 23 feet per month, demonstrates its utility, and will undoubtedly insure the continuance of that mode of firing in preference to the method formerly practised.

[41]

THE TROY AND GREENFIELD RAILROAD.

The completion of the railroad from Greenfield to the tunnel has been contracted for with B. N. Farren, for the sum of \$545,000, exclusive of the cost of depot buildings, turn-tables, and engineering expenses. The road to be opened for travel to Shelburne Falls by the 15th of November, 1867, and to the tunnel by the 15th of July, 1868. A lease of the same has been executed to the Fitchburg and the Vermont and Massachusetts Railroad Companies, at a rent of \$30,000 per year, to expire on the completion of the tunnel, or whenever the work on the same shall be stopped, by competent authority.

Mr. Farren commenced work under his contract about the 20th of October. At this time there were about four miles of track,—exclusive of that which had to be removed with the trestle-bridges,—built by Mr. Haupt. Some portions of the track were in fair condition; but the larger part of it must be relaid. Many of the ties are of hemlock; they are all decayed and must be removed, and new ones substituted. None of the bridges were strong enough to be used, and the timber of which they were constructed is too much decayed to be used for building purposes: There is on hand in addition to the track laid, chairs, or connecting joints, sufficient to lay five miles of rails; also about ten thousand chestnut ties. Such of these as had been properly piled are sound. Many of them, however, are so much decayed, as to be unfit for use.

The road-bed has in many places been injured by rain and frost. At exposed points near the river, it is entirely destroyed. Comparatively speaking, there was little masonry on the line. With the exception of one pier, the bridge masonry at Green River will be taken down. All the deep ravines were crossed by trestle work, and consequently there were but few culverts. Of these some small ones are still standing in good condition. Of the bank wall built, about one-half remains,—the remainder has either fallen down, or will be taken down and rebuilt.

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Very little alteration will be made in the general location of the line or its gradients. The curvature will be very much modified and improved. Some sharp and reversed curves will be entirely saved by the substitution of straight lines. Others, where the expense of reduction is not very heavy, will be materially changed. The alterations below Shelburne Falls are substantially as follows:—

A straight line substituted for one 2°, one 4° and one 6° curve.			
One 2°	curve substituted for one	4°	curve.
Four 4°	" "	" four	6° "
One 3°	" "	" one	6° "

Three 3°	"	"	"	three 6° "
Five 5° 30'	"	"	"	five 6° "
One 3° 30'	"	"	"	two 6° "
One 4° and two 2° curve	substituted for three 6° curve,			saving 45° and 60 feet.
One 5° 40'	curve substituted for one 7° curve.			
One 6°	"	"	"	one 7° "
Three 7°	"	"	"	three 8° "
One 5°	"	"	"	two 5° and one 6° curve.
Two 3°	"	"	"	two 6° curve, saving 30° and 40 feet.

The same plan for improving the line above the falls will be pursued, so that when completed, the road combining the alignment with the gradients will, in the judgment of the engineer, be "superior for doing economically a heavy traffic, to any railroad in New England which runs east and west."

At Green River there will be substituted for Mr. Haupt's bridge of 700 feet built on a curved line one of 470 feet, to be constructed on a straight line. The remainder of the ravine to be made a solid embankment. All the bridges on the line are to be "Howe's Truss," and equal in strength and durability to any in New England.

The trestle-work has been removed, and the ravines where it was placed are being filled with substantial masonry and solid embankments.

On the first day of November Mr. Farren had about fifty men employed; on the first day of December, two hundred and seventy-five, and on the 14th of December, when one of the Committee visited the line, he had over three hundred.

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About one-third of the masonry for Green River bridge has been built, and the stone is quarried for the other bridges. Nearly one thousand yards of culvert masonry and three hundred yards of bank wall have been constructed, and from forty to fifty thousand yards of earth removed.

The timber for Green River bridge is sawed and will be framed in January. The material for all the bridges below Shelburne Falls has been contracted for, to be delivered early in the spring. Twenty thousand ties have been purchased, together with posts and boards for fences. The work at the rock-cut near Shelburne Falls will be commenced in the month of January.

On the line below Shelburne Falls, there will remain in the road, the following sharp curves, to wit: In the track as laid and not disturbed, four of six degrees, and in the remainder of the line, six of six degrees, three of seven, and two of eight. One of the eight degree curves, is through a long heavy cut, and cannot be reduced without great expense. The other is near the Deerfield River crossing, where all trains will be required to run slow. It cannot be avoided without a tunnel or a curve over the entire bridge. The three seven degree curves occur in heavy rock-cuttings, and these are all the sharp curves that are contained in a space of thirteen miles.

Above Shelburne Falls the alignment and grades are more favorable. From the tunnel to the Deerfield River crossing, below Shelburne Falls, a distance of twenty-two miles, there is but one ascending grade going east; its location is about two miles west of the falls; it is one-half mile in length, and is thirty-five feet to the mile. Within the same space going east, there are the following descending grades, to wit: One of forty-five feet per mile for 2,000 feet, one of forty feet for 6,000 feet, one of twenty-eight feet for 2,500 feet, and one, near the village of Shelburne Falls, of fifty feet per mile for 5,300 feet. The remaining grades are from five to twenty feet per mile.

The sharp curves remaining after the proposed improvements will be as follows, to wit: Near the depot grounds at Shelburne, and running through the village, there is necessarily one eight degree curve, and on the seventeen miles between the falls and the tunnel, there occur thirteen six degree curves. A slight change in laying the track will increase the radius of these curves to 1,000 feet. This in some cases can be done.

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The county commissioners have been called out and have made an adjudication in regard to the public crossings and alterations of highways between Greenfield and Shelburne Falls.

The whole work below the falls is under good progress, and is being prosecuted with great vigor. The laying of the track can be commenced as early in the spring as the season will admit, and its extension to Shelburne Falls, may, in the opinion of the engineer, be expected early in October.

It appears from the foregoing, that of the work now in progress on the road and tunnel, their is performed by contract,—the construction of the railroad from Greenfield to the East End of the tunnel; the enlargements east and west in the tunnel at the West Shaft; the excavation of the New Shaft; and the arch masonry and excavation at the West End; while the work at the East End, at the Central Shaft, the heading and lifting at the West Shaft, the lifting at the New Shaft, and the work at the brickyard has been performed by the State. No criterion has been afforded enabling the Committee to determine upon the comparative economy of the different modes of operation.

The commissioners in their able report in 1863, speaking of the manner of constructing the tunnel, say: "It would not be wise nor according to any precedent for the State to expect to get the work done at the contract price if it should turn out to cost more. It would certainly get no abatement if the price was found to be exorbitant. We are clearly of the opinion that it should not be constructed by contract, excepting in so far as parts of the work may be in detail to the men actually at work upon it, and even such contracts should' not be permanent in their character." That the commissioners in April last entertained the idea of inaugurating and continuing the contract system so far as the same should prove economical for the State, satisfactorily appears in the following letter:

BOSTON April 25, 1866.

[45]

HON. TAPPAN WENTWORTH, *Chairman of Hoosac Tunnel and Troy and Greenfield Railroad Committee.*

DEAR SIR:—Hearing that questions have arisen in regard to the propriety of contracting the work upon the Hoosac Tunnel, it may not be improper for me to say that that subject (contemplated in the Act of 1863,) has for a long time engaged the serious attention of the commissioners, who have already a contract for constructing a portion of the West End, before the governor and council, awaiting their approval under section 3 of chapter 214 of the Acts of 1863.

When the economic value of their new facilities shall be demonstrated, they expect further to avail of this system so far as the interest of the State (as represented by the rapid, economical and certain progress of the work,) shall warrant.

While the high prices now prevailing will probably render the letting of large jobs at this time injudicious, they are not of short contracts, or of letting portions of the work to the miners by the piece.

Very truly yours,
J. W. BROOKS, *Chairman.*

The Committee coincide with the views of the commissioners. And the justness of their remarks, that the State

must not expect to have the work done at less than its cost, is borne out by the operations under the contract for the West End enlargement, where the State has increased the contract from four to seven dollars and fifty cents a perch, in order to insure the miners a compensation for their labor.

It may be proper to state in this connection, that the labor done upon the road and tunnel by early contractors, has not tended to a "rapid, economical and certain progress of the work," and that if even the whole work should be put under contract, the interest of the Commonwealth would require the continuance of a commission, and the services of an engineer of the highest skill and integrity to superintend its performance in order to avoid a loss and damage similar to that which occurred to the State while the work was under the nominal control of the Troy and Greenfield Railroad corporation.

The retirement of all the gentlemen who comprised the board of commissioners, first appointed under the legislation of 1862, affords the Committee an opportunity to acknowledge the eminent talent and ability which they respectively possessed for the discharge of the important duties assigned to them, and to bear testimony to the industry and intelligence displayed in their elaborate and comprehensive report upon the subject of the railroad and tunnel in 1863. It was fortunate for the State in that crisis in the affairs of this enterprise to be able to command so much practical information upon a question so interesting and important, and at the same time so difficult of solution. [46]

But in addition to the duty of furnishing an opinion of the feasibility and mode of constructing the tunnel, and of the propriety of opening this line of railway communication with the West, the commission was instituted to carry on and superintend a most important and difficult public work, involving the expenditure of several million dollars. Yet each of the gentlemen composing the board was engaged in other duties requiring substantially their whole time and attention. Under these circumstances their personal observance of the progress of the work could not be given to a degree satisfactory to the public, or essential to the interests of the State, and the responsibility of the operations came to devolve upon the engineer at the works, and the chairman of the commissioners in Boston. These irksome labors were discharged with diligent faithfulness, and as the event has proved with a physical suffering to one of them that has called forth a general expression of regret and sorrow.

By chapter 214 of the Acts of 1863, the governor is authorized to draw his warrant on the treasurer for such sums as may be required, from time to time, by the commissioners, for the purpose of carrying out the provisions of law for the completion of the tunnel and railroad. The commissioners under this enactment have made monthly requisitions upon the governor, transmitting at the same time vouchers for the expenses of the preceding month; and upon this information and requisition the warrants have been drawn. By the 293 chapter of the Acts of 1866, a general supervision of the work is vested in the governor and council, with power to "correct abuses, remedy defects, and impose and enforce requirements in such manner as the interests of the Commonwealth shall, in their judgment, require." As the commissioners exercise a delegated power, there would have been a manifest propriety in requiring of them, from time to time, a report upon the progress of the work, and of their own doings even under the Act 1863, so that the governor might have been more fully provided with information touching the necessity of the requisitions. But under the Act of 1866, it appears essential that the commissioners should report monthly to the governor and council the general plan of operations pursued, the progress of the work, and the manner and extent of their own superintendence of the same. [47]

The Committee are therefore of opinion that the commission should be reorganized in such manner that the State could command the whole time of its members: that a greater degree of personal attention should be given by them to the work than it has heretofore received: that the commissioners should keep minutes of their doings which shall be open to the inspection of the governor and council, and the appropriate legislative committee: that their monthly communications to the governor and council should embrace, in addition to the past, and the requisition for the current month, a report of the operations, the progress of the work during the previous, month, and the manner and extent of their own superintendence of the same.

The Committee are also of opinion that a due regard to economy in conducting the enterprise requires that the commissioners should at once, by experiment, ascertain the probable time required to excavate the enlargement of the tunnel, and that the work upon the enlargement be regulated and pursued with a view of avoiding any unnecessary delay in operating the road after the heading is removed.

In concluding this Report, the Committee cannot forbear to express their obligations to Mr. Doane, the engineer in charge of the work, for the assistance rendered by him in aid of their labors, nor withhold their approbation of the faithful and able manner in which he has discharged the duties of his office, so far as they have come under their observation. The Committee are indebted to Mr. Hill, the superintendent of labor, for his uniform attention during their examinations, and they fully recognize his capacity for his position, and his interest in the operations. They are likewise indebted to Mr. Hall, the intelligent master of the machine shop, for very valuable information concerning his particular department. And also to Mr. Field, the able and efficient engineer of the railroad, for a very satisfactory report upon that portion of the work under his direction. [48]

TAPPAN WENTWORTH,
_____, [A]
WILLIAM L. REED,
Of the Senate.

MOSES KIMBALL,
GEORGE B. LORING,
SYLVANDER JOHNSON,
B. F. TAFT,
E. H. CHISHOLM,
SILAS JONES,
JAMES R. GLADWIN,
Of the House.

[A] Hon. ALVAH CROCKER has not acted on the Committee since his appointment upon the commission.

APPENDIX.

[A.] [49]

[50]

Sketch of the Proceedings of the Troy and Greenfield Railroad Corporation, from its organization to the surrender of the Road under the mortgage, and the adoption of the work by the Commonwealth.

The charter of the Troy and Greenfield Railroad, was granted in 1848, and authorized the construction of a railroad with one or more tracks, from a point on the Vermont and Massachusetts Railroad, at or near Greenfield, to some point on the line of New York or Vermont, convenient to meet or connect with any railroad that may be constructed from any point at or near the city of Troy, on the Hudson River in the State of New York. Its capital stock was limited at \$3,500,000.

The corporation was authorized to contract with the owners of any contiguous railroad leading into or from either of the States of Vermont or New York, for the use of the whole or any part thereof, or for the running and operating the two railroads conjointly, or for the leasing of such contiguous road, or for any other road, or for the letting or hiring of their own road to the owners of such contiguous road, or of any other road which composes a part of the railroad line between the cities of Boston and Troy, of which the Troy and Greenfield Railroad shall be a part.

The first meeting under the charter was held June 1, 1848, at which subscription papers were voted to be issued and circulated, in order to organize the corporation. In 1849, March 16, the subscribers to the stock held their first meeting, and organized under the charter.

At the annual meeting, February 6, 1850, the stock was apportioned among the neighboring towns as follows:-

Ashfield,	60 shares.
Charlemont,	400 "
Colrain,	150 "
Conway,	50 "
Greenfield,	700 "
Hawley,	120 "
Heath,	120 "
Leyden,	30 "
Monroe,	50 "
Rowe,	100 "
Shelburne,	400 "
Buckland,	150 "
Florida,	120 "
Adams,	1,000 "
Williamstown,	800 "
Clarksburg,	40 "
Hancock,	50 "
Deerfield,	150 "
Bernardston,	40 "
Gill,	80 "
Whitingham,	00 "
Reedsborough,	00 "
Stansford,	00 "
	<hr/>
	4,610 shares.

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It was also voted to apportion the directors among the towns in the following manner, to wit:—

North Adams, 3; Florida, Rowe, Heath and Monroe, 1; Colrain, Buckland and Hawley, 1; Shelburne, 1; Greenfield, Deerfield and Conway, 3; Williamstown and Whitingham, 2; Charlemont, 1; and one director at large.

Before the annual meeting in 1850, the directors had voted to assess three per cent. upon each share of the capital stock. This vote was passed April 11, 1849, and on the first day of October in the same year, they voted that the construction of the road from the State line at Pownal, Vermont, to Adams, and from Greenfield to Shelburne Falls, be put under contract as soon as sufficient subscription shall have been obtained therefore, and that the two ends aforesaid shall be constructed simultaneously.

1850, January 28, the treasurer had received the sum of \$2,203.94, and had paid out on bills approved by the president, \$2,203.57, leaving a balance in the treasury of \$0.37.

Sundry assessments amounting in all to 75 per cent. upon the subscriptions, were afterwards voted, the last on the 6th of May, 1852. These assessments were rescinded by a vote passed July 23, 1858, and it also voted that the several amounts heretofore paid by individual stockholders, except on assessment laid April 11, 1849, be credited to their several accounts on assessments now or hereafter to be made.

1850, October 28, the contract with Messrs. Gilman and Carpenter, was ratified, and on the 29th, the president was authorized to execute it.

The Committee have not found this contract nor any record stating its provisions.

December 27, 1850, a committee reported that the whole amount of stock subscribed, was \$250,800, of which \$7,200 was payable in land damages and materials for the road; and that Messrs. Gilmore and Carpenter had subscribed for 500 shares of stock, to wit, \$50,000.

On the 7th day of January, 1851, the directors voted to break ground the next day, and on the 27th of May in the same year, they voted to expend a sum not exceeding \$25,000, in experiments upon the east side of the mountain, at or near the mouth of the proposed tunnel.

In 1851, the corporation petitioned the legislature for a loan of the State credit for two million dollars; but the application was unsuccessful.

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The failure to secure the aid of the Commonwealth, appears not to have discouraged the corporation, for on the 7th of August, 1851, the directors voted that they would proceed forthwith from Adams to the New York line, and simultaneously incur all the necessary expenses to make thorough experiments with such machines as promise to facilitate the construction of the tunnel, and when the road is begun from Greenfield, it shall be after an arrangement is made to construct it to the foot of the mountain in Florida and connect in some way with the road at North Adams.

The Troy and Greenfield Railroad Corporation having directed its attention to a connection with the Troy and Boston Railroad Company through a portion of the State of Vermont, and a charter having been obtained from the legislature of Vermont, incorporating the Southern Vermont Railroad Company, whereby such connection could be made, a committee of the directors of the Troy and Greenfield Railroad Company and of the Southern Vermont Railroad Company made an agreement, subject to the modification or ratification of the stockholders of each company, "that the stock of both of said companies and their franchises from said Greenfield to the west line of

Pownal, in the State of Vermont, shall become and be one joint, consolidated stock and interest, with equal and common rights and privileges to the stockholders of both companies;" it being understood that an application shall be made to the legislature of Vermont for a change of the name and style of the joint corporation mentioned in the said Act of the Vermont legislature. This report was made to the board of directors, and it was voted that the same "be accepted and adopted, recorded and placed on file." Subsequently the Southern Vermont Railroad was leased to the Troy and Greenfield Corporation on a perpetual lease for \$12,000 per year; and the 21st of April, 1860, it was purchased by the Troy and Greenfield Corporation for the sum of two hundred thousand dollars, with money advanced to the last named corporation by the Commonwealth. In the report of the commissioners on the Troy and Greenfield Railroad and Hoosac Tunnel, the Southern Vermont Railroad is estimated to have cost from \$110,000 to \$125,000 only.

In 1858, another application was made to the legislature for a loan, but with the same result as in 1851. In both instances, committees reported in favor of the application.

In 1854, the application was renewed, and was successful. The Act was passed on the fifth day of April, 1854. By the first section, the treasurer was authorized to issue scrip, as certificates of debt, for the sum of two million dollars, to be expressed in the currency of Great Britain or in federal currency, as the directors of the Troy and Greenfield Railroad should elect, to bear an interest of five per cent., payable semi-annually, and redeemable in thirty years, for the purpose of enabling the Troy and Greenfield Company to construct a tunnel and railroad under and through the Hoosac Mountain, in some place between the "Great Bend" in Deerfield River, in the town of Florida, at the base of Hoosac Mountain, on the east, and the base of the western side of the mountain, near the east end of the village of North Adams, on the west. The scrip was to be delivered to the treasurer of said Troy and Greenfield Railroad Company in the manner and upon the conditions following:—\$100,000, when it should appear to the satisfaction of the governor and council that said company had obtained subscriptions to their capital stock in the sum of \$600,000, and twenty per cent. upon each and every share of said six: hundred thousand dollars should have actually been paid in, and seven miles of their railroad and one thousand lineal feet of their said tunnel under the Hoosac, in one or more sections, of size sufficient for one or more railroad tracks, should have been completed.

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\$100,000, when ten miles of their said railroad, in one or two sections, and ten thousand lineal feet of their said tunnel, in one or more sections, should be completed.

\$100,000, when fifteen miles of their said railroad, in one or two sections, and three thousand lineal feet of their said tunnel, in one or more sections, should be completed.

\$100,000, when twenty miles of their said railroad, in one or two sections, and four thousand lineal feet of their said tunnel, in one or more sections should be completed.

\$100,000, when twenty-five miles of their said railroad, in one or two sections, and five thousand lineal feet of their said tunnel, in one or more sections, should be completed.

\$100,000, when thirty miles of their railroad, in one or two sections, and six thousand lineal feet of their tunnel, should be completed.

\$100,000, when thirty-two miles of their railroad, in one or two sections, including all the line east of Florida, and seven thousand lineal feet of their tunnel, in one or more sections, should be completed; and for each additional portion or portions of said tunnel of fifteen hundred feet, in one or more sections, completed by said company, \$100,000, subject to the condition that the last \$200,000 should be reserved until said company, or their successors, should open their railroad for use from Greenfield to the line of the State in Williamstown; and subject also to the condition, that, prior to the second delivery of scrip, thirty per cent. of the same shall have been paid in cash to the treasurer of the company by the stockholders thereof, in addition to the \$120,000 to be paid prior to the delivery of any scrip; and that upon each application for scrip, in pursuance of the law, and prior to the delivery thereof, thirty per cent. of the scrip then applied for shall have been paid by the stockholders to the treasurer of the company until the \$600,000 subscribed for has been paid by the stockholders.

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The Act further provided, that the treasurer of the company, within three months from the receipt of any scrip, should pay to the commissioners of the sinking fund created by the Act, ten per cent. on the amount of scrip so taken as a sinking fund; and after the road should be opened for use, twenty-five thousand dollars should be annually paid to said commissioners for the same purpose.

The Act further provided, that the said company should execute an assignment, as a pledge or mortgage on the railroad, with its franchise property and income, conditioned to pay the principal sum of said scrip, or so much thereof as the sinking fund should be insufficient to pay, and the interest, as the same became due; and that said company should assign all the interest it then had, or might afterwards obtain, in the Southern Vermont Railroad Company.

In 1855, the legislature authorized certain towns on the line,—to wit: Ashfield, Buckland, Conway, Colrain, Charlemont, Deerfield, Greenfield, Hawley, Heath, Rowe, Shelburne, Adams, Florida, and Williamstown,—to subscribe three per cent. on their valuation, respectively, to the capital stock. This Act was not fully complied with on the part of the towns, and \$125,000 only is reported to have been realized from that source.

In 1855 a contract with E. W. Serrell to construct the work was reported to and accepted by the directors. This contract does not appear among the papers of the corporation, and its terms cannot be stated.

At the same time the capital stock of the corporation was by a vote increased to \$1,500,000, and a location designated as the east line on the railroad near Cheapside was adopted. This singular resolution was also passed:—

Resolved, That the direction of the engineering operations within the Hoosac Tunnel after the location of the line is adopted, and plans perfected for the same, be left with the contractor, excepting the measurements for monthly and final estimates and the final acceptance of the work.

1855, July 18. Mr. Serrell having proposed to subscribe the sum of \$600,000 (less the amount of the new subscription made by others,) provided the company would make such allowances as would enable him to dispose of the proposed issue of \$900,000 of bonds advantageously, the directors voted to add \$300,000 to the contract prices of the work, and that said \$900,000 bonds as provided by the contract should be issued as soon as authorized by the stockholders, and placed in bank by the trustees to the credit of such persons as shall deposit against the same cash or railroad iron equal in value to sixty-five cents on the dollar. The said bonds to be taken by said Serrell at par and so estimated in his contract.

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At this time sixteen hundred and thirty-five shares of new stock had been subscribed, amounting to \$163,500.

The trustees alluded to in the foregoing vote were selected by a committee appointed for the purpose, and with power to execute to them a mortgage. They were J. V. C. Smith, Paul Adams and John G. Davis, all of Boston. The mortgage was executed, and is known in the history of the road as the "Smith mortgage." A resolution explanatory of this transaction was passed August 16, 1855, in the following words:—

"Resolved, That, whereas by the terms of the provisions of the resolution of July 18, 1855, by which it is provided that the bonds of the company to be issued, are to be placed in bank, &c.; therefore, as explanatory thereto, be it

Resolved, That it is not intended thereby to prevent the operation of the contract, but that the said bonds are to be delivered to Serrell & Co., on the warrant of the engineer, countersigned by the president and treasurer, whenever the engineer shall draw therefor on monthly or final estimates."

1856, February 7. The president reported to the directors that a contract had been redrafted and concluded with Messrs. Serrell, Haupt & Co., which was read, accepted and ratified, and the committee discharged. This contract was probably dated January 31, 1856, but the Committee have not been able to find it among the papers of the corporation.

1856, May 22. The directors voted, that in case Messrs. Serrell, Haupt & Co., would enter into an agreement to carry on the work of the Troy and Greenfield Railroad Company, in compliance with the terms and conditions of the loan Act, until 2,000 feet of the tunnel should be completed, the corporation would substitute bonds instead of stock in all payments to be made on account of work to be done to that time.

The treasurer was authorized to give the acceptance or notes of the company, to an extent equal to the whole indebtedness of the company to said contractors, upon which to raise money to carry on the work.

That the company would pay or allow to said contractors all discounts or losses to which they might be required to submit, provided such discounts or losses did not exceed the rate of 15 per cent. per annum.

That the trustees of the mortgage bonds should deliver to Mr. Herman Haupt one hundred thousand dollars in the bonds of the company in addition to payments due for work, said bonds to be sold or hypothecated by him, and the proceeds applied to the work. The bonds to be charged on account of the contract if not returned when the second payment from the State shall have been made.

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1856, July 28. H. Haupt and W. A. Galbraith notified a dissolution of the firm of Serrell, Haupt & Co., and proposed to enter into a new contract.

E. W. Serrell notified that Messrs. Haupt and Galbraith were authorized to surrender the old contract.

The stock subscription of Edward W. Serrell and E. W. Serrell & Co., was transferred to H. Haupt & Co., the latter to furnish a guarantee that the assessments due and to become due should be paid.

E. W. Serrell resigned his office as a director in the company, and was appointed consulting engineer. W. A. Galbraith was chosen a director.

1865, July 30. A contract was made with Herman Haupt, William A. Galbraith, C. B. Duncan and Henry Cartwright for the construction of the road and tunnel. The firm name of the contractors was H. Haupt & Co. By the provisions of the contract all work done under previous contracts with E. W. Serrell or Serrell, Haupt & Co., was to be credited to H. Haupt & Co., and all payments under said contracts were to be charged to H. Haupt & Co., and credited to the Troy and Greenfield Railroad. "The road from the eastern terminus at or near Greenfield from some convenient point on the Vermont and Massachusetts line, as the same now is or hereafter be located," is assumed to be in all about forty-two miles in length.

"This contract includes the graduation, tunneling, masonry and bridging, superstructure, fencing, depot buildings, switches, turn-tables, water and fixtures, and in fine all labor and materials necessary for the construction of the road are included in this contract." The right of way to be provided and paid for by the railroad company. The work to be completed and finished in the best manner, for which the Troy and Greenfield Railroad Company agreed to pay H. Haupt & Co., "the sum of three millions eight hundred and eighty-three thousand dollars in manner following, to wit: Two millions of dollars in the bonds of the State of Massachusetts, to be issued under the Act by which the credit of the said State is loaned to said corporation, nine hundred thousand dollars in the six per cent. mortgage bonds of said company, five hundred and ninety-eight thousand dollars in the capital stock of said Troy and Greenfield Railroad Company, and three hundred and eighty-two thousand dollars in cash." The work of constructing and completing the road was to be done in compliance with the loan Act of April, 1854. One hundred and fifty thousand dollars to be expended by the contractors in depot buildings and necessary rolling stock, cars, engines, &c. under the direction of the board of directors. The stock subscription of E. W. Serrell and of Serrell & Co., amounting to five thousand nine hundred and eighty-seven shares, was to be transferred and assumed by Haupt & Co., payable in compliance with said Loan Act with the understanding that the assessments on the stock were to be paid by the performance of this contract in stock credits as provided in the contract, and the stock taken by the contractors at par.

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This contract further provided, that on the receipt of the several installments of State bonds, the contractors should pay to the sinking fund the ten per cent. specified in the Loan Act, in consideration of which Haupt & Co. should retain whatever sums was realized from the exchange and premium on the bonds. The payments were to be made monthly, on estimate of the company's engineer. The cost of the materials and work upon the line, exclusive of the Hoosac Tunnel and its approaches, was assumed to be one million eight hundred and eighty thousand dollars, and the estimates were to be made in the relative proportion that the part done bore "to the whole amount of materials and work to be furnished, and done at the price named." The Hoosac Tunnel and its approaches were estimated at two million dollars for a double track, and the monthly estimates were to be in proportion to the amount of work done on the approaches, and the length of tunnel excavated.

The contract further provided, that, with the assent of both parties, the tunnel might be constructed for a single track, in which case no abatement was to be made for the first three thousand feet; but for the excavation beyond that point, the sum of twelve dollars per lineal foot was to be deducted from the contract price.

The above are the essential provisions of the contract under which H. Haupt & Co. performed their work upon the road and tunnel until February 18, 1858, except as the same was modified and changed by votes of the directors. The contract was reported to the board of directors, and approved by them August 6, 1856. On the same day the directors voted to request the trustees to recognize H. Haupt & Co. as contractors, instead of E. W. Serrell, and to issue the bonds to said H. Haupt & Co. on the estimate of the engineer and the order of the trustees.

They also voted to change the location of the road at the West End, in accordance with plans marked A and B.

Under date of July 10, 1857, there appears upon the records the following:—

A preamble, "stating that the efforts to raise money for building the road had proved unsuccessful; that no payments had been made the contractors for more than a year, * * * *; that the work could only be carried on by the continued efforts * * * * and personal credit of the contractors.

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"Therefore voted, that the whole of the State bonds that may be issued in aid of the Troy and Greenfield Railroad Company shall be exclusively appropriated to work done, or to be done, upon the tunnel, in compliance with the terms and conditions of the Act authorizing the loan of credit, and with such other conditions and modifications as the legislature may, from time to time, make and establish; but said H. Haupt & Co. shall not be held subject to any other conditions whatever, so far as respects the work done upon the tunnel; and any State scrip that may at any time be delivered to the treasurer of the company, shall be promptly handed to the contractors; the contractors, on their part, to comply with the conditions of the present Act, and with such other conditions or modifications as may be introduced, and to have the benefit of any extension of time or increase of compensation by the State.

Second. Any new or additional subscription that may be obtained, shall be applied to payment of the present contractors for work done, or to be done, by them, and to no other object; and any subscriptions that may be collected west of the Hoosac Mountain, shall be applied exclusively to the completion of that portion of the road.

Third. The present subscription east of the Hoosac Mountain may be collected and applied to the payment of other liabilities of the corporation, and the treasurer is requested to prepare, without delay, a full and complete list of all such liabilities.

Fourth. Any commissions for procuring or collecting subscriptions shall be paid by H. Haupt & Co., in consideration of which, and also of the premises, the payment of graduation, masonry, bridging, and superstructure on the road, exclusive of the tunnel, shall be two million dollars, with the addition of such sums as may be required for the right of way, if this item shall be paid by the contractors. Of this amount, nine hundred thousand dollars shall be in mortgage bonds of the company, and the balance in cash, to as great an extent as can be procured, the remainder in stock at par; and the directors of the Troy and Greenfield Railroad Company shall use their best endeavors to increase the cash subscriptions as much as possible.

If new parties be introduced, or desired by H. Haupt & Co., the contract may be redrafted, and these conditions and changes incorporated; the committee for this purpose shall consist of the president and Alvah Crocker, with power to execute it finally, if not inconsistent with the present contract, or with the changes hereby authorized. It is further agreed and understood, that nothing herein contained shall be so constrained as to invalidate the existing contract with said Haupt & Co., or vary its conditions, except so far as herein expressed or necessarily implied."

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On the 18th of February, 1858, another agreement was made by Herman Haupt and Henry Cartwright with the Troy and Greenfield Railroad Company, and such others as might be associated with them; and who upon signing the contract were to be considered as parties to the same; as it bears the signatures of D. N. Carpenter, President for the Troy and Greenfield Railroad Company, and H. Haupt & Co., by H. Haupt, and no others, it may be presumed that Messrs. Haupt and Cartwright are the only persons comprising the party of the first part.

This contract recites that every attempt to procure new or to collect old subscriptions to the capital stock of the company, since the execution of the former contract with H. Haupt & Co., have proved unsuccessful; that the contractors had prosecuted the work for more than two years without any payment having been made to them as required by existing contract; that there appeared no possibility of procuring means for the further prosecution of the work, except by the continued efforts, increased expenditures, and personal credit of the contractors themselves; and that H. Haupt & Co. propose to release the Troy and Greenfield Railroad Company from the cash payments required by the contract, and to assume themselves the labor of procuring and collecting subscriptions, and of carrying on and completing the Troy and Greenfield Railroad and Hoosac Tunnel in such manner as will comply with all the conditions of the Loan Act. The parties therefore agreed.

That H. Haupt & Co. should comply with all the conditions of the Act, approved April 5th, 1854, whereby a loan of credit was given by the State of Massachusetts in aid of the construction of the Hoosac Tunnel, and should have the benefit of any changes that may hereafter be obtained, or extensions of time that may be granted; but they shall be subject to no other conditions or restrictions other than those expressed in this contract.

That the road shall be so constructed that its gradients should not exceed those in each direction which exist or may hereafter exist permanently on other portions of the line between Troy and Boston; that sharper curves than were in ordinary use in other parts of the line were to be changed at the expense of the contractors, and trestle work or temporary bridging was to be replaced by permanent structures at the expense of the contractors as soon as practicable after the completion and opening of the whole line.

That H. Haupt & Co. should have the benefit of all existing subscriptions, and of all they might procure; also of any revenue that might arise from the use of the road, or any portion of it when completed, until their claims on the company were discharged and paid; and to secure this end, the payment of all other debts of the corporation was to be deferred until that of the contractors was satisfied. The real estate of the corporation not required for the purposes and use of the road, was to be sold or applied to meet present liabilities of the company; and Haupt & Co. were to maintain the organization of the corporation and pay its necessary printing expenses, by paying to the treasurer annually a sum not less than five hundred dollars.

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The State bonds were to be appropriated exclusively to the construction of the tunnel. The State scrip delivered to the treasurer of the company was to be promptly handed to the contractors.

The compensation to be allowed to H. Haupt & Co. was to be as provided in the resolutions of the directors, passed July 10, 1857.

The payment for graduation, bridging, masonry, and superstructure on the road, exclusive of the tunnel, was fixed at two million dollars, exclusive of any payments that might be made for the right of way. Of this amount, nine hundred thousand dollars was to be paid in mortgage bonds of the company; the balance in cash, to as great an extent as cash subscriptions could be secured; the remainder in stock at par.

The bonds and stock of the company to be issued to H. Haupt & Co. when required, to an amount equal to the work done, estimating it by the proportion it bore to the whole amount performed and to be performed.

H. Haupt & Co. were authorized to collect subscriptions to the capital stock of the company, and their receipt for money was to be accepted by the company as evidence of payment. By the execution of this agreement all former contracts between the same parties were agreed to be annulled and cancelled.

H. Haupt & Co. was recognized as the firm name under which the parties of the first part were associated, and then to be conducted. Copies of this and the preceding contract will be found printed verbatim in a report of a committee of the House of Representatives in 1860, of which Mr. Kimball, of Boston, was chairman. It was reprinted in 1861, and is House document No. 406, of last year; and it may be profitably consulted for other valuable information touching the doings of the Troy and Greenfield Corporation and the contractors therewith.

1858, May 25, the directors assented that the iron delivered by the Rensselaer Iron Company for the road should remain the property of the iron company until the same was paid for, in accordance with an agreement of H. Haupt & Co. with the iron company.

From a report of a committee of the directors made to the board July 23, 1858, it appears that at the date of the report, seven thousand four hundred and fifteen, shares were subscribed for unconditionally by parties who appeared to have been solvent at the time of subscribing.

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That three thousand four hundred and fifty shares had been subscribed for conditionally, or, by parties who were not solvent, or whose subscriptions could not be collected.

That of the conditional subscriptions, the greater part had been or would be complied with; of these nine hundred and thirty-nine were subscribed by the towns not included in the published lists.

Upon two thousand four hundred and thirty shares of the unconditional subscriptions, including those of Gilmore and Carpenter, twenty per cent. only had been paid.

That upon six thousand five hundred and nine shares, subscribed for unconditionally, twenty per cent. or more

had been paid in cash.

At this date it appears that the whole number of shares subscribed for conditionally and unconditionally, was ten thousand eight hundred and sixty-five.

At this meeting of the board the clerk was directed to place upon the record the names of all the stockholders, with the number of shares held by each, on which twenty per cent. or more had been paid. The record shows the number of shares to be six thousand six hundred and forty-eight, and the amount paid on the same two hundred and sixty-seven thousand five hundred and sixty-nine dollars. Against the name of H. Haupt & Co. was set the number of five thousand shares. At this meeting the directors also voted to fix the capital stock at one million five hundred thousand dollars.

1858, September 3. The last vote was reconsidered, and it was voted that the capital stock be fixed at [Note: amount missing] as represented by the list of stock reported at the previous meeting.

The directors also voted as they had previously done, to rescind all the assessments heretofore voted, except the assessment of three per cent. laid April 11, 1849, and then voted an assessment of ten per cent. upon each and every share in the capital stock of the company, payable in thirty days. Between this date and September 14, 1859, nine other assessments were voted, the whole amounting to eighty-eight per cent. of the par value of the stock.

By another entry upon the records, under date of November 3, 1858, it appears that Williamstown and Adams subscribed to the capital stock of the Troy and Greenfield Railroad, ninety-three thousand dollars, upon condition that the payment should be made in town scrip, maturing in thirty years, and to be issued when the road was completed between Adams and Troy; half the interest on the scrip to be paid by the Troy and Boston Railroad Company. Mortgage bonds of the Troy and Greenfield Railroad Company, in amount equal to said subscription, were to be deposited in the Adams Bank as security against loss of stock from such a contingency as a sale of the road by the *bona fide* holders.

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Immediately following this entry upon the records are recorded these votes:—

Voted, To accept the subscription on the condition stated, that the contract with the Troy and Boston Railroad Company be altered to allow said company to pay the interest on the scrip directly to the treasurers of the towns; that bonds to the amount of ninety-three thousand dollars be prepared ready for delivery, and that Mr. Haupt and the treasurer be a committee to carry this vote into effect, as also any change of contract with the Troy and Boston Railroad Company.

Voted, That the trustees of the mortgage bonds of this corporation be, and hereby are, requested to deliver to Mr. H. Haupt and the treasurer, ninety-three bonds of one thousand dollars each, to be deposited by them in the Adams Bank, in compliance with the conditions and requirements of the votes of towns of Adams and Williamstown, &c., &c.; sixty bonds to be appropriated as security for Adams, and thirty-three for Williamstown.

Under date of May 20, 1859, appears the following record:—

Whereas, satisfactory evidence has been afforded to the board of directors of the Troy and Greenfield Railroad Company that H. Haupt has, by an instrument of writing, duly executed, formally relinquished, for himself, his heirs, executors and administrators, all pecuniary interest in any profits that may be realized in the construction of the Troy and Greenfield Railroad and Hoosac Tunnel, and that the use of his name in connection with the firm is merely nominal, to avoid the inconvenience and embarrassment resulting from a change of title:

Voted, That in the opinion of this board, no impediment exists to prevent the said H. Haupt from performing the duties of chief engineer of the Troy and Greenfield Railroad Company, and that he be, and hereby is, appointed to said office.

1859, December 26. *Voted*, That the treasurer be, and hereby is, directed to hand over to H. Haupt & Co., as soon as received by him, the bonds of the Commonwealth, hereafter to be issued in aid of the road or tunnel, taking their receipt therefore.

In 1859, application was made to the legislature to reduce the size of the tunnel in order to facilitate its completion, and by chapter 117, of the Acts of that year, it was provided that the tunnel might be constructed of the height of eighteen feet, and fourteen feet wide, and the payments were changed so as to depend upon the construction of the railroad, the excavation of the tunnel, and also of the heading, which was to be driven of the width of fourteen feet at the bottom, and the height of six feet in the middle, with a proviso that no more than seventeen hundred thousand dollars (in addition to the six hundred thousand dollars of scrip,) of stock subscriptions, and the anticipated scrip from the towns before mentioned, all of which was to be considered as unconditional subscriptions, should be paid until the whole of the tunnel through the Hoosac Mountain shall have been completed, and the payments by the State were not to commence until twenty per cent. of the stock subscription should "have been actually paid in." The provisions of this Act, in regard to advances by the State for progress actually made in excavating the tunnel and constructing the road, were substituted for those of the Act of 1854, the second section of which was repealed. By chapter 184 of the Acts of 1860, the city of Boston was authorized, with the consent of the legal voters, to subscribe five hundred thousand dollars to the capital stock of the Troy and Greenfield Railroad; but the consent was not given.

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The legislation of 1859 did not meet the exigencies of the corporation, and application for assistance was again made. To relieve still further the difficulties of the company, the Act of 1860, chapter 202, was passed, in which it was provided that the undelivered portion of the loan of two million of dollars, authorized by chapter 226 of the Acts of 1854, amounting to one million seven hundred and seventy thousand dollars, should be apportioned between the railroad and tunnel, and for the construction of each respectively, and six hundred and fifty thousand dollars was set apart for the completion of the unfinished portion of the railroad, extending from its eastern terminus, near Greenfield, to within half a mile of the eastern end of the Hoosac Tunnel, and one million one hundred and twenty thousand dollars to the completion of the tunnel. The Act provided for the execution to the Commonwealth of such further bond and mortgage as the attorney-general should prescribe, and that such bond and mortgage, as well as all bonds, mortgages or other assurances heretofore made to the Commonwealth by said company, should have priority and be preferred before any and all attachments or levies on execution heretofore or hereafter made. The Act further provided that payments hereafter to be made for work done upon the road and tunnel, should be so made upon estimates of a State engineer, whose appointment and duties were prescribed in the Act. Such estimates were to be based upon a "width of road-bed, at grade, of fifteen feet on embankments, seventeen and a half feet in side cuts, and twenty feet in through cuts; in the heading of the tunnel, upon dimensions fourteen feet wide and six feet high in the middle, and in the finished excavation of the tunnel, of fourteen feet wide and eighteen feet high in the middle." And the deliveries of scrip were to be at the rate of fifty dollars for each lineal foot of tunnel, divided between heading and full-sized tunnel, in the proportion of thirty dollars for each lineal foot of heading, and twenty dollars per lineal foot for the remaining excavation, and of six hundred and fifty thousand dollars for the whole of the graduation, masonry, bridging and superstructure of the road east of the tunnel. The weight of the rails was fixed at not less than fifty-six pounds to the lineal yard; the capital stock of the corporation at two millions and a half dollars, including all shares before issued.

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By the eighth section of the Act the corporation was authorized to purchase the entire road franchise, stock, bonds, and other property or the Southern Vermont Railroad Company, together with its lease to the Troy and

Boston Railroad Company, and subject to its provisions, for the sum of two hundred thousand dollars. This Act repealed all prior legislation inconsistent with its provisions, with a saving of the security which the Commonwealth had, by virtue of its mortgage on the franchise, railroad and property of the Troy and Greenfield Railroad Company, and was approved April 4, 1860.

1860, July 3. A committee was appointed to execute the mortgage to the Commonwealth required by chapter 202, of the Acts of 1860.

1861, July 30. The directors voted that Mr. Haupt be a committee to appear before the council in reference to the withholding the scrip now due the road; and January 16, 1862, it was voted that Mr. Haupt be authorized to act as the agent and representative of the company in any relation that the company may be brought before the present legislature or any committee thereof.

Previous to the vote of July, 1861, suspicion was excited that Messrs. H. Haupt & Co. were not performing their work in a manner conformable to the requirements of the statute, and it was deemed imprudent to make any further advance of scrip under the Act of 1859, until the work was examined and the condition of the corporation better understood. An inquiry was instituted, a new State engineer appointed, and an investigation of the proceedings of the contractors and corporation was had. The facts disclosed in the examination induced the governor and council to withhold the issue of any more scrip, under the last mentioned law, and the legislature by chapter 156 of the Acts of 1862, passed April 28, assumed the duty of completing the road and tunnel.

The first section of the Act is as follows:—

"The governor, with the advice of the council, is hereby authorized and directed to appoint three able, impartial and skilful commissioners, to investigate the subject of finishing the Troy and Greenfield Railroad, and of tunneling the Hoosac Mountain, whose duty it shall be to report to the governor and council, what in their judgment, will be the most economical, practical and advantageous method of completing said road and tunnel; the estimated cost of fitting the same for use; the time within which the tunnel can be completed, and what contracts can be effected and with what parties for completing said tunnel and road and the probable cost of the same; the probable pecuniary value of the road and tunnel when completed; the sources and amount of traffic and income, and all other facts, in their opinion, useful to assist the governor and council in determining the best method of securing a continuous railroad communication between Troy and Greenfield."

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By the second section the Troy and Greenfield Railroad Company was authorized to surrender to the State the property mortgaged.

By the third section the commissioners were authorized to audit and allow all just claims for labor, service, materials and land damages incurred between April 6, 1860 and July 12, 1861, in carrying on the work, and to procure the release and discharge of all attachments and liens upon said materials. \$175,000 was appropriated to pay the claimants under the approval of the governor and council.

By the fourth section the commissioners were authorized to use or run that portion of the road east of the mountain or lease the same to the "Vermont and Massachusetts," the "Fitchburg," the "Troy and Boston Railway Company," or either of them, until the completion of the tunnel.

By the fifth section the commissioners were authorized to continue the work on the Hoosac Tunnel, and by contract or otherwise, to expedite its completion.

On the 18th of August 1862, is recorded on the records of the corporation the following votes:—

1. "The directors of the Troy and Greenfield Railroad Company hereby instruct the president to transfer to the Commonwealth of Massachusetts, under the several mortgages held by said Commonwealth, all the property of said corporation.
2. "Voted to call a meeting of the stockholders to see if they would ratify the above vote.
3. "Voted, That the treasurer be directed to make no further delivery of the stock or bonds to the contractors without the written order of all the finance committee."

At the commencement of the session of the legislature in January, 1863, his Excellency Governor Andrew, after stating the general provisions of the Act of April, 1862, and the appointment of the commissioners under it, "each of whom was carefully selected as being, in the words of the Act, at once 'able, impartial and skilful,'" and after alluding to the labors of the commissioners, and the reports of the distinguished engineers appointed to "assist them, closes his remarks upon the enterprise in the following words:—

"The report of the commissioners to the governor and council is not yet made, but it is understood to be in rapid preparation. I am unable, therefore, to communicate to the legislature at the beginning of its present session so fully as I have hoped on the subject of this important and interesting enterprise of establishing a new avenue for our trade with the West, piercing the Green Mountain range, and opening up to greater activity the economical resources of our Northern tier of towns. I trust that the conclusions and reasoning of the commissioners when published will settle conflicting opinions in the minds of the people, and, if favorable to the active pursuit of the enterprise, that its prosecution will enjoy an unanimous support. The work can be pursued, relieved from all factitious embarrassments, and contracts can be made by those in the sole interest of the Commonwealth, superintended by citizens of the highest experience and capacity."

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In communicating the report of the commissioners to the legislature on the 12th of March, 1863, after analyzing and commenting upon its statements and reasonings, the governor concludes his address in these words: "I congratulate thee general court and the people upon the rescue of the Commonwealth, and especially of this great experimental enterprise, from a position inconsistent with economical, safe, or even possible success in piercing its mountain barrier.

"I earnestly and respectfully invite your most candid and thoughtful consideration, not only of the specific facts and figures which elucidate or express the details of information bearing most immediately upon the work contemplated, but I also venture to commend to your deliberate judgment the arguments and reasonings drawn from liberal and enlightened views of public policy and of public economy, which finally lift this subject above all merely local interests or antagonisms into the sphere of statesmanship. And having attentively watched the progress of the report of the commissioners, and the documents by which it is accompanied through the press, I am prepared to give my own assent to the opinion with the expression of which the commissioners conclude their discussion:—

"By the time the tunnel can be completed, the public interest requiring it will have grown large enough to pay for the outlay. The impulse given to business by the new facility, would soon fill up the new line, and make up the temporary loss felt by any other.

"Considering the large sum which the Commonwealth has already invested in this work, which must be sunk if it is not completed; the reasonable protection from loss which is offered by the other companies interested in the line; the more intimate relations it may promote between Massachusetts and the West; and the benefits which such a facility promises to the city and State, we are of opinion that the work should be undertaken by the Commonwealth, and completed as early as it can be with due regard to economy."

The surrender of the road by the directors to the Commonwealth, was followed by the following vote, passed January 7, 1863:—

Voted, That Mr. Stevenson, formerly State Engineer of the Troy and Greenfield Railroad, be requested to return an estimate of the payments and credits to which Haupt & Co. were entitled, under their contract, at the time of the suspension of the work, and that the amount allowed by such estimate be passed to the credit of H. Haupt & Co.; also, that the stock and bonds to which they are entitled be issued without further order, when legal impediments are removed.

Under the vote, Mr. Stevenson made the following report:—

Engineer's Office, Bunker Hill Bank Building,}
CHARLESTOWN, MASS., Feb. 10, 1863.}

D. N. CARPENTER, Esq., *President, pro tem., T. & G. R. R. Co.*

DEAR SIR:—By a vote passed on the 7th of January last, I am requested to return an estimate of the payments and credits to which H. Haupt & Co. were entitled under their contract at the time of the suspension of the work on the Troy and Greenfield Railroad.

The contract thus alluded to recites that "The compensation to be allowed to H. Haupt & Co. shall be as provided in the resolutions of the board of directors of the Troy and Greenfield Railroad Company, passed July 10, A. D. 1857, to wit:

"The whole of the State bonds that may be issued in aid of the Troy and Greenfield Railroad Company shall be exclusively appropriated to work done, or to be done, upon the tunnel, in compliance with the terms and conditions of the Act authorizing the loan of credit; and any State scrip that may, at any time, be delivered to the treasurer of the company shall be promptly handed to the contractors.

"The payments for graduation, bridging, masonry, and superstructure of the road, exclusive of the tunnel, shall be two millions of dollars, with the addition of such sums as may be required for right of way, if this item shall be paid by the contractors. Of this amount, nine hundred thousand dollars shall be in the mortgage bonds of the company, and the balance shall be in cash, to as great an extent as cash subscription can be procured; the remainder in stock, at par.

"The bonds and stock of the Troy and Greenfield Railroad Company shall be issued to H. Haupt & Co. whenever required, but not to a greater extent than they would be entitled to receive for the work done, estimating it by the proportion which it bears to the whole amount done and to be done."

This contract is so clear and precise in its terms that but one construction can be placed upon it, though it is evident that such terms were predicated upon a different state of affairs than existed at the time of suspension. By this contract, all State payments are to be exclusively appropriated to the work on the tunnel, while the stock and bonds are as exclusively devoted to the graduation, bridging, masonry, and superstructure of the railroad. The amount of compensation the contractors would thus be entitled to, is the issue of State scrip from July 10th, 1857, to the time of suspension, and the \$2,000,000 of stock and bonds, less the amount required to finish the railroad. From this must be deducted such payments as may have been made from time to time, concerning which I have no data, but which your treasurer's books must show. Any sums that may have been paid by the contractors for right of way, are to be added to the amount due.

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The cost of finishing the railroad must be estimated. For the road east of the tunnel, my estimate of the cost of finishing was, September 12, 1861, \$102,394; to this we should add one-half mile of railroad and bridge over the Deerfield, \$20,000. For the unfinished portion west of the tunnel, I have no data of my own; I have, therefore, taken for the purpose the estimate of D. L. Harris, which is the highest I can find—\$40,000.

We thus have as the cash cost of completing the graduation, masonry, bridging, and superstructure of the road, \$162,394, which is to be deducted from the \$2,000,000 of stock and bonds, leaving the amount the contractors are entitled to, \$1,857,606, less payments made, plus the amount of right of way, &c.

This is in exact accordance with the strict construction of the contract which I previously have remarked was predicted upon a different condition of affairs than existed at the time of suspension.

I deem it my duty in this connection respectfully to suggest whether, in view of the changes made in the issue of State scrip, which was paid upon the road as well as upon the tunnel, the contractors should not make proper reductions of the stock and bonds due them, taking into consideration as an offset to this such losses as they have been subjected to by the adverse action of the State authorities. This suggestion, however, is volunteered. My duty under the vote of the board is simply to decide what amount the contractors are entitled to receive under an exact and literal construction of the contract.

L. STEVENSON, *Civil Engineer.*

Mr. Haupt was present at the meeting of the directors at which the vote of January 7 was passed, and the 30th day of May he addressed the following letter to the treasurer of the corporation:—

MAY 30, 1863.

W. T. DAVIS, Esq., *Treasurer, &c.* DEAR SIR:—I find the statement of payments on road in Senate Document, No. 82, 1863, page 17 communication of J. W. Brooks to governor, viz:—

Oct. 8, 1860,	\$64,090 00
Dec. 12, 1860,	112,190 00
Jan. 5, 1861,	30,355 00
Feb. 18, 1861,	23,270 00
March 7, 1861,	19,890 00
April 14, 1861,	19,175 00
May 7, 1861,	65,555 00
June 26, 1861,	34,645 00
July 9, 1861,	90,064 00
	\$455,234 00

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Omitting for the present any consideration of offsets, and deducting this whole amount for a temporary settlement, the items to be filled up will be as follows:—

Whole amount of credit on road per Stevenson's estimate,	.....	\$1,800,000 00
Deduct stock already issued as per certificates delivered, number,	.....
Shares,	.....
Bonds delivered, number,	.....
Dates of delivery,	.....
Total bonds and stock delivered,	.....
Balance stock to be delivered,	.....

In addition to this, H. Haupt & Co. have credits on the books of the company for cash payments made on company accounts as follows:—

* * * * *		
Amounting to say,	.....	\$90,000 00
		Yours, &c., HAUPT.

Stock to be delivered hereafter instead of bonds. You can with these dates make out this statement in an hour, please do so and send to me at Washington.

Some people in Massachusetts will find out that I am not quite dead yet, they may feel me kicking before long. Help Field all you can to get releases on payment of the 85 per cent. I will not forget you.

HAUPT.

Previous to the receipt of Mr. Haupt's letter to the treasurer, but subsequent to the message of the governor, from the foregoing, extracts have been made, to wit: On the first day of April, 1863, the following preamble and resolutions were passed by the directors.

"On motion of Mr. Brigham, seconded by Mr. Cheever, the following resolutions were adopted:—

"*Whereas*, The stockholders of this company at their annual meeting held September 2, 1862, unanimously acquiesced in the action which the legislature had taken in regard to the affairs of this company, and voted to surrender the property of the corporation to the Commonwealth in the expectation that the railroad and tunnel should be completed in conformity with the avowed intention of the legislature. It is

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"*Resolved*, That this board of directors see no reason to regret the step which this corporation has taken, but in the kindly interest shown by His Excellency the governor in this enterprise, and in the able report of the commissioners appointed to examine the subject, they perceive every indication that the great work will be prosecuted with vigor and arrive at an early completion.

"*Resolved*, That having released the property to the Commonwealth, we recognize the State as having entire and complete control over the same; our only claim being that the State shall carry out in good faith the recommendations of the commissioners as contained in their report, and in the address of the chief magistrate of the Commonwealth.

"*Resolved*, That the clerk be requested to furnish copies of the above vote to the friends of the road in the Senate and House of Representatives, to be used if necessary to show the views of the directors."

On the 29th day of April, 1863, the legislature, passed an Act entitled "an Act in addition to an Act, providing for the more speedy completion of the Troy and Greenfield Railroad, and Hoosac Tunnel," which is chapter 214 of the Acts of 1863. By the provisions of this Act, the commissioners appointed under chapter 156 of the previous year, were authorized, subject to the advice and approval of the governor and council, to construct, complete and equip the Troy and Greenfield Railroad and Hoosac Tunnel, and to make such alterations in the line of the road as may be deemed necessary to render it suitable and proper for part of a through line from Troy to Boston. Also such alterations in the location and dimensions of said tunnel as will render it suitable and proper for use, in accordance with the spirit and intent of the 224th chapter of the Acts of 1854.

By the legislation of 1862 and 1863, and the vote of the directors and of the corporation in the same years, the corporation surrendered to the State the road and tunnel, and the State took possession of the same with the express understanding on both sides, that they would proceed in the construction and completion of both works. The enterprise having fallen into the hands of the State, and the work having been assumed by the State government, no further vote of importance appears upon the records of the directors. Their last meeting was held August 30, 1865, when Alvah Crocker was chosen President, and Wendell T. Davis, Clerk and Treasurer.

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Principal Acts of the Legislature relating to the Hoosac Tunnel and Troy and Greenfield Railroad.

[1848—Chapter 307.]

AN ACT to incorporate the Troy and Greenfield Railroad Company.

Be it enacted, &c.

SECT. 1. George Grennell, Roger H. Leavitt, Samuel H. Reed, their associates and successors, are hereby made a corporation, by the name of the Troy and Greenfield Railroad Company, with all the powers and privileges, and subject to all the duties, liabilities, and restrictions set forth in the forty-fourth chapter of the Revised Statutes, and in that part of the thirty-ninth chapter thereof relating to railroad corporations, and in all other general laws which have been, or shall be hereafter passed, relative to railroad corporations.

SECT. 2. Said company are hereby authorized to locate, construct, and maintain a railroad, with one or more tracks, from some convenient point on the Vermont and Massachusetts Railroad, at or near the termination of said railroad in Greenfield, through any or all of the following towns, viz.:—Greenfield, Deerfield, Conway, Shelburne, Buckland, Coleraine, Charlemont, Hawley, Rowe, and Monroe, in the county of Franklin, and Savoy, Florida, Adams, Clarksburg, and Williamstown, in the county of Berkshire, to some point on the line of the state of New York or of Vermont, convenient to meet, or connect with, any railroad that may be constructed from any point at or near the city of Troy, on the Hudson river, in the state of New York.

SECT. 3. The said company may, with their railroad, unite with, and enter upon, the Vermont and Massachusetts Railroad, at or near the termination thereof, as aforesaid, and may likewise enter upon, cross, and use, the railroad of the Connecticut River Railroad Company, in and near the town of Greenfield, (not, however, interfering with the depot buildings of either of said companies,) on such terms as may be agreed upon between the corporation hereby created and the aforesaid companies respectively, or as may be prescribed by law.

SECT. 4. The capital stock of the said company shall consist of not more than thirty-five thousand shares, the number of which shall, from time to time, be determined by the directors thereof; and no assessment shall be laid of a greater amount thereon, in the whole, than one hundred dollars on each share. And the said company may purchase and hold such real and personal estate, as may be necessary for the purposes of their incorporation.

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SECT. 5. If the location of said road shall not be filed within two years, in the manner prescribed by law, or if the said railroad shall not be constructed within seven years from the passage of this act, then the same shall be void.

SECT. 6. The legislature may authorize any railroad company to enter, with their railroad, upon the Troy and Greenfield Railroad, on such terms as may be agreed upon by said companies, or as may be prescribed by the provisions of law.

SECT. 7. The legislature may, after the expiration of five years from the time when such railroad shall be opened for use, from time to time, alter and reduce the rate of toll, or profits, upon said road; but said toll shall not be so reduced, without the consent of said company, as to produce, with said profits, less than ten per cent. per annum, upon the investments of the said company.

SECT. 8. The said corporation may contract with the owners of any contiguous railroad leading into or from either of the states of Vermont or New York, for the use of the whole or any part thereof, or for the running and operating the two railroads conjointly, or for the leasing of such contiguous road, or for the letting or hiring of their own road to the owners of such contiguous road, or of any other road which composes a part of the railroad line between the cities of Boston and Troy, of which the railroad hereby authorized shall be a part.

SECT. 9. The Troy and Greenfield Railroad Company shall, within one year after the opening of their road for use, purchase and take an assignment of the lease and contract of transportation, made and executed between the Western Railroad Corporation and the Pittsfield and North Adams Railroad Corporation, on the thirteenth day of January, in the year one thousand eight hundred and forty-six; and shall have all the advantages, and assume all the liabilities, accruing under and by virtue of said lease: provided, that the said Western Railroad Corporation shall perform their covenants in said lease, to keep said road, and other property therewith connected, in repair, until such assignment; and shall, within six months after the said Troy and Greenfield Railroad Company shall have filed the location of their road, according to law, and shall have raised, by subscription, one million of dollars, for the construction of the same, signify, in writing, their election to make such assignment: and provided, that, at the time of such assignment, there shall be secured to said Western Railroad Corporation, by a proper instrument, a lien or mortgage upon all their rights in said Pittsfield and North Adams Railroad, as collateral security for the performance of all the obligations of said corporation, contained in said lease and contract of transportation: and, provided also, that, after the completion of the said Troy and Greenfield Railroad, the said Western Railroad Corporation shall assign and convey, to the said Troy and Greenfield Railroad Company, the said contract of transportation, according to the terms of this section, if the said Troy and Greenfield Railroad Company shall so elect.

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SECT. 10. This act shall take effect from and after its passage. [*May 10, 1848.*

[1852.—Chapter 291.]

AN ACT concerning the Troy and Greenfield Railroad Company.

Be it enacted, &c.

SECT. 1. The Troy and Greenfield Railroad Company and the Southern Vermont Railroad Company, a corporation established by the laws of Vermont, are hereby authorized by a vote of the stockholders now, or to be, passed, to unite themselves in one corporation; and such vote having been passed, they shall thereupon become one corporation, and all the franchises, property, powers, and privileges now enjoyed by, and all the restrictions, liabilities, and obligations imposed upon, said two corporations, by virtue of their respective charters, shall appertain to said united corporation in the same manner as if the same had been contained in or acquired under an original charter. Such corporation, so formed by such union, shall be called by the name of the Troy and Greenfield Railroad Company.

SECT. 2. If the Troy and Greenfield Railroad Company shall unite with said Southern Vermont Railroad Company, then, and in that case, one or more of the directors of such corporation, formed by such union, shall be an inhabitant of this Commonwealth, on whom processes against such corporation may be legally served, and said company shall be held answerable to answer in the jurisdiction where the service is made and the process returnable.

SECT. 3. The said company and the stockholders therein, so far as they are situate in Massachusetts, shall be subject to all the duties and liabilities of railroad corporations in Massachusetts, and to the general laws of this Commonwealth in relation to railroad corporations. [Approved by the Governor, May 20, 1852.

[1854.—Chapter 226.]

AN ACT authorizing a Loan of the State Credit to enable the Troy and Greenfield Railroad Company to construct the Hoosac Tunnel.

Be it enacted, &c.

SECT. 1. The treasurer of the Commonwealth is hereby authorized and instructed to issue scrip, or certificates of debt, in the name and in behalf of the Commonwealth, and under his signature and the seal of the Commonwealth, for the sum of two millions of dollars, which may be expressed in the currency of Great Britain, and may be payable to the bearer thereof in London, and bearing an interest of five per cent. per annum, payable semi-annually in London, on the first days of April and October; or the said scrip may be issued in federal currency, payable in Boston, as the directors of the Troy and Greenfield Railroad Company shall elect when they apply for each and every issue of said scrip, with warrants for the interest attached thereto, signed by the treasurer; which scrip or certificates, in the currency of Great Britain, shall be redeemable in London, and those in the federal currency, at Boston, at the end of thirty years from the date thereof, and the same shall bear date on the first day of April or October which shall precede the issue of each portion of said scrip; and all such scrip shall be countersigned by the governor of the Commonwealth, and be deemed a pledge of the faith and credit of the Commonwealth, for the redemption thereof; and the treasurer of the Commonwealth, under the conditions hereinafter provided, shall deliver the same to the treasurer of the Troy and Greenfield Railroad Company for the purpose of enabling the said company to construct a tunnel and railroad under and through the Hoosac Mountain, in some place between the "Great Bend" in Deerfield River, in the town of Florida, at the base of Hoosac Mountain on the east, and the base of the western side of the mountain, near the east end of the village of North Adams, on the west.

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SECT. 2. Whenever it shall be made to appear to the satisfaction of the governor and council, that the Troy and Greenfield Railroad Company shall have obtained subscriptions to their corporate stock, in the sum of six hundred thousand dollars, and twenty per cent. on each and every share of said six hundred thousand dollars shall have been actually paid in, and shall have completed seven miles of their said railroad, in one or two sections, and one thousand lineal feet of their said tunnel under the Hoosac, in one or more sections, of size sufficient for one or more railroad tracks, a portion of said scrip, to the amount of one hundred thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have completed, in one or two sections, ten miles of

their said railroad, and two thousand lineal feet of their said tunnel, in one or more sections, another portion of said scrip, to the amount of one hundred thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have completed fifteen miles of their said railroad, in one or two sections, and three thousand lineal feet of their said tunnel, in one or more sections, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have completed twenty miles of their said railroad, in one or two sections, and four thousand lineal feet of their said tunnel, in one or more sections, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have completed twenty-five miles of their said railroad, in one or two sections, and five thousand lineal feet of their said tunnel, in one or more sections, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have completed thirty miles of their said railroad, in one or two sections, and six thousand lineal feet of their said tunnel, in one or more sections, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have completed thirty-two miles of their said railroad, in one or two sections, including all their line to be constructed east of the town of Florida, and seven thousand lineal feet of their said tunnel, in one or more sections, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered to the treasurer of said company; and for each additional portion or portions of said tunnel, of fifteen hundred lineal feet, in one or more directions, completed by said company, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered to the treasurer of said company; subject, however, to this proviso, that the last two hundred thousand dollars of said scrip shall be reserved until said company, their successors or their representatives, have opened said railroad for use through the Hoosac, and laid a continuous railroad from Greenfield to the line of the state in Williamstown, when the same shall be delivered: provided, that prior to the second delivery of scrip to the treasurer of the Troy and Greenfield Railroad corporation, according to the provisions of this section, evidence shall be furnished, satisfactory to the governor and council, that a sum, equal to thirty per cent. of the amount of the scrip then applied for, shall have been actually paid to the treasurer of said corporation; in cash, by the stockholders thereof, in addition to the hundred and twenty thousand dollars to be paid prior to the delivery of any scrip. And that on each application for scrip, in pursuance of the provisions of this section, and prior to the delivery thereof, satisfactory evidence shall be furnished to the governor and council, that a sum, equal to thirty per cent. of the amount of scrip then applied for, has been actually paid to the treasurer of said corporation, until six hundred thousand dollars subscribed for have been paid by the stockholders. And no scrip shall be delivered till satisfactory evidence of such payment is, from time to time, furnished to the governor and council.

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SECT. 3. Whenever the treasurer of said company shall receive any of said scrip, he shall, within three months from the receipt of the same, pay to the commissioners of the sinking fund, by this act hereafter established, ten per cent. on the amount of scrip so taken, as a sinking fund; after the whole of said road is open for us, twenty-five thousand dollars annually, shall be set apart from the income of said road and paid to said commissioners, and the whole thereof shall be added to said sinking fund, and shall be managed, invested and appropriated, as is, or shall be provided by law, in relation thereto.

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SECT. 4. The treasurer of the Commonwealth, the auditor of accounts of the Commonwealth, and the treasurer of the Troy and Greenfield Railroad Company for the time being, shall be the commissioners of the sinking fund of the Troy and Greenfield Railroad Company. The said commissioners shall have the care and management of all the moneys, funds and securities at any time belonging to said sinking fund, and shall invest the same; but the moneys not invested, and all the securities of said fund, shall be in the custody of the treasurer of said Commonwealth.

SECT. 5. This act shall not take effect until said company, at an annual meeting, or at a special meeting duly notified for that purpose, shall have assented to the provisions thereof, and shall have executed to the Commonwealth a bond, in such form as the attorney-general prescribed on the issuing of scrip to the Western Railroad Corporation, conditioned, that the Troy and Greenfield Railroad Company shall comply with the provisions of this act, and shall faithfully expend the proceeds of said scrip as herein provided, and shall indemnify and save harmless, the Commonwealth, from all loss or inconvenience on account of said scrip, and that said company shall well and truly pay the principal sum of said scrip, punctually when the same shall become due and payable, or such part thereof as the sinking fund aforesaid shall be insufficient to pay, and the interest thereon semi-annually, as the same shall fall due, and shall also assign to the Commonwealth, by suitable instrument or instruments, of the same form with that or those prepared by the attorney-general on the issuing of scrip to the Western Railroad Corporation, the entire railroad, with its income, and all the franchise and property to them belonging, the whole thereof to be held by the Commonwealth as a pledge or mortgage to secure the performance of all the conditions of said bond: *provided, however,* that the Commonwealth shall not take possession of said pledged or mortgaged property, or any part thereof, under or by virtue of said mortgage, unless for some substantial breach of some condition of said bond.

SECT. 6. In addition to the security provided in the preceding section, the said company shall assign all the interest they now have, or may hereafter obtained, in the Southern Vermont Railroad Company.

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SECT. 7. The Troy and Greenfield Railroad Company are authorized, and at any time prior to the execution of said mortgage, and within one year from the passage of this act, to alter the present location of their road: provided, that the tunnel shall be located and constructed within the limits prescribed by the first section of this act.

SECT. 8. The time for completing the Troy and Greenfield Railroad is hereby extended, for the additional term of six years.

SECT. 9. When the Commonwealth shall have advanced to said company, said bond or scrip to the amount of five hundred thousand dollars, the legislature may elect two directors of said company, who shall hold office for the same time, be elected in the same manner, and receive compensation to the same amount as the state directors of the Western Railroad Corporation, but neither of them, while holding such office, shall serve as a director of any other railroad company. *[Approved by the Governor, April 5, 1854.]*

[1855.—Chapter 394.]

AN ACT to authorize certain towns in the Counties of Franklin and Berkshire to subscribe to the Capital Stock of the Troy and Greenfield Railroad Company.

Be it enacted, &c.

SECT. 1. That each of the several towns of Ashfield, Buckland, Conway, Coleraine, Charlemont, Deerfield, Greenfield, Hawley, Heath, Monroe, Rowe, and Shelburne, in the county of Franklin, and each of the several towns of Adams, Florida and Williamstown, in the county of Berkshire, be, and hereby is, authorized to subscribe for and hold shares in the capital stock of the Troy and Greenfield Railroad Company, to any amount of money not exceeding three per centum on the amount of its last valuation: provided, the inhabitants of such town or towns, at a legal town meeting duly called for that purpose, shall vote by a two-thirds vote to subscribe for such shares in accordance with the terms of this act, to pay for the same out of the town treasury, and to hold the same as town property, subject to the disposition of the town, for public purposes, in like manner as any other property which it may possess.

SECT. 2. Said towns are hereby authorized to raise, by loans or taxes, any sums of money which shall be required to pay the instalments on their respective subscription to said stock and interest thereon.

SECT. 3. This act shall take effect from and after its passage. [*Approved by the Governor, May 18, 1855.*

[1859.—Chapter 117.]

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An Act in addition to, an Act authorizing a loan of the State Credit, to enable the Troy and Greenfield Railroad Company to construct the Hoosac Tunnel.

Be it enacted, &c., as follows:

SECT 1. The terms of the act authorizing a loan of the state credit to enable the Troy and Greenfield Railroad Company to construct the Hoosac Tunnel, are hereby modified as follows, viz.:

Whenever it shall be made to appear to the satisfaction of the governor and council, that the Troy and Greenfield Railroad Company shall have actually obtained unconditional subscriptions to their corporate stock in the sum of six hundred thousand dollars, and twenty per cent. on each and every share of said six hundred thousand dollars shall have been actually paid in, and shall have completed seven miles of their road, in one or two sections, and one thousand lineal feet of their said tunnel under the Hoosac Mountain, in one or more sections, of size sufficient for one or more railroad tracks, a portion of said scrip, to the amount of one hundred thousand dollars, shall be delivered to the treasurer of said company; and whenever said company shall have, excavated, in addition to the amount of tunnel above provided for, one thousand lineal feet, in one or more sections, of heading or gallery of fourteen feet width at the bottom, and six feet in height in the middle, and of suitable proportion and form, or (if excavated by machinery) circular, and with a diameter of not less than eight feet, another portion of said scrip, amounting to fifty thousand dollars, shall be delivered to the treasurer of said company; and when said company shall have excavated two thousand feet of their said tunnel, of the size above specified, another portion of said scrip, amounting to thirty thousand dollars, shall be delivered as aforesaid; and whenever said company in addition to said two thousand feet, shall have excavated one thousand lineal feet of heading, in one or more sections, and of the size above specified, and shall have graded three miles of road, commencing on the bank of Green River, at the present location of the crossing of said stream, or north thereof, and extending towards Shelburne Falls, on the same side of Green River and Deerfield River as the present location, said three miles being all situated within four miles of the point of commencement, another portion of said scrip, amounting to eighty thousand dollars, shall be delivered as aforesaid; and whenever in addition to the grading of said three miles as above, said company shall have excavated three thousand lineal feet of tunnel as above specified, another portion of said scrip, to the amount of twenty thousand dollars, shall be delivered as aforesaid; and whenever said company, in addition to the three thousand feet above specified, shall have excavated, in one or more sections, one thousand lineal feet of heading, as above specified, and shall have graded six miles of road in location and otherwise as aforesaid, said six miles of road being all situate within seven miles of the point of commencement at Green River, another portion of said scrip, amounting to eighty thousand dollars, shall be delivered as aforesaid; and when said company, in addition to the grading of six miles of road above specified, shall have excavated four thousand feet of tunnel as above, another portion of said scrip, amounting to twenty thousand dollars, shall be delivered as aforesaid; and whenever said company, in addition to the above, shall have excavated, in one or more sections, one thousand lineal feet of heading as aforesaid, and shall have graded nine miles of road, in location and otherwise as aforesaid, between Greenfield and Shelburne Falls, another portion of said scrip, to the amount of eighty thousand dollars, shall be delivered as aforesaid; and whenever said company, in addition to the above nine miles of graded road, shall have excavated five thousand feet of tunnel as aforesaid, another portion of said scrip, amounting to twenty thousand dollars, shall be delivered as aforesaid; and whenever said company shall have excavated, in one or more sections, one thousand lineal feet of heading as aforesaid, in addition to the five thousand feet of tunnel above specified, and shall have graded the road between Greenfield and Shelburne Falls, crossing the Green River upon the present location, or at a point north thereof, another portion of said scrip, amounting to eighty thousand dollars, shall be delivered as aforesaid; and whenever said company, in addition to the grading of the road between Greenfield and Shelburne Falls as aforesaid, shall have excavated six thousand feet of tunnel as aforesaid, another portion of said scrip, amounting to twenty thousand dollars, shall be delivered as aforesaid; and whenever in addition to the grading and tunnel above specified, the said company shall have excavated as aforesaid, one thousand lineal feet of heading, another portion of said scrip, to the amount of thirty thousand dollars, shall be delivered as aforesaid; and whenever in addition to the grading above specified, the said company shall have excavated seven thousand feet of tunnel as aforesaid, another portion of said scrip, to the amount of twenty thousand dollars, shall be delivered as aforesaid; and for each additional thousand feet of heading that shall be excavated of dimensions as aforesaid, another portion of said scrip, amounting to thirty thousand dollars, shall be delivered as aforesaid; and for each additional one thousand feet of tunnel that shall be excavated of dimensions as aforesaid, another portion of said scrip, amounting to twenty thousand dollars, shall be delivered as aforesaid; and whenever said company shall have completed the graduation and superstructure of the road between Greenfield and Shelburne Falls, on the route herein before specified, and shall have put the same in running order, another portion of said scrip, to the amount of forty thousand dollars, shall be delivered as aforesaid; and whenever said company, in addition to the road between Greenfield and Shelburne Falls above specified, shall have completed the graduation and superstructure of two continuous miles of road, commencing at the western termination of the above road, another portion of said scrip, amounting to eighty thousand dollars, shall be delivered as aforesaid; and for the graduation and superstructure of each additional mile of road, graded and laid continuously through either of the towns of Buckland, Charlemont, Rowe or Florida, another portion of said scrip, amounting to twenty thousand dollars, shall be delivered as aforesaid: *provided*, that when the rails shall have been laid and the road put in running order, between Greenfield and the east end of the Hoosac Tunnel, excepting that portion of the road which is to be made from the material to be furnished by the tunnel itself, another portion of said scrip, amounting to one hundred thousand dollars, shall be delivered as aforesaid: and *provided, also*, that whenever the aggregate amount of scrip that shall have been delivered to the treasurer of said company shall have reached the sum of one million seven hundred thousand dollars, no further delivery of scrip shall be made until the whole of the tunnel through the Hoosac Mountain shall have been completed, of size not less than fourteen feet in width and eighteen feet in height from the bottom to the top of the excavation, and until the facades of the said tunnel and such portions as may require arching shall be finished with good substantial stone or brick masonry, and until the rails shall have been laid over the whole length of the road, including the tunnel, and the same constructed in such manner, and the necessary connections with other roads so finished, as will permit the convenient use of the same in the transportation of passengers and freight between the cities of Boston and Troy; but when such connections shall have been made, the tunnel fully completed and the road constructed as herein before provided, the balance of said scrip, amounting to three hundred thousand dollars, shall be delivered as aforesaid: and *provided, also*, that until the rails shall have been laid and the road put in running order between Greenfield and Shelburne Falls, the aggregate payments under this act shall not exceed one million of dollars: and *provided, also*, that prior to the second delivery of scrip to the treasurer of the Troy and Greenfield Railroad Corporation, according to the provisions of this section, evidence shall be furnished, satisfactory to the governor and council, that a sum equal to thirty per cent. of the amount of the scrip then applied for, shall have been actually paid to the treasurer of said corporation, (in cash,) by the stockholders thereof, in addition to the one hundred and twenty thousand dollars to be paid prior to the delivery of any scrip, and that on each application for scrip, in pursuance of the provisions of this section, and prior to the delivery thereof,

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satisfactory evidence shall be furnished to the governor and council that a sum equal to thirty per cent. of the amount of scrip then applied for, has been actually paid to the treasurer of said corporation, until the six hundred thousand dollars subscribed for shall have been paid by the stockholders; and no scrip shall be delivered until satisfactory evidence of such payment is, from time to time, furnished to the governor and council; and provided, also, no scrip shall be delivered to the treasurer of said corporation until satisfactory evidence shall be furnished to the governor and council, that said corporation have expended in a reasonable manner, in excavating and completing said tunnel, and in grading, constructing and completing the line of road, a sum at least equal to the amount of all the preceding issues of scrip.

SECT. 2. The preceding section of this act shall not be so constructed as necessarily to delay the opening of the road between Greenfield and Shelburne Falls, until after the completion of six thousand feet of tunnel; but whenever any portion of not less than three miles of said road shall have been graded between Greenfield and Shelburne Falls, as herein before provided, a portion of scrip, amounting to fifty thousand dollars, shall be delivered to the treasurer of the said company; and in case such payments shall have been previously made upon the road, the payments upon the completion of the third, fourth, fifth and sixth thousand feet of tunnel shall be reduced to thirty thousand dollars for each thousand feet of heading, and twenty thousand dollars for each thousand feet of tunnel of the required dimensions; but no portion of said scrip shall be delivered for any portion of said heading or tunnel, until the corresponding portion of the road shall have been graded as is herein before provided.

SECT. 3. Whenever the treasurer of said company shall receive any of said scrip, he shall offer the scrip, 80 received, to the treasurer of the Commonwealth for sale; and if the treasurer of the Commonwealth shall so require, being thereunto authorized by law, the treasurer of said company shall sell and dispose of the same to the treasurer of the Commonwealth, at the fair market value thereof, to be determined by the governor and council. If the treasurer of the Commonwealth shall decide to buy as aforesaid, then the treasurer of the company shall forthwith pay, to the commissioners of the sinking fund, ten per cent. on the amount of the scrip so taken, as a sinking fund. If the treasurer of the Commonwealth shall decide not to buy, as aforesaid, then the treasurer of the company, within three months after the receipt of any of said scrip, shall pay to the commissioners of the sinking fund, ten per cent. on the amount of the scrip so received, as a sinking fund. After the whole of said road is open for use, twenty-five thousand dollars annually, shall be set apart from the income of said road, and paid to said commissioners; and the whole thereof shall be added to said sinking fund, and shall be managed; invested and appropriated, as is or shall be provided by law in relation thereto.

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SECT. 4. The preceding sections shall be in lieu of and be substituted for sections two and three of chapter two hundred and twenty-six of the acts of the year one thousand eight hundred and fifty-four, and the second section of said act is hereby repealed.

SECT. 5. The time for completing the Troy and Greenfield Railroad and Hoosac Tunnel, is hereby extended until December thirty-first, in the year one thousand eight hundred and sixty-five.

SECT. 6. Subscriptions, the instalments upon which are payable in cash, or in the scrip of the towns authorized to subscribe to the stock of the Troy and Greenfield Railroad Company, under the provisions of chapter three hundred and ninety-four of the acts of the year one thousand eight hundred and fifty-five, shall be considered as unconditional subscriptions, in compliance with the requirements of this act; and payment in the bonds of said towns shall be considered as cash.

SECT. 7. This act shall take effect, whenever said company shall file, in the office of the secretary of state, a certified copy of any vote or votes accepting the same, which may be passed at any regular meeting of the stockholders of said company, or at any meeting specially called for that purpose.

Approved March 26, 1859.

[1860.—Chapter 202.]

AN ACT in addition to an Act authorizing a loan of the State Credit to enable the Troy and Greenfield Railroad Company to construct the Hoosac Tunnel.

Be it enacted, &c., as follows:

SECT. 1. The Troy and Greenfield Railroad Company shall forthwith make and file in the proper offices a location of their entire road and tunnel, which location shall be made on that side or sides of the Deerfield River which will afford the most direct and eligible route between the village of Shelburne Falls and a suitable terminus in the town of Deerfield or Greenfield, to be determined by the state engineer appointed as hereinafter provided.

The grades of any part of the road hereafter to be constructed shall not exceed forty feet to the mile ascending eastward, and fifty feet to the mile ascending westward; and the limits of grade and curvature of said road, included within said location; and not graded, shall be such that the maximum resistance to the passage of trains, in either direction, shall not exceed the maximum resistance in the same direction on the Fitchburg and Vermont and Massachusetts Railroads; and before any location made by the chief engineer of the Troy and Greenfield Railroad Company shall be filed, a copy of the alignment and a table of grades, verified by the oath of said engineer, shall be submitted to a state engineer appointed as hereinafter provided, who shall certify that the limits of grade and curvature herein before prescribed have not been exceeded, and the said table of grades so certified shall be filed with the location.

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SECT. 2. No further deliveries of scrip shall be made to said company upon the conditions authorized in former acts, but the undelivered portions of the loan of two millions of dollars authorized by chapter two hundred and twenty-six of the acts of eighteen hundred and fifty-four, amounting to one million seven hundred and seventy thousand dollars, shall be divided and apportioned between the railroad and tunnel, and for the construction of each, respectively; six hundred and fifty thousand dollars for the completion of the unfinished portion of railroad extending from the eastern terminus of said road near Greenfield to within half a mile of the eastern-end of Hoosac Tunnel, and one million one hundred and twenty thousand dollars for the completion of the tunnel, which shall be delivered upon the conditions and in the manner hereinafter declared, subject however to the provisions of the third section of chapter one hundred and seventeen of the acts of eighteen hundred and fifty-nine.

No delivery of any portion of said scrip shall be made until said company shall, at a special meeting duly authorized for the purpose, have assented to the provisions of this act, nor until said company shall have duly made and located their line of road as aforesaid, and shall have executed to the Commonwealth such further bond and mortgage, or other assurances of title on their franchise, railroad, or other property, as the attorney-general shall prescribe, for the further security of the Commonwealth; and said bond and mortgage, and other assurances, and all bonds, mortgages, or other assurances heretofore made to the Commonwealth by said company, shall have priority to and be preferred before any and all attachments or levies on execution heretofore or hereafter made.

SECT. 3. The governor and council shall annually appoint a state engineer for the purpose of examining and determining monthly the amount and value of the work done, and materials delivered on the railroad and tunnel of the Troy and Greenfield Railroad Company, who shall receive an annual salary of one thousand dollars, payable quarterly. The state engineer shall forthwith fix permanent marks in each end of the Hoosac Tunnel, marking the progress of the work up to February twenty-fourth, eighteen hundred and sixty, from which to determine the

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progress subsequently made. He shall also determine by suitable notes, marks, or observations, the amount and value of all grading, bridging, masonry, or other work done, or iron, or other materials delivered on the road east of the Hoosac Tunnel prior to December twenty-second, eighteen hundred and fifty-nine, and fix data from which to determine the value of any work, or materials delivered subsequent to the date last named. He shall monthly, immediately after the first day of each month, estimate the proportion which the work done upon the road, since the preceding estimate, bears to the whole of the work required to be done in the graduation, masonry, bridging, and superstructure of said railroad east of the Hoosac Tunnel, and also the work done in the excavation of said tunnel, which he shall certify separately to the governor, together with the amount of state scrip to which the company is entitled under the provisions of this act. Such monthly estimates shall be based upon a width of road-bed at grade of fifteen feet, on embankments, seventeen and a half feet in side-cuts, and twenty feet in thorough-cuts; in the heading of the tunnel, upon dimensions fourteen feet wide and six feet high in the middle, and in the finished excavation of the tunnel of fourteen feet wide and eighteen feet high in the middle.

The deliveries of scrip shall be at the rate of fifty dollars for each lineal foot of tunnel, divided between heading and full sized tunnel, in the proportion of thirty dollars for each lineal foot of heading and twenty dollars per lineal foot for the remaining excavation; and of six hundred and fifty thousand dollars for the whole of the graduation, masonry, bridging and superstructure of the unfinished portion of the road east of the tunnel.

The scrip shall be delivered on the road in the proportion which the value of the work done and the materials delivered each month bears to the estimated cost of the whole work and materials required on the portion of road aforesaid.

No expenditures shall be required merely for the purposes of ornament, but the work shall be substantially performed, and the rails shall weigh not less than fifty-six pounds to the lineal yard; for any defective materials or work, a proportionate amount of scrip shall be withheld.

The governor and council shall have a general supervision of the work, and for that purpose shall visit and inspect the same at least once in each year, and as much oftener as they may deem expedient; and they shall have power to correct abuses, remedy defects, and enforce requirements, by withholding scrip or imposing new requirements in such manner as the interest of the Commonwealth shall in their judgment require.

If the governor, upon the receipt of the monthly estimates and certificates of the state engineer, shall approve thereof, he shall transmit the same and his approval thereon to the state treasurer, and the state treasurer shall thereupon deliver the amount of scrip so certified for, to the treasurer of the Troy and Greenfield Railroad Company, or to his order, subject to the provisions hereafter mentioned. If he shall not approve thereof he shall submit the same to the council, and their approval transmitted to the state treasurer as aforesaid shall authorize such delivery.

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SECT. 4. The company shall at least thirty days before any interest on any state scrip delivered to said company becomes payable, transmit the amount thereof, with costs of exchange, to the treasurer of the state, and he shall in all cases and at the charge of said company, pay at maturity all interest and costs of exchange which become payable on said scrip where the same is payable; and if said interest and exchange and all interest and costs thereon, or any payments required to be made into the sinking fund, or interest thereon, or any part thereof, remain unpaid when said company becomes entitled to the next delivery of state scrip, then the state treasurer shall deduct the amount so remaining unpaid, with all costs and interest thereon, from the amount of scrip then deliverable.

SECT. 5. The Troy and Greenfield Railroad Company may construct their railroad across the public highways at grade, in cases where the county commissioners of the county do not determine such manner of crossing to be detrimental to the public safety and convenience; but whenever they do so determine, said company shall construct the same in such manner as the county commissioners direct.

SECT. 6. The legislature shall immediately after the passage of this act, elect two directors of the Troy and Greenfield Railroad Company, to hold their office for one year, or until others are elected by the legislature; and any city, town or corporation that may subscribe not less than one hundred thousand dollars, shall have the right to elect annually one director; and any city that may subscribe not less than five hundred thousand dollars, shall have the right to elect annually by their council two directors in said company, which election may be held at any time after such subscription is made.

SECT. 7. The capital stock of the Troy and Greenfield Railroad Company shall consist of twenty-five thousand shares of the par value of one hundred dollars each, in which shall be included all shares heretofore issued or subscribed for, conditionally or unconditionally, or payable in work, an accurate account of which shall be made by the company, and recorded in the records of the directors. And the residue of said shares, and all shares which may revert to said company, shall be hereafter issued only at par value, and for cash, or town or city scrip, or for the bonds of the company.

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SECT. 8. The Troy and Greenfield Railroad Company is hereby authorized and required to purchase the entire road, franchise, stock, bonds, and other property of the Southern Vermont Railroad Company, together with the income, benefits and reversion of its lease to the Troy and Boston Railroad Company, and subject to its provisions, for the sum of two hundred thousand dollars; and for the purpose of enabling them to make such purchase, and transfer the same to the Commonwealth as additional security to the Commonwealth for its whole loan, a further issue and loan of state Scrip in federal currency; of the description specified in chapter two hundred and twenty-six, of the acts of the year eighteen hundred and fifty-four, is hereby authorized to be made, to the amount of two hundred thousand dollars, deliverable as follows, namely:

Whenever all the capital stock of the Southern Vermont Railroad, excepting not exceeding twenty shares, of one hundred dollars each, and one hundred thousand dollars of its mortgage bonds, with coupons attached, the whole amount being one hundred and fifty thousand dollars, payable in twenty years from the date of issue, with six per cent. interest, payable semi-annually at the Bank of Commerce, in the city of New York, and the aforesaid lease of said company to the Troy and Boston Railroad Company, together with the rent reserved therein of twelve thousand dollars per annum, payable semi-annually, shall have been transferred to the treasurer of the Commonwealth, for the future security of the Commonwealth for its whole loan of credit to the Troy and Greenfield Railroad Company, in such manner as the attorney-general shall prescribe, and to the satisfaction of the governor and council, the state treasurer shall deliver one hundred and twenty-five thousand dollars of said scrip to the treasurer of the Troy and Greenfield Railroad Company; and when the remaining portion of said bonds, with the coupons attached, shall be in like manner delivered to the state treasurer, he shall deliver to the treasurer of the Troy and Greenfield Railroad Company the balance of said scrip, amounting to seventy-five thousand dollars: *provided*, that if any holders of said bonds, not exceeding ten thousand dollars in all, shall refuse to surrender the same at par, the Troy and Greenfield Railroad Company shall not be required to purchase the same, but the state treasurer shall withhold an equal amount of state scrip at par in lieu thereof.

The semi-annual payments of the coupons, with the balance of the income from the lease of the Southern Vermont Railroad, shall be collected by or paid to the state treasurer, who shall therefrom pay the interest on the two hundred thousand dollars of five per cent. scrip herein authorized to be issued, and shall pay the balance to the commissioners of the sinking fund of the Troy and Greenfield Railroad loan, to be by them from time to time

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invested as is now by law required.

The Troy and Greenfield Railroad Company shall, as soon as may be after the passage of this act, procure from the legislature of the slate of Vermont the requisite authority for purchasing, holding and mortgaging to the Commonwealth the franchise, railroad and property of the Southern Vermont Railroad Company, according to the provisions of this act; and in case such authority shall not be granted, and any want of security by reason thereof accrue to the Commonwealth, the governor and council shall withhold from the Troy and Greenfield Railroad Company portions of scrip constituting the last deliveries to be made on the completion of the tunnel, to such amount, not exceeding two hundred thousand dollars, as may be required for further security.

SECT. 9. All acts and parts of acts inconsistent herewith, are hereby repealed: *provided, however,* that such repeal shall not, and nothing contained in this act shall, have effect or be construed in anyway to release or impair any security which the Commonwealth now has or may hereafter have by force of the bond and mortgage now held by the Commonwealth on the franchise, railroad and property of the Troy and Greenfield Railroad Company.

Approved April 4, 1860.

[1862.—Chapter 156.]

AN ACT providing for the more speedy completion of the Troy and Greenfield Railroad and Hoosac Tunnel.

Be it enacted, &c., as follows:

SECT. 1. The governor, with the advice of the council, is hereby authorized and directed to appoint three able, impartial and skilful commissioners to investigate the subject of finishing the Troy and Greenfield Railroad, and of tunneling the Hoosac Mountain, whose duty it shall be to report to the governor and council what, in their judgment, will be the most economical, practical and advantageous method of completing said road and tunnel, the estimated cost of fitting the same for use, the time within which the tunnel can be completed, and what contracts can be effected, and with what parties, for completing said tunnel and road, and the probable cost of the same, the probable pecuniary value of the road and tunnel when completed, the sources and amount of traffic and income, and all other facts in their opinion useful to assist the governor and council in determining the best method of securing a continuous railroad communication between Troy and Greenfield.

SECT. 2. The Troy and Greenfield Railroad Company is hereby authorized to surrender to the slate, the property now mortgaged; but the right of redemption shall not be barred until ten years have elapsed after said road and tunnel are completed and the same open for use. The said commissioners shall immediately, in the name of the Commonwealth, take complete possession under the mortgages to the Commonwealth, given by the Troy and Greenfield Railroad Company, of all property, rights and interests intended to be conveyed by said mortgages, or either of them, and then shall, without unnecessary delay, cause the said railroad to be completed and put into running order, and supplied with suitable depots, turn-tables and other usual and necessary appliances for the reception of freight and passenger cars, from the eastern terminus of the Troy and Greenfield Railroad to the Hoosac Tunnel.

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SECT. 3. Said commissioners shall audit and allow all just claims for labor, service, materials, land-damages incurred after April sixth, eighteen hundred and sixty, and before July twelfth, eighteen hundred and sixty-one, in carrying on the work of constructing the Troy and Greenfield Railroad and Hoosac Tunnel, and may procure the release of all attachments and discharge all liens on said materials. The accounts thus audited shall be transmitted to the governor, and, if approved by the governor and council, the governor is hereby directed to draw his warrant upon the treasurer in favor of the claimants, for the amounts thus allowed, to an amount not exceeding one hundred and seventy-five thousand dollars.

SECT. 4. Said commissioners are hereby authorized, with consent of the governor and council, to use or run that portion of said road east of the Hoosac Mountain, or lease the same to the "Vermont and Massachusetts," the "Fitchburg," the "Troy and Boston Railroad Company," or either of them, until the completion of the said tunnel.

SECT. 5. Said commissioners shall have authority, with the approval of the governor and council, to continue the work on the Hoosac Tunnel, and by contract or otherwise, to expedite the completion of said tunnel.

SECT. 6. All the net earnings and income derived from said railroad, including the tunnel, shall be held by the Commonwealth in trust: first, for the payment and reimbursement of the interest on all loans, advancements and disbursements of the Commonwealth, on account of said railroad or tunnel: second, for the payment and reimbursement to all parties having a legal right thereto.

SECT. 7. The governor is hereby authorized to draw his warrant on the treasurer of the Commonwealth, for such sums as may be required from time to time by the commissioners for the purpose of carrying out the provisions of this act, and the amount of the same is hereby appropriated therefore; and the treasurer of the Commonwealth is hereby authorized to issue scrip, or certificates of debts, in the name and in behalf of the Commonwealth, to an extent sufficient to secure the required funds, which scrip shall bear such rate of interest, as is allowed at the time on state scrip issued for other purposes, and shall be redeemable at the end of thirty years from the date thereof; and he shall sell or otherwise use the same at his discretion, to procure the sum necessary to meet the payments in this act provided: *provided,* that all expenditures and advances made under and by virtue of this act, shall be on account, and form part of the two millions of dollars, authorized to be loaned in state scrip to the Troy and Greenfield Railroad Company by chapter two hundred and twenty-six of the acts of eighteen hundred and fifty-four; and said expenditures and advances, together with all sums hitherto advanced to said company, excepting the sums advanced on account of the "Southern Vermont Railroad," shall not exceed in amount the said two millions of dollars. Such changes may be made in the location and grades of the road, as may be necessary to improve the same; and no lease shall be made of the portion of the road east of the tunnel for a term exceeding six years; nor shall such portion be constructed without the approval of the governor and council.

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SECT. 8. All acts and parts of acts inconsistent herewith, are hereby repealed.

SECT. 9. This act shall take effect upon its passage.

Approved April 28, 1862.

[1863.—Chapter 214.]

AN ACT in addition to "an Act providing for the more speedy completion of the Troy and Greenfield Railroad and Hoosac Tunnel."

Be it enacted, &c., as follows:

SECT. 1. The commissioners appointed under the one hundred and fifty-sixth chapter of the acts of eighteen hundred and sixty-two, are hereby authorized, subject to the advice and approval of the governor and council, to construct, complete and equip the Troy and Greenfield Railroad and Hoosac Tunnel; and to make such alterations in the line of said road as may be deemed necessary to render it suitable and proper for part of a thorough line from Troy to Boston; also such alterations in the location and dimensions of said tunnel as will render it suitable and proper for use, in accordance with the spirit and intent of the two hundred and twenty-sixth chapter of the acts of eighteen hundred and fifty-four.

SECT. 2. The governor is hereby authorized to draw his warrant on the treasurer of the Commonwealth for such sums as may be required from time to time by said commissioners for the purpose of carrying out the provisions of this act, and the act or acts to which this is in addition; and there is accordingly hereby appropriated for the purpose of constructing and completing said tunnel and railroad and equipping the the same, and paying interest upon such scrip, as has been or may be issued during the progress of the work, the unexpended balance of the two millions of dollars authorized by chapter two hundred and twenty-six of the acts of the year eighteen hundred and fifty-four, and referred to in chapter one hundred and fifty-six of the acts of the year eighteen hundred and sixty-two. And the treasurer of the Commonwealth is hereby authorized, upon the warrant of the governor drawn as aforesaid, to issue scrip or certificates of debt to the amount of said appropriation, which shall be expressed in such currency and shall bear such rate of interest as the governor and council may direct, and shall be redeemable at the end of thirty years from the date thereof: and said treasurer shall sell or otherwise dispose of the same as he may deem proper, subject to the approval of the governor and council.

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SECT. 3. Said commissioners', and their successors in office, shall be removable by the governor, with the advice of the council, and in case of any vacancy occasioned by death; resignation or removal, such vacancy shall be filled by appointment of the governor, with the advice of the council; and said commissioners shall, once in three months, and oftener if required, present to the governor and council an account of all contracts entered into by them as such commissioners, and of all payments and charges by them made, by virtue of their commission, with their vouchers therefore, which vouchers and accounts shall be examined, and if found correct, and in good faith, shall be allowed by the governor and council; but no lease of any part of said railroad, nor any contract amounting to more than ten thousand dollars shall be made by said commissioners without the of the governor and council.

SECT. 4. Said commissioners in altering the location of the line of said road shall have the same power as railroad corporations have in making locations under existing laws, and may take, by purchase or otherwise, such lands, or easements therein, as may be needed for any purposes connected with the construction of said tunnel, and all titles or easements so taken shall vest in the Commonwealth; and all parties aggrieved by any action of said commissioners, under this section, may have their damages assessed in the manner provided by law for the assessment of damages against railroad corporations; and all damages so assessed shall be paid from the treasury of the Commonwealth to the party entitled thereto, upon the warrant of the governor, drawn pursuant to the provisions of this act.

SECT. 5. Said commissioners, subject to the approval of the governor and council, shall have the power to use a part of the money appropriated by this act, not exceeding fifty thousand dollars, to extinguish any liens or claims, or rights of redemption which any person or corporation may have, in order to perfect the title of the Commonwealth to said railroad and tunnel.

SECT. 6. The contract executed by the Troy and Boston Railroad Company, on the eighteenth day of February, eighteen hundred and sixty-three, by the Vermont and Massachusetts Railroad Company on the twentieth day of said February, and by the Fitchburg Railroad Company on the twenty-third day of said month, printed on pages eighty-eight to ninety-four, inclusive, of the report of said commissioners made on the twenty-eighth day of February, aforesaid, and referred to in the message of the governor, dated the twelfth day of March, in the year eighteen hundred and sixty-three, is hereby approved, ratified and confirmed.

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SECT. 7. The compensation or said commissioners shall be fixed by the governor, with the advice of the council; but the compensation of the chairman of said commissioners shall in no event exceed the sum of five thousand dollars per annum, nor shall the entire compensation of all of said commissioners exceed the sum of seven thousand dollars per annum.

Approved April 29, 1868.

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Statement of J. W. Brooks, Esq., Chairman of the Commissioners, made to the Committee during the session of the Legislature, 1866.

The first Act for loaning the credit of the State to the Troy and Greenfield Railroad Company, dated April 5, 1854, provides, besides other conditions, that when seven miles of the road in one or two sections is completed, and 1,000 feet of the tunnel, in one or more sections, sufficient for one or more tracks is completed, then \$100,000 of scrip shall be delivered to the company.

The size of the tunnel required by this Act is not definitely stated, nor what proportion of the \$100,000 of scrip is loaned on account of the tunnel.

The Act of April 4, 1860, defines the size the tunnel to be 14 feet wide and 18 feet high. If this means excavation and not completed tunnel, then the room required for the ballast and drainage would reduce the height to about 16 feet above the rails; a size absurdly small enough to be regarded as certainly not above the minimum intended by the Act. The same Act provides that \$30 per foot shall be allowed on account of heading, and \$20 on account of the enlargement, making \$50 per foot for the completed tunnel; \$50,000 of the first advance may therefore be considered as on account of the first 1,000 feet of completed tunnel, and the remainder, say \$50,000, on account of the road which had been then completed west of the tunnel.

The second delivery of scrip was on account of the tunnel, and under the provisions of the' Act of 1859, which provides that \$50,000 may be advanced upon the completion of 1,000 feet of heading. The heading was done and \$49,777.78 delivered October 4, 1859.

The third delivery of scrip was under the provisions of the same Act, and was on account of grading three miles of road, in detached pieces, near Greenfield. For this, \$50,222.22 was delivered January 3, 1860.

The fourth delivery was under the same Act, and for completing the second 1,000 feet of tunnel, for which \$30,222.22, was delivered March 1, 1860.

An Act changing the terms of the loan was passed April 4, 1860. Section 2 divides the scrip remaining undelivered, as follows: "No further deliveries of scrip shall be made to said company upon the conditions authorized in former Acts, but the undelivered portions of the loan of two millions of dollars authorized by chapter two hundred and twenty-six of the Acts of eighteen hundred and fifty-four, amounting to one million seven hundred and seventy thousand dollars, shall be divided and apportioned between the railroad and tunnel, and for the construction of each, respectively: 'six hundred and fifty thousand dollars for the completion of the unfinished portion of railroad extending from the eastern terminus of said road near Greenfield, to within half a mile of the eastern end of Hoosac Tunnel."

[93]

Section 3 contains the following provisions: "The governor and council shall annually appoint a state engineer for the purpose of examining and determining monthly the amount and value of the work done, and materials delivered on the railroad and tunnel of the Troy and Greenfield Railroad Company, who shall receive an annual salary of one thousand dollars, payable quarterly. The state engineer shall forthwith fix permanent marks in each

end of the Hoosac Tunnel, marking the progress of the work up to February twenty-fourth, eighteen hundred and sixty, from which to determine the progress subsequently made. He shall also determine by suitable notes, marks or observations, the amount and value of all grading, bridging, masonry, or other work done, or iron, or other materials delivered on the road east of the Hoosac Tunnel, prior to December twenty-second, eighteen hundred and fifty-nine, and fix data from which to determine the value of any work, or materials delivered subsequent to the date last named. He shall monthly, immediately after the first day of each month, estimate the proportion which the work done upon the road, since the preceding estimate, bears to the whole of the work required to be done in the graduation, masonry, bridging, and superstructure of said railroad east of the Hoosac Tunnel; and also the work done in the excavation of said tunnel, which he shall certify separately to the governor, together with the amount of state scrip to which the company is entitled under the provisions of this Act. Such monthly estimates shall be based upon a width of road-bed at grade of fifteen feet, on embankments, seventeen and a half feet in side cuts, and twenty feet in through cuts; in the heading of the tunnel upon dimensions fourteen feet wide and six feet high in the middle, and in the finished excavation of the tunnel of fourteen feet wide and eighteen feet high in the middle.

"The deliveries of scrip shall be at the rate of fifty dollars for each lineal foot of tunnel, divided between heading and full-sized tunnel, in the proportion of thirty dollars for each lineal foot of heading and twenty dollars per lineal foot for the remaining excavation; and of six hundred and fifty thousand dollars for the whole of the graduation, masonry, bridging, and superstructure of the unfinished portion of the road east of the tunnel.

"The Scrip shall be delivered on the road in the proportion which the value of the work done and the materials delivered each month bears to the estimated cost of the whole work and materials required on the portion of road aforesaid.

[94]

"No expenditures shall be required merely for the purposes of ornament, but the work shall be substantially performed, and the rails shall weigh not less than fifty-six pounds to the lineal yard; for any defective materials or work, a proportionate amount of scrip shall be withheld.

"The governor and council shall have a general supervision of the work, and for that purpose shall visit and inspect the same at least once in each year, and as much oftener as they may deem expedient; and they shall have power to correct abuses, remedy defects, and enforce requirements, by withholding scrip or imposing new requirements in such manner as the interest of the Commonwealth shall in their judgment require."

Under the provisions of this Act scrip to the amount of \$455,034.70 has been delivered on account of the railroad and \$40,131.95 on account of the tunnel.

State scrip was delivered in sterling up to and including the delivery of March 7, 1861, and afterwards in dollar bonds. In this statement the sterling is changed into dollars, to show it all in one currency, and the pound sterling is reckoned, as by the State treasurer when the deliveries were made, at \$4.44 ⁴⁴/₁₀₀.

The certificates for amounts due on account of the railroad or tunnel were for irregular sums, and the scrip delivered was in round amounts; the fractional difference sometimes in excess and sometimes below the amount of the certificates is divided between the tunnel and railroad in proportion to the amount due on account of each.

Stated and divided as above, the scrip which has been delivered on account of the railroad and tunnel, is as follows:—

Date.	On account of Tunnel.	On account of road west of Tunnel.	On account road east of Tunnel.	Total.
1858, October 6,	\$50,000 00	\$50,000 00	-	\$100,000 00
1859, October 4,	49,777 78	-	-	49,777 78
1860, January 3,	-	-	\$50,222 22	50,222 22
1860, March 1,	80,222 22	-	-	80,222 22
1860, October 8,	15,829 79	-	64,170 21	80,000 00
1860, Dec. 12,	5,580 37	-	112,197 40	117,777 77
1861, January 5,	2,781 99	-	30,601 34	38,883 83
1861, February 18,	2,545 83	-	23,281 95	25,777 78
1861, March 7,	2,052 82	-	19,724 95	21,777 77
1861, May 8,	5,061 65	-	80,438 35	85,500 00
1861, June 27,	2,831 89	-	84,668 11	37,500 00
1861, July 12,	3,497 61	-	90,002 39	93,500 00
	\$170,131 95	\$50,000 00	\$505,256 92	\$125,388 87

The amount of State scrip which according to statutes, had been earned by the progress made towards constructing the tunnel before the surrender of the property to the State, may be stated as follows:—

[95]

Strictly considered, no portion of the tunnel at the East End was cut to the required size of 14 feet wide and 18 feet high, much of it was less than 12 feet wide, and some of it only about 13 feet high. At the entrance the excavation was so nearly sufficient that only a small amount more was required to bring it to full size, and had all the rest been well done, a not very exacting inspector might have passed 25 feet of this as completed. The remaining 2,964 feet of penetration at this end could form no ground whatever for a claim as completed work.

At the West Shaft the heading had been driven in both directions 56 ½ feet.

At the West End the total penetration had been 543 feet. Of this distance 26 feet had been arched with stone—40 feet is in rock, standing without support, and 477 feet is temporarily supported with timbers. Under the assumption that the 40 feet left unsupported is safe enough to be left permanently 80, then 66 feet was completed at this end, giving at all points a total penetration of 3,588 ½ feet, of which, 91 feet was completed.

It is clear that the payment of \$50,000, under the Act of April 5, 1854, for 1,000 feet of completed tunnel, was not earned.

Under the Act of 1859, scrip to the amount of \$50,000 was to be delivered upon the completion of 1,000 feet of heading, and though the prior conditions of this Act had not been complied with, this amount may fairly be considered as having been earned.

The next payment of \$30,222.22 for the completion of the second 1,000 feet of tunnel was clearly not earned.

All subsequent payments were made under the Act of April 4, 1860, providing for the payment of \$30 per foot for heading and \$20 per foot for the enlargement.

The total amount according to the several Acts is as follows:—

Under the Act of 1859,—

For 1,000 feet of heading,

\$50,000 00

Under Act of 1860,—	
For balance of heading, say 2,588 ½ feet, at \$30 per foot,	77,655 00
For 91 feet of enlargement, at \$20 per foot,	<u>1,820 00</u>
Total amount earned,	\$129,475 00

The amount of State scrip which under the statute had been earned by the progress made in constructing the railroad may now be considered.

The first payment of \$50,000 under the Act of 1854, should have been for seven miles of completed railroad. The certificate of the engineer, upon which it was paid, gave (see page 82 of House document No. 185 for 1860,) the length of rails laid as upwards of seven miles; nothing in the certificate showed then any part of it was completed road, and upon investigation then made it proved that while most of it was done, a part near the west end of the tunnel "was not ten feet wide," and would cost several thousand dollars to complete it. It is clear that this payment had not then been earned in the manner provided by the statute. [96]

The second payment was on account of the road, under the Act of 1859, for grading three miles of road, "said three miles being all situated within four miles of the point of commencement;" Page 30 of House document No. 185 for 1860 says of this grading, "the continuous line is interrupted by fourteen gaps of cuts and fills;" it is thus made up of fifteen separate pieces, avoiding all but the cheapest part of the work, and costing, as the contractor who did the work certifies, between \$8,000 and \$9,000. Under, to say the least, a somewhat liberal construction of the Act, \$50,000 was said to have been earned by doing this grading.

All further deliveries of scrip have been under the Act of 1860, which provides that the \$650,000 to be delivered on account of the road east of the tunnel shall be in proportion to the progress made upon the work. On page 15, (Senate document No. 93 for 1863,) the cost of the work done and materials furnished upon the road east of the tunnel is stated at	\$463,047 90
Deduct amount first expended, as testified by the contractor, for which the \$50,000 was paid, say	<u>8,500 00</u>
Amount expended under the \$650,000 appropriation, including the cost of worthless bridging and masonry,	\$454,547 90
The cost of completing the grading, bridging, masonry and superstructure upon this part of the road, as estimated by Mr. Laurie in 1862, was	\$370,970 80
Deduct the cost of a small change in the line, and of embankment washed away by the Deerfield River,	<u>5,275 00</u>
Sum required to complete the road upon the old line where the work stopped,	\$365,695 80
Amount already expended under the \$650,000 appropriation,	<u>454,547 90</u>
Amount expended and to be expended at the then prices,	\$820,243 70

Of which 55 per cent. had been done when the work stopped, in July, 1861. 55 ⁴¹⁶/₁₀₀₀ per cent. therefore of the \$650,000 had been earned, and this amounts to \$360,204 00 [97]

The total amounts earned and paid compare as follows: Amount paid upon the tunnel,	\$170,131 95
Amount paid upon the road west of the tunnel,	50,000 00
Amount paid upon the road east of the tunnel,	<u>505,256 92</u>
	\$725,388 87
Amount earned upon the tunnel,	\$129,475 00
Amount earned upon the road west of tunnel, (not fully earned,)	50,000 00
Amount earned upon the road east of tunnel, (temporary work included,)	<u>410,204 00</u>
	589,679 00
	<u>\$135,709 87</u>
Overpayment in reckoning sterling exchange, say	44,000 00
Overpayment when the work stopped, in July, 1861,	<u>\$179,709 87</u>
Further payments made upon the same work under the law of 1862,	140,226 95
Total amount paid more than earned,	<u>\$319,936 82</u>

If proper deductions had been made from the amount earned on account of the unfinished condition of the seven miles west of the tunnel, on which the first \$50,000 was paid, and on account of the worthless masonry and bridging which have been reckoned in at full cost, the overpayments would be shown more correctly to exceed in amount the sum of \$350,000.

Transcription of text from [image facing page 10](#)

Profile of Hoosac Mountain

Length of Tunnel when finished	25,586.0 feet
Jan ^y . 1867 E. End heading	3,521.0
" " E. heading W. shaft	1,044.0
" " W. " " "	298.0
" " W. End heading	1,010.0
	<u>5,873.0"</u>
Balance	19,713.0"
Depth of Central Shaft when finished	1,037.0"
Jan ^y . 1867 down	<u>393.0"</u>
Balance	644.0"

Transcriber's Notes:

All obvious typographical errors were corrected. Tables containing decimal fractions were standardized to show decimals for all values in the column. Spelling was standardized to the most prevalent form. Punctuation was left as printed.

On page 42 the curve value 3 ½ ° was changed to 3° 30' to match the other similar values. The sum of the shares in the table in Appendix A on pages 50-51 should total 4,610 shares but was printed as 0,000. This was assumed to be a typographical error.

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