

A  
DESCRIPTION  
OF THE  
CANALS AND RAIL ROADS  
OF THE  
UNITED STATES,  
COMPREHENDING  
NOTICES OF ALL THE WORKS  
OF  
INTERNAL IMPROVEMENT  
THROUGHOUT  
THE SEVERAL STATES.  
BY H. S. TANNER.

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NEW YORK:  
T. R. TANNER & J. DISTURNELL,  
124 BROADWAY.

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1840.

## PENNSYLVANIA.

It is now about eighty years since the first movements were made to introduce a system of internal improvements into the then province of Pennsylvania. The friends of the system were indefatigable in their efforts to promote its commencement, in which they were seconded by the public authorities of the time. Essays showing the utility of internal navigation were written and extensively circulated, by which the people were stimulated to active exertions, in order to secure the accomplishment of this important object.

Having by these means enlisted the zealous co-operation of some of the most influential and wealthy inhabitants of the province on behalf of the proposed measure, application was made to the provincial legislature, for authority to open a water communication between the Schuylkill and Susquehanna rivers, and in the year 1762, a survey with a view to this object, was effected, by which its practicability was satisfactorily demonstrated. In 1791, the "Schuylkill and Susquehanna Canal" was commenced; and in 1794, one of the western sections, four miles in length, was completed and opened for navigation. From this period the further prosecution of the work was suspended; and it was not again resumed until the year 1816, when a newly organized company assumed its management, under whose direction the canal was completed and opened for use in 1824. This is, briefly, the history of the "*Union Canal*" now so called. Other works, less important in character and extent, had been executed in some parts of the province long prior to the above date. They are, however, merely adverted to now in justification of the claims of Pennsylvania, to credit, as the leader in the march of internal improvement in our country. By a reference to early enactments, especially those embraced in the period from 1760 to 1800, it will appear

that the legislature was not wholly indifferent to the promotion of internal improvement, or insensible to its importance. A navigable communication between the eastern waters and those of the Ohio, early attracted the attention of the public authorities; surveys for this object, were made by several distinguished engineers, assisted by David Rittenhouse, in his capacity of astronomer, who reported that "the whole distance of a navigation by water between Philadelphia and Pittsburg, would be 426 miles, in which there would not be any interruption but one portage of 18 miles at Conemaugh." The route as proposed by Rittenhouse and his colleagues, coincides, very nearly, with the line of the Union Canal, the central and western divisions of the Pennsylvania Canal, now constructed. In 1792 a company was incorporated to construct a canal between the Delaware, at Philadelphia, and the Schuylkill, at Norristown. This work was subsequently commenced, and considerable progress made in its construction, when, for want of funds and other causes, its further prosecution was suspended for the time, and ultimately abandoned altogether. A part of this line now forms the bed of the Columbia Rail-road, from Fair-mount to a point near Peters's Island. The failure of this enterprise, and the suspension of others of a like description, seem to have paralyzed the energies of the friends of internal improvement. With the exception of the Schuylkill Navigation and some minor works, little or nothing was done by them towards the introduction of a general system of improvement, until aroused by the example of their neighbours of New York, whose successful achievements now began to attract universal attention, they resumed their efforts, and succeeded in arresting the attention of the government. The legislature of Pennsylvania, actuated by a due sense of the importance of the subject, authorized the immediate commencement of several extensive canals and rail-roads; and on the 4th of July, 1826, was commenced that great system of internal improvement, which for extent, magnitude and utility, stands unrivalled in modern times. Though the canals and rail-roads are now in a condition to accommodate the present trade, there are yet some sections under contract, and in progress, which must be completed in order to perfect the system.

The whole of these public works are so located as to penetrate those sections of the state, which, from their known fertility

and mineral resources, afforded the greatest promise of a successful commerce with the great eastern and western emporia of the state; and more, perhaps, than any other sections, required those facilities which would most effectually develop their resources.

The entire expense to which the state will have been subjected, when the various lines of improvement are completed, will probably not be less than \$25,000,000. In addition to the state works, there are distributed throughout the commonwealth, completed or in progress, canals and rail-roads, the aggregate cost of which, when finished, will not fall short of \$25,000,000.

### CANALS.

**CENTRAL DIVISION OF THE PENNSYLVANIA CANAL.** This canal, with the Columbia and Portage Rail-road, and the western division of the Pennsylvania Canal, forms the great chain of communication between the Delaware and Ohio rivers. It commences at Columbia, on the western terminus of the Columbia and Philadelphia Rail-road, follows the east bank of the Susquehanna, and passes through the villages of Maytown, Bainbridge and Falmouth; intersects the Union Canal at Middletown, where there is a side lock of three feet, connecting this division with the Union Canal, and others, which connect it with the Susquehanna river. From Middletown, after uniting with the Susquehanna by a series of locks, it continues along the east bank of that river, through Highspiretown and Harrisburg to Duncan's Island, where it is intersected by the Susquehanna division of the Pennsylvania Canal. At the head of this island the canal crosses the Susquehanna and enters the valley of the Juniata, which it pursues mostly along its north or left side, and passing Millerstown, Mexico, Mifflintown, Lewistown, Huntingdon and Petersburg; and through the counties of Lancaster, Dauphin, Perry, Juniata and Huntingdon, terminates at Hollidaysburg, where it meets the Portage Rail-road across the Allegany mountain.

Length 172 miles; course W. N. W.; total lockage, from the basin at Columbia, to that at Hollidaysburg 670.53 feet; 40 feet wide at top, 28 at bottom, 4 feet deep; 18 dams; 33 aqueducts; 108 locks, exclusive of 2 guard locks, and outlet

locks at Columbia; those between Columbia and Duncan's Island are each 90 by 17 feet; and those from Duncan's Island to Hollidaysburg, 90 by 15 feet in the chamber; the latter are built on the composite plan. 15.83 miles of this canal consists of slack water navigation.

**RAYSTOWN FEEDER**, at the mouth of the Raystown branch of the Juniata. Length 1 mile.

**WESTERN DIVISION OF THE PENNSYLVANIA CANAL.** This link in the grand chain which stretches from Philadelphia to Pittsburg, traverses the valleys of the Conemaugh, Kiskiminetas and Allegany rivers, to its termination at Pittsburg. After leaving Johnstown, it passes the towns of Fairfield, Lockport, Blairsville and Saltzburg in Indiana county, Warren and Leechburg in Armstrong, and, crossing the Allegany above the mouth of the Kiskiminetas, enters Butler county, and thence along the right bank of the Allegany (which is crossed by a splendid aqueduct) enters and passes through the city of Pittsburg, and terminates on the Monongahela river. Length 104.25 miles; 40 feet wide at top, 28 at bottom, 4 feet deep; lockage 471 feet; 66 locks (exclusive of four on a branch canal to the Allegany) 90 by 15 feet within the chamber; total lockage 470 feet; 10 dams;  $21\frac{1}{2}$  miles of the above canal consist of slackwater navigation. The average fall from Johnstown to Blairsville, 30 miles, is about 8 feet per mile. Between the latter and Pittsburg it is 3 feet per mile; 2 tunnels; 16 aqueducts; 64 culverts; 39 waste wears; 152 bridges. Cost, \$3,000,000.

This work completes the route by rail-roads and canals to Pittsburg. It is one of the great thoroughfares from Philadelphia to the west. The entire distance from Philadelphia by the canal and rail-road is 394.54 miles. A navigable feeder extending from Kittaning to this division and commenced in 1838, was suspended in 1839, as no appropriation had been made by the legislature, for the prosecution of the work. Length 14 miles. Estimated cost \$662,603.

**JOHNSTOWN FEEDER**, at the eastern terminus of the western division. Length 1.50 miles.

**ALLEGANY BRANCH**, from Alleghanytown to the Western division. Length 0.75 miles.

**SUSQUEHANNA DIVISION OF THE PENNSYLVANIA CANAL**, commences at the outlet lock on Duncan's Island, where it joins the Central Division, crosses the north outlet of the Juniata, and enters Buffalo township, in Perry county; thence it pursues nearly a due north course through Perry and Mifflin counties, along the right bank of the Susquehanna, in Union county, to the town of Northumberland, where it intersects the canals which extend along the north and west branches of the Susquehanna. Length 39 miles; cost of construction \$1,039,256; 12 locks; and 86.50 feet of lockage.

**WEST BRANCH DIVISION**, leaves the Susquehanna Division at Northumberland, and passes along the left bank of the west branch of the Susquehanna, through Northumberland and Lycoming counties, to Farrandsville, in Clinton county. Length, including several sections of pool navigation, 73 miles; lockage 138.50 feet; 19 guard and lift locks; 8 dams, varying from 4 to 10 feet in height; 4 aqueducts; cost \$927,388.

**BALD EAGLE SIDE CUT**, extends from the pool at Dunns-town Dam, on the West Branch Division to Bald Eagle Creek. Length 3.62 miles.

**LEWISBURG SIDE CUT**, extends from Lewisburg, in Union county, to the West Branch Division. Length 0.63 miles.

**TANGASCOOTAC EXTENSION**, from Dunnstown to the mouth of the Tangascootac, a distance of 7.50 miles; nearly completed.

**SINNEMAHONING EXTENSION**. This work had progressed to some extent, when, in July, 1839, active operations were suspended for want of funds. It is 33 miles in length, and extends from the mouth of Tangascootac to that of the Sinnemahoning. The line, as located, will require 2 dams; 2 guard, and 17 lift locks; 5 aqueducts; 19 culverts; 10 waste weirs; and 30 bridges; with a lockage of 150 feet; estimated cost \$1,388,099 15.

**NORTH BRANCH DIVISION**, commences at the basin which unites the Susquehanna and West Branch Divisions at Northumberland. This canal pursues a north-eastern course, through Northumberland, Columbia and Luzerne counties; and by the towns of Danville, Bloomsburg, Berwick, &c., and terminates at Lackawana, in Wyoming valley. Length, including pool navigation, 72.50 miles; 40 feet wide at top, 28 at bottom, 4 feet deep; 7 lift and one guard locks, each

17 by 90 feet within the chambers; rise 68.89 feet; cost \$1,096,178.

**NORTH BRANCH EXTENSION**, in progress, commences at the mouth of Lackawana creek, and terminates at the village of Athens, in Bradford county. Length 90 miles, with 189.50 feet of lockage; 23 locks; 6 guard locks; 9 aqueducts; 3 dams; 23 waste weirs; 26 culverts; and 100 bridges. The design of this work is to effect a communication by means of the Chenango Canal of N. York and the Susquehanna, between the improvements of Pennsylvania, and the Erie Canal of New York, and thus facilitate the exchange of the various products of the respective states. Estimated cost of the North Branch Extension \$3,528,302 20.

**WISCONISCO CANAL**, in progress, extends from Wisconisco creek, at the western terminus of the Lykins Valley Rail-road to the pool of Clark's Ferry dam, at Duncan's Island. Length 12.25 miles. It has 1 guard and 6 lift locks; 3 aqueducts; 1 dam; 2 culverts; 5 waste weirs; and 18 bridges; descent 35 feet; estimated cost \$376,195 43.

**LACKAWANA FEEDER**, at the northern terminus of the North Branch Division. Length 0.25.

**DELAWARE DIVISION OF THE PENNSYLVANIA CANAL**. Commences at Bristol, in Bucks county, 18 miles above Philadelphia.

On leaving the basin at Bristol, the canal passes in nearly a direct line to Morrisville, opposite Trenton, leaving Tullytown on the right, and Tyburn on the left. On leaving Morrisville it pursues a course nearly at right angles with the section from Bristol to Morrisville. Following this direction, sometimes approaching within a short distance of, and then receding from the Delaware; it successively passes the towns of Yardleyville, Taylorsville, Brownsburg, New Hope, Lumberville, Smithville and Monroe, and terminates at Easton, where it unites with the Lehigh Company's works. Length 59.75 miles; 40 feet wide at the water line, and 5 feet deep; rise 164 feet, overcome by 23 lift locks, 90 by 11 feet, varying in height from 6 to 10 feet; 9 aqueducts; 20 culverts; 125 bridges; 2 guard locks; 1 outlet and 1 tide lock; completed, October, 1830; cost \$1,275,715.

**BEAVER DIVISION OF THE PENNSYLVANIA CANAL**. This canal is merely preparatory to a more extensive line of canals,

designed to connect Conneaut lake, in Crawford county, with Lake Erie, and ultimately with the Ohio river at Pittsburg. Another section of this work is just completed ; it extends from the town of Beaver, on the Ohio, to the head of slack water navigation on the Shenango, 6 miles above New Castle, and is 30.75 miles in length ; 17 locks ; lockage 132 feet. The section of the Beaver Division, from the Ohio to the confluence of Big Beaver and Mahoning, about three miles below Newcastle, forms a part of the communication between the canals of Ohio and Pennsylvania. The surface of low water in the Ohio river at the mouth of Big Beaver is 419.50 feet below the surface of Conneaut lake, and 90.50 above that of Lake Erie.

**FRENCH CREEK FEEDER**, extends from the head of navigation in the pool of Bemus Dam, three miles above Meadville, to the junction with the Erie extension ; including Conneaut Lake. Length 27 miles.

**FRANKLIN LINE**, extends from the feeder aqueduct over French creek, seven miles below Meadville, to the town of Franklin, on the Allegany river. The surface of the water in the aqueduct will be level with the Conneaut Reservoir when full, and 510 feet above Lake Erie. Length 22.25 miles ; lockage 128.50 feet.

**ERIE EXTENSION.** This work, now in progress, commences at the head of the pool, on the Shenango, six miles above New Castle, Mercer county, and thence proceeds towards the north along the valley of the Shenango, and through Crawford and Erie counties, to Presque Isle, at the town of Erie. It is 105.50 miles in length, and is divided into two lines, viz., the Shenango line, extending to the summit at Conneaut lake, 60 miles ; and the Conneaut line, thence to lake Erie, 45.50 miles. The ascent from the New Castle pool to the summit, when the reservoir is full, is 287.50 feet ; and the descent thence to the surface of Lake Erie, is 510 feet ; making the entire lockage 797.50 feet. A section of 43 miles, extending from the northern terminus of the Newcastle pool to Greenville, in Mercer county, is nearly completed, and will be opened for the public, in the spring of 1840. There are on the Shenango line 44 locks ; 35 of stone, and 9 of the composite order, (stone walls faced with plank) ; 5 dams ; 3 aqueducts ; 21 road, 46 farm, and 11 towing-path bridges ; and 24 waste wiers ; estimated cost \$1,658,679 06.



**THE CONNEAUT LINE.** Eleven and a half miles, 13 locks, 6 culverts, and 2 bridges of this line are progressing towards completion. The remainder of the work was put under contract in 1839. It is divided into 61 sections, comprising 21 composite locks; 2 aqueducts; 5 culverts; 50 waste weirs; 41 road, and 40 farm bridges. Estimated cost of the Conneaut line \$1,612,515 45; or \$3,271,194 51 for the whole work, extending from the pool above Newcastle to Lake Erie.

## RECAPITULATION.

Pennsylvania Canal, Central Division	.	.	172.00
" " Western "	.	.	104.25
" " Susquehanna "	.	.	39.00
" " W. Branch "	.	.	73.00
" " N. Branch "	.	.	72.50
" " Delaware "	.	.	59.75
" " Pittsburg and Erie*	.	.	80.00
" " West Branch Feeder	.	.	4.25
" " North Branch Feeder	.	.	0.25
" " West. Division Feeder	.	.	2.25
" " Cent. Division Feeder	.	.	1.00

		Total Canals	608.25
Columbia Rail-road	.	.	81.60
Alleghany Portage	.	.	36.69

Total Rail-roads	118.29
Total Canals	608.25

Grand total of Pennsylvania state works 726.54

All the above feeders are navigable. There are others not navigable. That at Hollidaysburg is 3 miles, and that at Swatara is 2 miles in length.

\* This includes the French Creek Feeder, and all the other improvements in that section of the state.

*Canals and Rail Roads constructed by Joint Stock Companies.*

## CANALS.

**SCHUYLKILL NAVIGATION.** This work extends from the dam at Fairmount, near Philadelphia, to Port Carbon in Schuylkill county. It consists of a succession of canals and pools. The pool above Fairmount dam is entered by a short canal on the west side of the Schuylkill. This pool extends about six miles to Flat Rock. About  $1\frac{1}{2}$  miles from Flat Rock dam, the Manayunk Canal leaves the last mentioned pool and rejoins the stream a short distance above the dam, and thus enters the second pool. This extends 4 miles to an inconsiderable canal, which connects it with the pool above. Three miles farther, another small canal conducts into the pool above Norristown, in Montgomery county; thence the stream is ascended by several short canals and pools, to the commencement of the "Oaks Canal,"  $3\frac{1}{2}$  miles in length. The Oaks Canal commences half a mile above the outlet of Perkiomen creek, and extends along the north or left bank of the Schuylkill, to a dam about one mile above Phenixville, in Chester county, where it enters the river. The pool formed by the dam just mentioned, extends to the outlet of the Vincent Canal, nearly five miles in length. About 1 mile above the termination of the Vincent Canal, commences the Girard Canal, one of the most extensive in the series. It is 22 miles in length, and extends along the right bank of the Schuylkill, from Pigeon creek five miles below Reading in Berks county. In the space between that point and Reading there are two dams and a small canal, which is connected with that passing through Reading, where the Union Canal intersects the Schuylkill Company's works. The latter canal enters the Schuylkill a short distance below Reading, and is on the left bank of the stream. With the exception of the Hamburg canal, ten miles in length, and another of three miles, the distance from Reading to Hamburg is traversed by a succession of short canals, mostly on the left bank of the Schuylkill; this is also the case from Hamburg to Port Carbon, where the navigation ceases.

This work opens a direct communication between Philadelphia and the anthracite coal region, in Schuylkill county,

whence immense quantities of it are transported to Philadelphia and other cities of the Union. Length of canals 58, and of pools 50 miles. Entire length from Fair Mount to Port Carbon, 108 miles. Canals 36 feet wide at top, 22 at bottom, 3 feet 6 inches deep; 129 locks, each 80 by 17 feet; 34 dams; 1 tunnel, 385 feet in length; rise 610 feet; cost \$2,500,176. Commenced in 1815; completed in 1826.

**FAIRMOUNT WATER WORKS.** The hydraulic works by which the city of Philadelphia and the adjoining districts are supplied with water, are situated on the east bank of the Schuylkill, two miles north-west from the city. They occupy an area of 30 acres, which extends from the Schuylkill on the west, to Fairmount street on the east, and from Callowhill and Biddle street on the south to Coates street and the Columbia Rail-road on the north. The greater part of this area consists of the "mount," an oval shaped eminence, about one hundred feet in height, with sides more or less inclined, according to the nature of the formation and the uses to which they are applied.

On the top of the hill, at an elevation of one hundred feet above mid-tide in the Schuylkill, and about 56 feet above the highest ground in the city, there are four reservoirs, whose aggregate capacity is about twenty-two millions of gallons.

One of these is divided into three sections, for the purpose of filtration. They are inclosed by a substantial pale fence, which while it serves to protect, does not obstruct the view of the reservoirs. The whole is surrounded by a gravel footway, extending along the entire brow of the hill, which is attained by a flight of steps on the west, and several inclined planes, of easy ascent, from the east.

Fairmount originally extended to, and formed the immediate bank of the Schuylkill, and the entire site of the various structures, and the beautiful embellishments which now adorn the place, and render it an object of peculiar attraction, is the result of expensive and laborious excavation into solid gneiss rock. It was commenced in 1819, and continued with occasional intermissions from that time down to the present day. The requisite power for propelling the machinery, is obtained by means of a pool formed by a dam, erected across the Schuylkill, which backs the water for several miles, and thus serves the double purpose of improving the navigation of the river, and giving

motion to the wheels and forcing pumps by which the reservoirs are supplied. The excavated plateau, extending from the foot of the mount to the precipitous bank of the river, is partly occupied by the wheel houses, forebays and other necessary structures, and the remaining spaces are very tastefully arranged, with flower gardens, gravel walks, fountains, statues and other ornamental devices, which, viewed in connection with the romantic country around, and the animating and busy scenes presented by the canals and rail-roads in the vicinity, form, altogether, a prospect of uncommon interest and beauty.

Previously to the erection of the works at Fairmount, the city had been supplied with water from the Schuylkill by means of two steam engines, one on Chestnut and Front streets, near the river, and the other at the intersection of Broad and Market streets. These were soon found to be wholly inadequate to the necessary supply, and were in a few years superseded by the works at Fairmount. By the first arrangement, the water was let into a basin, formed with suitable gates, at the foot of Chestnut street, and thence conveyed by an aqueduct, 460 feet in length to the water shaft at the lower engine house. Here it was raised by the engine and forcing pumps into a tunnel, 6 feet in diameter, extending along Chestnut and Broad streets, 3144 feet, to the other engine house at the Centre, now called Penn square. At this point, the water was again elevated, by the second engine, into a reservoir, 36 feet above the ground, and thence into an iron distributing tank, from which the wooden pipes, then in use, conducted the water through the various parts of the city. The total cost of this establishment from its commencement in 1799, to its abandonment in 1815, was \$657,398 91, including \$898 94 "*for whiskey*;" and the amount of water rents received during the same period, was \$105,351 18, leaving a balance chargeable to the city treasury of \$552,047 73.

In August, 1812, the construction of the steam works at Fairmount was commenced, and in September, 1815, was so far completed as to afford a partial supply of water to the citizens. In 1818, after expending \$320,669 84 in the erection and support of these works, it became apparent that a more economical system, and one better calculated to secure the object in view, than the one then in use, must be adopted, and in compli-

ance with a recommendation of the watering committee, councils immediately appropriated \$350,000, and authorized the erection of the dam and other works, now in operation at Fairmount.

The dam, a mound of earth and stone, planked on its southern side, is 1600 feet in length, including the western pier, 150 wide at the base, 12 at top, and varying in height from 36 to 12 feet. The entire length of the overfall is 1204 feet, the eastern embankment 270, and the head arches through which the water flows into the mill race, 104 feet. At the western end of the dam is a short canal, with 2 guard, and 2 lift locks, constructed at the expense of the city, by agreement, for the use of the Schuylkill Navigation Company.

The strength of this dam has been subjected to many severe trials, but it has hitherto escaped serious injury. The great ice freshet of the 26th January, 1839, when the water rose 10 feet 2 inches above the top of the dam, and 12 feet 3 inches above high water in the river below, affected it more than any previous one. It completely inundated all the pump machinery, and by its force burst open the doors and considerably injured the partitions, floors, &c. of the mill houses, and carried away some of the planking and masonry of the dam.

The mill race forms a parallelogram, excavated from compact gneiss rock, to a mean depth of 38 feet, is 419 feet long, from north to south, 90 feet wide, and 6 feet deep below the overfall of the dam. It is bounded by a paved avenue, 253 feet long and 26 wide, and the mill houses on the west; on the east by the rocky and nearly vertical side of Fairmount, 70 or 80 feet in height, and on the north by the head arches, which are so constructed as to allow the passage into the race of a body of water 60 feet wide and 6 feet deep. By means of a waste gate, the water in the race may be drawn off and discharged into the river below the dam. The mill buildings are of stone, 238 feet long and 56 wide. The lower floor is divided into 12 apartments, 4 are intended for 8 double forcing pumps, of which six have been introduced. The other apartments are for the forebays leading to the water wheels. These wheels are all of the same length, but not of the same diameter, are formed of wood, having iron shafts weighing about five tons each. The pumps with a head equal in weight to 7900 lbs., force the water into

the reservoirs at the top of the mount, 92 feet in height. The first of which was put in motion on the 1st July, 1822. It is 15 feet long and 15 feet in diameter, working under one foot head and seven feet fall. It forces one and a quarter millions of gallons of water to the receiving basin in twenty-four hours, with a stroke of the pump of four and a half feet, a diameter of 16 inches, and the wheel making eleven and a half revolutions in a minute. Five have since been put in operation, some of which make thirteen strokes in a minute, with small additional water fall, and force one and a half millions of gallons in twenty-four hours. Though the wheels are sunk below the ordinary line of high water, they are seldom affected except when the back water is about sixteen inches on the wheel.

The pumps are worked by a crank on the water wheel attached to a pitman connected with the piston at the end of the slides. They are fed under a natural head of water, from the forebays of the water wheel, and are calculated for a six feet stroke, but they are generally worked with not more than five feet. They are double forcing pumps, and are each connected with an iron main 16 inches in diameter, which is carried along the bottom of the race, to the foot of the mount, and thence up the bank into the reservoir, 92 feet above the dam.

The lowest estimate of the quantity of water afforded by the river in dry seasons, is 440,000,000 of gallons in 24 hours. The average quantity of water raised by each wheel and pump is about 530,000 gallons daily, but when the whole six wheels are put in motion, they can supply 6,000,000 of gallons in the 24 hours. The average daily consumption of water for the present year is about 4,000,000 of gallons, or 177 for each permit.

The reservoirs are lined with stone, and paved with bricks, laid upon a very tenacious clay bed, in strong lime cement, and made water tight. They are  $12\frac{1}{4}$  feet in depth. The whole cost of the reservoirs was \$133,824 42. From the central reservoir the water is conducted into the city by means of two iron pipes, one 20 and the other 22 inches in diameter. One passes down the north and the other down the south slope of the mount, each is nearly 10,000 feet in length; additional mains have since been inserted in the same reservoir. In 1821, the work of laying down iron distributing pipes was commenced,

and gradually displaced the old wooden pipes which had been used previously and exclusively. Of the 30 miles of wooden pipes laid from Fairmount through the city, in 1819, only 3 miles remain. Since the introduction of iron pipes there have been laid 62.62 miles of them up to January, 1840; add to which, 48.13 miles laid by the districts, and we have 109.75 miles. They extend about four miles in a south-east direction, and nearly the same distance towards the north-east. The larger iron pipes were originally imported from England; the whole cost of which, however, does not exceed \$20,000; whilst those furnished by American manufacturers amount to \$497,171 37.

The expense of supplying the city by steam power, with the same quantity of water now used, would be \$206 a day; whilst the cost by water power, is \$7 a day. This includes attendants' wages, fuel, light, &c. The estimated expenses for the year 1840, including general repairs and improvements, and extension of pipes, is \$27,500; and the amount of the water rents for the same year, is \$127,234 25; from which deduct the annual appropriation to the sinking fund, \$17,000, and the estimated expenses for 1840, \$21,209 67; making in all \$38,209 67, and a balance remains, applicable to any other purpose, of \$89,024 58. The whole sum expended at Fairmount since the employment of water power was determined on, up to December 31st, 1839, is \$1,464,146 21; and the amount paid for salaries, labour, and incidental expenses, from 1812, is \$379,428 19; making a total of \$1,843,674 40. The amount of revenue derived from the city and districts for the use of the water, from the commencement of the works, is \$1,493,024 53.

In addition to the innumerable pipes which convey the water into dwellings, &c., there are now distributed throughout the city and liberties 1007 "fire plugs," so called; to which, in case of fire, hoses, corresponding in calibre with the cavity of the plugs are attached, and thus convey the water to the engines, or, as is often the case, directly to the fire.

The average daily supply of water for the city and districts, during each quarter of the year 1839, was as follows:

	Gallons.
January, February, and March, . . .	2,981,560
April, May, and June, . . .	4,363,191
July, August, and September, . . .	4,573,465
October, November, and December, . . .	3,995,211

This shows an average daily supply for the year, of 3,978,357 gallons; and exceeds the consumption of the preceding year by 127,710 gallons.

In the city, the cost to each family supplied with water by private pipes, is \$5 a year; the owner or occupant of the house paying all expenses of the introduction of the water into the premises. In the districts, each family pays \$7 50 for the like supply. Hotels, manufactories, &c., pay an amount in proportion to the water supposed to be used, and generally at as high rates as families.

Their payments vary from \$10 to \$600 per annum. The County Prison pays \$500; the City and Northern Liberties Gas-works, each \$200; United States Mint, \$85; stable keepers pay each \$1 a year for each horse kept by them; hydrants for washing pavements, \$2 each; small houses in the rear of other buildings, \$2 50; and for openings, in private baths or lodging rooms, \$3. Establishments similar to that at Fairmount, are now in successful operation in Richmond and Lynchburg, Virginia; Nashville, Tennessee; Cincinnati, Ohio; Wilmington, Delaware; Pittsburg, Lancaster, Allentown, and Bethlehem, Pennsylvania; the latter was established in 1752, and is probably the first work of the kind erected in this country.

UNION CANAL, extends from a point a short distance below Reading, to Middletown, on the Susquehanna, and passes through the counties of Berks, Lebanon and Dauphin. If the pool near Reading be regarded as a part of the Union Canal, that work commences about three miles below Reading, on the west bank of the Schuylkill, and running nearly due north, enters the valley of Tulpehocken creek; following that stream chiefly along its left bank, the canal gradually ascends to the summit, a distance of 41.29 miles. The summit level is 6.97 miles, and the western section, including  $\frac{3}{4}$  of a mile of towing path, along the right bank of the Swatara, is 33.80 miles in length, making the entire length of the Union Canal, 82.08



miles. Course W. S. W. Summit at Lebanon, 498.50 feet above tide water; ascent 311; descent 208.50; total lockage 519.50 feet; 36 feet wide at top; 24 at bottom; 4 feet deep; 93 lift and 2 guard locks, each 75 by 8.50 feet; 43 waste weirs; 49 culverts; 135 bridges; 14 aqueducts; 1 tunnel, 729 feet in length. A navigable feeder from the Swatara, 6.75 miles long, and a pool formed by a dam at the head of the feeder, have also been constructed by the Union Canal Company. As the pool from which the summit is supplied is below the canal, the water is thrown into it by means of two forcing pumps, which are worked by water wheels; steam engines are provided for the same purpose, to be used in the event of accident to the wheels. This improvement affords a navigable communication from the main trunk of the Union Canal to Pine Grove, a distance of 23 miles, in a north-east direction. From Pine Grove the company have laid a rail-road through a gap in the Sharp Mountain, 4 miles in length, to the coal mines.

**LEHIGH NAVIGATION.** The Lehigh works, like those on the Schuylkill, consist of several canals and slack water pools. They extend from Easton to the Great Falls of the Lehigh, near Stoddartsville, in Northampton county.

Leaving the Lehigh immediately south of Easton, the line is conducted by locks, into the first canal, on the right bank of the river. About four miles above its point of outset, this section of the canal terminates at a dam one fourth mile below Smith's Island, and the pool thus formed is entered. This pool is about two miles in extent. At a distance of about six miles from Easton, commences the most extensive section of canal. It leaves the river one mile below Jack's Mill, passes along the north or left bank, through Bethlehem, and re-enters the Lehigh, at a dam not far from Allentown, in Lehigh county; thence by the river, one and a half miles; thence by canal to a dam, three miles; thence to river, three-quarters of a mile; thence by canal to a dam, four and a half miles; thence by the river, one and a half; thence by canal one mile to a dam; thence by the river, two and a half miles; thence by the canal three and a half miles to the Lehigh Water Gap. Here the Canal passes the Great Blue Mountain, and enters the coal region. From the termination of the last mentioned canal, the

river is used for one mile to a dam at the mouth of the Aquan-shicola creek ; then occurs a canal four and a half miles long, to a dam ; thence by the stream one mile ; and then is entered the canal, six miles in length, which extends to Mauch Chunk. From Mauch Chunk to Whitehaven, 24.75 miles, the improvements consist of canal and slack water navigation, similar to that below Mauch Chunk. From Whitehaven to Wright's creek, about one and a quarter miles, it is slack water ; and thence to the Great Falls, at Stoddartsville, it is for a descending navigation by artificial freshets. The works from Easton to Mauch Chunk are 46.23 miles in length ; and from Mauch Chunk to their northern terminus, 38.25 miles. Total length, 84.48 miles ; of which 30.53 miles consist of pools ; 39.26 of canals ; 2.48 of locks ; and the remainder of sluices.

The canals above Mauch Chunk are 60 feet wide at top water line, 40 feet at bottom, and 5 feet deep.

The locks, 29 in number, are each 20 feet wide, 100 between the quoins ; 86 feet clear of the swing gates ; 10 to 30 feet lift ; and are capable of passing boats of more than 100 tons. One of the locks has a lift of 30 feet, which is filled or emptied in two and a half minutes.

High water guard, 5 to 6 feet. Working guard, 3 to 4 feet. Twenty dams, from 187 to 375 feet long, and from 14 to 38 feet high. Total fall, 935.83 feet.

The canals at and below Mauch Chunk, are 60 to 65 feet wide at top water line, 45 feet at bottom, and 5 feet deep. Five guard, 3 guard and lift, and 44 lift locks, 22 feet wide, 100 between the quoins, 85 feet clear of the swing-gates ; 6 to 9 feet lift ; pass boats carrying more than 100 tons ; 8 dams from 300 to 564 feet long, and 8 to 19½ feet high. Total fall, 353.2 feet.

The export of coal by the Lehigh Company, during the year 1839, was 142,507 tons ; and by other companies, 79,343 tons ; total conveyed on the Lehigh Canal, 221,850 tons. In 1837 the Lehigh Company sent down the canal 200,000 tons.

The tolls received on 273.190 tons of coal and other articles amounted in 1839 to \$141,300 11.

This company's coal lands, amounting to six thousand acres, comprise the whole of the east end of the first or southern anthracite coal field, beginning on the top of the mountain,

about half a mile from the Lehigh river, and near Mauch Chunk, and extending without interruption to Tamaqua, on the Little Schuylkill, a distance of 13 to 14 miles. On these lands are found, beginning on the north side of the Coal Basin, nine veins from 5 to 28 feet in thickness, making together 111 feet. On the south side, which has not been so fully examined, are found veins of 50, 20, 15, and 9 feet. This coal is now penetrated, from the Room Run Valley, which cuts into the mountain on the northern side of the Coal Basin, and near to its base, and thus exposes the veins above-mentioned. At the Old Mine, five miles west of Room Run, the vein of 50 or 60 feet, which is the only vein worked at this place, lies as a saddle on the top of a hill nearly as high as the main mountain; here the coal is removed by quarrying in open day. About 30 acres have been worked out from this single vein, which have produced upwards of 1,100,000 tons.

Connected with the Lehigh Navigation, are several rail-roads leading from the various coal mines, situated in what are termed the first and second coal fields, whence large quantities of anthracite coal are sent to Philadelphia by the Lehigh and Delaware Canal, and to New York by the Morris and Delaware and Raritan Canal. Among these are the Beaver Meadow; Hazelton; Nesquehoning; Wilkesbarre; Mauch Chunk; Buck Mountain; Sugarloaf, and other small rail-roads.

**LACKAWAXEN CANAL**, see Hudson and Delaware Canal, New York.

**CONESTOGA CANAL**, consists of dams and locks. It commences at Reigart's landing in the city of Lancaster, and terminates at Safe Harbour on the Susquehanna. Length, 18 miles; course, south-west; 9 locks, each 100 by 22 feet; 9 dams; descent 62.

**CODORUS NAVIGATION**, is similar to the preceding, the improvement having been effected by means of canals and pools. It extends from York to the Susquehanna river and consists of 8 miles of slack water pools, and 3 of canals; length 11 miles; course, north-east; 9 locks.

**BALD EAGLE AND SPRING CREEK NAVIGATION**, extends from the state dam, on the Bald Eagle Creek, at the head of the side cut, to the town of Bellefonte in Centre county. Length 25 miles; cost so far as finished, (19 miles) \$230,000. This

improvement, though under the control of a joint stock company, is in fact a state work, constructed on the faith of the commonwealth which is pledged for the payment of an interest of 5 per cent. per annum for 25 years on \$200,000, and has since become a stockholder to the amount of \$25,000.

**WEST PHILADELPHIA CANAL**, is a small canal around the western abutment of the bridge over the Schuylkill, near Philadelphia. It is designed for the use of such vessels as cannot pass underneath the bridge, and enables those engaged in the coal trade to approach the first lock of the Schuylkill Navigation. Length one-twelfth of a mile.

**SUSQUEHANNA CANAL**, commences at Wrightsville, opposite Columbia on the Susquehanna river, and descends the right or west bank of that stream to Havre de Grace in Maryland. Length 45 miles; 50 feet wide at top; 5 feet deep; 29 lift and 2 guard locks, double chamber, and admit the passage of two boats each 85 feet long at the same time, or 1 raft 170 feet long and 16 wide; total lockage 233 feet. This work, sometimes called the "Tide water Canal," opens a communication between the Central Division of the Pennsylvania Canal and Chesapeake Bay. In structure, it is similar to the Pennsylvania Canal, and is designed as a continuation of that work, to tide water, though owned by a private company.

**CHESAPEAKE AND OHIO CANAL.** See Maryland.

**SANDY AND BEAVER CANAL.** See Ohio.

**MAHONING CANAL.** See Ohio.

## RAIL-ROADS.

**COLUMBIA AND PHILADELPHIA RAIL-ROAD**, the first link in the great western chain, commences at the intersection of Vine and Broad streets, Philadelphia, pursues a western course, and terminates at Columbia on the Susquehanna. Length 81.60 miles. This rail-road opens a direct communication between the valleys of the Delaware and Susquehanna, and intersects those of the Schuylkill, Brandywine and Conestoga, passing through the counties of Philadelphia, Chester and Delaware; and the towns of Downingtown, Lancaster, &c. The West Chester branch leaves the main line at a point 22 miles from Philadelphia, and that to Harrisburg, in the city of Lancaster.

This road forms a part of the great thoroughfare to Pittsburg and the western states, and is the most important outlet of the city of Philadelphia, towards the valley of the Mississippi. At its point of termination at Columbia, commences the Central Division of the Pennsylvania Canal which, with the Alleghany Portage Rail-road, and the Western Division of the Pennsylvania Canal, completes the "Rail-road and canal route to Pittsburg." An extension of this road from Columbia to York, in York county, is nearly completed; and a farther extension towards Gettysburg was advancing, when an order from the legislature, during the session of 1838-39, arrested its further progress. The Columbia Rail-road is the property of the commonwealth of Pennsylvania; the legislature of which authorised its construction on the 24th of March, 1828, and its location soon followed. On the 20th of September, 1832, twenty miles of single track were ready for use; in April, 1834, a single track along the entire route from Philadelphia to Columbia, was opened for travelling; and in October of the same year, the second track was completed, and the road opened for public use. The depots, work-shops and other necessary structures, were subsequently completed.

At a distance of about two miles from its point of outset, the road crosses the Schuylkill by a viaduct 984 feet in length, and immediately ascends an inclined plane of 2805 feet in length and 187 feet in height; and thence pursues its course along the dividing ridge between the Delaware and Schuylkill to a point near the intersection of the West Chester Rail-road, where it attains an elevation of 543 feet above high tide. Hence the road descends the South Valley hill into the great Chester valley, to Downingtown; from the summit of the South Valley hill to the Big Brandywine bridge, which is 250 feet above tide, the descent is at the rate of 29 feet per mile. After crossing the Little Brandywine, the road ascends the North Valley hill until it attains the summit at Mine Ridge Gap. Here the soil, being such as to forbid the excavation of 37 feet as originally intended, it was determined to increase the grade so as to reduce the depth of excavation to 23 feet; the grade, therefore, from the summit on both sides now stands at 45 feet per mile, for three-fourths of a mile, and thence a farther distance of one-fourth of a mile at 40 feet, when it resumes the

original inclination of 30 feet per mile. From the Gap summit, which is 533 feet above high tide at Philadelphia, it proceeds through Lancaster, and enters Columbia at the outlet lock of the Pennsylvania Canal. The plane by which the town of Columbia was formerly entered, is 1800 feet in length and 90 in height.

After many vexatious delays, occasioned by individuals, whose personal interests were likely to be affected by the location of the road, especially its eastern section, Major Wilson, the efficient engineer in chief, proceeded to the execution of his important task. Having determined upon its route, the principles of its construction next engaged his attention. The maximum grade of the line was fixed at 30 feet per mile and its minimum radius of curvature 631 feet. These principles were rigidly adhered to, with the trifling exception at Mine Ridge Gap, above-mentioned. As the inclined planes augment the expense and time of transit on this road, efforts have been made to avoid them. A new route of six miles has been completed, by which that at Columbia is dispensed with; the distance is nearly the same as the abandoned section, but its grade is 35 feet per mile. Several routes have been surveyed for the purpose of avoiding the inclined plane near Philadelphia; but as yet no alteration has been made. Two roads for this purpose have been commenced by joint stock companies; the West Philadelphia Rail-road, about 8 miles in length, with a maximum grade of 57, and an average grade of 43.30 feet per mile, and the Valley and Norristown Rail-roads; by the latter, the distance to Columbia will be increased 2.12 miles.

There are on the Columbia Rail-road nearly 57 miles of straight line; 12 miles with a mean radius of 2230 feet, and the remainder with that of 822 feet. The width of the road is 25 feet in the excavations, the top width of embankments generally exceeds 25 feet. The deepest cuttings are between 30 and 40 feet, and the highest embankment is 80 feet. A building at the head of the Schuylkill inclined plane, contains a stationary steam engine of 60 horse power. The rope used for elevating the carriages, is an endless one, 9 inches in circumference when new, and cost about \$2,800. The first rope used was 6.75 inches in circumference, and cost \$2,100, weighed

5.25 tons, and lasted about one year. On this plane cars pass up and down at the same time.

The culverts, 75 in number, are built of stone, and the masonry is either hammer or rubble work, with spans, varying from 4 to 25 feet, and contain 31.161 perches of masonry.

The number of viaducts is 20; they are constructed with stone abutments and piers, surmounted by wooden structures. There are 33 bridges across the rail-way for public and private roads.

The superstructure of the Schuylkill viaduct is of wood, with distinct trusses, formed of arch piers, king-posts and braces. The whole width from out to out is 49.67 feet, which admits of three separate passages, two of 18.50 feet each, in the clear, and one of 4 feet; the latter is used for foot passengers; one of the former for two rail-way tracks, and the other for common carriages. The spans are seven in number and six piers. The whole length of wooden platform is 1,045 feet, and the height of bridge floor above usual water line, is 38 feet. The total cost was \$133,947.

Valley creek viaduct has four spans, each 130 feet in clear between the piers. Piers vary from 56 to 59 feet in height. Cost, including stone work, \$22,254. The wood work was recently destroyed by fire, and replaced by a lattice bridge, (depressed so as to admit of the rail-way being carried over the top.) Cost, \$17,218.

East Brandywine viaduct, four spans, two of 88.66 feet each, and two of 121.58 feet in the clear. Clear width 18.50 feet; length of platform, 477 feet, and height of floor above water, 30 feet. Cost, \$17,523.

The West Brandywine viaduct, has a wooden superstructure, resting upon stone piers and abutments. Length of platform, 835 feet, divided into six spans; its greatest height above the water is 72 feet. The whole of stone and wood work. Cost, \$57,916. In this, like the one over Valley creek, the line is carried over the top.

Big Conestoga viaduct, is 1412 feet in length, and is elevated 60 feet above the water; stone piers and lattice superstructure on Town's plan. Cost, 31,503. The longest span of the bridge is 120 feet.

Little Conestoga viaduct, stone piers and abutments; flooring

804 feet in length; elevation 47 feet above the water. Cost, \$15,359.

Mill Creek viaduct, length of platform 550 feet; elevation above the water 40 feet. Cost \$9,273.

Pequea viaduct, single span 130 feet; cost \$8,735. This, like most of the others, is on Burr's plan.

*Railway superstructure.*—The entire length of *single track* is 163.20 miles, 6 miles of which have granite sills, plated with flat iron bars; 16 with wooden string pieces, similarly plated; 2 miles with stone blocks and edge rails, having stone sills, extending across the track at intervals of 15 feet; and 137.20 miles with stone block and edge rail, having wooden sills across the track, except on some of the embankments, where the edge rail is secured to cross sills of wood, supported by mud sills.

*Granite track.*—The trenches are dug in the direction of the road, two feet wide and 22 inches deep, measuring from the level of the top sill. Broken stone is then placed compactly, in layers of 3 inches each. Upon this are laid granite sills varying in length from 3 to 12 feet, and one foot in depth and width. Holes are drilled into the stone, 3.50 inches in depth and 5-8 of an inch in diameter. Into these holes, plugs of locust wood are driven, to receive the spikes which secure the iron bars, which are 15 feet in length, 2.25 inches wide and 5-8 of an inch in thickness. The inner edge of the sill is chamfered off for a width of two inches, and the outside is backed up with broken stone. Horse power being used on the road when this track was laid, a horse-path was formed of broken stone or gravel 6 inches in depth. The average cost of one mile of this track, including the trimming and dressing off half the width of the road-way, was \$10,179 20.

*Wooden track.*—The trenches are dug across the road, four feet apart, eight feet in length, one foot in width and 16 inches in depth, (making 24 inches to top of wooden rail.) Into these, broken stone is rammed in layers, upon which are laid sills of chesnut or white oak, 7.50 feet long and 7 inches square. The sills are notched to receive a yellow pine string piece, 6 inches square, which is secured in its place by wooden wedges. Flat iron bars are then spiked on, similar to those used on the granite track; the horse-path is also similar. This track cost \$5,604 48 per mile.



The two kinds of structure just described, have been in use about seven years, during which the wooden sills and string pieces have become much decayed; some of the bars also are broken and displaced, and in consequence they are working loose. This part of the road is to be renewed with edge rails,—a portion of which are already laid.

*Edge rails on stone blocks and sills.*—The trenches are dug in the direction of the road, 28 inches wide and 24 deep from top of block; at 15 feet these are connected by a cross trench, 16 inches wide. Broken stone to the depth of 12 inches, is well rammed in layers; the blocks and sills are then settled in their places by heavy rammers, and backed up to their tops with broken stone. The blocks are of granite or other hard stone, 20 inches long, 16 wide, and 12 deep; the sills are of the same material, 6.50 feet long and one foot square, placed across the track at every 15 feet; the blocks are so arranged as to give support to the rails at every three feet. Cast iron chairs, weighing 15 lbs., are secured to the blocks and sills, by bolts driven into cedar plugs previously inserted into the stone; there are two bolts to a chair, weighing 10 ounces each; between the stone and chair, a piece of tarred canvass is inlaid. The rails are of rolled iron, 15 feet long, 3.50 inches deep, parallel at top and bottom, and weigh 41.25 lbs. per lineal yard. The rail is secured in the chair by two wrought iron wedges, one on each side, weighing 10 oz. The horse-path for this track is formed of broken stone and gravel, 9 inches deep. Average cost of one mile, \$12,568 85.

Several miles of track were laid in a similar manner to the above, omitting the stone sill, and substituting in its place two blocks, at a cost of \$10,927 88 per mile. This kind of track was found so liable to spread, particularly in the spring of the year, that wooden sills have since been put in at intervals, connecting the two rails of the track.

*Edge rails on stone blocks and locust sills.*—This kind of track is similar to the edge rail track already described, with the following exceptions; instead of stone, locust sills are used, placed 15 feet apart on the straight lines, and 9 feet apart on the curves; to suit which, some bars were rolled in lengths of 18 feet; the stone horse-path is dispensed with, the tops of the blocks and sills being level with the graded surface of the road.

The average cost of one mile on this plan is \$13,249 92; the excess over the cost of the track in which stone sills were used, is owing to a rise in the cost of iron, from \$41 to \$50 per ton, (delivered at the eastern end of the road.)

On newly formed embankments the following plan was adopted: longitudinal trenches were dug, 22 inches wide, and 22 inches deep; broken stone to the depth of 6 inches, being rammed in, string pieces of white oak or chesnut were laid, 12 inches deep by 10 inches wide; these being notched to the depth of two inches, cross sills of the same material, 6 by 8 inches, were secured to them at every 3 feet by pins or wedges. On these sills the iron chairs, rails, &c. were placed. The trenches were connected at intervals, by cross trenches, running out to the edge of the embankment, for the purpose of carrying off the water. This description of track cost \$12,905 35 per mile. This road having been originally constructed for horse power, a system of turn-outs and side-tracks was adopted. Turn-outs were placed at intervals from one track to the other, and side-tracks were laid, adjacent to each of the main lines, at the distance of one mile and a half apart, for the whole length of the road; these side-tracks measured as follows:—160 feet in length parallel to the main track, and 70 feet at each end, curved to the intersection with the outside rail of main track. They afforded a space of about 200 feet in length for cars, and as the cars always entered in the same direction after both tracks were completed, only one moveable switch was used. Upon the introduction of steam power, the old castings having been found objectionable, were displaced, and others better adapted to this object, laid down; most of the side-tracks were also removed.

The following table exhibits the cost of the Columbia Railway, as nearly as can be ascertained. It must, however, be borne in mind, that since the road was opened for public use, various sums have been appropriated to it, in addition to previous appropriations; some portions of which belong, properly, to the item of construction, while others have been applied to objects not connected with its construction.

*Total cost of the Columbia and Philadelphia Railway.*

Grading, . . . . .	\$649,158 69
Culverts, . . . . .	74,113 94
Viaducts or rail-way bridges, . . . . .	327,695 80
Road and farm bridges, . . . . .	42,055 00
Fencing, . . . . .	65,410 86
Rail-way superstructure, . . . . .	2,181,156 25
Building and machinery, . . . . .	111,787 12
Engineering and superintendence, . . . . .	133,934 31
Damages, . . . . .	54,833 29
Repairs, . . . . .	42,451 76
Incidental, . . . . .	11,980 18
Alteration to accommodate the city of Lancaster, . . . . .	60,000 00
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	\$3,754,577 20

Since the road was opened in 1834, the following items of expenditure are to be added :—

Locomotive engines, . . . . .	\$327,203 41
Additional buildings, turn-outs, &c. . . . .	37,511 16
Retained per centage on former contracts, . . . . .	5,134 08
Engineering, . . . . .	4,741 25
New ropes at inclined planes, . . . . .	11,584 34
Embankment at Maul's bridge, . . . . .	1,796 34
Renewal of wooden track, . . . . .	18,907 48
Rebuilding Valley Creek bridge destroyed by fire, . . . . .	17,218 13
New road to avoid Columbia inclined plane, . . . . .	118,123 53
	<hr/>
Grand total	\$4,296,796 92
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The total expenses of working the road for one year, commencing October 31st, 1837, to October 31st, 1838, were :—

Ordinary road expenses, . . . . .	\$44,033 23
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Motive power	“ . . .	133,820 99
		<u>\$177,854 13</u>

Receipts during the same period.

Road tolls,	. . . . .	\$233,588 75
Motive power tolls,	. . . . .	164,052 74
		<u>\$397,641 49</u>
Deduct expenses,		177,854 13
		<u>\$219,787 36</u>

During the year just mentioned there were 103,336 passengers and 87,180 tons of merchandize conveyed upon the road. All the cars used on the road belong to individuals or companies, but the motive power is furnished by the state. Horse power is used on the West Chester Rail-way and a few others.

The officers and attendants of the road consist of one “superintendent of motive power,” who has charge of every thing in that department. One supervisor, who is charged with the repairs, &c. These officers are wholly independent of each other ; they appoint all persons employed under them, respectively, and report annually to the Board of Canal Commissioners, by whom the collectors of tolls, five in number, are appointed.

The rates of toll, vary from 6 mills to 4 cents per ton (of 2000 pounds) per mile ; there are twelve different rates, the average of which would be 2 cents per ton per mile. The lowest rates are for coal, stone, iron, vegetables, lime, manure, and timber, and the highest are for dry goods, drugs, medicines, steel and furs. On the United States mail, the toll is one mill per mile for every 10 pounds ; on every passenger, one cent per mile. In addition to these rates, a toll is levied of one cent per mile on each burthen car, two cents on each baggage car, and on every passenger car, one cent per mile for each pair of wheels. The motive power toll is, for each car having four wheels, one cent per mile, for each additional pair of wheels five mills, for each

passenger, one cent per mile, and for all other kinds of loading, 12 mills per ton (2000 pounds.) The owners of cars now charge \$3 25 for each passenger, and \$7 50 for every ton of merchandise conveyed the whole length of the road, they paying all tolls; which is at the rate of 4 cents per mile for a passenger, and  $9\frac{1}{10}$  cents per mile for a ton of goods.

The heavy locomotives now used for the transportation of freight, are capable of drawing thirty-five cars, each with a load of three tons, or one hundred and five tons, exclusive of the cars, engine and tender; if these be added, the whole will be 190 tons. The number of locomotives on the road at the date of the last report, was thirty-six, of which twenty-seven were in good order. The daily duty of the engines is to run about seventy-seven miles. During the year 1839, 51,156 cars passed over the Schuylkill plane, and 52,664 over that at Columbia.

Subjoined is an article relative to the cost of motive power, which is from the American Rail-road Journal, and which, in connection with the preceding remarks will afford a satisfactory view of the whole subject.

"In 1838 the cost of motive power, for repairs, oil, fuel, attendance, &c., was per mile run on the

Boston and Lowell Rail-road,	.	.	94 cents.
Boston and Worcester Rail-road,	.	.	79 "
Baltimore and Ohio Rail-road,	.	.	1 60 "
Richmond and Fredericksburg Rail-road,	.	.	80 "
Philadelphia and Columbia Rail-road,	.	.	55 "

The length, and the manner in which each of these roads is built, and the kind of engines used on them, are all before the world, and we presume our readers are familiar with their history; it is therefore unnecessary to make any remarks with regard to them. It is also well known that the Philadelphia and Columbia Rail-way is owned by the state of Pennsylvania, and the motive power is supplied by the state, while the cars are owned by individuals or companies. In making a statement of what profit the road would have given to the state, if it had owned the cars, we will assume an indebtedness for them in addition to the cost of road and motive power, when we shall find that it paid a profit upon the whole outlay, of *nearly*  $12\frac{1}{2}$  per cent.

Original cost of the road, . . .	\$3,333,236
Fifty locomotive engines cost . . .	336,000
Various appurtenances, . . .	330,764
Cost of passenger depots, supposed, . . .	200,000
Pay of agents and officers, . . .	55,625
Three hundred and sixty-three cars at \$275 each, . . .	99,825
Twenty passenger cars at \$2,000 . . .	40,000
Wear and tear, . . . . .	27,964
Contingencies, . . . . .	20,000
	<hr/>
	4,443,414
	<hr/>

In the year 1838 there was carried over the	
road 87,180 tons 82 miles at \$7 50 per ton, . . .	653,850 00
75,612 passengers, \$3 25, . . . . .	245,739 00
	<hr/>
	\$889,589 00
	<hr/>

The expenses were for carrying	
87,180 tons at \$2 50, . . . . .	\$217,950
The expenses were for carrying	
75,612 passengers at \$1 60, 120,979 80 . . . . .	338,929 80
	<hr/>

Net receipts, \$550,659 20

Which is 12.39 per cent on the preceding statement of cost. We consider it as very remarkable that the state can manage a road with more profit than a company; yet so it is; and as some may doubt the correctness of the assertion, we give the different expenses in detail, which are as follows:

A statement of the cost of working the Philadelphia and Columbia Rail-road, from October 31st, 1837, to October 31st, 1838.

Cost per trip, the distance of 82 miles, \$44 03 c. 5 m.	
The fuel costs per trip, of 82 miles, . . . . .	14 04 1
Cost per ton, the distance of 82 miles, . . . . .	1 55 3
Cost per ton per mile, 7,562,040 tons, . . . . .	1 8
Fuel cost per ton, 82 miles, . . . . .	50 79-1000
Cost of repairs per ton, 82 miles . . . . .	27 4
Cost of repairs per ton per mile, . . . . .	3 3

Cost per mile travelled for repairs of engines, . . . . .	9 c. 7 m.	
Cost per mile travelled 260,400, including all repairs, attendance, &c.,	54	99-100
Cost of maintenance of planes per ton, 82 miles, . . . . .	18	3
Engineer's and firemen's pay per ton, 82 miles, . . . . .	18	8
Cost of maintenance of planes per mile per ton, . . . . .	2	2
Engineer's and firemen's pay per ton per mile, . . . . .	2	3
Cost for fuel per mile travelled, . . . . .	13	86-100
No. of tons per trip way and through, 28 1-5 useful load,		
No. of cars per trip 14 2-7.		
Cost of oil per ton per trip, 82 miles, . . . . .	7	1
Cost of oil per ton per mile, . . . . .		8
Cost of oil per mile travelled, . . . . .	2	5 2-10
No. of tons through and way trains, useful load 42 1-7		
Total number of tons hauled, allowing 15 passengers to a ton, and 87,180 tons of merchandise, was 92,204 tons 82 miles, as copied from the book of performances kept in that year.		

A statement of the work done on the Philadelphia and Columbia Rail-way by 13 engines, manufactured by M. W. Baldwin, and the cost; said engines being taken in order as they came on the road, being the 13 last furnished by him to the state, from the time they commenced running till 31st October, 1838. [See Table next page.]

1837. When commenced.	No. of miles travel- led.	No. of cars haul'd.	No. of ts. dis. 77 ms. 3 ts. pr car.	No. of ts. dis. 1 m. over as- cent of 45 ft per mile.	No. of trips.	No. of ts. per trip thro	Cost of repairs to engines.	Cost pr. ton dis. 77 pr m. miles.	Cost pr. ton dis. 77 pr m. miles.
Westchester, Feb. 19.*	30.636	1.973	5.919	455.763	268	22.08	1.715.975.6m	.76	c28.97
Virginia, Feb. 19.†	36.421	3.729	11.187	861.399	473	23.65	1.658.484.55	1.92	14.82
Paoli, Feb. 19.†	36.036	3.426	10.278	792.099	468	21.98	1.148.453.16	1.44	11.14
Connestoga, F <sup>b</sup> . 22.†	5.929	1.549	4.647	357.819	77	60.35	131.622.21	.36	2.83
Ed. F. Gay, March 24.	25.872	7.265	21.795	1.678.215	336	64.86	1.475.785.63	.87	6.68
Parksburg, April 2.	24.178	6.361	19.083	1.469.391	314	60.77	1.591.296.58	1.08	8.33
Octarara, April 7.	13.552	3.628	10.884	838.068	176	61.84	771.905.69	.91	7.09
Pequa, April 24.	14.169	3.664	10.992	846.384	184	59.73	1.221.698.61	1.44	11.11
Downingtwn, Ap. 16.	26.257	7.074	21.222	1.634.094	341	62.23	1.475.235.64	.9	6.95
Indiana, May 1.	26.026	6.975	20.995	1.611.225	336	61.90	562.802.16	.84	2.68
Mississippi, May 9.	15.323	3.915	11.745	904.365	199	59.02	1.384.019.04	1.41	11.07
Montgomery, May 15.	21.406	5.261	15.783	1.215.291	278	54.99	830.643.88	.68	5.32
Wisconsin, May 28.‡	8.624	2.160	6.400	480.960	112	51.85	82.22.95	.17	1.26
	274.428	56.980	170.940	13,162.380	3,564		14,031.595.18	1c.	9.
							avera. avera.		

\* This was run 10,000 miles, below the Schuylkill plane, of which the number of cars was not kept.

† Ran the passenger train.

‡ This was on the Portage road six months.

§ This was used on a ferry boat, at Clark's ferry, all the season.



N. B. All those engines whose repairs exceed \$1000, met (during the period of seventeen months, at different times,) with accidents, such as running off the track, and breaking their axles, springs or frames, so that the mere wear alone, or repairs occasioned by running, would have been less. The West Chester is not allowed any cars or expenses for 10,000 miles which she run from Broad-street to the Schuylkill plane—all her repairs being charged to the number of cars she hauled over the road, which, if allowed, would diminish her expenses considerably.

The Paoli and Virginia, run with passenger trains, took less cars, but run more trips—the first running 473 out of 530 working days; the second 468 out of the same number of days. One losing 57 days, the other 62. The other engines did not fill up the time so, because freight was not to be had at all times."

**ALLEGANY PORTAGE RAIL-ROAD.** This work commences at the termination of the Central Division Pennsylvania Canal, at Hollidaysburg, pursues a W. N. W. course to Blair's Gap, and thence turning to the S. W. enters and passes along the valley of the Connemaugh to Johnstown, in Cambria county, having traversed in its course portions of Huntingdon, Bedford and Cambria counties. This road is connected with the central and western divisions of the Pennsylvania Canal, by two extensive basins, with which it communicates with slips and branch rail-ways. Length 36.69 miles; rise from Hollidaysburg to the summit 1398.71 feet, in a distance of 10.10 miles; and fall from the summit to Johnstown 1171.58 feet, in a distance of 26.59 miles; total rise and fall 2570.29 feet; of which 2007.02 are overcome by planes, varying in inclination from  $4^{\circ} 9'$  to  $5^{\circ} 51'$ , or from 7.25 feet to 10.25 feet elevation, to 100 feet base. The planes are all straight in plan and profile; and 563.27 feet by grading. With the exception of the ends, the grades never exceed 21.12 feet, and are generally between 10 and 15 feet, per mile. Aggregate length of the bases of the inclined planes, 4.37 miles, and that of the graded portion of the road, 32.32 miles. The embankments are 25 feet wide on the top. There are four extensive viaducts; one over the Connemaugh at the Horse Shoe bend, which is a magnificent structure, with

a single arch of 80 feet span, and the top of the masonry is 70 feet above the surface of the water. The cost of this work was \$54,562 24. One at the Ebensburg branch; one at the Mountain branch; and one across the Beaver Dam branch of the Juniata. Of culverts there are 68; 85 drains; and several bridges; 11 levels; 10 inclined planes, 5 on each side of the mountain; 1 tunnel, about four miles from Johnstown; it is 901 feet long, and 20 feet wide by 19 high within the arch; cost of tunnel \$37,498 85. Width of the road 25 feet, exclusive of side drains.

The edge rails used on the Alleghany Portage, are "parallel" rails of rolled iron, weighing about forty pounds per lineal yard. They are supported by cast iron chairs, which weigh on an average about thirteen pounds each. The rail is secured in every chair by one iron wedge. The stone blocks which support the chairs, contain three and a half cubic feet each, and they are imbedded in broken stone, at a distance of three feet from centre to centre. On a part of the rail-way, the chairs are laid upon a timber foundation; and on the inclined planes, and along the canal basins, at the two terminations of the road, flat rails upon timber are used. At the head of each inclined plane, there are two stationary steam-engines of about thirty-five horse power each, which give motion to the endless rope, to which the cars are attached. Only one engine is used at a time, but two are provided to prevent delay from accidents. Four cars, each loaded with 7000 lb. can be drawn up, and four may be let down at the same time; and from six to ten such trips can be made in an hour. A safety car attends the cars, both ascending and descending, and stops them in case of accident to the rope, which adds greatly to the security. The grubbing and clearing of the Portage Rail-road cost \$30,524. This work was equal to cutting a road through a dense forest, 120 feet wide and about 30 miles long. The grading of the rail-road, including the grubbing and clearing, and all work done under the contracts for grading cost \$472,162 59½. This work includes,

337,220	cubic yards of	common excavation.
212,034	"	slate or detached rock.
566,932	"	hard-pan or indurated clay.
210,724	"	solid rock.

14,857	cubic yards of	solid rock in tunnel, at \$1 47.
967,060	"	embankments carried over 100 feet.
67,327	perches	slope-wall, of 25 c. feet.
13,342	"	vert. " and wall in drains.

The viaducts and culverts, and the skew bridge for carrying the turnpike over inclined plane No. 6, contain 28,368 perches masonry, and their total cost was \$116,402 64½. For the first track and the necessary turn-outs, including a double track upon the inclined planes, there were delivered 50,911 stone blocks, each containing three and a half cubic feet, cost \$27,072 15; and 508,901 feet lineal of 6 by 8 inch timber; 239,397 feet of 10 by 10; and 2,842 feet of 12 by 12 inch timber, of white oak and pine, which cost \$47,184 50. The work done under the contracts for "laying" rail-way on the first track, including furnishing broken stone, amounted to \$135,776 26. The total cost of British iron at Philadelphia imported for the first track, was \$118,888 36. The *aggregate cost* of all the work done and materials furnished under contracts for the *first track* of rail-way, was \$430,716 59½. For the second track there were imported 16,976 bars of edge rails, each eighteen feet long, which weighed 1803 tons, 14 cwt. gross, and cost at Philadelphia \$87,494 80, or \$48 51 per ton. The *aggregate cost* of all work done, and materials furnished under contracts for the *second track* of rail-way was \$362,987 05½. Aggregate cost of work done and materials furnished under contracts for building ten stationary engines and machinery at the inclined planes, houses, sheds, dwelling-houses for enginemen, wells, water-pipes and ropes, first set, was \$151,923 30½.

*General statement of the cost of Portage Rail-road.*

Cost of Grading,	.	.	.	.	\$472,162 59½
Masonry,	.	.	.	.	116,402 64½
First track of Rail-way,	.	.	.	.	430,716 59½
Second "	.	.	.	.	362,987 50½
Buildings, Machinery, &c. at planes,	.	.	.	.	
first set,	.	.	.	.	151,923 30½

Ten Stationary Engines, <i>second set</i> ,	37,779 25
Buildings, &c. for second set of engines,	21,048 59
Depots, Machine Shops, Water Stations, Weighing Machines, and various works,	41,336 66½
	<hr/>
	\$1,634,357 69½
	<hr/>

The above sum is the cost of constructing the Portage Railroad at the contract prices; but it does not include office expenses, or engineering, or the extra allowances made to contractors, in a few instances, by the legislature after the work was completed, and beyond the contract prices.

Four locomotive engines have been used upon the "long level," but the expenses of them belong to another account.

In its course from Hollidaysburg to Johnstown the road attains an elevation of 2,491 feet above the Atlantic ocean. At Johnstown the Portage Rail-road joins the Western Division of the Pennsylvania Canal.

The execution of this important work was authorized by an act of the legislature of Pennsylvania, passed on the 21st of March, 1831. It was commenced on the 12th of April, 1831, and completed March 18th, 1834.

**PHILADELPHIA RAIL-ROADS.** The various important rail-roads which concentrate at Philadelphia, are extended into the city and surrounding districts by several minor works; among which are the following:

**CITY RAIL-ROAD,** commences at the termination of the Columbia Rail-road, at the intersection of Vine and Broad streets; extends thence down the latter, and terminates at the crossing of Cedar or South street, where it unites with the Southwark Rail-road. Length 1 mile; double track.

**MARKET-STREET BRANCH OF THE PRECEDING,** leaves the main line at Broad street; proceeds eastward to Third street; thence south, to, and along, Dock street, to an extensive range of buildings, erected by the city authorities, for the accommodation of the tobacco trade. Length 1.25 miles; double track to Eighth street; thence to Dock street, single track; and

along Dock street double tracks are laid. These roads are the property of the city.

**NORTHERN LIBERTIES AND PENN. TOWNSHIP RAIL-ROAD**, diverges from the Columbia Rail-road near its eastern terminus, and proceeds eastward, along James and Willow streets, to the Delaware. In its course it is intersected by the Germantown and Norristown, and Philadelphia and Trenton Rail-roads. Length, about 1.25 miles; constructed by a joint stock company.

**SOUTHWARK RAIL-ROAD**, extends from the termination of the City Rail-road at Broad and South streets, along the former, to Prime street, where it is intersected by the Philadelphia and Wilmington Rail-road. After uniting with that road, it curves towards the east, and proceeds down Prime street to the Delaware, near the Navy Yard. Length, about two miles.

A branch leaves this road and extends, along Swanson street, to South street. Length, half a mile.

**WEST PHILADELPHIA RAIL-ROAD**, Pa., commences on the Schuylkill river about 400 feet below the Market-street bridge, pursues a north-west course, through Hamilton and Mantua villages, and joins the Columbia and Philadelphia Rail-road about 8 miles from the Schuylkill. This road is intended to avoid the inclined plane on the latter at Peters's Island. Its maximum grade is 57 feet per mile, and its average grade 43.30 feet per mile. The grading of this road is principally done, but the work is now suspended.

**VALLEY RAIL-ROAD**, extends from Norristown to a point on the Columbia and Philadelphia Rail-road, about 31 miles west of Philadelphia. It is 20.25 miles in length, with a maximum inclination of 35.70 feet per mile. From Norristown the road has ascending grades nearly its entire length.

**WEST CHESTER RAIL-ROAD**, connects the Columbia Rail-road with the village of West Chester; it commences on the South Valley Hill, 22 miles from Philadelphia, and pursues the general course of the ridge about 10 miles to West Chester, in Chester county. Single track, though graded for two tracks. Width between the tracks is 4 feet, 8 $\frac{1}{4}$  inches. Maximum radius of curvature, 1260 feet; minimum, 541 feet. Greatest inclination 40 feet per mile; constructed in 1832; cost \$90,000.

**HARRISBURG, PORTSMOUTH, MOUNTJOY AND LANCASTER**

**RAIL-ROAD.** This company was incorporated in 1832; since which time various supplements to their charter have been enacted by the legislature, under which their corporate privileges are now exercised. The road was commenced in 1836, and a single track completed in September, 1838. It is proposed to lay down, immediately, another track of the best T rail iron. Length, 35.50 miles. Maximum inclination 42.24 feet per mile, but generally under 35 feet; the radii of the curves are mostly 2640 feet, and only one where the radius is less than 1000 feet. More than 22 miles of the road is perfectly straight. It has one tunnel, 850 feet in length. Total cost of the road, locomotive engines, &c. \$859,537 03 or \$24,212 31 a mile.

The gross receipts of the company for tolls were, in 1837, \$38,536 44; in 1838, \$64,532 94, and in 1839, \$92,894 72. Total in those three years, \$195,964 10; from which deduct expenses, \$139,524 50; net gain \$56,439 60.

Two dividends, amounting to 10 per cent. on the cost, were declared in 1839: leaving a surplus of \$16,614 72, which has been partly applied to the liquidation of the company's debts, and partly expended on the repairs of the rail-road. Already the sum of \$49,146 43 has been expended in repairs, which became necessary in consequence of the settlement of the embankments and the abrasion of the slopes. This road forms a section of the line towards Pittsburg, commencing on the Columbia and Philadelphia Rail-road in Lancaster, and terminates at Harrisburg, where the Cumberland Valley Rail-road commences.

**CUMBERLAND VALLEY RAIL-ROAD,** is a continuation of the Lancaster and Harrisburg Rail-road. After leaving Harrisburg and crossing the Susquehanna, the road proceeds with a general ascending grade, nearly due west, to Carlisle, in Cumberland county; thence, gradually curving towards the south-west, it enters Newville. Here the road taking a south-west direction, and passing through Shippensburg and Green Village whence the grade descends, enters Chambersburg in Franklin county. Length 50 miles. This road constitutes a part of the great western route to Pittsburg, &c.

**FRANKLIN RAIL-ROAD,** is a prolongation of the preceding. Its course, after leaving Chambersburg, is nearly south, which

is pursued, and passing through Greencastle, and along the left bank of Conococheague creek, enters and terminates at Williamsport on the Potomac, in the state of Maryland, where the road intersects the Ohio and Chesapeake Canal. Length 30 miles.

**CHAMBERSBURG AND PITTSBURG RAIL-ROAD.** The line proposed for this work, commences at Chambersburg, passes through Cumberland valley, crossing the west branch of Conococheague creek some distance below Loudon, thence ascending the side of Cove Mountain, it reaches Cowan's Gap, and descending the valley of Augwick creek, by the Burnt Cabins, to Sidling Hill Run, it proceeds up that stream. Passing through Well's valley, the line meets Ray's Hill, or properly a point where the Harbor Mountain joins the Broad Top Mountain, where a tunnel will be necessary. The line then proceeds, and, passing into Woodcock valley, and through the valley of Bloody Run, enters the town of Bedford. Thence over Dry Ridge and Deeter's Run, it encounters the main ridge of the Allegany, which must be tunnelled; and then passing on three miles north of Somerset, it ascends Laurel Hill; thence to Laughlintown, and along the valley of Loyalhanna, through a gap in Chesnut Ridge, it reaches Greensburg. From Greensburg it proceeds along Brush and Turtle creeks, and thus gains the valley of the Monongahela, which is followed to Pittsburg. Length of line 243 miles. It attains an elevation of 2081.69 feet at Laurel Hill.

Other lines from Chambersburg to Pittsburg have also been surveyed by the state engineers; but as no route has yet been definitively located, any further notice of them at this time, is deemed unnecessary.

**YORK AND WRIGHTSVILLE RAIL-ROAD.** This road, although the work of a private company, may be regarded as an extension of the Columbia and Philadelphia Rail-road. It unites with that road at Columbia, crosses the Susquehanna to Wrightsville, and thence proceeds to York, where it meets the unfinished rail-road to Gettysburg, and the Baltimore and Susquehanna Rail-road, now in operation. Length 13 miles.

**STRASBURG RAIL-ROAD,** in Franklin county, extends from the Cumberland Valley Rail-road to the town of Strasburg; 7 miles in length.

**MARIETTA RAIL-ROAD**, from Columbia to Marietta.

**BALTIMORE AND YORK RAIL-ROAD.** See Susquehanna Rail-road, Maryland.

**PHILADELPHIA AND READING RAIL-ROAD.** This road has its point of outset at the foot of the inclined plane, on the Columbia and Philadelphia Rail-road, on the west side of the Schuylkill, about three miles from the city of Philadelphia.

Ascending the right bank of the river Schuylkill, through Montgomery, Chester and Berks counties, the road enters the town of Reading in the last named county. It was commenced in 1835, under the orders of a joint stock company, and opened for public use on the 17th of July, 1838. A branch leaves the main line at the Falls of the Schuylkill, and thence proceeds in an eastwardly direction, and intersects the west bank of the Delaware, at the village of Richmond, three miles from Philadelphia. This branch is designed for the accommodation of the coal business. The entire length of this road from the Delaware to Reading, is 59 miles: and from its junction with the Columbia Rail-road, 54 miles. An extension of this work to Pottsville, 36 miles from Reading, is nearly completed: its structure is similar to that of the southern section. The heaviest grade from Reading to Philadelphia is 19 feet to the mile, for about 17,700 feet; between those points, there are 152,600 feet of level, and the remaining distance is divided into grades, varying from 1.5 to 11.8 feet per mile. All of which, as well as those between Reading and Pottsville, descend in approaching Philadelphia. About 30 miles above Philadelphia, the line passes through the Black Rock Tunnel, which cost \$150,000. At Flat Rock, 8 miles from Philadelphia, is another tunnel, 960 feet long, cut through gneiss rock. Near Port Clinton is a third tunnel, 1600 feet long. The shortest radius of curvature is 819 feet, and but 1480 feet struck with this radius. The other curves generally average from 2000 to 3000 feet radius. Total cost, including Pottsville extension, \$5,000,000.

*Plan of construction.*—The H rail is employed, weighing 45½ lbs. per yard lineal; each bar is 18½ feet in length, with square ends, and weighs, on an average, 282 lbs., or 8 bars to the ton. With exception of the square ends, the form of the rail resembles that on the Washington branch of the Baltimore

63  
36  
95



and Ohio Rail-road, except that it is  $5\frac{1}{2}$  lbs to the yard heavier than the latter.

The rail is laid upon the white oak sleepers, or cross ties, 7 feet in length, and hewn upon the upper and lower sides, so as to have a flat surface for the under bearing, and a similar one for the rail to rest upon of 8 inches wide; the depth of the sleeper being 7 inches uniformly. These are laid 3 feet  $1\frac{1}{2}$  inches apart from centre to centre, and cost, upon an average, delivered at distances apart of about two miles, on the graded surface of the road, about 60 cents each. Timber is scarce and dear upon the Schuylkill, and it was said that these were brought by the Union Canal from Huntingdon county. Each sleeper is laid upon a prism of broken stone, deposited in a trench 14 inches deep, 12 inches wide, and 9 feet long, transversely of the line of the track. The cost of broken stone was, on an average, (for this the first track) \$1 10 per perch of 25 cubic feet, delivered in heaps 10 feet apart on the road surface. Two sizes of broken stone were used, the one to pass through a two inch, the other through a 3 inch ring, the larger of which constitute the lower portion of the mass. The stone were placed and compacted in three different layers, one upon the other. The spaces between the sleepers are filled with clay, or any material most convenient to be obtained. This filling reaches the top surface of the sleepers in the middle of the track.

Every sleeper (except where there is a chair) is notched to a depth of about one-fourth of an inch, to receive the lower web of the rails. These notches cost 5 cents per sleeper, which is not included in the 60 cents above-mentioned.

Of the *fastenings*, it may be observed, that the rails, at their joinings, rest upon cast iron chairs, let into the sleepers by means of notches cut for that purpose. The chair is 6 inches square at its lower surface, where it is five-eighths of an inch in thickness. Upon that side of the chair situated upon the outer side of the track, and upon the entire length of the chair, there is a portion of the casting having an upward projection, and passing over the lower web of the rail upon that side, and thence to the stem of the rail; and also extending to, or very nearly to, a contact with the under side of the *upper* web. Through this upper projecting part of the chair, there are two

square countersunk holes, to receive square bolts, with heads formed to fill the said countersunk holes: each bolt passes through one of these holes in the chair horizontally, and likewise through a hole in the stem of the rail, near its end. The hole in the rail, however, is not precisely square, as it is in the chair, but is three-fourths by seven-eighths of an inch, and situated at a clear distance of three-fourths of an inch from the end of the rail. The hole in the chair is for a bolt five-eighths square, and the head of the bolt to fill the countersink, is fifteen sixteenths. Upon the inner side of the rails, a nut screws upon each bolt, to hold the ends of the two rails to the chair, and in proper line, whilst the hole in the rail is wider than the bolt to allow for contraction and expansion from change of temperature. The bolt and nut weigh seven ounces, and the chair  $10\frac{1}{2}$  lbs., and is held in place by means of four spikes, the heads of which pass over the edge of the chair, whilst their stems are driven into the sleepers, and also fill recesses left for that purpose in the corners of the chairs in casting them. The same kind and size of spike is used to fasten the rail to each sleeper, (except where the chairs are) the head of the spike passing over the edge of the lower web on each side of the rail. The spikes are six inches in length, and their stems are three-fourths by five-eighths of an inch, and they weigh about three-fourths of a lb. each. It is thought that the stem should be square, and the length  $4\frac{1}{2}$ , or at most 5 inches.

The varied cost of the iron rails at Philadelphia, averaged about \$60 per ton. And the cost of the conveyance to the road, by means of the Schuylkill Navigation, was \$2 60 per ton.

There are in the mile of track,

Bars of rails, in number 563, weighing	71 tons.
Chairs, . do. 563, do.	5,910 lbs.
Spikes, . do. 7,882, do.	4,524 "
Screw bolts & nuts, do. 1,126, do.	481 "
Sleepers of wood, do. 1,689.	

The track cost an average rate of \$1 50 per sleeper, or \$2,533 per mile, exclusive of the cost of all the iron materials, at Philadelphia.

The cost of *laying down* this single track of rail-way, consisting of excavating the trenches to receive the broken stone—putting down the broken stone—laying, notching, and

adjusting the sleepers—putting on the chairs and the iron rails complete—*has been, on an average, 40 cents per sleeper, or \$675 60 per mile of track*: to which add, for contingencies, such as cutting the iron bars, in order to make the joinings of each two have a position opposite to the middle of the length of the opposite rail, or bar, (this being a condition uniformly observed in the track) extra transportation, cleaning the side ditches, making crossings, &c. &c., say about \$200 per mile.

The above-mentioned 40 cents per sleeper, or \$675 60 per mile, is included in the aforesaid \$1 50 per sleeper, or \$2,533 per mile. The contracts for laying down the rail-way were made at so much per sleeper, viz. 40 cents as above.

The entire cost of the single track, as laid, is stated to be \$7,617 per mile, inclusive of materials and workmanship.

*The Tunnel*, about 30 miles from Philadelphia, is 1932 feet in length, 19 feet wide, and  $17\frac{3}{10}$  feet in extreme height. The sides are cut perpendicular at a height 10.9 feet from the bottom of the grade line, which is ten inches below the top of the rails. Above this the form of the cross section is that of a semi-ellipse, rising 6.4 feet. The faces of the excavations of the openings at the ends of the tunnel, are respectively 47 and 55 feet in height, and these are secured by well dressed masonry. Except at the ends, no masonry is required, as the rock, called here *Grauwacke slate*, appears to be of sufficient tenacity, to justify dispensing with arch masonry.

*Stone Viaduct*.—At the northern end of the tunnel, the road immediately crosses the Schuylkill to its left bank, by means of a stone bridge.

Length 4 spans, each 72 feet, . . . . . 288 feet.

3 piers, “ 8 “ . . . . . 24 “

with circular wing walls to support the banks, &c. Width of structure, from out to out, 18 feet 4 inches. Roadway above low water mark 24 feet. Versed sine of each arch  $16\frac{1}{2}$  feet, the form being that of a circular segment of  $47\frac{1}{2}$  feet radius. The abutments and piers are founded upon the rock from 8 to 12 feet below the surface of low water, by the use of coffer dams. The work is laid in Roman cement below the water surface, and in common mortar above that line. The whole exterior is of cut stone, and has a very light and beautiful appearance.

The Philadelphia and Reading Rail-road, with its extension to Pottsville, completes the line of communication between Philadelphia and the anthracite coal region of Schuylkill county: and comes in direct competition with the Schuylkill Navigation, which unites the same points, and pursues nearly the same course as the former. It connects with the Mount Carbon Rail-road, and by means of it, with the Danville and Pottsville Rail-road. It will also, at the same place or at Mount Carbon, half a mile below Pottsville, be connected with the Mill Creek and Schuylkill Valley Rail-roads, either by the extension of one or other of the last named rail-roads, or by a branch of the Reading Rail-road of less than two miles to Port Carbon. At Schuylkill Haven it connects with the Mine Hill and Schuylkill Haven Rail-road; and at Port Clinton, 15 miles below Pottsville, it connects with the Little Schuylkill Rail-road, by which the Lehigh Coal and Navigation Company can transport their coal to the Reading Rail-road. It will thus be perceived, that the Reading Rail-road unites with all the rail-roads in the coal region of Schuylkill county, by which the coal is, at present, brought in cars to the Schuylkill Canal.

Some idea of the character and construction of the Philadelphia and Reading Rail-road may be formed from the fact, that an engine weighing 11 tons, conveyed over the road from Reading to Philadelphia, 101 cars, with a gross weight, including the engine, of 423 tons, at an average speed of 10 miles per hour. Among the freight were 2002 barrels of flour, weighing 190½ tons! Amount of freight for this trip, \$835 19, and expenses of every sort, including the return of the empty cars, &c., \$105 94; net profits, \$729 23.

**LITTLE SCHUYLKILL RAIL-ROAD.** Commences at Port Clinton, at the junction of the two principal branches of the Schuylkill; and extends to the mines at Tamaqua, at the foot of the Broad Mountain. Length 23 miles; single track, although graded for a double track. The radii of curvature are in general from 477 to 1000 feet. Rise, 406½ feet.

**DANVILLE AND POTTSVILLE RAIL-ROAD.** Commences at a point on the Mount Carbon Rail-road, 2½ miles N. W. of Pottsville; by a deep cut and tunnel, of 700 feet in length, the road passes into and along the valley of Mill Creek, until

it reaches, by four inclined planes, the first summit on the Broad Mountain, 1014 feet above Sunbury. Thence it descends the Broad Mountain by a plane, which depresses the road nearly 400 feet to a level,  $2\frac{1}{2}$  miles in extent, when the sixth inclined plane conducts it to another level of four miles. The line then proceeds and gains the summit between the Mahonoy and Shamokin creeks, by the seventh plane and an ascending grade, and then descends the Shamokin valley to Sunbury on the Susquehanna; length 44.54 miles. A branch, 7 miles long, from the main line to Danville is proposed; entire length 51.54 miles.

The eastern section of this road was opened for use on the 24th of September, 1834. On this section there are 1 large, and 4 inferior inclined planes. The former, in Mahonoy valley, is 1650 feet in length, and overcomes an elevation of 345 feet, and the 4 latter 700 feet.

The coal tunnel on the Girard estate, which opens a communication between the Mahonoy and Shenandoah valleys, is 2500 feet long.

**LITTLE SCHUYLKILL AND SUSQUEHANNA OR CATAWISSA RAIL-ROAD**, is a prolongation of the Little Schuylkill Rail-road, though owned by a different company. The Company was incorporated by the legislature of Pennsylvania, in the year 1830, with a capital of \$300,000, for the purpose of extending the Little Schuylkill Rail-road to the town of Catawissa, on the *North Branch* of the Susquehanna. By subsequent legislative enactments, however, the capital stock of the Company was increased to *two millions* of dollars; and the managers were authorized to extend their road to Williamsport, on the *West Branch* of the Susquehanna. They are also permitted to hold *five thousand acres* of coal land; to exercise mining privileges; and to make whatever contracts they may consider necessary, with other rail-road and canal companies, for the transportation of their coal to market.

This road commences on the northern termination of the Little Schuylkill Rail-road, and proceeding northward, through Lindner's Gap, and a tunnel, 1150 feet in length, in the ridge which divides the waters of the Schuylkill from those of Catawissa creek, it enters and pursues the valley of the Catawissa, to the village of that name, on the *North Branch* of the Susquehanna. Here it intersects the line of the Pennsylvania Canal, which will extend to

the New York boundary. From Catawissa the road ascends the left bank of the Susquehanna a short distance, then crosses that river to Bloomsburg, where it enters the valley of Little Fishing Creek, which it ascends, passing through the village of Millville to Cox's Gap, where it traverses a summit 479 feet above Catawissa. Descending the northern declivity of the Muncy Hills to Muncyboro, and thence with the left bank of the West Branch of the Susquehanna, the line is conducted to Williamsport in Lycoming county, where it unites with the Williamsport and Elmira Rail-road.

A branch line, 12 miles in length, with a descending grade, leaves the main road near Lindner's Gap, about one mile south-east of the summit, traverses the valley of the Quakake, and intersects the Beaver Meadow Rail-road, about four miles from the Lehigh, and below its inclined planes. At Lindner's Gap is a plane 1900 feet long, whose angle of inclination is  $4^{\circ} 58'$ , overcoming an elevation of 165 feet. In the section from Catawissa to the summit tunnel there is no grade exceeding 33 feet per mile: from that point to Tamaqua the maximum inclination is 66 feet per mile, and the total descent 740 feet. There are two tunnels on the main line, and one inclined plane on the Beaver Meadow branch road. Total cost, as estimated by the principal engineer, exclusive of engineering, \$1,622,117. Length of main line 106 miles; general course north-west. Though it appears by the charters of the two companies, that the Little Schuylkill company's works should terminate 9 miles north of Tamaqua, we have considered them as terminating at Tamaqua, and framed our descriptions accordingly.

**WILLIAMSPORT AND ELMIRA RAIL-ROAD.** This road leaves Williamsport at the termination of the Tamaqua road, and pursues the left bank of Lycoming creek; passing through the village of Ralston and the county of Bradford, it enters Chemung county, in New York, and terminates at the town of Elmira, the southern terminus of the Chemung Canal. Length 73.50 miles. General course, N. N. E.

**CORNING AND BLOSSBURG RAIL-ROAD,** partly finished and the remainder in progress, from Blossburg, in Tioga county, Pa., to Corning at the western termination of the Chemung Canal, in Steuben county, N. Y. Length 40 miles. With the addition of about fifteen miles of rail-road, which are proposed, from

Blossburg to the Williamsport and Elmira Rail-road, an unbroken chain of improvement by canal and rail-road, from Philadelphia to Buffalo and the Falls of Niagara, will be established. This is a most important improvement as it affords a new and convenient route to the central and western parts of New York, and is the first opening from those parts to the coal region of Pennsylvania. The chartered name of the company under whose direction this work was commenced, is the "Tioga Navigation Company."

CATAWISSA AND TOWANDA RAIL-ROAD, as proposed, will diverge from the Little Schuylkill and Susquehanna Rail-road at or near Millville, and pass up the east bank of the Little Fishing Creek, thence by the head waters of the Muncy and Loyalsock, through Towanda and Athens, to the New York state line, where it will intersect the New York and Erie Rail-road, and form a connection with the rail-road between that point and Ithaca, at the head of Cayuga Lake.

SUNBURY AND ERIE RAIL ROAD. The necessity for a continuous rail-road communication from Philadelphia to the great lakes, was long since suggested and is now universally admitted. In consequence of the increase of trade between eastern and western Pennsylvania, it has become an object of the utmost importance to improve those channels of communication upon which the continued increase of that trade depends. Influenced by this consideration, some of the citizens of Philadelphia, in conjunction with others, concerted measures for the construction of a rail-road to extend from the town of Sunbury to that of Erie on the southern shore of Lake Erie, and thus complete the line from Philadelphia to that point: a charter having been obtained in 1837, the surveys which soon followed resulted in the adoption of the following line:—Commencing at the town of Erie, it passes in a south-east direction, and ascends the escarpment which separates the waters of Lake Erie from those of French Creek. Having attained the summit, the line enters the ravine of Boeuf Creek, and thence crossing by an eastern course the north branch of French Creek, it surmounts the ridge between the head streams of that creek and those of the Broken Straw Creek, whose valley is pursued to the mouth of Kenjua Creek, in Warren county. Here the line deflects towards the south-east, and ascending the valley of the Kenjua, proceeds over the high table-land of

M'Kean county, and falls into the ravine of the Driftwood branch of the Sinnemahoning, whose valley is then entered and followed to its junction with the West Branch of the Susquehanna in Clinton county. From the confluence of the Sinnemahoning, and West Branch, where it meets the western terminus of the state canal, the line proceeds along the right or south bank of the West Branch, and terminates at a point opposite to Dunnstown. The route thence to Sunbury has not been definitely located, nor is its point of connection with existing works yet determined. Owing to the deranged state of the currency, nothing further than a survey and location of the line has yet been done in its execution. By means of this rail-road, and either the Danville and Pottsville, or the Susquehanna and Little Schuylkill Rail-road, and the works now completed or nearly so, between Port Clinton and Philadelphia: a continuous rail-road communication will be opened from the latter city to the town of Erie, a distance of about 420 miles.

The great importance of such a communication, and the deep interest which the friends of internal improvement take in its successful completion, are abundantly exemplified in the enthusiasm which animated the members of the late convention. The merchants of the east and the manufacturers and farmers of the west, cannot fail to perceive how intimately their future success in trade is identified with the issue of the great effort now making to open the way to a more intimate connection between them, and thus to promote their mutual prosperity. At present there is but little intercourse between the inhabitants of the east and those of north-western Pennsylvania, for the obvious reason that the necessary facilities of a direct communication are wanting. The citizens of Pennsylvania, therefore, could not but view this enterprise with peculiar favour, as tending to unite more closely the interests of every member of the great Pennsylvania family, and thus to cement that bond of union, which should form one of the leading objects of all such efforts.

It is proposed to extend a branch from the Sunbury and Erie Rail-road to Pittsburg. Surveys to a limited extent have been made, chiefly to ascertain the practicability of crossing the main ridge of the Alleghanies. These surveys prove satisfactorily that a rail-road, without inclined planes, may be constructed from Lock Haven, on the Sunbury and Erie Rail-road, along the



valley of Bald Eagle Creek, through Emigh's Gap of the Alleghany mountain, into the Kiskiminitas valley ; whence, to Pittsburgh, no uncommon difficulty is likely to interpose to prevent the accomplishment of this important connection.

**MOUNT CARBON RAIL-ROAD**, commences at the lower landings of Mount Carbon, passes through Pottsville, and thence up the valley of Norwegian creek, where it unites with the Danville and Pottsville Rail-road. Length, including two branches, 7.24 miles. Cost \$118,000. Rise 246.50 feet.

**SCHUYLKILL VALLEY RAIL-ROAD**, extends from Port Carbon, where the Schuylkill Navigation terminates, and follows the valley of the Schuylkill to Tuscarora. Length 10 miles. It has 20 branches extending from this road in various directions, the aggregate length of which is 15 miles. Cost of main line, \$5,500 per mile. There are two sets of tracks, the width of each is  $3\frac{1}{2}$  feet. The curves are numerous and many of them abrupt.

**SCHUYLKILL RAIL-ROAD**, 13 miles in length ; cost, \$7,000 per mile.

**MILL CREEK RAIL-ROAD**, from Port Carbon to the coal mines near Mill Creek. Length of main line 4, and of branches 5 miles ; cost \$20,000.

**MINE HILL AND SCHUYLKILL HAVEN RAIL-ROAD**, commences at Schuylkill Haven, extends along the west branch of Schuylkill, through Mine Hill Gap, and terminates at the coal mines in that vicinity. Length, including two branches, 20 miles ; cost \$181,615. The curves have radii from 400 to 500 feet ; maximum grade, 30 feet per mile ; 2 inclined planes ; 50 bridges ; 12 culverts ; highest embankment 21 feet.

**MAUCH CHUNK RAIL-ROAD**, extends from Mauch Chunk to the coal mines, 9 miles, exclusive of branches which are nearly 16 miles in length ; constructed in 1827 ; elevation of the mines above the Lehigh, 936 feet. The curves are generally abrupt, most of the radii being only 190 feet. Some of these have been improved. The line ascends, in some parts, at the rate of 133 feet per mile. Cost \$3,500 per mile. Single track, with turn-outs, &c. ; width between the tracks 42 inches ; iron rails, one inch and three-quarters wide, three-eighths of an inch thick, fastened on wooden rails, sleepers mostly of wood.

**ROOM RUN RAIL-ROAD**, extends from Mauch Chunk to the

coal mines on Room Run. Length 5.26 miles. Rise 534.57 feet. Cost \$76,111.

**BEAVER MEADOW RAIL-ROAD**, extends from Parryville on the Lehigh, 6 miles below Mauch Chunk, to the Beaver Meadow coal mines in Northampton county. Length 20 miles.

**HAZELTON AND LEHIGH RAIL-ROAD**, from the mines above Hazelton to a point on the Beaver Meadow Rail-road, 8 miles.

**NESQUEHONING RAIL-ROAD**, from the Nesquehoning coal mines in Northampton, to the Lehigh, 5 miles.

**LEHIGH AND SUSQUEHANNA RAIL-ROAD**, extending from White Haven on the Lehigh, to Wilkesbarre on the Susquehanna, forms a part of the Lehigh Coal and Navigation Company's works, and unites the Wyoming valley with that of the Lehigh.

It is 19.58 miles in length, with one tunnel and three inclined planes, by which it ascends the mountain from Wilkesbarre. From its northern terminus, the Wyoming Coal Company have constructed a branch rail-road, four miles in length, extending to their mines, and thence to the North Branch Canal. This road will be so constructed with iron T rails as to permit loaded boats to be conveyed over it and thus avoid the transshipment of their cargoes.

**CARBONDALE AND HONESDALE RAIL-ROAD**. This road extends from Honesdale, the western terminus of the Lackawaxen Canal, to Carbondale on the Lackawana river, in Luzerne county, Pa. It forms the concluding link in the chain of improvement from the Hudson river to the coal region of Luzerne county, Pa. Length, including branches, 17.67 miles; to which add about 4 miles of turn-outs and side lines; the entire length of single track is 21 miles. The road attains the summit of Moosic mountain, 912 feet above the mines, by seven inclined planes, worked by stationary power, and descends, 850 feet, by three self-acting planes. Minimum radius of curvature 1000 feet. About nine miles of this road consist of lofty truss work in place of embankments.

**LYKENS VALLEY RAIL-ROAD**, extends from the Broad Mountain through Bear Creek Gap, and thence on the north side of Berry's Mountain, to Millersburg on the Susquehanna, in Dauphin county. Length 16.50 miles.

**PINE GROVE RAIL-ROAD**, from Pine Grove, in Schuylkill county, to the coal mines, 4 miles above.

**PHILADELPHIA AND TRENTON RAIL-ROAD**, commences at Philadelphia, passes through or near the towns of Frankford, Bristol, Tullytown, &c. and terminates at Morrisville, opposite Trenton : length 26.25 miles.

**PHILADELPHIA, GERMANTOWN AND NORRISTOWN RAIL-ROAD**, extends from Philadelphia to Norristown. About three miles from the former, the road to Germantown branches off and pursues a north course, whilst that to Norristown enters the valley of the Schuylkill, which it follows to Norristown, passing through Manayunk. Length from Philadelphia to Norristown, 17 miles. Entire length, including Germantown branch, 21 miles. The cost of the latter was nearly \$50,000 per mile.

**PHILADELPHIA AND WILMINGTON RAIL-ROAD**, commences on the Southwark Rail-road at the intersection of Prime and Broad streets in Philadelphia, proceeds towards the southwest through Chester, in Delaware county, and terminates on and unites with the Wilmington and Susquehanna Rail-road, at Wilmington, in Delaware. Length 27 miles.

This road and the others which now form a continuous line of rail-road between Philadelphia and Baltimore, having been commenced by four several and distinct companies, it soon became obvious that an union of the various interests was indispensable to the full development of all the advantages, which, under judicious management, might be anticipated, from this important link in the great Atlantic chain. Measures were accordingly adopted, to re-organize the whole ; and, after obtaining the sanction of the various legislatures, an arrangement was effected, on the 5th February, 1838, by representatives from the respective companies, and subsequently ratified by the stockholders, by which they were consolidated under the title of the Philadelphia, Wilmington and Baltimore Rail-road Company. In the construction of this work, several kinds of rails have been adopted for different sections of the route, in all of which, strength and consequent permanence have been made, essential requisites. The bridge rail, weighing 40 lbs. per yard ; the T rail, weighing 56 lbs. per yard ; and the heavy bar rail, 1 3-4 inches in thickness, by 2 1-2 inches in breadth,

weighing 40 lbs. per yard, are used throughout the whole, with the exception of a portion of the route between Philadelphia and Wilmington, upon which the heavy plate bar has been laid.

The superstructure of the road consists of longitudinal sills, connected by cross ties of locust, red cedar, or seasoned white oak, and surmounted by longitudinal string pieces of Carolina heart pine, on which is laid the iron rail. Upon the greater part of the road, however, the strength of the iron bar is such, as to render unnecessary the use of the longitudinal string piece, the bar being supported by the cross tie alone.

Between the city of Wilmington and the Susquehanna river, (see Maryland,) the roadway is graded thirty-five feet in width with superior bridging, all but one being built of the most substantial stone masonry and brick arches, making them secure from risk of fire. Upon other portions of the road, the surface width is twenty-five feet, having, throughout nearly the whole length of the line, a surface graded sufficiently wide for two tracks of railway. The whole distance was contracted for and finished by different contractors, in various quantities of from five to ten miles in extent, and amounts from \$10,000 to \$60,000.

The total receipts of the road for the year 1839, were \$490,635 55, exceeding those of the preceding year by \$118,720 61, and the whole number of persons conveyed on the road during the year 1839, was 213,650, a great portion of whom were through passengers. The receipts from passengers amounted to \$416,974 76, and from the transportation of merchandise, \$39,239 27, and for the United States mail \$27,497. The dividends for the same year, were seven per cent. on \$4,379,225 17, the total amount expended by the company for road construction, building, travelling apparatus, &c.

**GETTYSBURG RAIL-ROAD.** This road, the construction of which was commenced under the authority of the state government some years since, extends from York in York county, in a south-west direction, through Gettysburg, in Adams county, to the village of Clear Spring, on the Potomac, in Maryland. Length, about 91 miles, 13 of which are in the state of Maryland. After expending \$622,891 61, and incurring liabilities to the amount of \$145,307 78, in addition, the legislature, by a resolution passed February 19th, 1839, directed the suspension

of the work from and after the 1st of March ensuing, with the implied understanding that it was not to be resumed. That portion of the route which extends from York to Gettysburg, about 28 miles in length, passes through one of the most populous sections of the state, and if completed, would form an important link in the chain of rail-roads to Pittsburg. It is much more direct than the Harrisburg route, as will appear on consulting the map, and in this point of view, it should have received the earliest attention. When the great amount (\$768,127 39) already expended on the work, and the probable benefits which would result from the completion of the former section, are considered, its entire abandonment in its present advanced stage, is matter of regret to the friends of internal improvements. From the large amount of money and time consumed upon this portion of the line, it may be inferred that the period of its completion, was not very far distant when it was determined to suspend the work. Unless the expense of construction should greatly exceed the average cost of other American rail-roads, a small additional appropriation on the part of the legislature would have ensured the completion of the York and Gettysburg division. With regard to the question of an abandonment of the work altogether, the inquiry should have been, not whether the road would yield the current interest on the whole investment, but whether the revenue to be derived from the section under consideration, would justify such an additional expenditure as would effect its completion. That it would produce a handsome interest on this *additional* amount, no one who is familiar with the country, can entertain a doubt. In the abandonment of the remaining division, from Gettysburg to the Potomac, the legislature is fully justified by the almost unparalleled cost which would have attended its construction, and the certainty of an inadequate return. Nearly the whole line from Gettysburg to Clear Spring, as located, would have required a continued succession of tunnels, bridges, culverts and embankments, forming altogether one of the most irregular profiles we have yet had occasion to examine.

Aggregate length of Canals in Pennsylvania, 974.06 miles.

Aggregate length of Rail-roads in Pennsylvania, 953.58 miles.