

"View From the Inclined Plane, Near Philadelphia" - a lithograph by John Caspar Wild from *Views of Philadelphia, and its Vicinity*, 1838. From the east, the Main Line of Public Works began on Vine Street in the center of Philadelphia. After crossing the Schuylkill River below Peters Island on the first Columbia Bridge (a 1040-foot wooden covered bridge built in 1834), this image shows a set of coaches being hauled 2,805 feet up the 196-foot high Belmont Plane. Then, recoupled to horses and later locomotives, the trip would continue west to the canal basin along the Susquehanna River at Columbia. *Courtesy of the Pennsylvania State Archives.*

base through which a spike could be driven directly into the wooden cross-tie, became the standard rail for the Columbia & Philadelphia Railroad, and later for all American railroads.¹⁴

2. Every Man An Equal

During the first decade of the Columbia's operation, an ironic egalitarian presumption controlled the spirit by which the railroad offered itself to the citizens of Pennsylvania. Stated simply, the Board of Canal Commissioners believed that this railroad, owned and maintained by the Commonwealth, should be considered little different from any other turnpike ... only possessing certain improvements. Thus, any citizen who wished access to the trackage would be allowed use it and gain passage so long as he paid the state's wheel tolls, and that he used a vehicle compatible with the rails. This presumption of equality became the law, and a farmer wishing to take his produce to market using the "Public Works" was as entitled to operate on those tracks as the largest commercial transport company.

Thus, a Lancaster farmer, his horse harnessed to his potato-laden, four-wheeled cart, was fully entitled to plod along the rails toward the Philadelphia market, and stopping every few miles to water or otherwise rest his animal. Anticipating these natural respites, the railroad had been constructed with turnouts¹⁵ every mile and a half for the entire length of the road, with side tracks adjacent to each of the main line tracks.

But should a locomotive hauling a trainload of passengers approach our farmer from the rear soon after he had passed the last turnout, the farmer would legally have the right to continue upon that track at his pace until the next turnout, perhaps a mile ahead, despite the impotent frustration of those following close behind. Conflicts were continual between individual transporters who wished to maintain their use of horses, and the Board of Canal Commissioners increasingly realized that steam power provided better control for the movement of trains. Ironically, it was not until 1844 that the Commissioners finally announced the prohibition of horse power on the State-owned "Main Line."

3. The Role of Forwarders for Passengers and Freight

It must be understood that while the Commonwealth maintained the infrastructure of the "Main Line" and operated the steam locomotives on the railway, only private companies (or even individuals) owned and operated the canal boats and railroad cars used on the Public Works. The legislature did not authorize the Canal Commission to purchase railway cars for passengers or for freight (originally called "burden" cars). Furthermore, no state employee was permitted to sell tickets to travelers. Instead, for both the Columbia and the Portage railroads, the canal commission contracted with firms that became solely responsible for the transportation of both freight and passengers. This created the ironic conundrum of highly

A Train for the Accommodation of Way Passengers will leave

COLUMBIA for PHILADELPHIAEvery Morning at 11 o'clock, and a like Train will **Leave Philadelphia** each Morning at the same hour, stopping at the following named points:**EASTERN TRAIN.**

Leave Basin at	N. N.
Arrive at Mountville	11 50
" Hempfield	12 15
" Lancaster (dine)	12 30
" Bird-in-Hand	1 30
" Leaman's	1 50
" Kinser's	2
" Gap	2 10
" Pennington's	2 30
" Parkersburg	2 45

WESTERN TRAIN.

Leave Philadelphia at	N. N.
Arrive at Whitehall at	12 20
" Brookeville	12 40
" Eagle	1
" Paoli (to dine)	1 20
" Steamboat	1 30
" Oakland	2 10
" Downingtown	2 25
" Gallagherville	2 35
" Coatesville	3

A. MEHAFFEY,
Sup't Col. & Phila. R. R.

Alex. Knox, Printer, 96 1/2 Chestnut street, Philadelphia

An "Accommodation of Way" train was one that, unlike an express, stopped at all or nearly all of the authorized inns which acted as stopping points along the C&P right-of-way. This Columbia Railroad schedule, printed in 1837, shows each of the 18 stops that would be expected between Philadelphia and the canal basin at Columbia. Note that there are only two stops within Tredyffrin and Easttown townships, Chester County: Paoli and Eagle. *Courtesy of the Railroad Museum of Pennsylvania.*

The "accommodation" train was what we today would call a "local," such as the famous Paoli Local. In urban areas in the 1840s the railroads began offering reduced "commutation" fares for the bulk purchase, in advance, of tickets between the same points, or for the purchase of back-and-forth passes. The term "commute" was used to describe the reduction of the fares, much as we say a prisoner's sentence may be commuted by the governor. Before long, the term commute had come to describe the act of traveling back-and-forth to work, and from that came the noun "commuter," referring both to the train and the person. — *Larry DeYoung*

profitable private transportation companies encouraged to operate on the largely profitless system of public works.

The individual teamsters who first operated over the "Main Line" soon gave way to organized groups of freight forwarders or "transporters." These organizations acted more as consolidators than simply as shippers: soliciting freight and passengers, loading them on board their railroad cars or canal boats, and handling all trans-shipment operations. The dominant freight forwarders included the Pioneer Line, Western Transportation Company, the Union Line, and Bingham & Dock. These companies tended to specialize in either the transportation of freight or of passengers. Each firm either owned, or contracted for, substantial fleets of freight or passenger cars, as well as canal boats and, on occasion, even river steamboats.¹⁶

4. The Inclined Planes

When the surveyors were laying out the original railroad for the Main Line of Public Works, they took it for granted that trains could only operate on mostly level track. So, based upon that assumption and the technology available, if one encountered a hill which could not be avoided, the surveyor might recommend an inclined plane. Such a solution comprised a length of track laid straight upon the slope on a grade between seven and ten feet per hundred, and generally with an overall length not exceeding one-half mile. At the top of this incline, a stationary steam engine was positioned which pulled an endless rope (later an iron or steel cable) over a 9-foot horizontal drum. Railway cars could then be raised or lowered upon the incline by attaching the cars to this rope using special clamps.

The "Public Works" had several inclined planes, and the Columbia & Philadelphia Railroad had two. The larger of these, on the banks of the Schuylkill River at the Philadelphia terminus, was called the Belmont Inclined Plane, and had a length of 2,805 feet and a rise of 196 feet (a 7% grade). The second inclined plane on the C&P dropped down some 90 feet

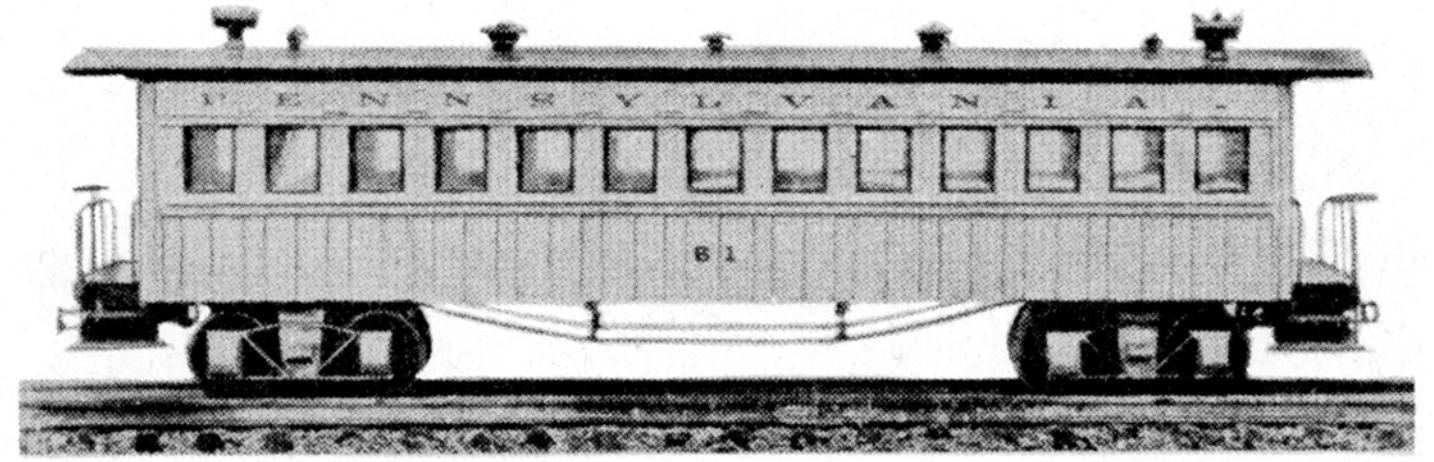
in elevation over 1,800 feet in length to the Columbia canal basin on the Susquehanna River.¹⁷

From the Philadelphia transporter terminal at Broad and Vine streets, the railroad crossed the Schuylkill River upon the first Columbia Bridge.¹⁸ On the west bank, the line then ascended towards Judge Richard Peters' *Belmont* mansion located near the top. A pair of 60-hp stationary steam engines (one used at a time while the other served as backup) moved the cars up and down the grade at 6 mph by means of a nearly 3" diameter continuous rope.

Soon after the Columbia & Philadelphia became operational, however, the Canal Commissioners realized that the inclined planes at both termini were not only expensive to operate and exceedingly slow, but were also dangerous. The planes were a frequent scene of accidents that destroyed railroad cars and their loads. Passengers were afraid for their safety, and the company had them disembark from the cars to walk to the top or down to the river while the cars were moved. This process was "a source of terror to most minds, and of grievance to all."¹⁹ The Belmont Plane soon became stretched to the limit of its capacity, and moving cars up and down the grade caused increasing scheduling delays for both freight and passengers. Several alternate rail routes were surveyed and debated over the ensuing years,²⁰ but each in turn seemed to create political gridlock by the advocates of the alternate routes.

Not until 1849 did the Legislature approve a new and more efficient course to bypass the Belmont Plane. Using portions of the right-of-way of the failed West Philadelphia Railroad, this new route began in West Philadelphia near the Market Street Bridge and ascended up from the Schuylkill River for 7.5 miles at a comparatively gentle 0.7% grade until it connected with the original Columbia tracks at Athensville (later known as Ardmore). This new bypass was put into passenger operation in October 1850, and two months later a second track was opened which allowed freight service.²¹

Type of car used on Pennsylvania Railroad about 1855



In 1849 the newly-created Pennsylvania Railroad ordered its first two passenger cars and one baggage car for use on its passenger service west of Harrisburg. Railroad passenger car design was finally departing from the old stagecoach-style day coach, and these new cars had eight-wheels mounted on two swiveling trucks which allowed these 37' cars to more easily navigate tight curves. The wooden cars were not much more than long, windowed boxes with entrances at either end, fairly spartan in construction with vent pipes through the roof providing ventilation, and seating provided for some 32 passengers. Between 1851 and 1857 the number of cars in the PRR passenger fleet soared to 161 cars, including 87 passenger cars, 35 baggage cars and 39 "emigrant" cars ("Emigrant" cars were of the most utilitarian design, often furnished with only wooden benches along the wall, used to cheaply haul settlers to the Midwest). *Courtesy of Burgess & Kennedy, pp. 748-51.*

5. The Matter of Passenger Stations

William Hasell Wilson, in his 1896 classic *The Columbia-Philadelphia Railroad and its Successor*, makes clear to his reader that during the 25 years of the Columbia Railroad, "the State had workshops of limited extent for ordinary repairs of locomotives, but no station houses for passengers or freight [emphasis added]." ²² Therefore, virtually every stop depended upon a roadside inn that had generally stood serving the local transportation network long before the "State Works" were built. Charles Frederick Carter, in his book *When Railroads Were New* (1909), makes clear that, under this arrangement, early "railroad travel ... had its compensations."

"There were no stations in those early days. The roadside inns sprinkled all over the country at intervals of a few miles, in response to the requirements of stage-coach travel, took their place."

"Coaching customs were still kept up. As the stage always stopped at every inn, so the trains would come to a halt whenever they passed in sight of one. All hands—engineer, firemen, trainmen, and passengers—would alight and trudge across the field, leaving the train deserted on the main line until the thirst and appetites of all were satisfied. Each inn carried the fundamental necessity of life in the thirties, to wit, whisky, of course; but in addition each had its own particular specialty by which its fame was spread among travelers. At one place it would be coffee and big, fat doughnuts; at another, apple-pie with milk; at another, waffles and fish; at still another, chicken fricassee or beer and gingerbread, and so on. To any one not dyspeptic nor in haste, therefore, a trip over the Philadelphia & Columbia Railroad was one prolonged delight." ²³

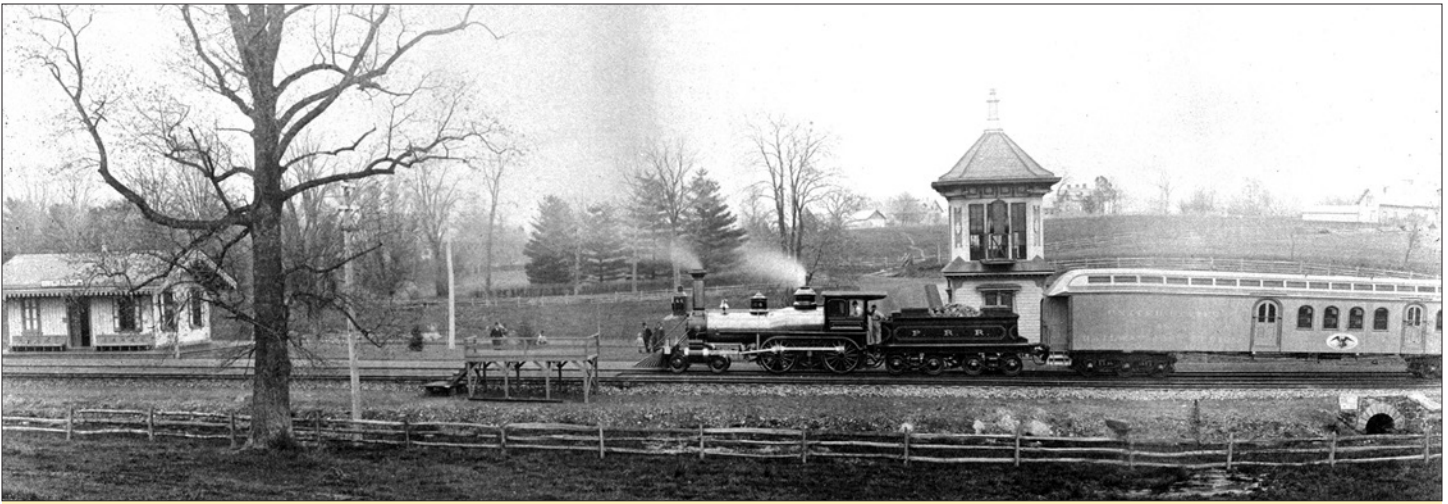
While Carter perhaps spoke with some tongue in cheek, a brief stop at these old inns did indeed provide a respite from the travel. It was not until after the Pennsylvania Railroad purchased the assets of the Main Line of Public Works that

passenger stations, in the way we understand that term today, begin to be established along what had been the former Philadelphia & Columbia right-of-way.

Creation of the Pennsylvania Railroad Company

Though the Main Line of Public Works initially made some commercial inroads after becoming operational in 1834, it never became a formidable competitor to the Erie Canal. And a decade after incurring the tremendous expense of constructing the "State Works," the anticipated flood of new trade and travel had simply not reached expectation. For example, in the year 1847, the Erie Canal transported 1,661,575 tons of freight across New York State. This compared to a mere 234,229 tons traveling across Pennsylvania on the Main Line of Public Works. ²⁴ The high tolls, the continual route delays, and the inconvenience caused by the inclined planes (especially the Allegheny Portage Railroad) increasingly persuaded Western shippers to use either the more easily traversed Erie Canal, or the expanding Baltimore & Ohio Railroad which connected to the port of Baltimore. It was even recorded that merchants and millers from Western Pennsylvania and the Ohio River Valley actually found it cheaper to send their flour down the river to New Orleans, and then by sea to Philadelphia, rather than patronize the State Works. ²⁵

The Main Line of Public Works increasingly became a financial calamity for the Commonwealth. By 1842, the Commonwealth was unable to meet the interest payments on its Main Line loans, which by that point totaled over \$33,000,000. ²⁶ In his annual message that year, Pennsylvania Governor David R. Porter dourly stated that he was reluctant to spend any additional funds for necessary repairs and improvements ... even though more competitive routes were being created elsewhere. ²⁷



This excellent image shows a Pennsylvania Railroad D5-class steam locomotive approaching Merion station in 1875. One of eighteen 4-4-0 locomotives built during 1870–73 for light-duty service such as the Paoli accommodation service, it was constructed at the railroad's own Altoona Works. Note the prefabricated signal tower rising behind the coal tender. Identical towers were to be found in Eagle, Berwyn and Paoli. *Courtesy of Ted Xaras.*

By the mid-1840s, state officials and influential businessmen began considering options to get out from under the “Public Works.” They increasingly came to believe that a continuous east and west railroad to Pittsburgh provided the greatest hope to profit from the developing commerce of the West, and actively began to encourage private investment.

Prominent among those seeking an alternative to the “State Works” was Thomas Pim Cope (1768–1854), a successful Philadelphia merchant and ship owner who dominated the city’s economic and intellectual life in the 1840s. Cope and his associates believed the only way to protect Philadelphia from further economic and commercial ruin was to build a railroad from Harrisburg to Pittsburgh which would complement the existing Philadelphia & Columbia. Such an all-rail route, which they referred to as the Central Railroad, or the Pennsylvania Central Railroad, would replace the remainder of the Main Line of Public Works with a parallel continuous rail line. An efficient transportation artery from Pittsburgh, they insisted, would redirect the western grain trade to the wharves and warehouses of Philadelphia, and once again enable the city to flourish. Philadelphia merchants were quick to support the Pennsylvania Central project, and by December 1845, widespread public and municipal support for the project had launched strong public debate. It was said that more than any other individual, Thomas Cope was responsible for creating the Pennsylvania Railroad.²⁸

With the approval of the Commonwealth’s House and Senate, on April 13, 1846, Governor Shunk signed a bill creating the new corporation simply known as the Pennsylvania Railroad (PRR). Under the terms of the exceedingly favorable corporate charter, the PRR pledged to begin construction within two years, and to complete the entire route from Harrisburg to Pittsburgh within a decade. The company soon began constructing its eastern terminus in Harrisburg, and by the start of 1853, a passenger was able to travel completely by rail from Pittsburgh to Philadelphia ... albeit still traveling upon

the archaic inclined planes of the Allegheny Portage Railroad, and over the length of the increasingly hostile Philadelphia & Columbia Railroad.²⁹

With great determination, the Pennsylvania Railroad had laid a direct rail line across and through the Alleghenies, including the completion of their soon to be world-famous Horseshoe Curve in 1854, and their 3,600-foot Gallitzin Tunnel, both near Altoona. With these accomplishments, the PRR eliminated the need of the original Portage Railroad and its soon to be opened successor, the New Portage Railroad.³⁰ In November 1855, the Pennsylvania Railroad commenced full operations upon its own seamless road from Pittsburgh to Harrisburg.

A track’s gauge is defined as the distance between the inside vertical surface of its rails. From the beginning of steam railroading in North America, “Standard” gauge was defined as 4 feet, 8½ inches, and this was the track gauge used by the Columbia Railroad.³¹ Though the Pennsylvania Railroad used the slightly wider track gauge of 4 feet, 9 inches, this was still easily compatible with the P&C’s “Standard” gauge.

But there remained a serious problem for the Pennsylvania Railroad.

When the Philadelphia & Columbia had been double-tracked late in 1834, the two track-sets had been laid with a separating distance of 9’-9” from the center of one track to the center of the adjoining track. But when the new Pennsylvania Railroad laid its double-tracked railbed from Pittsburgh to Harrisburg, it chose to establish a more expansive width of 12’-2” between track-centers, 2’-5” wider than that found east of Harrisburg. This increased track width had allowed the PRR to build a more comfortable passenger fleet, and more expansive freight cars. But this difference in track centers would now make it impossible for any unbroken route eastbound from Harrisburg to Philadelphia.

Heading east from Harrisburg, Pennsylvania Railroad traffic now intersected with the double-track line of a small railway



A dream fulfilled: The year is 1900, and a westbound Pennsylvania Railroad through passenger train climbs the grade on the number 3 track through Narberth, Pennsylvania, on the four-track superhighway enroute to Chicago. *Courtesy of Ted Xaras.*

called the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad (HPMtJ&L), which operated on the narrower 9'-9" track centers to tiny Dillerville, Pennsylvania, just outside Lancaster. Here a further, short connection to Lancaster then allowed the double-tracked Philadelphia & Columbia Railroad to cover the final 82 miles to Philadelphia ... again, on tracks with the narrower 9'-9" centers. Because all cars used by the Pennsylvania Railroad were from 18 to 26 inches wider than the cars used on either the HPMtJ&L or the State-owned P&C, trans-shipment for both passengers and freight became mandatory at Harrisburg. An eastbound passenger from Pittsburgh was obliged to leave her wide, comfortable PRR coach in Harrisburg and re-board onto the comparatively narrow, more spartan cars of one of the transporters for her continuing journey to Philadelphia. It was reported that the Pennsylvania Railroad had to "entail upon its passengers the discomforts of changing cars and passing from one to another on an adjoining track over an eight feet long, one foot wide plank."³²

Our passenger traveling the P&C rails east from Columbia would have passed through eastern Chester County with stops at Oakland (today's Whitford), Steamboat (today's Glen Loch), Paoli, and Eagle (today's east Devon); and then on to Morgan's Corner (today's Radnor) in Delaware County and eastward to its terminus. The final stop was West Philadelphia,

just west of the Market Street bridge over the Schuylkill River. Our passenger would then have transferred to a railcar owned by the City, which crossed the bridge to connect with the terminal at 11th and Market. The city tracks were in such a bad state of repair that even in the 1850s, each railcar entering the city, whether for passenger or freight, had to be drawn by horse power.

The Purchase of the Main Line of Public Works by the Pennsylvania Railroad

In 1844, Pennsylvanians had voted 149,748 to 124,598 to sell the Main Line of Public Works.³³ The Pennsylvania Legislature, realizing that the Main Line increasingly represented a financial sinkhole, offered to sell the entire system for \$20,000,000 ... but because it was earning less than three percent of its original cost, no one wanted it.³⁴ Eleven years passed with no meaningful concessions from the Legislature or interest from private enterprise. But in 1855, a new, more pragmatic Legislature finally sweetened the offer by reducing the price of the entire "Public Works" to \$7,500,000 (plus, the PRR—as the only candidate—would have to create reserves of an additional \$1.5 million in 5 percent bonds (a sort of collateral) as a lien on the MLPW).³⁵ After months of rigorous and often vitriolic negotiation, at the end of 1855, the Pennsylvania Railroad submitted its counter-proposal,

agreeing to purchase the “Works” for the \$7,500,000 asking price, but to use an installment plan of \$500,000 down, with the balance paid in fourteen equal payments, with 5 per cent interest on the unpaid balance.

Over the next year and a half, the Canal Commissioners and the canal interests fought ferociously against this sale, even vainly asking the U. S. Supreme Court to enjoin Pennsylvania from selling the property. But on June 25, 1857 the Pennsylvania Railroad’s bid was accepted by the Commonwealth. By proclamation of Governor James Pollock, the PRR assumed full control of the “State Works” effective August 1st. In addition to the Philadelphia & Columbia Railroad, with its entire collection of rolling stock and right-of-way (in varying states of repair), was the New Allegheny Portage Railroad, and over 250 miles of canals.³⁶ The PRR had just purchased for \$7,500,000 what had already cost the Commonwealth of Pennsylvania \$32,542,267.77 through November 30, 1853.³⁷

The Much-Needed Improvements by the Pennsylvania Railroad

The Philadelphia & Columbia Railroad had never been adequately maintained under State control. And during the two years preceding the sale in 1857, the Commonwealth had allowed the infrastructure of the Public Works to fall into serious disrepair. So when the PRR assumed control of the Philadelphia & Columbia, Pennsylvania Railroad Co. president J. Edgar Thomson immediately set the formidable goal to modernize the old railroad’s entire infrastructure. The first priority was to quickly widen the track centers on all necessary trackage of the old P&C and HPMtJ&L rights-of-way to allow adequate passage for the PRR’s wider cars. This was rapidly accomplished, and by July 1858, the first through-train passed from Pittsburgh to Philadelphia without the delay and inconvenience of having to transfer passengers at Harrisburg.³⁸

Over the next three decades, the PRR would accomplish extraordinary projects that improved its right-of-way, including track realignments to reduce old curves and grades, widening of roadbeds to accommodate more trackage, upgrading the track and roadbed, and construction or improvement of many bridges and stations. For example, the railroad’s decision to upgrade all their trackage from iron to steel rails, begun soon after the Civil War and accomplished by 1876, is viewed as one of the Pennsylvania Railroad’s most important technology investments in that—even though doubling the cost per yard of rail—it reduced substantially the road’s operating cost.³⁹

In the 1870s, rail traffic was increasing at a significant rate, causing the PRR’s Philadelphia Division (Philadelphia to Harrisburg) to begin constructing a third and then a fourth track to more efficiently handle the ever-increasing freight tonnage and passenger train density and speed. The creation of a “four-track system” would continue to the dawn of the

20th Century. The old Philadelphia & Columbia track beds from Philadelphia to Rohrerstown (Lancaster Co.) were reconstructed and often relocated. Of particular interest to the Upper Main Line were the many realignments, begun in 1876, on the 8.5-mile sector from Morgan’s Corner (now Radnor) to Green Tree (just east of Malvern). These adjustments eliminated 15 major curves, and modified many elevations by using “fills” and “cuts” (particularly the area from Devon west through Berwyn to Daylesford).

Though the actual decrease in distance from these adjustments within this short segment was only 0.0237 miles (about 125 feet), a remarkable reduction of 648 degrees in curvature was effected.⁴⁰ Every curve increases friction and maintenance on both track and wheel, and these curve reductions are noteworthy because they were the largest within any section between Philadelphia and Columbia. Also begun was the elimination of many dangerous grade-level crossings across these increasingly busy tracks, the scene of so many tragic accidents. These track realignments in this section were partially completed by 1878, and except for some minor additional relocations which continued between Wayne and Paoli in the 1880s, the Main Line took on the configuration so familiar to us today—almost a century and a half later.

Full implementation of the eventual four-track system took a little longer. When the widely-popular Centennial Exposition was held in Philadelphia in 1876, a four-track Main Line extended as far west as Merion. And though the roadbed west from Merion to Paoli had been—for the most part—realigned to its present state by 1878, not until 1887 was the widening completed which allowed a fourth track to extend through Berwyn. But when that system was finally completed to Paoli in 1893, the result was a magnificent four-track superhighway,⁴¹ able to simultaneously handle heavy through-passenger fleet service from the West to New York City, the many commuter locals into Philadelphia, and the ever-increasing variety of freight.

In 1868, the Pennsylvania Railroad began encouraging a post-Civil War building boom along its right-of-way west of Philadelphia to stimulate “suburban” commuter travel. Land formerly used for farming was acquired, at times by the PRR itself, and was increasingly settled with attractive homes, including many belonging to PRR officials. Local rail service, called the “Paoli Accommodation,”—created in the 1860s to serve the needs of local farmers between Philadelphia and Paoli— now would reliably allow businessmen to commute to Center City and return home to the suburbs each evening. The Pennsylvania Railroad constructed ornate and even iconic stations for each of these evolving communities, each a distinctive example of Victorian architecture, and often becoming attractions in themselves.⁴²

Thus, Philadelphia’s suburban “Main Line” as we know it today was conceived through the efforts of the Commonwealth’s Main Line of Public Works, and refined and nurtured by the Pennsylvania Railroad.

Afterword

In an ironic twist of history, on June 23, 2020 (163 years after the Commonwealth of Pennsylvania finally sold its “white elephant,” the Main Line of Public Works, to the Pennsylvania Railroad), a bipartisan group of legislators in the Pennsylvania House of Representatives introduced a resolution requesting that the U.S. Department of Transportation cause Amtrak to relinquish to the Commonwealth of Pennsylvania the ownership of the Philadelphia to Harrisburg (“Keystone East”) railroad line—currently utilized by Amtrak and the Southeastern Pennsylvania Transportation Authority (SEPTA) for passenger rail operations. The following day, the resolution was approved by the House Transportation Committee and sent back to the main body, where it was

unanimously adopted. Resolutions do not carry the weight of laws, but are generated to express the sentiment of the Legislature.⁴³

Will they never learn?

Acknowledgements

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Notes

- 1 George H. Burgess & Miles C. Kennedy, *Centennial History of the Pennsylvania Railroad Company, 1846–1946*, 1949, p. 9.
- 2 Pennsylvania Historical and Museum Commission, Pennsylvania State Archives. RG-17-Records of the Land Office Series 452: Records of the Board of Canal Commissioners. Reviewed April 23, 2020 at: http://www.phmc.state.pa.us/bah/dam/rg/di/r017_0452_CanalMapBooks/CanalMapsInterface.htm
- 3 “The survey was commenced in the month of June [1827] at Valley Forge on the Schuylkill river, about twenty-four miles above Philadelphia, and continued westward along the “Great Valley” of Chester county ... The country through which we passed was one of the finest agricultural regions in the United States, thickly settled with an intelligent population, and picturesque in its features ... The route left the valley after having followed it for a considerable distance, and ascended to the summit of the Mine Ridge dividing the Chester and Conestoga valleys, at a point known as the Gap, where a halt was made for the purpose of summing up the results of the survey so far. On account of the scarcity of water [emphasis added] and other good reasons, the Chief Engineer decided against the adoption of a canal, and made a report to that effect to the Board of Canal Commissioners.” William Hasell Wilson [Maj. Wilson’s son], *The Columbia-Philadelphia Railroad and its Successor*, 1896, pp. 8–9.
- 4 Burgess & Kennedy, op. cit., p. 10
- 5 Stockton and Darlington Railway, Grace’s Guide to British Industrial History, https://www.gracesguide.co.uk/Stockton_and_Darlington_Railway
- 6 The railroad was officially designated “The Philadelphia & Columbia Division of the Pennsylvania Railroad,” but during the early years it was usually referred to as the “Columbia & Philadelphia” or, more commonly, just the “Columbia Railroad.” After 1842 the name was commonly altered to the “Philadelphia & Columbia Railroad.” All designations are valid, and are used interchangeably in this account. David W. Messer, *Triumph II: Philadelphia to Harrisburg, 1828–1998*, 1999, p. 13.
- 7 The western terminus of this first eastern segment of the C&P from Philadelphia was the Green Tree Hotel at Intersection (later Malvern), where the line connected with the privately-owned West Chester Railroad (WCRR) in November 1832. The WCRR ran from the county seat of Chester County on a single, nine-mile track, with turnouts each mile as passing-points. It is believed that that railroad from West Chester to Intersection was the first completed in Pennsylvania. Horses were the sole motive power for several years, and the track was made of yellow pine “string-pieces” plated with flat iron bars. By May 1833 a passenger was able to travel by rail non-stop from West Chester to the Belmont Place in Philadelphia by way of Intersection. James Jones, *Railroads of West Chester: 1831 to the present*. 2006, p. 15. Retrieved from http://digitalcommons.wcupa.edu/hist_facpub/9
- 8 Messer, *Triumph II*, op. cit., p. 15.
- 9 Wilson, op. cit., p. 67. It would take almost 50 years to set this short-sighted decision right.
- 10 The Canal Commissioners had gone out of their way to pronounce their unquestioning belief that canals were the superior means of transportation. So strong was the Commissioners’ bias that in their annual report of December, 1831, they stated emphatically: “... the Board believe that notwithstanding all improvements which have been made in railroads and locomotives, it will be found that canals are from two to two and a half times better than railroads for the purposes required of them by Pennsylvania.” Hubertis Cummings, “Some Notes on the State-Owned Columbia & Philadelphia Railroad,” *Pennsylvania History*, Volume XVII, No. 1, 1950, p. 48 <https://journals.psu.edu/phj/article/download/21984/21753/0>
- 11 The locomotives, *Lancaster* and *Columbia*, each weighed eight tons, and each was capable of hauling thirty tons of freight. They were surprising reliable, and were configured to take the many sharp curves of the new track system with reasonable ease.
- 12 The original 36-mile Portage Railroad utilized five separate inclined planes on either side of the Allegheny Mountain spine to ascend or descend, each separated by “level” stretches of various lengths.
- 13 Charles Frederick Carter, *When Railroads Were New*, 1909, p. 138.
- 14 Burgess & Kennedy, op. cit., pp. 246–7. The “Tee” rail was invented in the 1830s by Robert L. Stevens, president of New Jersey’s Camden and Amboy Railroad.

- 15 Turnouts (or switches) are sections of track that allow trains to travel from one line of track to another.
- 16 Albert J. Churella, *The Pennsylvania Railroad, Volume I, Building an Empire, 1846–1917*. 2013, pp. 49–50.
- 17 Carter, op. cit., p. 127.
- 18 Built in 1834, the bridge was a seven-span, 1040-foot enclosed wooden truss on masonry piers, the first railroad bridge of its size built in the United States.
- 19 James Jones, *Railroads of West Chester: 1831 to the present*. 2006, pp. 17–18.
Retrieved from http://digitalcommons.wcupa.edu/hist_facpub/9
- 20 One of these alternative routes would have run a line through the Great Chester Valley to Downingtown (on a route later to be constructed as the Reading's Chester Valley Railroad in 1853).
- 21 Messer, *Triumph II*, p. 21. This realignment allowed P&C traffic to pass directly into downtown Philadelphia by way of the City's street railroad. This 1850 alignment remains largely in use today as the four track "Keystone Corridor," and roughly aligns with Lancaster Avenue.
- 22 Wilson, op. cit., p. 39.
- 23 Carter, op. cit., p. 123–4.
- 24 Henry Varnum Poor, *History of the Railroads and Canals of the United States of America*, 1970, p. 367.
- 25 It must be understood that the worst handicap for through-service on the Main Line of Public Works was, ironically, the fragility of the canals themselves. They froze over and became unusable during the winter months. High waters predictably damaged them during every spring thaw. And during the hot summer months, low water within the canal frequently interrupted operations as heavily-laden barges ran aground.
- 26 Carter Goodrich, *Government Promotion of American Canals and Railroads, 1800–1890*, 1974, p. 67.
- 27 Burgess & Kennedy, op. cit., p. 25.
- 28 Churella, op. cit., p. 82.
- 29 In May 1852 the canal commissioners solicited bids for the exclusive right to accommodate passengers traveling over the Philadelphia & Columbia. Though the PRR submitted several bids, the commissioners granted to Bingham & Dock, one of the long-standing transporters operating over its Main Line, the exclusive right to carry passengers via the Philadelphia & Columbia. This Bingham & Dock monopoly soon caused almost insurmountable hardship for PRR passengers traveling east from Harrisburg, and threatened an end of cross-Commonwealth transport for the Pennsylvania Railroad. During the spring of 1853, however, Governor Bigler brokered a compromise between the warring sides, and on March 3, 1853, the General Assembly issued its approval, decreeing "that the Pennsylvania Railroad Company be, and that they are hereby authorized to run... their cars over the railroads belonging to this commonwealth, for the transportation of freight, passengers, their baggage, and the United States mails with the right of attachment to the motive power of the State." Churella, op. cit., pp. 156–8.
- 30 Within a decade after the opening of the Main Line of Public Works in 1834, the Commonwealth realized that their once-innovative Allegheny Portage Railroad across the mountains had become increasing obsolete and even dangerous, and the Commissioners began to investigate a more technically advanced alternative. Thus the State created the New Portage Railroad which opened on July 1, 1855, built to avoid the inclined planes of the original Portage Railroad. From that date the Old Portage Railroad ceased to exist. Two years later, on June 25, 1857, the Pennsylvania Railroad purchased the entire Main Line of Public Works, including the new Portage line. Four months after the purchase, on November 1, 1857, the New Portage Railroad was declared "abandoned," and all railroad traffic was rerouted across the Horseshoe Curve. Christopher T. Baer, "A General Chronology of the Pennsylvania Railroad Company, its Predecessors and Successors, and its Historical Context [1857]." June 2015 edition. http://www.prrths.com/newprr_files/Hagley/PRR1857.pdf
- 31 George W. Hilton, "A history of track gauge: How 4 feet, 8-1/2 inches became the standard," *TRAINS*, May 1, 2006
<https://trn.trains.com/railroads/abcs-of-railroading/2006/05/a-history-of-track-gauge> (via web.archive.org)
- 32 William B. Wilson, *History of the Pennsylvania Railroad Company*, Volume 1, 1895, p. 44.
- 33 Churella, op. cit., p. 70.
- 34 Goodrich, op. cit., p. 68.
- 35 Burgess & Kennedy, op. cit., p. 95.
- 36 Messer, *Triumph II*, p. 23. The Canal Commission was dissolved in 1859. The canals were retained for several years, carrying coal and lumber traffic. The Western Division canal was abandoned in 1863–5, and the Eastern and Juniata Division canals were sold in January 1867 to the Pennsylvania Canal Company.
- 37 Cummings, op. cit., p. 49.
- 38 Carter, op. cit., p. 147.
- 39 Burgess & Kennedy, op. cit., p. 293.
- 40 William B. Wilson, p. 76. Said another way, with 360° encompassing a full circle, these realignments eliminated almost two complete circles of curvature across this short distance.
- 41 David W. Messer, *Triumph III: Philadelphia Terminal, 1838–2000*, p. 176.
- 42 Ibid, p. 163.
- 43 *Harrisburg Rail Review*, the monthly newsletter of the Harrisburg Chapter, National Railroad Historical Society, Inc., Volume 61, Number 7, July 2020.