

### Railroad Growth and Development, 1830s to 1850s

Comparatively speaking, the railroad industry started late in Pennsylvania, in part due to the huge investment sunk by the Commonwealth and private investors into the turnpikes and then the Main Line Canal system. After the slow start of the 1830s, Pennsylvania became a national leader in railroad development in the 1840s and 1850s. By 1860 it had surpassed all states in total railroad mileage, a position it would hold into the 20th century.

Railroads initially developed as a means of more economically moving commodities such as minerals and farm goods to market. Yet they were also a function of, and a catalyst for, the state's industrial-based economy. The new dependable, all-weather transportation, in turn, spurred further industrial growth. Freed from dependence upon water-borne transportation, industries grew up in all corners of the state. With new industries, small towns with rail connections grew to urban centers, and other smaller rail towns were founded overnight wherever a railroad company decided to place a depot. Other towns such as Altoona grew specifically to service the railroads with car shops and maintenance yards. The most dramatic growth occurred in iron making and in coal extraction. Iron was spurred by the railroad's demand for metal rails and cars, and coal was the primary fuel for railroads, the metal industries, and home heating throughout the Northeast. In a symbiotic relationship, Pennsylvania railroads carried these products throughout the state and the nation.

In Pennsylvania, railroads made their first appearance as short gravity roads and horse-powered railroads designed primarily to connect mines and furnaces with docks and boat landings. In the 1830s, with the introduction of steam-powered locomotives, the railroads reached a level of technological maturity that enabled them to challenge and over the following decades even replace the canals in the anthracite region.

In 1842, Philadelphia capitalists completed the first of the most important anthracite roads, the Philadelphia and Reading Railroad, between Philadelphia and Pottsville, paralleling the route of the Schuylkill Navigation Canal. Other rail companies followed into the coal fields. Among the most successful were the Lehigh Valley Railroad (LV RR) from Easton to Mauch Chunk (Jim Thorpe), completed in 1852. The LV RR became a leading factor in the growth of Allentown and Bethlehem as

iron and steel centers. Another important coal line, the Delaware, Lackawanna, and Western Railroad (DL&W), completed its route from Scranton to the Delaware River with connections to northern New Jersey and New York in 1851. The DL&W promoted the growth of Scranton as an important commercial and manufacturing center in the coal region.

As railroads revolutionized transportation in the anthracite fields, the need for improved cross-state transportation was again assumed importance. Philadelphia's status as a leading port city was challenged by improvements to its north and south. In 1828, Maryland pushed west with the Baltimore and Ohio Railroad. The B&O's charter called for the railroad to pass through Pittsburgh, thus diverting western trade from Philadelphia to Baltimore. Meanwhile to the north in New York, the Erie Canal remained a potent force, and plans were afoot to build a cross-state railroad connecting the mouth of the Hudson River with the Great Lakes. Beginning in 1835, the Erie Railroad was built in stages from the Hudson River, eventually reaching Binghamton, N.Y. in 1847. The Erie, although a New York railroad, ultimately became affiliated with numerous branch lines that dipped into Pennsylvania's northern tier of counties, and drew them into the New York orbit.

In response to the challenges from Baltimore and New York, in 1846 Philadelphia business interests chartered the Pennsylvania (Central) Railroad Company with the aim of constructing a direct route between Philadelphia and Pittsburgh. The Pennsylvania Railroad developed into the dominant transportation carrier in the state and one of the most important in the nation. The main line between Harrisburg and Pittsburgh, destined to become one of the busiest and most significant in the country, was constructed quickly under the able direction of company chief engineer J. Edgar Thompson. By 1852 the line cut the five-to-six day trip via the Main Line Canal to as little as 15 hours. Altoona, founded as the Pennsylvania Railroad's main shop complex, was located at the base of the Allegheny Mountains in Blair County, a convenient mid-point along the original route and a place to add helper locomotives for the push up the mountains. In 1857 the Pennsylvania Railroad purchased the state-owned Main Line Canal, putting it out of business.

The railroad industry influenced bridge technology and resulted in the development of new bridge types, new construction techniques, and the widespread use of structural iron. The railroads were a huge market for new bridges, and had special needs, including meeting the load requirements of heavy locomotives and cars. The leading practitioners of iron bridge construction were railroad civil engineers, who, beginning in the 1840s, experimented first with combination wood and iron bridges, such as the Howe truss, and increasingly, used all metal trusses, such as the Whipple truss or the Haupt truss, named after the Pennsylvania Railroad's chief engineer, Herman Haupt. Each railroad had its own preferred type of truss, and many railroad engineers patented the trusses they developed.

The growth of the railroads paced the emergence of an increasingly specialized and interdependent economic region in which Pennsylvania, by virtue of its "keystone" position in the Northeast, played a crucial part. Although much of the drive toward transportation improvements was motivated by the economic competition of merchants in northern cities to capture new resources and market areas, by the 1850s and 1860s the railroads had helped carve the state into distinct spheres with trunk lines flowing to and from the seaport cities. Philadelphia's rail connections first concentrated on coal, iron, and allied manufacturers at first east of the Susquehanna River, and then with the opening of the Pennsylvania Railroad further west. New York City methodically extended direct connections from the Erie Corridor southward into the coal regions of northern Pennsylvania, supplementing its dominance as the nation's new center of finance and foreign trade. Baltimore dominated Maryland and parts of southwestern Pennsylvania by virtue of the B&O Railroad. At the fulcrum of rail development was Pittsburgh,

originally a transshipment point to eastern markets, but increasingly a manufacturing city in its own right serving the trans-Allegheny west. After the Civil War (1861-1865), rail entry to Pittsburgh would become hotly contested, and the city a maze of competing rail lines.

#### **D. The Age of Railroad Dominance, 1860s-1910s**

The leading story of Pennsylvania's transportation from the 1860s to the early 1910s was the dominance of railroads and the extension of rail lines into every corner of the state. The state's railroad industry grew from 2,600 miles of track in 1860 to more than 11,500 miles of track at its peak in 1920. The expansion of Pennsylvania's railroads was not unique but part of a nationwide trend that brought the railroads to the forefront of the American economy. Railroads evolved into the nation's first "big business," assuming control of vast holdings of capital, real estate, equipment, and employees. As they grew in size, the railroads moved to standardize operations, gradually eliminating the multiplicity of gauges that had plagued the industry during the Civil War. In favor of the standard gauge, the new standard gauge of four feet eight and one-half inches, helped the railroads to integrate the many lines into a vast network serving a national market. At the same time, the railroads upgraded their physical plant, replacing iron rails with heavier steel ones, wood and iron bridges with stronger steel and stone spans, wooden cars with steel, and early engines with larger, more powerful varieties.

The railroads had a profound impact on the state's economy and landscape, so much so that every major town or city was historically impacted in some way. American iron and steel manufacturers concentrated production at large, integrated plants in selected districts, most notably the Pittsburgh region, on its way to becoming "the steel city." After 1870, rail lines extended south and east from Pittsburgh to rich bituminous coal fields, such as the one centered around Connellsville, location of one of the nation's richest supplies of coking coal, an important fuel source for the iron and steel industry. Reflecting the railroad's role in the development of a national economy, Pittsburgh increasingly relied on iron ore shipped from the Marquette and Mesabi Iron ranges of northern Michigan and Minnesota by Great Lake ore boats, and loaded onto rail cars for delivery from Erie, Cleveland and other ports.

As the rail lines opened national markets, thousands of Pennsylvania manufactories, great and small, benefitted from the new markets and availability of new resources. Northeast of Pittsburgh, rail lines extended into the oil fields around the towns of Oil City and Titusville, precipitating the boom in that industry. Logging railroads were a significant technological advance helping loggers reach vast stands of timber in the Allegheny Plateau of northern Pennsylvania. The state was soon known nationally not only for iron and steel, coal and coke, oil and lumber, but also textiles, machine tools, leather, railroad cars, ship building, glass, and printing.

Railroads were also a factor in the changing scale and scope of Pennsylvania agriculture. Farmers, unable to compete with cheap midwestern grains and meats, shifted to goods such as dairy products, eggs, tobacco, vegetables, and fruits that railroads quickly delivered before spoilage to growing urban populations. With increased specialization, farmers devised new ways to finance, market, and store their products with special railroad sidings, silos, and canning and packing operations.

By 1860, more than 140 railroad companies were operating in Pennsylvania. During the following decades, old lines were absorbed into larger rail systems and new lines constructed in a maze of corporate take overs, alliances, leases, and joint ownerships. While the tracing of the individual histories of each railroad is a herculean task, suffice it to say the majority of the state's railway mileage fell under the

control of the Pennsylvania Railroad system. Numerous other systems served specific industries or regions or simply passed through small portions of the state on their way to other places. In addition to the Pennsylvania Railroad, major rail systems operating in Pennsylvania included the Reading Lines; the Lehigh Valley Railroad; the Delaware, Lackawanna and Western Railroad; the Erie Railroad; the New York Central (including the Pittsburgh & Lake Erie Railroad, 80 per cent owned by NYC); the New York, Chicago and St. Louis Railroad (Nickel Plate); Buffalo, Rochester, and Pittsburgh Railway (BR&P); the Western Maryland Railway; and the Baltimore and Ohio Railroad. Depending upon which lines passed through an individual community, specific ties to the various urban markets serviced by the regionally dominant carriers were created.

The Pennsylvania Railroad was the preeminent Pennsylvania rail carrier by sheer virtue of its size and economic power. By the early 1870s, its lines reached every part of the state, save for the far northeastern anthracite coal country. Much of the Pennsylvania Railroad's strength came not only from its control of in-state rail lines but its aggressive posture gaining connections to major urban areas east, west, and south.

In 1869, a series of leases gave the Pennsylvania Railroad routes west to Chicago and St. Louis, and in 1871, the company acquired lines northeast from Philadelphia to Jersey City, NJ, the gateway to New York City. The Pennsylvania's New York-Chicago connections made it the nation's premiere mover of goods from the Midwest to the East Coast. In 1873, the Pennsylvania Railroad was also the nation's first rail company to offer through service between New York City and Washington, DC, by way of Philadelphia. Over the years, the Pennsylvania Railroad's Northeast Corridor would gain fame as the nation's most profitable passenger service.

Competing with the Pennsylvania Railroad for the trade between the Midwestern cities and the East Coast were several rival lines originating in New York and crossing Pennsylvania's northwestern corner paralleling the shore of Lake Erie en route to Cleveland, Youngstown, and other Ohio and Midwestern cities. The railroad situation in the vicinity of Erie was complicated with the New York Central, Erie Railroad, and Nickel Plate, each possessing roughly parallel routes. The lines and their several branches into northern Pennsylvania towns like Williamsport, Bradford, and Meadville linked these small and previously isolated communities with New York cities such as Buffalo and Rochester.

Although frequently outmaneuvered by the Pennsylvania Railroad and the major New York lines, the eastern Pennsylvania coal roads that had their origins in the 1840s and 1850s expanded to serve specific regional markets after 1865. In 1882, the DL&W acquired trackage connecting New York Harbor and Buffalo, NY, by way of Scranton, and making the line an important carrier of passengers and general merchandise, as well as coal. Similarly, by 1892 the Lehigh Valley Railroad was operating on its own lines from Buffalo to New York Harbor by way of Wilkes-Barre. The Reading Railroad was far less successful at expansion, mainly concentrating on a system of branch lines to eastern Pennsylvania communities like Shippensburg, Allentown, and Williamsport. The Reading attempted acquiring tracks northeastward to New York City and New England, but eventually fell into receivership and came under control of the Central of New Jersey Railroad (CNJ) in the late 1880s, which itself was controlled by the B&O after 1901.

Along parts of Pennsylvania's southern border and into areas of southwestern Pennsylvania, the most important of the rail systems was the B&O. The B&O, which began in the 1820s as a route from Baltimore west along the Potomac River, expanded in the 1870s to connect east with Philadelphia by way of Wilmington, DE, and west with Pittsburgh. Its main-line routes was further extended west to Chicago, Cincinnati, and St. Louis. The B&O competed with the Pennsylvania Railroad and the New York Central on the New York-Chicago and New York-St. Louis runs. In southwestern Pennsylvania, the B&O was an

important mover of coal to Pittsburgh. The Western Maryland Railway provided an alternative route to the B&O from Baltimore to Cumberland. By virtue of several branch lines, the Western Maryland connected the southern Pennsylvania towns of Connellsville, Shippensburg, Gettysburg and York with Baltimore.

From the 1870s to the 1890s, the business climate of the railroad industry was characterized by intense rivalries with different railroad companies, virtually duplicating routes and services to key industrial points throughout the state. The overbuilding led to rate-cuts and rebates, and companies, especially weaker ones, struggled for business. By the early 1900s, ended, the hectic pace of expansion and the era of cutthroat competition. The stabilization of the larger rail systems. Focus turned from building new lines to improving the existing infrastructure. Work included straightening alignments; constructing low-grade lines for freight; double or quadruple-tracking rights of way; rebuilding bridges to carry faster, heavier traffic; and adding automatic block systems to improve safety.

The most significant of the technological improvements, and perhaps the most significant railroad achievement in the northeast in the 20th century, was the Pennsylvania Railroad's electrification of service between Washington and New York and Philadelphia west to the Enola Yards outside Harrisburg. The project, which took over 25 years to complete, began in 1910 when the Pennsylvania Railroad initiated electric service in its tunnel under the Hudson and East rivers in order to eliminate the choking smoke caused by steam locomotives. In a bold move, the Pennsylvania Railroad determined to extend the electric service south from New York. Between 1915 and 1930, the Pennsylvania Railroad electrified five branch lines out of Philadelphia, including its 20-mile Paoli to Philadelphia commuter line, the company's first experience in regular service with overhead trolleys. From 1926 to 1930, the Pennsylvania section of the Northeast Corridor main line between Trenton, NJ and Wilmington, DE. was electrified. Between 1936 and 1938, the Pennsylvania Railroad electrified the 45-mile long Trenton Cut-off, the main line west between Paoli and Harrisburg, and the low grade freight line between Perryville, MD, and Enola Yards.

Although railroad bridges are not the focus of the historic bridge survey, since the survey includes only of those railway bridges that intersect highways, the bridge engineering accomplishments of Pennsylvania railroads from 1865 to 1920 are worth noting briefly. Each of the major Pennsylvania railroad companies employed engineering staff responsible for bridge design and construction. Although each rail system had its own bridge standards and bridge type preferences, after 1890, the trend was away from pin-connected trusses and toward riveted-connected trusses and expanded use of larger and heavier riveted plate girders. Some exceptions to this rule were the Pennsylvania Railroad's decision to build massive stone arches to replace bridges in the early 1900s, and the DL&W's innovative use of reinforced concrete at the Clark's Summit-Hallstead Cut-off north of Scranton. In general, the railroads were the most advanced bridge builders of their day, often applying new bridge technologies and design standards such as Cooper's loadings years before such techniques and standards appeared in use for the ordinary highway bridges constructed by Pennsylvania's counties and municipalities.

In the late 19th century, railroad-company-built highway bridges were generally few in number and usually found in situations often required by law, where railway cuts and fills passed below or above previously existing streets and farm lanes. While many of these older crossings still exist, most are second or third generation bridges that have been replaced and raised for the greater vertical clearances required by present-day freight cars.

As both locomotives and automobiles increased in size and speed, after 1900, the problem of providing safe and efficient crossings of railroads and roads became widespread. Safer grade crossings received

national publicity from the 1900s to the 1930s. In 1919 alone, nearly 14,000 persons all across the nation died from being struck by trains. Railroads and local, state, and federal governments struggled to find ways to meet the safety needs of the traveling public. The railroads erected signals and signs, and sponsored public education campaigns to "Stop, Look, and Listen." The separation of tracks and roads was another answer to the problem, but grade crossing eliminations involved costly changes in elevation of either track or roadway, the railroads rarely were willing to bear alone. Railroad officials usually preferred less substantial means of providing for safer crossings, but they were sometimes had no option but to build viaducts and bridges. This was especially true in densely populated urban areas where at-grade crossings also caused significant delays to the railroad's own traffic. Concerted grade crossing elimination campaigns outside of metropolitan areas did not occur until the 1930s with the help of massive federal and state funded programs. (Stilgoe 1983: 167-188).

#### Railroads In the Highway Era, 1920s-1990s

Despite their great success as a transportation system, railroads were always a business of comparatively modest profits. The industry was heavily capitalized, with high fixed costs tied up in essential holdings like rights-of-way, track, bridges, locomotives and cars, stations, warehouses, and other fixed structures. Large land holdings, in turn, subjected the railroads to an equally great property tax load, often this burden increased beyond what could be justified by traffic. Competing lines, which were legion in Pennsylvania, assured that most bulk commodities shipping rates remained comparatively low. Moreover, arcane freight pricing structures did not establish rates strictly based on competition, commodity, and distance but instead used various factors to establish maximum and minimum rate levels. So long as other costs and competition from outside forms of transportation remained static the railroad industry remained profitable. Its position was, however, precarious (Douglas, 379-395; Harwood interview).

Competition increased from other forms of transportation, particularly private automobiles, trucks, barges, and pipelines. During World War I, more and more shippers, exasperated with railroad car shortages and freight bottlenecks, turned to the nascent trucking industry. After World War I, massive infusions of federal aid helped Pennsylvania and other states build and improve integrated state highway systems. State highways paralleled the routes served by the rail lines and trucking offered shippers the advantage of door-to-door service, eliminating the long delays associated with shifting railroad cars in freight yards and cargo between cars and destination. For the railroads, the Depression only worsened the situation; freight and passenger traffic slipped to all time lows. During World War II, the railroads shouldered most of the nation's transportation duties moving troop trains and increased freight loads, but physically, the railroad industry was in near-shambles by war's end. After 1945, outside competition continued to erode the railroads' business, as new, government-subsidized highways and, later, interstates gave the trucking industry a major boost. Trucking companies, which offered greater flexibility and a much lower incidence of damaging goods in shipment, took the high volume products the railroad industry counted on to subsidize higher weight, but less profitable goods like coal. The improved road system also spurred the growth of automobile suburbs, shifting passengers and businesses away from railroad corridors. The dramatic growth of the airline industry decimated long-distance railroad passenger traffic and made slow but steady inroads into the freight business.

Years of overbuilding, high-fixed costs, heavy debt loads, and declining business were catching up with the industry. With railroad traffic and profits declining precipitously following World War II, there was no money to spare, and further debt was something few railroads could afford. Pennsylvania's anthracite railroads were among the hardest hit, victims of outside competition, mine depletion, a switch from hard coal to oil as the primary choice in home heating, and the completion of the St. Lawrence Seaway, which

syphoned off Great Lakes traffic. The decline of manufacturing and mining in Pennsylvania and the northeast, the lifeblood of the Commonwealth's railroads, sapped the carriers. The railroad companies, led by the Pennsylvania Railroad, reorganized ruthlessly, consolidating shop operations, reducing employment, and abandoning unprofitable branch lines.

Despite the gloom, the railroad industry introduced a number of innovations that won back some traffic. Diesel and electric locomotives increased efficiency, allowing an engine to operate 28-30 days per month, rather than 15-18, the limit of a steam locomotive. Equally important, joint ventures with the trucking industry revolutionized the industry. The introduction of piggyback trains (truck trailers on flat cars), containers on flat cars, and unit trains (trains shipped and routed as a unit, eliminating switching) regained some of the medium distance and long haul freight business. Ironically, the introduction of the tri-level car carriers secured for the railroads the movement of automobiles from manufacturing plant and import point to their final destination (Douglas, 382-395).

But the inroads could not halt the painful restructuring. Declining freight revenues and massive debt forced the B&O into a merger in the early 1960s with the Chesapeake and Ohio Railway, a union that eventually became known as the Chessie System. In 1968 the rival New York Central and Pennsylvania Railroads, the pride of northeast railroading concluded lengthy negotiations by announcing a merger of operations. It was destined to be short lived. Within two years the unwieldy Penn-Central had collapsed in on itself. A number of other notable carriers, such as the Erie, DL&W, Lehigh Valley, and Central of New Jersey, followed them into bankruptcy.

The Penn-Central bankruptcy and the ailing condition of the railroad industry in general convinced many in Congress that a legislative solution was needed. In 1970 Congress created the National Railroad Passenger Corporation (Amtrak) to run the nation's passenger service, including the northeast corridor through Philadelphia and southeastern Pennsylvania and the main route between New York and Chicago. The Penn-Central's freight business was reorganized and, with remnants of other northeastern railroads, formed the basis for a quasi-public company, the Consolidated Rail Corporation, better known as Conrail.

The formation of Conrail and Chessie System closed a number of railroad yards and produced a spate of abandonments of feeder lines throughout Pennsylvania, but railroading survives in Pennsylvania. Partial deregulation in 1980 with the passage of the Staggers Act finally gave the railroad industry the ability to set rates competitively and to own other forms of transportation, like barge and truck lines. This has led to a boom in the intermodal business, particularly on routes greater than 400 miles. It has also led to an improved climate for the railroad business (Martin, 390; USRA, 49-59).

The railroad industry thrives in Pennsylvania in a form much different from as recently as 50 years ago. The Pennsylvania's major east-west freight and passenger lines still handle traffic as Conrail and Amtrak. Both Conrail and CSX Corporation, the successor to B&O/Chessie, carry freight along their historic routes, although the lines have been regraded and tracked for modern equipment. Smaller carriers, like the Monongahela Railroad and the Pittsburgh and Lake Erie, continue to serve coal mines and industrial customers, but in volumes well below historic levels. Other railroads live on as highway routes, their abandoned rights of way appropriated for multi-laned roadways carrying vehicular traffic.