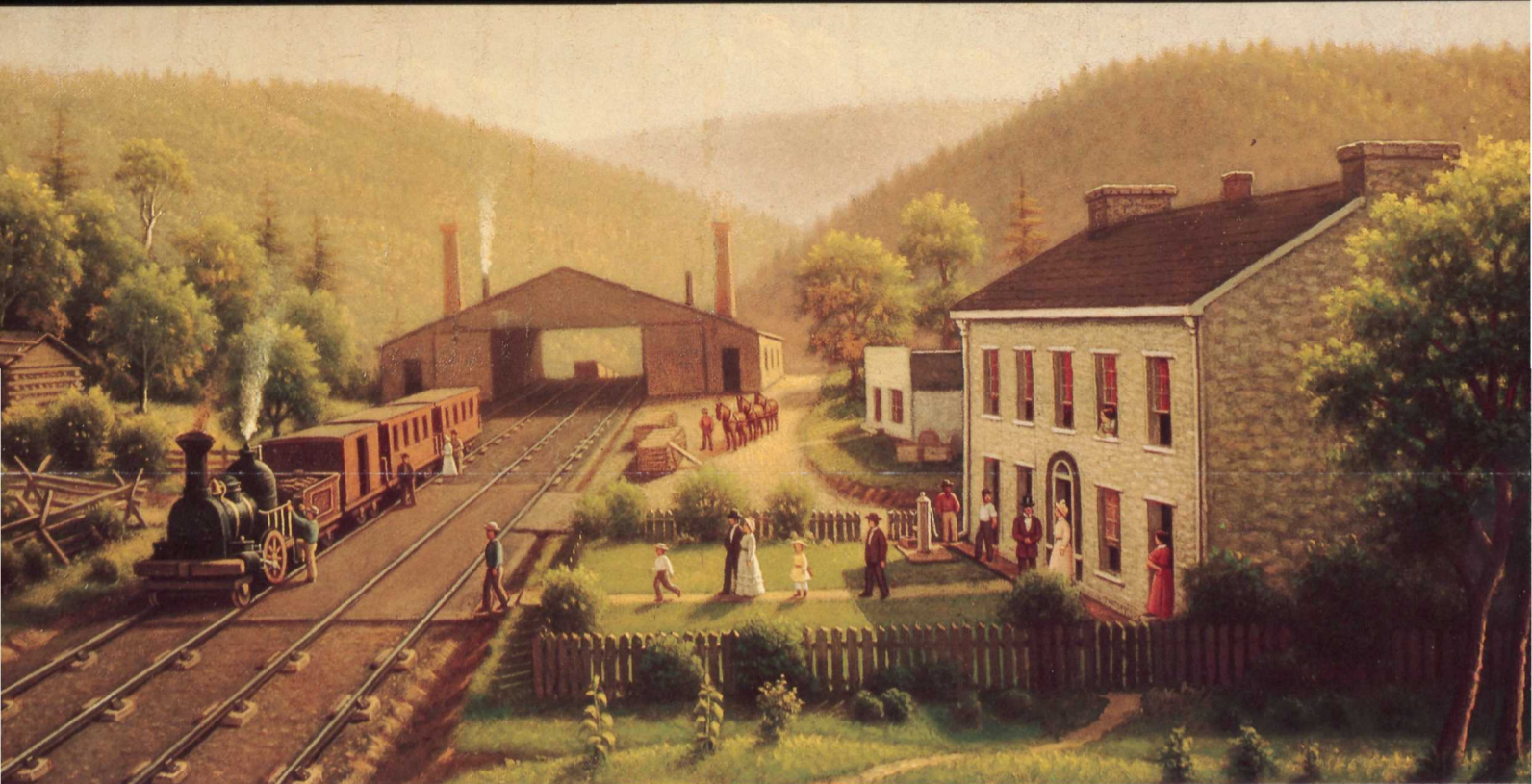


# Allegheny Portage Railroad

National Historic Site  
Pennsylvania

National Park Service  
U.S. Department of the Interior



## Pushing A Nation Westward

The completion of the Erie Canal in 1825 was cause for celebration among the merchants of New York City, but the feat only discouraged their counterparts in Philadelphia. They watched helplessly as the trade that normally flowed through their city began to slip away, diverted through New York to take advantage of the western markets opened by the new canal. So, in 1826, Pennsylvania's legislators authorized the Main Line canal system between Philadelphia and Pittsburgh, an ambitious plan requiring 276 miles of canal, plus aqueducts, tunnels, reservoirs, dams, and 82 miles of railroad track. The daily loss of trade to New York loosened the state's purse strings and spurred construction. By 1831, much of the state-owned Main Line canal system was finished. But so concerned was everyone with pushing the eastern and western sections of the canal toward each other that no one had grappled with the greatest obstacle American canal builders had yet faced—the Allegheny Mountain range.

As workers on both canals approached the Alleghenies in March 1831, the legislature authorized a system in which canal boat passengers and goods would be moved to railroad cars and towed by stationary steam engines up a huge staircase of five inclined planes. On the descent they would be let down five more planes, then transferred again

to canal boats. By late 1833, workers had completed one track. The portage officially opened on March 18, 1834, and the first adventurous passengers were pulled up incline number one. The basic drawback of the system—the transfer of freight from canal boat to railroad car—was eliminated in the mid-1830s by the development of sectional boats. These could be split into sections and loaded onto railroad cars for the portage, allowing freight to make the entire journey from Philadelphia to Pittsburgh on the same canal boat. At first, horses towed the cars on the levels between inclines. They were dependable but slow, and soon they were replaced on most levels by locomotives.

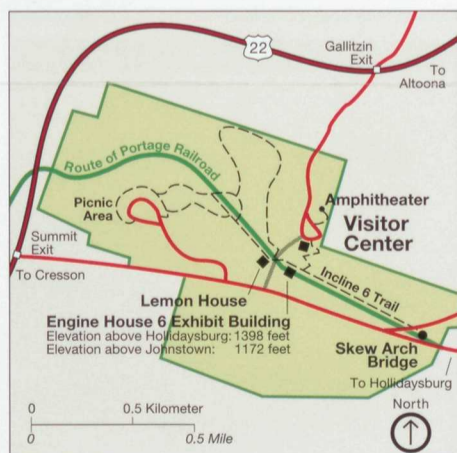
The portage railroad was a daring stroke of engineering that worked remarkably well during a time when railroads were still experimental. It was not without its problems, however. Boiler explosions endangered anyone near them. Heart-stopping breakages of the 3½-inch hemp tow ropes occurred all too frequently. John Roebling solved that problem by suggesting the portage railroad use the “wire rope” that he was developing. By 1849 wire cable, later used by Roebling on the Brooklyn Bridge, was used on all planes.

Despite the new technology employed on the portage railroad, it was obsolete within a few years. As locomotives grew more powerful and dependable, railroads provided stiffer

competition for canals, finally putting most of them out of business. Moreover, inclines were slow and costly compared to continuous track. In the early 1850s, the state of Pennsylvania began construction of a New Portage Railroad without inclined planes, spelling the demise of the old portage. But the new portage was doomed before it was finished, when the privately owned Pennsylvania Railroad completed its line over the Alleghenies in 1854. The canals, which froze over in winter, could not compete with a carrier that offered faster, year-round rail service. The portage was abandoned after 23 years of service, when the Pennsylvania Railroad bought the Main Line canal system in 1857.

The Main Line never captured enough western markets to live up to its commercial expectations. Nevertheless, the Main Line canal system was important to Pennsylvania because it quickened trade between the coal-producing western towns and eastern manufacturing cities. Its role in the country's westward expansion was perhaps its greatest contribution. Before the canal and portage were built, an arduous, weeks-long journey lay between eastern farms and cities and the uncrowded West. The Main Line, decades before the first rails spanned the distance, gave settlers reasonably comfortable, routine transportation to their new homes.

## Visitor Information



**Visitor Center** The visitor center has information, exhibits, and a film about the portage railroad. From there you can follow a boardwalk through a stone quarry to Incline Plane 6. The Engine House 6 Exhibit Building preserves the remains of the original engine house foundation. It features exhibits and a life-sized model of the stationary steam engine. Samuel Lemon built Lemon House on Cresson Summit (see photo above and painting) about 1832. It served as his home, tavern, and business.



Other features in the park include planes 6, 8, 9, and 10, stone culverts, stone railroad ties, Skew Arch Bridge, and Staple Bend Tunnel, the first railroad tunnel constructed in the United States. Ask at the visitor center about interpretive trails and nearby park areas you can visit.

**Accessibility** The visitor center (a wheelchair is available here), boardwalk, Lemon House, picnic area, and Engine House 6 Exhibit Building are accessible for visitors with disabilities.

**Safety and Regulations** Much of the portage railroad is next to or covered by busy highways. Be cautious when stopping. Camping, hunting, open fires, and removal of objects are prohibited.

**More Information**  
Allegheny Portage National Historic Site  
110 Federal Park Road  
Gallitzin, PA 16641  
814-886-6150  
www.nps.gov/alpo



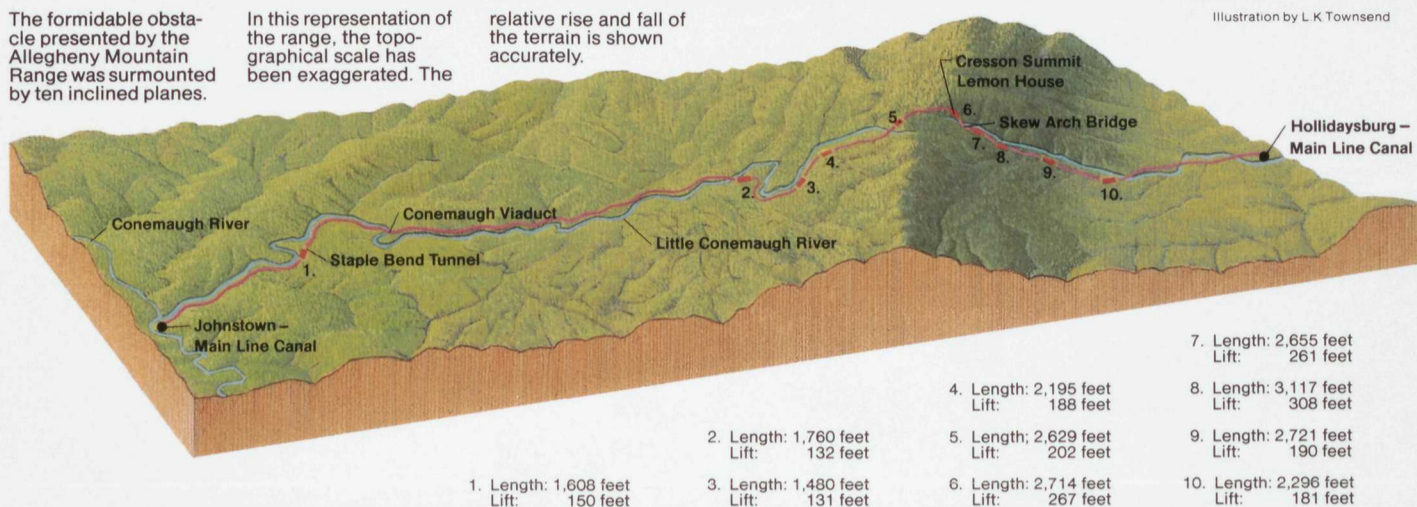
# Crossing A Mountain

The formidable obstacle presented by the Allegheny Mountain Range was surmounted by ten inclined planes.

In this representation of the range, the topographical scale has been exaggerated. The

relative rise and fall of the terrain is shown accurately.

Illustration by L.K. Townsend



## How an Inclined Plane Worked

The railroad portage over the Allegheny Mountains, though only a short section of the Pennsylvania Main Line, was crucial to the enterprise. It joined the system's two great canals into an efficient artery between eastern and western Pennsylvania. Passengers leaving Philadelphia in 1840 could reach Pittsburgh in 4 days instead of 23.

The engineering was simple in principle but bold in execution. In the canal basin at Hollidaysburg, the packet boat sections in which passengers had traveled from Philadelphia were floated onto railroad cars for the portage. They were hauled from the water by stationary steam engines, then pulled by locomotives at about 15 mph over the long grade to the first incline. In a small shed at the foot of the

incline, workers hitched three cars at a time, each with a load averaging 7,000 pounds, to the continuous cable that moved over rollers between the rails. This cable was pulled at about 4 mph by a stationary steam engine beneath a large shed at the top of the incline.

During the portage's busiest periods, six trains an hour were pulled up each incline. When possible, the operators used cars descending on the other track to counterbalance those ascending, lessening the strain on the engines. By today's standards, these were not particularly steep inclines, but they were too much for early locomotives. The steepest—number 8—had a slope of 9.9 percent (a 9.9-foot rise in 100 feet), or less than 6 degrees. The aver-

Illustration by L.K. Townsend based on a painting by George Storm.

age incline rose about an inch every foot, easy enough for horses to pull up one car at a time if the engines broke down.

Five of these inclines carried the cars to the summit. On the near-level grades between inclines, the cars were drawn by horses or locomotives. The process was simply reversed on the other side of the summit, although gravity made the descent faster. Upon reaching the Johnstown canal basin, the boat sections were eased into the water, reassembled, and floated down the canal's Western Division to Pittsburgh. In 6 hours, the boats had traveled 36 miles, ascended 1,398 feet, and descended 1,172.

Sheds at the top of inclines housed twin 35-hp steam engines, used one at a time, with

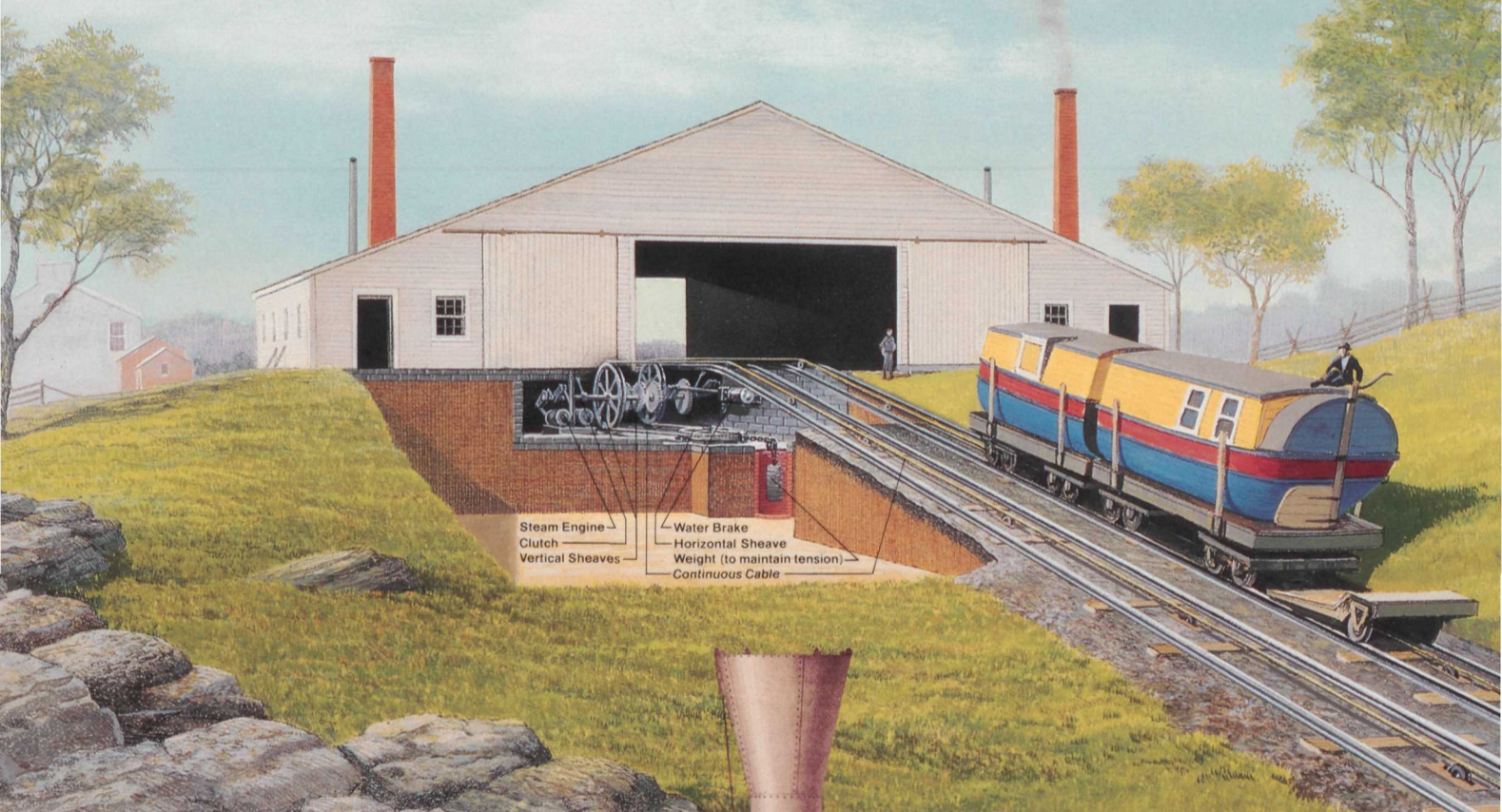
the other as backup. Each pulled the continuous cable that ran between the rails and

turned around vertical pulleys rotating in opposite directions beneath the shed floor. The

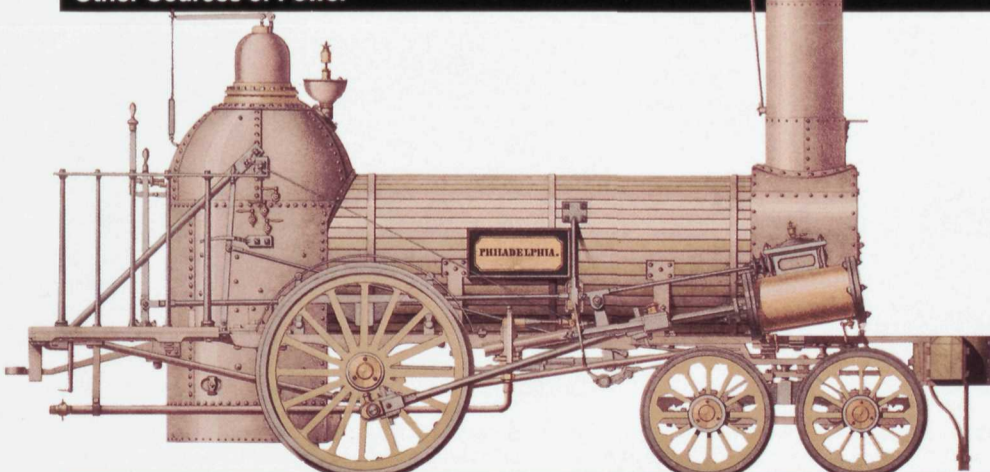
cable was kept taut by weighted horizontal pulleys. A water brake on the pulleys kept

descending cars from picking up too much speed. A spring-loaded friction brake car (visi-

ble behind burden cars) prevented cars from rolling downhill if a rope broke.



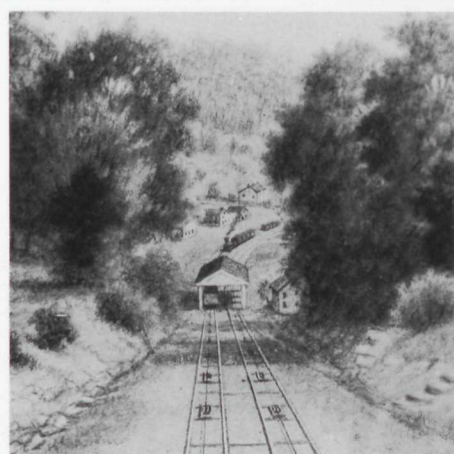
## Other Sources of Power



Library of Congress

Locomotives (like the Norris shown here) or horses pulled cars on the levels between inclines. The long level between incline num-

ber 10 and Hollidaysburg was steep enough to allow cars to descend by gravity, with a locomotive used only to control speed.



This view of the portage railroad looks down incline Number 4. Cars descending an incline were attached to the cable and slowly eased

down. Their counterweight helped pull up cars ascending the parallel track.