
The Canal Through Pittsburgh: Its Development and Physical Character

by Robert D. Ilisevich
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THE Erie Canal, connecting the Hudson River to Lake Erie, proved to be a pivotal development in the history of the Pennsylvania canal system. Before its construction, a "canal craze" had swept the state, but it was not until the New York canal had opened in 1825 that Pennsylvania's businessmen began to panic. Statistics were as depressing as they were revealing. Philadelphia merchants, for example, were dismayed to learn that the Erie Canal was bringing to New York City a rate of growth exceeding that of their own city. Pittsburgh merchants expressed similar concerns over the volume of western goods that flowed through the New York canal system. Subsequently, they intensified their efforts in urging fellow-Pennsylvanians to support a canal system comparable to that of their neighboring state.¹ In time their efforts paid off.

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This study is based upon a report prepared for the Pittsburgh Urban Redevelopment Authority entitled, *A Survey of Historical Sources Relating to the Pennsylvania Main Line Canal in Pittsburgh*, 1983.—Editor

- 1 There is no published comprehensive study of the Pittsburgh canal, though primary sources do exist. Local documents include maps, deeds, business correspondence, and the municipal records of Pittsburgh and Allegheny, but the most extensive collection is the Pennsylvania Board of Canal Commissioners' "Records" in the State Archives, Harrisburg. Interpretive works on the Pennsylvania Main Line Canal providing limited coverage of the canal in the city are William H. Shank's *The Amazing Pennsylvania Canals* (York, Pa., 1965) and *The Pennsylvania Main Line Canal* (York, Pa., 1973), by Robert McCullough and Walter Leuba. A general treatment of the Pittsburgh canal can also be found in Erasmus Wilson's *Standard History of Pittsburgh* (Chicago, 1898); Leland Baldwin's *Pittsburgh, The Story of a City* (Pittsburgh, 1937); and Catherine E. Reiser's *Pittsburgh's Commercial Development, 1800-1850* (Harrisburg, 1951). A useful bibliography on the canal era in Pennsylvania was compiled by Harry L. Rinker in Theodore B. Klein's *The Canals of Pennsylvania and the System of Internal Improvements* (1901, reprint ed., Bethlehem, 1973).

Preliminary investigations into the canal question had been most encouraging. Philadelphia interests in 1824 had formed the Society for the Promotion of Internal Improvements in the Commonwealth and had sent an architect and engineer, William Strickland, to Great Britain to study the canals, roads, railways, and bridges.² Later he became the engineer for the state's canal system, where he applied some of the techniques he had observed in the British system. In August 1825 delegates from forty-six counties had gathered in Harrisburg to take up the matter of internal improvements. Pittsburgh was represented at this meeting by Ephraim Pentland, Joseph Patterson, Mathew B. Lowrie, and Harmar Denny, all of whom recommended that a canal program be immediately adopted.³ In the same year, Governor J. Andrew Shulze had appointed a Board of Canal Commissioners, which began to explore the best means of connecting the eastern and western waters of the state with Lake Erie.⁴

With the preliminaries out of the way, the Pennsylvania legislature in 1826 authorized canal construction at three locations: along the Susquehanna River from Middletown below Harrisburg to the mouth of the Juniata River; up the Allegheny River from Pittsburgh to Freeport; and along French Creek and connecting by feeder to Conneaut Lake.⁵ In its haste to get the project under way, the legislature directed that the work begin, even though the decisions regarding exact routes and the crossing of the intervening mountains had not been reached.

2 William Strickland, *Reports on Canals, Railways, Roads and Other Subjects Made to "The Pennsylvania Society for Promotion of Internal Improvements in the Commonwealth"* (Philadelphia, 1826).

3 The Harrisburg convention adopted a series of pro-canal resolutions, the first of which advocated the opening of communication between the Susquehanna and Allegheny rivers, and between the latter and Lake Erie. Resolution 7 established a committee of correspondence to prepare "an address to the people of Pennsylvania, upon the subject of internal improvement." Joseph Patterson of Pittsburgh was a member of this committee. The committee's lengthy report, issued on August 22, 1825, summarized the pro-canal position and urged the need to establish contact between the state's eastern and western waters. Canal pamphlets, published and unpublished, compiled apparently by Harmar Denny in four volumes, Carnegie Library of Pittsburgh, 1: 1-23.

4 The act of the General Assembly, April 11, 1825, calling for the appointment of a board of canal commissioners was preceded by an act of 1824 that provided for a board of commissioners to promote the internal improvements of the state, and an act of 1823 that provided for commissioners to examine all possible routes for connecting the waters of Lake Erie and French Creek. In his annual message to the General Assembly, December 1824, Governor Shulze promised aid in support of the development of waterways. *Pennsylvania Archives*, 4th Series, 505, 548-49.

5 *Pennsylvania, Journal of the Senate*, 1826, 375.

Eventually three divisions were established: the Eastern Division, along the Susquehanna River; the Juniata Division, which followed the Juniata River from its mouth to Hollidaysburg; and the Western Division, which extended from Pittsburgh to Johnstown along the Allegheny, Kiskiminetas, and Conemaugh rivers. The Allegheny Portage Railroad across the mountains was the means finally adopted to connect the Juniata and Western divisions. This remarkable piece of engineering consisted of a series of inclined planes on which boats were raised or lowered by long ropes. A railroad connected the level stretches. The final link in the Main Line system was the Philadelphia and Columbia Railroad, which connected the Eastern Division on the Susquehanna with Philadelphia. When completed, the Main Line was 395 miles long and cost the state \$12,106,788.

The Roberts Surveys

The canal commissioners, directed by the act of February 25, 1826, to begin work on the Western Division, instructed Nathan S. Roberts, an experienced engineer who had worked on the New York canal system, to survey the route from Pittsburgh to the mouth of the Kiskiminetas at Freeport.⁶ Starting at the foot of Liberty Street and following the east bank of the Allegheny for a distance of seventeen miles, Roberts found steep hillsides and other conditions unfavorable to canal construction.⁷ He communicated this to the commissioners and advised them that building a canal on the east side of the river would be a costly adventure. They instructed him to do a comparative analysis by examining both sides of the river, which he did. He later informed them that a canal on the west side, from the mouth of the Kiskiminetas to some point on the river opposite Pittsburgh, would be simpler to construct and less expensive (\$296,122) than one on the opposite side of the river (\$661,951.51). This meant that, were his findings and suggestions accepted, the canal would either begin or terminate in the community of Allegheny — not Pittsburgh.

Pittsburghers were concerned. Henry Baldwin and Harmar Denny appealed to the commissioners by reminding them that the 1826 act had required that the canal begin within the chartered limits of the

⁶ Pennsylvania Board of Canal Commissioners' Records, Record Group 17 (hereafter cited PBCCR), Division of Archives and Manuscripts, Pennsylvania Historical and Museum Commission, Minute Book, 1825-1829, W2-a1, 33.

⁷ Nathan S. Roberts to Joseph McIlvaine, Secretary of the Board of Canal Commissioners, April 30, 1826, PBCCR, W2-g1b, 58-59.

city — that to build it on the other side of the Allegheny would both violate the law and deal a serious blow to the interests and welfare of Pittsburgh residents.⁸ The commissioners heard the arguments but seemed unanimous in their opinion that the canal must be constructed on the west side. Because of the remonstrances by Pittsburghers, however, a final decision on the matter was not reached at this time.

Meanwhile, in the company of Strickland and Roberts, the commissioners in early August ascended the Allegheny to the mouth of the Kiskiminetas to view for themselves the two possible routes. The river tour convinced the majority of them that the obstacles on the eastern side were too serious, that the canal ought to terminate, if possible, in the Monongahela River, within the city limits, and that it must cross the Allegheny by an aqueduct at Pine Creek (Etna). While final action was pending, the commissioners focused their attention upon the five miles between Pine Creek and Pittsburgh and arranged for Roberts to survey additional routes.⁹

Subsequently, Roberts did two more surveys.¹⁰ The first, contained in a report dated September 6, 1826, examined two routes: one crossed the Allegheny by an aqueduct at Pine Creek and then followed the east bank to Pittsburgh; the other ran along the west side into the borough of Allegheny, where it connected with the river. This report also examined three routes to bring the canal through Pittsburgh. One began at Eleventh Street and ran between Penn and Liberty to the Monongahela. Another ran along Eleventh and Grant streets, followed the edge of Grant's Hill and then headed straight for the river on a line just east of Smithfield Street. The third route, staked out along Eleventh and Grant, required a tunnel through Grant's Hill before it followed Suke's Run to the Monongahela.

Roberts's second survey examined two more routes from Pine Creek and, in more detail, the three routes within the city. One line ran along the west side of the Allegheny and provided for an aqueduct crossing either below Herr's Island or opposite Eleventh Street in the city. Another, favored by Roberts, and also on the west bank, called for a basin and an outlet lock to the river at Saw Mill Run and an additional outlet lock in the borough of Allegheny.¹¹

John M. Snowden, mayor of Pittsburgh, and the Select and Com-

8 PBCCR, Minute Book, 1825-1829, W2-a1, June 17, 1826, 54-55.

9 *Ibid.*, W2-a1, 59.

10 PBCCR, Map Book No. 29, c' Nos. 29-1 thru 29-4; *Pennsylvania, Journal of the Senate*, 1828, 2, Appendix, 37-48.

11 *Pennsylvania, Journal of the Senate*, 1828, 2, Appendix, 46.

mon councils of the city favored the most expensive of the three routes — the one through Grant's Hill. In their opinion, the alternate routes along either Liberty or Smithfield would cause excessive property damage and disrupt the city's normal development. Land use in that section of the city which is now the Liberty Center site (adjacent to Greyhound Terminal) and surrounding area was a mixture of residential units, small shops, and factories. The *Samuel Jones Directory* (1826) and the Barbeau and Keyon map of 1830 provide specific information regarding the location of residents, their homes, or businesses in this area. There is also reference to a Roman Catholic Church and a Methodist burial ground. Among the businesses mentioned are Charles Avery's white lead factory on Fayette Alley (French Street) and the Phoenix cotton mill in the Northern Liberties, the region bounded by the Allegheny River, Herron Hill, and Eleventh and Twenty-sixth streets.

On April 25, 1827, the Select and Common councils adopted a resolution to approve the Grant's Hill route. Furthermore, "the faith and funds of the city" were pledged to cover the expenses beyond those estimated for an alternative route between Penn and Liberty.¹² With these assurances from the city of Pittsburgh, the commissioners two weeks later approved the action of the councils, thus resolving the vexing problem of determining the western terminus of the Main Line Canal. At the same time, they authorized a three-quarter-mile extension to serve the borough of Allegheny.¹³ It began where the Main Line turned to cross the river. At this point the aqueduct was to be built. The way was now clear to complete the first leg of the Western Division from Pittsburgh to Freeport.

Engineering Considerations

Abner Lacock, acting canal commissioner for the Western Division, started almost immediately to negotiate section contracts for the portion of the canal from Pine Creek to Pittsburgh.¹⁴ Designated as the Pine Creek Line, to distinguish it from the Allegheny Line that ran from Pine Creek to Freeport, it was subdivided into approximately half-mile segments beginning with section 93 at Pine Creek and ending with section 113 at the Pittsburgh outlet lock. The Allegheny Line

¹² *Ibid.*, 35-36.

¹³ PBCCR, Minute Book, 1825-1829, W2-a1, May 7, 1827, 153-66.

¹⁴ Lacock rented office space from George Beale, innkeeper, located on the west side of the Diamond, the present Market Square. *Pennsylvania, Journal of the Senate*, 1827, 609; *Samuel Jones Directory* (1827), 106.

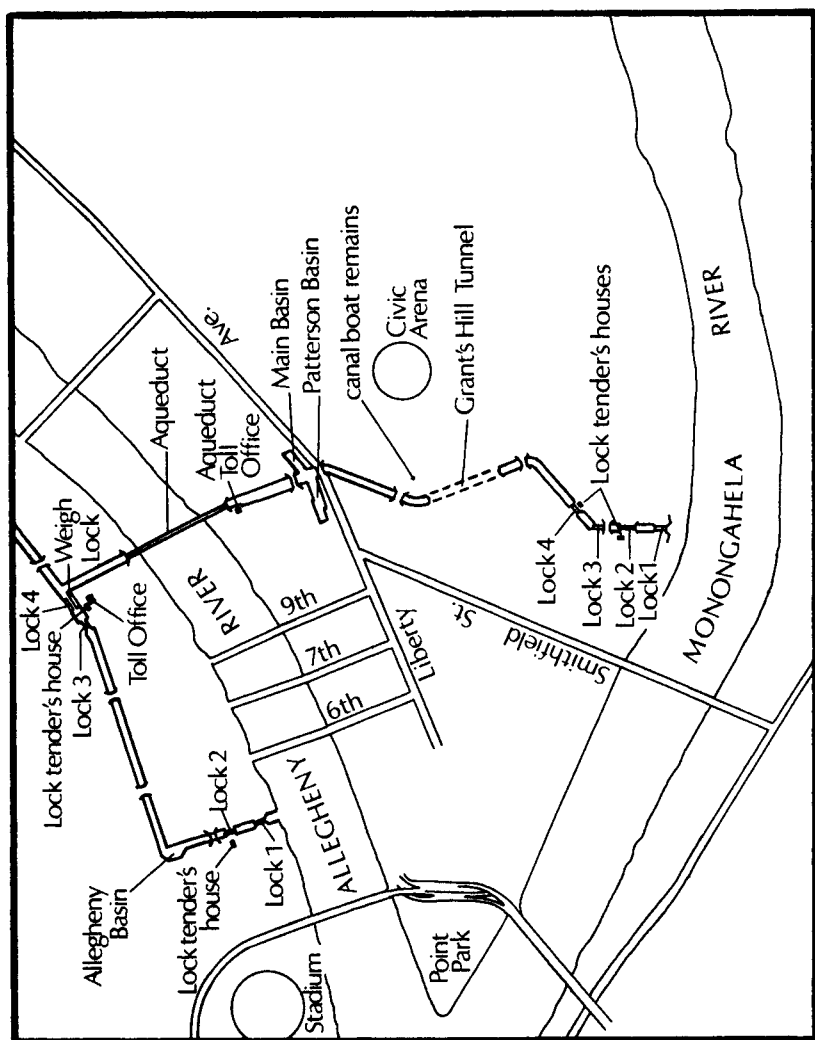


Figure 1. The canal and associated structures in relation to present map of Pittsburgh (map research and design by John N. Kyle, Penn-Oh-Wes Map Company, Pittsburgh; redrawn by James Senior)

ran from section 0 at Freeport to section 92 just above Pine Creek. Section contracts represented the basic units of canal construction and generally included bridges, culverts, waste-weirs, aqueducts, and tunnels. By the end of June 1827, Lacock had executed most contracts for the Pittsburgh sections 105 through 113. Sections 111 through 113 included the present downtown area of Pittsburgh (Fig. 1).

The contracts appeared as articles of agreement that specified the nature of the work, the terms of completion, and miscellaneous particulars. A contract covered either one or several sections of canal construction. The itemized specifications detailed the manner in which the construction was to be done. Much of the engineering was standardized. In a cross-section view of the canal, for example, the contained water was to form a prism forty feet at the top and twenty-eight feet at the bottom; the water depth was to be at least four feet. In addition, the banks of the canal were to be two feet above the water line. The towpath had to be ten feet wide, at a minimum, and had to be located on the river side of the canal. The opposite bank or "berm" had to be at least six feet wide. The slopes of the banks were to have a gradient of eight inches per foot.

By today's standards the work methods were primitive. Before canal excavation could begin, all brush, trees, roots, and stumps had to be removed from an area ninety feet wide along the path of the canal. This clearing process, called "grubbing," insured that the banks made a tight bond with the earth. Workers primarily used picks and shovels. The dirt for the banks was hauled in wheelbarrows and horse-drawn carts. Gangs of immigrants, primarily Irish, performed much of the labor. The final operation included the application of a three-foot-thick layer of clay, called puddle, to the bottom and sides of the canal. The puddle prevented the loss of water and was particularly useful in areas of porous soil. William Strickland had observed puddling techniques in England.

Embankments were an important part of canal construction. To maintain the elevation required to bring the canal through Pittsburgh, extensive embankment was necessary as the canal passed over lower ground in its approach to the future aqueduct. Some raising and embanking were also required to support the level of water from the east end of the aqueduct to Grant's Hill. On July 1, 1829, Thomas Flood signed a contract to build an embankment "between the west end of the Allegheny Aqueduct at Pittsburg and Lock Number 4" (in Allegheny Borough).¹⁵ Two months after Flood had agreed to do this

15 PBCCR, W2-f27, 142.

work, McAvery and Company contracted to build an embankment "from the Allegheny Aqueduct to the south side of Seventh Street."¹⁶ In addition to the embankment, they were to "form and dress" the canal banks and dig foundation holes for the Seventh Street Bridge. The contract specified that all excavated earth "be conveyed to the east end of the Aqueduct and there used as embankment." The new acting canal commissioner of the Western Division, James S. Stevenson, contracted with both Flood and McAvery.

Work on the nine Pittsburgh sections progressed, but not without difficulty and delay. Contractors met with unforeseen circumstances and, on occasion, disagreed with the chief engineer, James D. Harris, over contractual obligations. Weather was always a problem; so were labor-management differences. More serious delays resulted when contractors defaulted and new contracts had to be made, as in the case with sections 109 and 110, or when some preliminary job had to be finished before the major work on the section was undertaken. Culverts had to be built in sections 106, 107, and 109, for example, before work in those sections could be completed. Despite these delays and setbacks, on March 20, 1828, Harris reported to the commissioners that he expected all work on the Pine Creek Line, with the exception of the tunnel and aqueduct, to be completed by October.¹⁷ His optimism exceeded the harsh realities of construction, for the first canal-boat did not arrive in Allegheny until June 28, 1829, thus signalling the completion of sections 105 through 110. Only the tunnel through Grant's Hill and the aqueduct remained to be done.

Spanning the River

On June 23, 1827, shortly after the commissioners authorized the first Pittsburgh aqueduct, Acting Commissioner Lacock awarded a construction contract to William LeBaron and Sylvanus Lothrop, who had submitted a model of their design. The wooden structure was to be 1,140 feet in length, supported by stone piers and buttressed at each end by massive stone abutments. The contract price was \$100,000, with a completion date of March 1, 1829.¹⁸ Specifications appended to the contract called for six stone piers 150 feet apart from each other. Each measured fifty-four by seventeen feet at the bottom and tapered to forty-four by ten feet at the top; the height was forty

¹⁶ *Ibid.*, W2-f24, 135.

¹⁷ *Ibid.*, W2-g1b, 61.

¹⁸ *Ibid.*, W2-f25, 52-55.

feet. The longer sides paralleled the flow of the river and the shorter ends were rounded. The piers rested upon a platform of white oak timbers covered with three-inch planks that was to be at least one foot below the lowest water level of the river. Two parapets on either side of the trunk brought the piers to a total height of forty-nine feet. Well-dressed stones sat in layers from sixteen to thirty inches high. The stone abutments had the same dimensions as the piers and were seventeen feet thick at the bottom and ten feet deep at the top. Semi-circular wings, ten feet thick, flared outward from each side of the abutment. All stonework was knitted together with iron bars and bolts at the corners where the wooden arches rested.

The specifications on the aqueduct provide little information regarding the construction of the trunk. According to William Shank, its length was 1,140 feet, its width fourteen feet at the bottom and sixteen and one-half feet at the top, and its depth eight and one-half feet.¹⁹ There was a towpath on one side of the trunk and a footbridge or walk on the other. The trunk was to have a roof, for the contract called for good pine shingles and also pine weatherboards for the sides. But a painting by Russell Smith in 1832 shows no roof over the trunk at that time.

On November 10, 1829, the *Pittsburgh Gazette* reported that the aqueduct had been completed (Fig. 2). In a letter dated November 11, an observer in Pittsburgh wrote to a member of the legislature:

Yesterday was probably a day of more enthusiastic feeling than Pittsburgh ever witnessed. The 10th inst. was fixed for letting the water in, to cross the aqueduct. . . . The men were in fine spirits, and went on cheerily during the night of Monday and up to twelve o'clock on Tuesday. Five minutes before the appointed hour, the water touched the Pittsburgh shore. In half an hour the canal was filled to the tunnel, and three packet boats crossed in fine style, hailed by ten thousand spectators, and under a salute of 105 guns from the artillery.²⁰

Much work remained to be done. A month after the aqueduct had been opened to traffic, John Ackerman and Albert Weatherby contracted to construct a railing for the towpath. The following April Ackerman agreed to build two gates, waste-weirs, two pairs of stairs, and two "bridges or footways over the trunk."²¹ Over the years, however, a wooden structure like this required constant repairs. Still,

19 William H. Shank, *The Amazing Pennsylvania Canals*, Historical Society of York County Booklet Series (York, Pa., 1965), 16.

20 Quoted in Samuel Hazard, ed., *Register of Pennsylvania*, Philadelphia, Nov. 14, 1829.

21 PBCCR, W2-f25, 20.

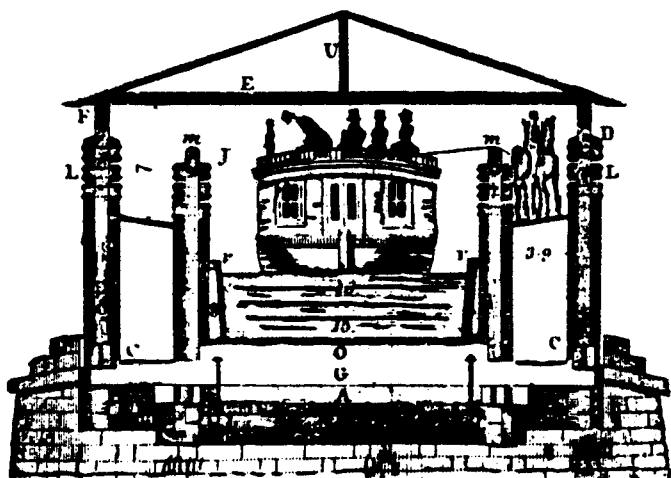


Figure 2. John Trautwine's structural rendering (*Journal of the Franklin Institute*, 1842) of the original Pittsburgh aqueduct adapted from Don A. Sayenga's "The Original Pittsburgh Aqueduct," *Canal Currents* LIX (1982), 1-4

maintenance failed to slow sufficiently the degenerative process. In August 1843 the aqueduct was declared to be unsafe for boat traffic.

With a commercial crisis facing the city of Pittsburgh, the legislature on January 17, 1844, passed a bill authorizing the city either to repair or rebuild the aqueduct. The necessary costs were to be recovered through tolls. Two weeks later the councils adopted an ordinance that provided for temporary repairs to accommodate navigation at least through the forthcoming season.²² The contractors, J. and A. C. Beck, received \$4,000 for straightening the arches and stringers and for laying new flooring. But limited repairs were not going to suffice. John Fleming, toll collector, reported shortly to the commissioners that four king posts and other timbers had broken. In his opinion, unless the water was withdrawn, the aqueduct would collapse within a week.²³

Obviously the aqueduct had to be rebuilt. John Roebling, who had established near Pittsburgh a wire rope factory, was selected to do the work. According to specifications written by Roebling and contained

²² *Ibid.*, W2-f24, 33-34, 142-43, 147-48.

²³ *Ibid.*, W2-g4, 39, 216, 296.

among the canal commissioners' records, the trunk of the aqueduct was to be supported by two seven-inch cables. This application of the wire suspension principle to aqueduct construction was indeed unique and may have been the first of its kind in the country.²⁴ Roebling's plan called for using the old piers and abutments which had to be modified to receive the suspension cables. The upper layers of the old piers' stones were removed, then relaid with fresh grouting to form a solid foundation for two columns, or pyramids, which had to support the wire cables. Surmounting each column was a large cast iron saddle one foot seven inches high, over which the cables passed. An elaborate anchoring system secured the cables to the ground on both sides of the river.

The trunk was sixteen and one-half feet wide at the top, fourteen on the bottom, and nine and one-half feet deep. Its bottom and sides consisted of double courses of planks laid diagonally. The structure rested upon paired transverse beams twenty-seven feet long, sixteen inches deep, and six inches wide; these were placed every four feet. The tow-path was on one side of the trunk, the footpath on the other. Each was six and one-half feet wide. The framework of the trunk was attached to the cable by double rods, one inch in diameter, every four feet. Roebling completed the job on schedule, and the aqueduct was reopened to boats on June 2, 1845.

Digging Through Grant's Hill

Perhaps more difficult than crossing the river was boring through a big hill. In 1827, the commissioners had adopted the most expensive of the three routes surveyed by Roberts — the one that required an 810-foot tunnel through Grant's Hill. With firm assurances from city leaders that cost overruns were to be absorbed by the city, the commissioners undertook what was to become a most challenging and expensive enterprise. The work on the tunnel was tedious, slow, dirty, and dangerous. Defaults by some of the contractors, damage claims by

24 *Ibid.*, W2-g4, 201-11. Roebling's suspended aqueduct across the Allegheny was his first major structure. This was followed by the Monongahela suspension bridge at Pittsburgh and several suspended aqueducts on the Delaware and Hudson Canal. He went on to complete at Niagara Falls a long-span wire suspension bridge. The success of this bridge prompted the building of similar structures. Roebling's design for a bridge spanning the East River between Manhattan and Brooklyn was accepted, but he never saw the famous bridge completed due to his untimely death. It was completed under the direction of his son, Augustus Roebling.

adjacent property owners, and litigation between the state and city over payments resulted in endless delays. Even with its completion, the tunnel failed to hold water satisfactorily, while its open ends suffered from what canal engineers called "hill slips" — earthslides, earthflows, and slumps.

American tunnel techniques were still in their infancy when the Grant's Hill project was proposed.²⁵ The Pittsburgh tunnel was one of the first attempted in the country. Massive rock formations required drilling and blasting; black powder was the only explosive available. Although the procedure was crudely simple, considerable skill and care were necessary to avoid cave-ins and the loss of life. A sledgehammer and a steel drill were first used to punch a hole, three to four feet deep, which was packed cautiously with powder and clay. A small hole was bored through the clay and a fuse inserted, then lit. If everything went as planned, the explosion loosened rock and earth while the support beams held.

The records of the commissioners indicate that a number of contracts regarding the tunnel were issued. On June 23, 1827, John McAvery, Daniel Malloy and Company agreed not only to dig the tunnel, but construct four locks near the Monongahela and three road bridges over the canal. The contractors were to receive \$61,000 for their effort.²⁶ The following spring, the chief engineer, James D. Harris, reported to the commissioners that the work was "progressing with spirit" and in November he added that eighty-five feet at each end of the tunnel had been completed.²⁷ But the contractors ran into problems and on May 30, 1829, Lacock informed the commissioners that McAvery and Malloy had abandoned the project. Other contractors tried their hand at the job. In July 1829, John Welch agreed to do an open cut through Grant's Hill but it is questionable that any work was performed.²⁸ Six months later Simon Lonergan contracted to complete excavation of the tunnel. Apparently he fulfilled the terms of his contract for, by the following August, he agreed to "arch and vault" the tunnel and to finish the work by Christmas. He apparently succeeded.²⁹ Finally, after four years, the commissioners reported to the State

25 See Robert S. Mayo, "Early American Tunnels," *Canal Currents* 40 (Fall, 1977): 6-8.

26 PBCCR, W2-f24, 144-45. This handwritten contract is preceded in the commissioners' records by an undated document providing specifications for the locks and tunnel signed by the same parties. PBCCR, W2-f24, 144.

27 *Ibid.*, W2-g1b, 82-83.

28 *Ibid.*, W2-f24, 142-43.

29 *Ibid.*, W2-f24, 133-34. On February 23, 1830, Lonergan and Company agreed

Senate on December 15, 1831, that "the tunnel at Pittsburgh and outlet locks into the Monongahela are finished and ready for navigation. This tunnel is solidly arched with sandstone, laid in hammer-dressed range work."³⁰ While excavating the foundation of the United States Steel Building in 1967, contractors found the remains of the tunnel (Fig. 3).

Basins

Not far from the entrance to the tunnel was the Stevenson, or Main, Basin. For many years it was the only Pittsburgh basin and it remained in use until the canal was abandoned in the 1850s. Basins were bodies of water where packet boats were moored to receive or unload cargo. Naturally these basin areas became centers of commercial activity; near them were built warehouses, hotels, taverns, and offices of transportation companies. The Pittsburgh vicinity eventually had five such basins — one in the North Side (Allegheny) and the other four in the downtown district. In addition, various segments of the canal were widened to serve the same function as a basin.

The Allegheny Basin was located north of the Allegheny outlet lock between Cremo and Dasher streets, directly south of the present Conrail tracks. It was part of the original 1827 "Allegheny extension" plan as contemplated by the commissioners. Gary W. Lantz gives its dimensions as 125 feet wide (east to west) and approximately 250 feet long.³¹ It had a ten-foot towpath around its perimeter. For the first season of canal operation, it served as Pittsburgh's basin as well.

Completion of the aqueduct in November 1829 created the need for a basin in downtown Pittsburgh. James S. Stevenson, one of the commissioners who had replaced Lacock as acting canal commissioner for the Western Division, requested that a basin be built on his land adjacent to the canal. The commissioners complied with his request.³² The Barbeau and Keyon map of 1830 suggests that the basin was in use during that year's boating season. An undated map included among the commissioners' records identifies this facility as the

to excavate the tunnel, *ibid.*, W2-f24, 140-41. In April 1830, Hugh Wilson and George Hutchison contracted to build the stone arch or vault in the tunnel, but abandoned the project. Lonergan and Company on August 17, 1830, agreed then to complete the vaulting, *ibid.*, W2-f24, 147-48.

³⁰ Pennsylvania, *Journal of the Senate*, 1831, 20.

³¹ Gary W. Lantz, *A Cultural Resource Survey of the East Street Interchange* (Pittsburgh, 1980), 78.

³² PBCCR, Minute Book, 1829-1830, W2-a2, 142.

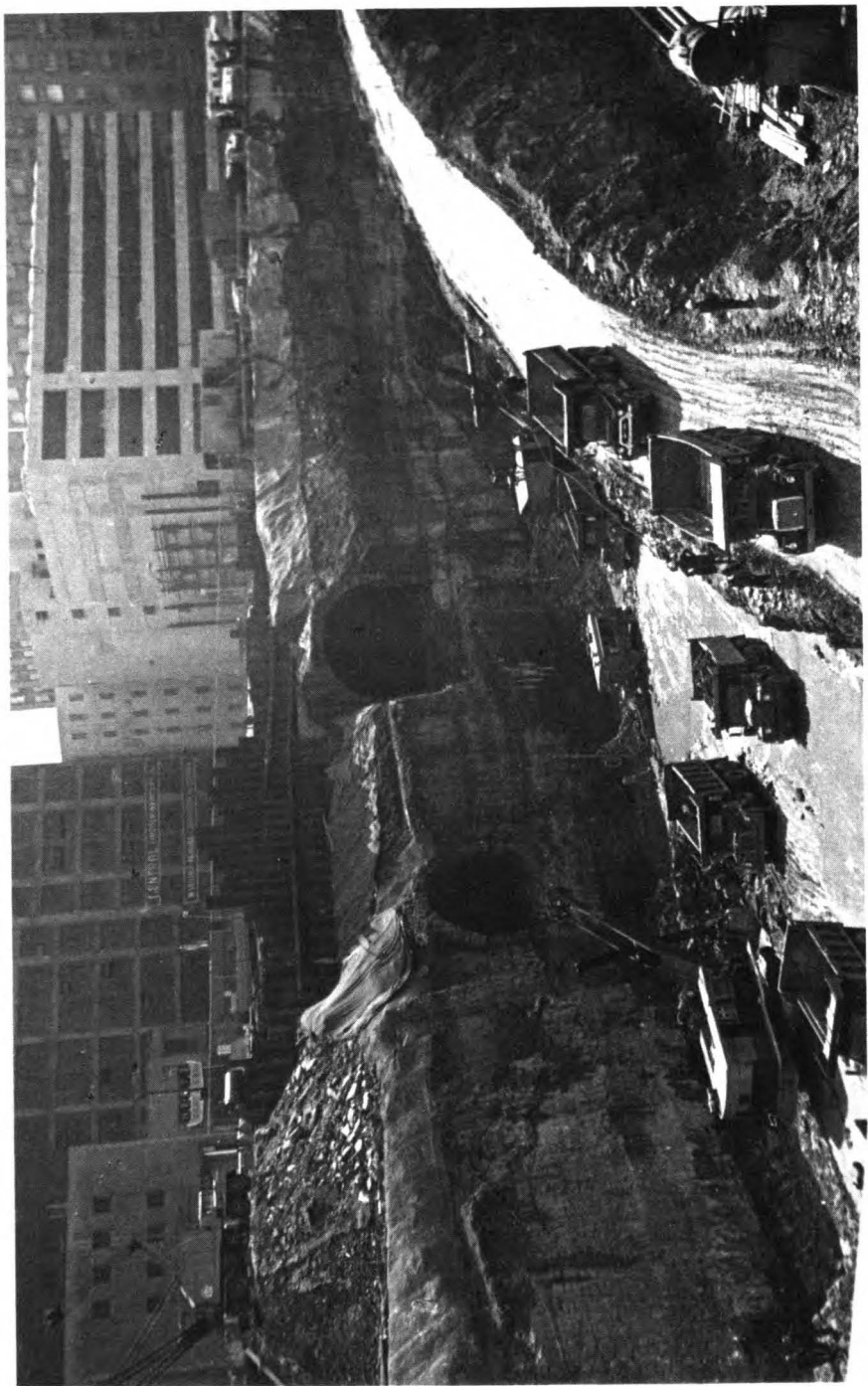


Figure 3. Grant's Hill tunnel, lower left, and Pennsylvania Railroad tunnel, upper right, encountered while excavating for foundation of the U. S. Steel building (courtesy of the Historical Society of Western Pennsylvania)

Stevenson Basin.³³ This latter map had to be drawn sometime after June 1834 for it includes sewer routes that were contracted for in that month. An 1840 lithograph of downtown Pittsburgh by W. and A. K. Johnston also shows the basin.

John McCrea and Joseph Patterson, jointly, and David Greer petitioned the commissioners in 1831 to build basins on the present-day Liberty Center site. On January 17, 1832, the commissioners unanimously voted in favor of two basins, pending approval of the plans by city government.³⁴ The undated map previously mentioned does depict both a "Patterson" and "Greer" basin at this location, but no additional reference to the "Greer" basin has been found. The Patterson Basin appears to have been completed sometime between 1834 and 1838, for in early 1839 a group of citizens petitioned city officials for a sewer at Wayne (Tenth) Street to drain the basin.³⁵ They complained that the water in the basin became "stagnant and exceedingly unwholesome and unpleasant during the summer months."

The character of the Patterson Basin area is evident in the 1840 lithograph. Two canalboats are moored next to a cluster of buildings, which were obviously warehouses. The buildings in front of this cluster probably belonged to the Reliance Portable Boat Company, while those in the rear may have been owned by Taafe and O'Connor. Along Liberty Street there is a continuous row of two-story structures and a three-story one on the southeast corner of the block. At the end of the row stands the warehouse of Samuel M. Kier, noted canal transportation agent and salt-refiner. Other occupants on Liberty Street were the salt merchants Forsyth and Gebhart, wholesale grocers, and several transportation companies — Bingham, Despatch, Hollidaysburg, and Pilot lines. The U.S. Hotel occupies the northeast corner of the block, and the footbridge that connects the hotel to Liberty Street is clearly visible in the lithograph. Built sometime before the publication of the 1837 *Harris Directory*, this hotel had to be one of the earliest, if not the first, commercial enterprises in the Liberty Center area. It was a gathering place for businessmen, politicians, and tourists.

Another basin that is not indicated on any known Pittsburgh map was the Seventh Street Basin. Its existence, however, can be inferred from other sources. An advertisement by Samuel M. Kier, which is

33 PBCCR, Map Book No. 29, d' No. 30.

34 PBCCR, Minute Book, 1830-1832, W2-a3, 745.

35 Pittsburgh City Records (hereafter cited PCR), Box 12, Historical Society of Western Pennsylvania.

printed in Stefan Lorant's history of Pittsburgh, places his office of business at the "Canal Basin, Seventh Street."³⁶ On December 30, 1839, H. Wilkeson, tax collector, reported to the Select and Common councils his failure to collect the taxes owed by Charles B. Taylor on "warehouses fronting on the Canal and Fountain Street."³⁷ This location is probably the same place referred to in the *Pittsburgh Gazette-Times*, August 17, 1911, where the remains of an "old canal boat" were found while workers excavated the foundation of the Pittsburgh and Allegheny Telephone Company building.

Finally, in 1831, James Ross petitioned the commissioners to build a ninety-five by forty-five-foot basin near his warehouse between Diamond and Third streets. Ross promised that the retaining walls would be "laid with stone" and "coped with massive timbers." On March 31, the commissioners granted the request, but, to date, supportive evidence of this basin has not been found, though it is depicted on the undated map previously mentioned.³⁸

Locks

The canal consisted of a series of level steps formed by impounding barriers through which boats passed by a lock. Essentially a lock permitted a canalboat to be raised or lowered from one level to another. It was a rectangular chamber with fixed sides and massive wooden gates at either end, which could be opened or closed by the lock tender. Lock gates were generally mitered, that is, V-shaped, with the point of the V upstream. When the lock was filled to the level of the upper pound, the upstream gates were opened for boats; after closing the upstream gates, water was drawn out until the lock level was again even with the lower impoundment, and the downstream gates were opened. Filling or emptying the chamber was done by sluices, which were openings in the lower sections of the gates. These sluices were opened and closed by paddle gates which the lock tender operated by a vertical rod.

Lock construction began by digging the lock pit. Foundation timbers, thirty-four feet long and twelve inches thick, rested on the floor of the pit, which had been carefully levelled. These were laid

³⁶ Stefan Lorant, *Pittsburgh: The Story of an American City* (New York, 1964), 119.

³⁷ PCR, Box 4.

³⁸ PBCCR, Minute Book, 1830-1832, W2-a3, 493; PBCCR, Map Book No. 29, d' No. 30.

crosswise not more than a foot apart. The spaces between the foundation beams were then packed with puddle level with the tops of the beams, which were covered by three-inch white pine planks. The stone chamber was built upon this base.

The lock was basically two parallel stone walls, 138 feet long and fifteen feet apart, with outward flaring ends, or wings. The walls were recessed to receive the opened gates. At the downstream edge of the recesses, a carefully fashioned groove, called a "coin" or quoin, engaged the rounded pivot-edge of the lockgate. The lock chamber was ninety feet from coin to coin, or from one gate to the other. The stones of the walls were neatly shaped, groomed, and set in mortar. The gates themselves were of sturdy wood, primarily oak or white pine, but yellow pine was used for the pivot posts that engaged the coins. The gates had paddles of cast iron below the waterline. Extensive use of this type of gate is indicated in a contract dated October 29, 1829, with King and Livingstone, who were to supply "one hundred and fifty of their patent cast iron paddle gates."³⁹ Culverts also required cast iron gates to carry excess water around the lock.

Within the present-day city limits of Pittsburgh, the state-owned canal system included eight lift locks and one weigh lock. Four lift locks in both the North Side and downtown Pittsburgh lowered the canal approximately thirty-nine feet to the Allegheny and Monongahela rivers, respectively. Locks 1 and 2 in the North Side were near the river along the present-day West Canal Street, while 3 and 4 and the weigh lock were along the present-day Conrail tracks between Goodrich and Voeghtly streets. All four locks in downtown Pittsburgh were clustered near the Monongahela just east of Ross Street.

The lowest of these locks were called outlet locks because they permitted boats to pass into the rivers. The construction of outlet locks was similar to the other lift locks, with the exception that the floors were four feet below the lowest water level of the river. On March 20, 1828, Harris reported to the commissioners that work had been suspended at the Allegheny outlet lock pending a drop in river level. Special precautions were taken always to protect the river ends of outlet locks from erosion. The outlet gates of Allegheny Lock 1 are visible in the 1859 Schuchman lithograph of Pittsburgh.

Weigh locks housed huge scales that were used to determine the weight of a boat and its cargo for toll collection purposes. After a boat had entered the lock, the water was drawn off and the boat came

³⁹ PBCCR, W2-f27, 239.

to rest upon a large cradle attached by levers to a weigh scale. On January 4, 1832, the commissioners adopted a resolution to install a weigh lock at Pittsburgh.⁴⁰ John Lynch contracted to do the work. In December 1833, the commissioners reported to the State House of Representatives that the lock had been completed.⁴¹ The specifications are not appended to Lynch's contract but a map book among the commissioners' records includes a drawing of the Huntingdon weigh lock on the Juniata Division. This structure had a stone chamber ninety feet long, seventeen feet wide, and eleven feet deep. Its walls were eight feet thick. The cradle consisted of six twelve-inch-by-twelve-inch beams, sixty-six feet long. Presumably the weigh lock in Pittsburgh was of similar construction.

Miscellaneous Structures

Collecting tolls was an important part of the canal system — perhaps the most important. Whether or not the Main Line was to pay for itself remained to be seen. Transportation costs were high. For example, the freight on iron from Blairsville to Allegheny was \$2.75 per ton, including tolls; for salt from the Kiskiminetas works it was from 25 to 31 cents per barrel. Two houses were maintained to collect tolls — one in Allegheny near the weigh lock, the other at the south end of the aqueduct. It became customary to furnish the toll collectors with houses that served as both dwelling and office, but such facilities at first were not provided at either location. Both collectors found their own housing for several years after canal operations had begun.

Before assuming his duties as toll collector at the aqueduct, John Fowler had written to the commissioners regarding the building of a toll house for himself. They agreed to construct a "suitable toll house," but it was not until January 1831 that they directed the superintendent to begin the work.⁴² Interestingly, the location chosen for the collector's office-house at the aqueduct was on the land belonging to James S. Stevenson, acting canal commissioner for the Western Division. On March 30, 1831, a committee of Pittsburgh citizens that included James Ross, Robert T. Stewart, and Benjamin Bakewell had assessed the property's value at \$600 and had recommended that the dwelling be built on the property. The lot, thirty by fifty feet, was on the west

40 PBCCR, Minute Book, 1830-1832, W2-a3, 462.

41 Pennsylvania, *Journal of the House of Representatives*, 1833, 13.

42 PBCCR, W2-a2, 106, 198; W2-a3, 451.

side of Washington Street (Eleventh Street), 569 feet from its intersection with Penn Street. Title to the property was transferred to the commonwealth in a deed recorded on July 9, 1832.

The primary contract for the collector's house has not yet been found among the commissioners' records, but one for supplementary work on the structure signed by Richard Lewis in 1831 does exist.⁴³ Lewis agreed to build a porch and stairs in the rear of the structure, install a pair of wooden shutters on the lower story, and build a privy near the house. The building was about twenty-four by thirty-six feet, with a roof pitching east and west and a chimney on the gable end facing south. If this is the same building shown near the extreme right margin of the 1840 Johnston lithograph, it was a full two-story structure. By December 1831, the minute books of the commissioners indicate that the house was ready for occupancy by Fowler.

The main toll collector's office for Pittsburgh was located in Allegheny on the same lot as that of the lock tender, who operated Locks 3 and 4. The lot south of the basin between these locks had been bought from William Robinson, Jr., for \$600. The building was completed sometime after December 3, 1832, for on that date the collector, William B. Foster, father of the famous composer, Stephen Collins Foster, pleaded with the commissioners for its construction. He complained that he had been forced to rent a dwelling considerably distant from his office, a "miserable hovel, at three dollars per month."⁴⁴ Foster got his wish — a brick building near Locks 3 and 4. A plan to scale gives the dimensions to be about twenty by forty feet. According to an 1833 authorization for payment by the commissioners, Foster used "stone coal" to heat his office. What furnishings the building contained is not known, but, assuming that toll collector offices were probably similar, an 1844 inventory of an office in Johnstown might suggest the contents of Foster's. It lists the following items: one iron safe, two tables, one desk, two stools, one chair, three candlesticks, several lots of canal registers, and various office supplies.⁴⁵

The commissioners also provided dwellings for the men who manned the locks. There were four such houses for lock tenders within the present city limits: two in the North Side, and two in the downtown area. Each lock tender managed two locks. Their houses were simple in design but substantial. On August 17, 1830, Thomas

⁴³ *Ibid.*, W2-f25, 142.

⁴⁴ *Ibid.*, W2-g1b, 155.

⁴⁵ *Ibid.*, W2-g4, 289.

McKown contracted to build two lock houses with accompanying privies to serve the locks along Suke's Run, downtown. He was to complete the work in fourteen months.⁴⁶ The contract cost was \$329 for each house and \$12 per privy. Though the specifications and plans are referred to in the contract, they were not filed with this document.

Certainly there was nothing elaborate about the lock tender's house. Rectangular in shape, its ground floor contained a kitchen and basement. The first floor had an eight-foot ceiling and consisted of two rooms, while the half-story above was a single room. The flooring was of tongue-and-groove, the walls and ceilings plastered, and the woodwork smoothed. The exterior walls were sided with clapboard and painted with "three coats of white lead and oil." A detailed drawing of the two downtown locktender houses by Z. W. Remington and Lewis Keyon, dated April 11, 1834, shows their dimensions to be sixteen by twenty-six feet, with five-foot, one-inch porches on their northern sides.

The canal engineers also provided for road and farm bridges, the former to accommodate important commercial traffic, the latter to give farmers access to land separated by the canal. The tendency of the waterway to divide farms, thus often isolating the owners, led to constant petitions for additional bridges. Just how many canal bridges were eventually built in the Pittsburgh area is also unknown. There are some references. For instance, on November 20, 1827, Harris reported that seven wooden and two stone bridges remained to be completed on the line between Etna and Pittsburgh.⁴⁷ And there is some information on those individuals contracted to do bridge work. Black and Charters were the contractors for a bridge in Allegheny (probably Federal Street) and the Penn Street bridge in Pittsburgh; Collart and Dilworth were the builders of the Liberty Street bridge.

Finally, waste-weirs, culverts, and tumbling dams were among the miscellaneous structures. Weirs, or barriers, were placed at the top water level of the canal to discharge or divert the flow of surplus water during floods. Culverts were necessary to prevent erosion where streams passed under the canal and tumbling dams were devices that helped regulate streams flowing through the canal. The commissioners' records indicate that at least six culverts were located on the north side of the Allegheny River. One tumbling dam was at Seventh Street, another on Suke's Run near the outlet locks to the Monongahela.

⁴⁶ *Ibid.*, W2-f27, 41.

⁴⁷ Pennsylvania, *Journal of the House of Representatives*, 1828, 54.

Summary

After its heyday in the 1830s and 1840s, the Main Line Canal faced increasing competition from America's newest transportation miracle — the railroad. Trains were faster, more versatile, and often cheaper to use than canals. At the same time that the trains offered better service, communities and businesses were faced with the physical deterioration of their canals. Were they to invest limited resources in repair and reconstruction of the old or in building the new? By the 1850s, they had firmly chosen the railroad. The canal system in Pittsburgh gradually lost its financial support and virtually ceased operations in the 1850s—despite Roebling's new aqueduct. Its physical traces were already disappearing by the 1860s, as railroads were built over the filled-in locks and downtown Pittsburgh developed.

The people who witnessed and encouraged the construction of the Pittsburgh sections of the Main Line Canal were tremendously excited by it, and some were generously rewarded. Its engineering complexities — and amazements — included the Allegheny River aqueduct and Grant's Hill Tunnel. They both leaked, but they were nevertheless remarkable engineering achievements. Despite its short life, the Pittsburgh component of the Main Line Canal should be remembered and recognized as a significant part of the area's technological and business development. ■

PITTSBURGH DURING CONSTRUCTION OF THE CANAL — 1828. A VISITOR'S ACCOUNT

The town, or city, for it is I believe incorporated, did not appear so large as I had expected; in all other respects it surpassed my expectations, for in smoke, noise bustle & activity it is quite a rival to the English manufacturing towns. . . . The hotel, the principal one of the town was as full as it could be; and the guests were entirely composed of western men of business, caring as little as could be about comforts, luxuries, or appearances. The best room I could get was already tenanted by three of these worthies, and my only chance of a bed was in a fourth cot.

After dinner I commenced a survey of the place, and wishing to see the glass manufactories, which are so much celebrated, went immediately to Mr. Bakewell's whose establishment is the finest and to whom I had a letter, unfortunately, the works were stopped from its being Saturday, and he was himself out of town. I shall not however trouble you with accounts of iron works, glass houses, steam engines &c. which wd. be neither very new nor amusing, though they are the things most thought of by people at Pittsburg. I was most interested with the trade of the river; I counted seven large steamboats, ready to go down, as soon as it rose, and the shores of the Monongahela were filled with keel-boats, which as they draw very little water can descend at all times; they are very much of the shape of large canal boats, though not quite so flat, and rigged with a mast which carries one large square sail. The arks are very singular things, being big square boxes, which float down with the current, generally carrying a whole family with all their furniture, food, stores & stock living & dead, and left almost entirely to the mercy of the stream. I walked on the wharves or shore from the bridge over the Monongahela, round the point, & up the Alleghany to the other bridge, then crossed & examined the new works erecting the Canal; in returning I saw the northern part of the town, and reached home just at dark. The houses and stores are well built, the streets paved, and laid with water pipes, and the people the most active & bustling imaginable; I never saw a place of more industry, but this is all, there is no time for the refinements of society or letters.

* * *

On Sunday morning . . . we had a pleasant drive, passing on the way the new tunnel which is to bring the Pennsylvania canal, across the upper part of the town from the Alleghany to the Monongahela river.

Written September 19, 1828, from Henry Gilpin to his father. [“Tossing about among woods & mountains, and strange people”: Henry D. Gilpin's Account of Travel to Maryland and Western Pennsylvania in the Fall of 1828,” edited by John C. Dann, *The American Magazine and Historical Chronicle* 1 (Spring-Summer 1985): 38-40]