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**ERIE CANAL** The Erie Canal was the greatest American engineering project of the first half of the nineteenth century, though it was completed only a quarter-of the way through it. It was the single most important factor in the emergence of New York as the “Empire State” and New York City as the economic center of the new nation. The canal sent settlers and manufactured goods through New York to the frontier and funneled grain, salt, lumber, and other raw materials to New York City for sale to the nation and the world. The canal cut the cost of freight transportation through its territory by up to 90 percent and reduced delivery times from uncertain weeks to scheduled days. By channeling overland through western New York, the canal bypassed traditional trade routes centered on Lake Ontario, limiting Canada’s share of economic growth. By reaching westward before the American southern states, especially Virginia, which had tried for decades to canalize the Potomac, New York’s canal delivered national economic dominance to the North. As the first human-made artery communicating with

the continental interior, the canal provided an early bond of national unity, soon strengthened by other canals, railroads, and eventually highways. The Erie Canal began the process of both tying the nation together and dividing it: the canal helped establish a national free-market industrial economy, but its locus in New York sowed division between the slave-based agrarian economy of the South and the rest of the country that eventually helped undermine the Union.

#### **ARTIFICIAL RIVER**

For all its impact, the original canal—begun in 1817 and completed in 1825—was a remarkably slender waterway. Stretching 363 miles from the Hudson River north of Albany to Lake Erie at the nascent village of Buffalo, the canal was just forty feet wide on its surface, narrowing to twenty-eight feet at a four-foot depth: it was a small prism of water dug across the breadth of New York. The path of the canal followed the lay of the land as much as possible to maintain levels and minimize expensive, traffic-slowng lockage. Long levels from Utica to what be-

## DEWITT CLINTON

In popular imagination, DeWitt Clinton (1769–1828) created the Erie Canal. In fact, the plan for a canal linking the Hudson River with Lake Erie originated in 1807 with Jesse Hawley's newspaper essays. The following year, state-appointed surveyor and future Erie engineer James Geddes determined that the canal was feasible. Clinton had little if any interest in the project or canals generally until 1810, when fellow state senator Jonas Platt sought Clinton's influential support for a bill to conduct detailed surveys. To his credit, the once and future New York City mayor and future governor then seized on the canal as a means of ascendancy for the state and himself. Clinton served on the state canal commission from its creation in 1810 until his removal from its leadership in 1824, an unpopular maneuver by political opponents that prompted his reelection later that year as governor, holding the office until his death. During his first six years on the commission, Clinton emerged as the canal's most effective advocate, neutralizing the negative influence of commission head Gouverneur Morris, who until his death in 1816 clung to the imprac-

tical notion of a 360-mile inclined plane instead of the traditional locks and levels ultimately employed. After the War of 1812 suspended canal planning, Clinton's leading role at a public meeting in New York City in December 1815 and his authorship of a widely distributed memorandum to the legislature set the state on its course toward building the canal and placed Clinton in his role as its greatest champion. After construction began in 1817, Clinton—as commission head (and governor)—guided the project toward completion in a timely and economical manner unique to engineering projects in the new nation. Not standing for reelection as governor in 1823 and turned out of the canal commission the following year, Clinton presided as governor once again for spectacular celebrations of the canal's completion in 1825. Contemptuous of enemies and indifferent to allies, Clinton was rarely secure in his political life. As the greatest advocate of the Erie Canal, Clinton's name endures.

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came Syracuse (seventy miles) and from the village of Rochester to what became Lockport (sixty-five miles) comprised over one-third of the canal's length and were the two longest canal levels in the world. Topography and water supply required the construction of eighty-three hand-operated locks, each 90 by 15 feet. Lake Erie is 572 feet above the Hudson but sag between Syracuse and Rochester required seven of the locks to lower the line, making a total of nearly 700 feet in elevation changes. Over four hundred feet of ascent occurred in the first one hundred miles of canal up the Mohawk River valley from the Hudson, requiring fifty-three locks; half of these were needed in the first thirty miles to Schenectady. The most challenging lockwork was located near the western end of the canal, where a double flight of five locks surmounted a forested, sixty-six-foot rock ridge at Lockport. Eighteen major aqueducts and several high embankments carried the canal trough over substantial rivers and valleys. To navigate the new waterway, boats sixty feet long and seven feet wide were designed to carry up to one hundred passengers or thirty tons of cargo. Animals were the motive force, initially horses but soon sturdier mules that towed the boats at four miles per hour.

### HISTORICAL BACKGROUND

For nearly its entire length, the Atlantic coast is separated from the continental interior by the Appalachian Mountains and the Adirondack Mountains. The gap between these ranges lies in central New York State, where the Mohawk River runs in a westerly direction 125 miles from its mouth at the Hudson River above Albany to Rome. The traditional route of water travel into New York's interior—first by fur traders in native canoes and later by diversified merchants in increasingly larger paddled and poled shallow-draft boats—was up the length of the rapids-strewn and flood-prone Mohawk to a portage of several miles at what became Rome, then down shallow and meandering Wood Creek, across wind-swept Oneida Lake, and down the Oneida and treacherous Oswego Rivers to Lake Ontario at Oswego. Interior travel further west was up the Seneca River from the Oswego River to Seneca Lake, a hundred miles east of Lake Erie. There was no river route to Lake Erie; the only water route to Lake Erie and the other Great Lakes was from Lake Ontario via a steep portage around Niagara Falls, a route barely explored and rarely taken before the late 1700s. From Lake Ontario there were two major, competing

## LABORERS

In popular imagination, gangs of immigrant Irish laborers built the Erie Canal. In fact, during the first half of the construction period (1817–1821), the overwhelming majority of laborers were the families and hands who worked the small farms through which the canal line passed. The entire middle section of relatively level, dry land was contracted for and built (1817–1820) largely by these homesteaders, who had emigrated from no further away than New England. The state canal commissioners overseeing the construction reported proudly in 1819 that three in four canal laborers were American born. Gradually, contracts for multiple of the canal's hundreds of short sections were taken up by local and regional merchants and associations of contractors, suppliers, and speculators who needed larger labor crews. In the remote western sections, where work began in 1819, the scattered resident population could not supply adequate labor. Nor were area farmers willing to muck out or risk sickness in the extensive Montezuma swamps. This work increasingly fell to Irish immigrants hired right off the boat in New York City who sang their

way into American folklore: "We are digging a ditch through the mire, Through the mud and the slime and the mire, dammit! And the mud is our principal hire; In our pants, down our boots, down our necks, dammit!" When the deadly work of blasting the canal trough through a long rock ridge in western New York was done, Irish laborers remained to become prominent settlers of the canal-made city of Lockport.

The Irish became the most notable and, for their considerable brawling, notorious immigrant group on the canal, but preceding them were substantial numbers of skilled and semiskilled Welsh, who often worked on the canal's masonry structures. Regardless of national origin, the tens of thousands of unskilled laborers who worked on the canal over nine construction seasons earned the same low wages: as little as fifty cents for day work, or from eight to ten dollars a month including room, board, laundry, and whiskey.

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routes to market: on the tangle of New York waterways to the Hudson and, often preferably, down the St. Lawrence River to Montreal, and eventually the Atlantic.

### CONCEPTUALIZATION

Jesse Hawley (1773–1842) was a pioneering western New York grain merchant who went bankrupt trying to get produce east along crude roads and unimproved waterways. While confined to debtor's prison in Canandaigua in 1807, Hawley wrote a series of newspaper essays under the pseudonym "Hercules" outlining how and why an Erie-Hudson canal should be built. Over the next several years, the Hercules essays circulated among the influential New Yorkers who would plan and build the Erie Canal. Hawley himself subsequently became a prominent citizen of Rochester and Lockport, two among the numerous cities created by the canal.

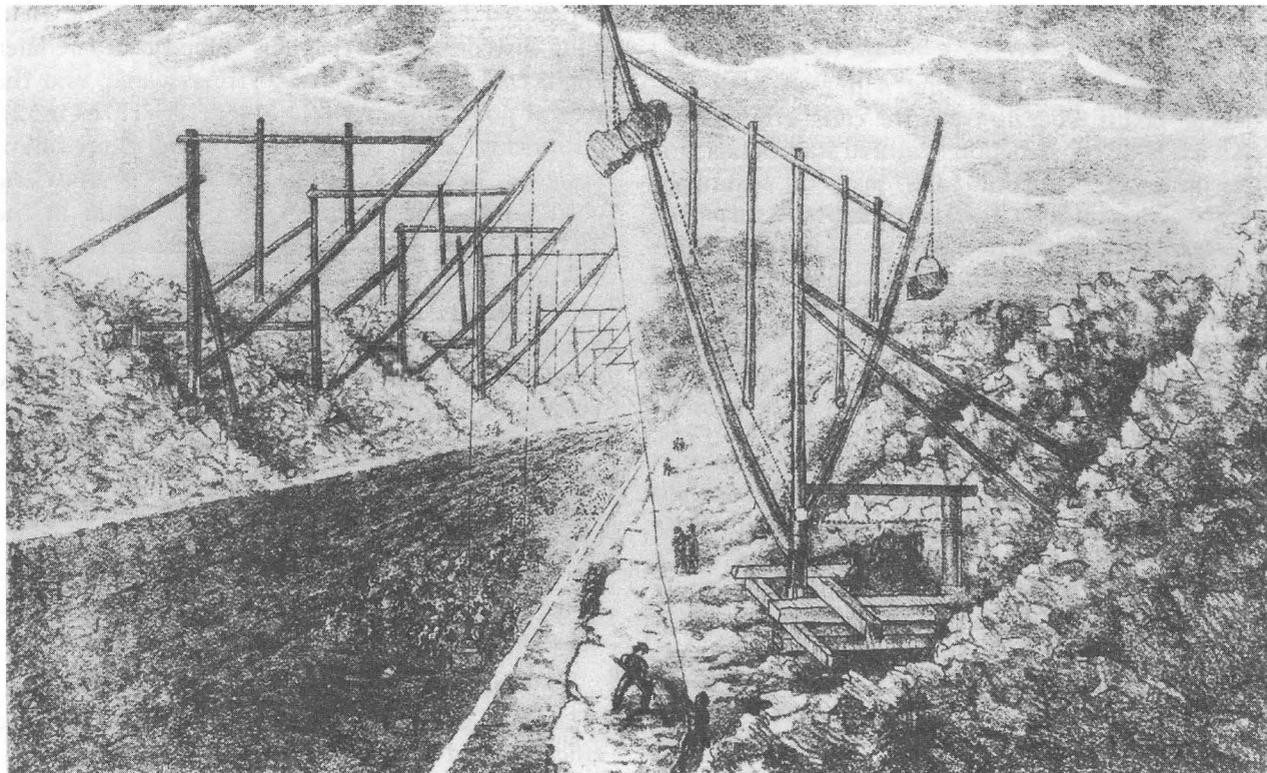
There were several other early proponents. Gouverneur Morris (1752–1816) may have informally suggested a cross-state canal as early as 1777; he subsequently led the first state canal commission (1810–1816) but induced ridicule for the project by insisting it be built on an inclined plane spilling Lake

Erie into the Hudson, instead of with locks and levels using local water sources. State assemblyman Joshua Forman (1777–1848) sponsored an 1808 resolution for the first survey that proved the canal possible; in 1819 he founded what became Syracuse, the canal-made city that shipped salt to the nation. State senator Jonas Platt (1769–1834) drafted the 1810 legislation that created the canal commission; Platt sought and won influential support for the bill from fellow senator DeWitt Clinton, who had given no prior thought to canals. Upon Morris's death in 1816, fellow commissioner and future governor Clinton emerged as the canal's greatest and most effective proponent, hitching his own destiny to that of the canal.

### PLANNING

The seven-member commission established in 1810 oversaw several rounds of surveys. It was stifled, however, by popular, economic, and technological uncertainty and ultimately by the War of 1812, during which the British burned future canal terminus Buffalo.

Interest in the canal revived quickly after the war. A public meeting in New York City in late De-



**Excavation of the Lockport Lock.** During construction of the Erie Canal, the most challenging lockwork occurred near the western end of the canal, where a double flight of five locks surmounted a forested 66-foot rock ridge at Lockport, New York. This illustration from 1825 shows laborers operating manual pulley cranes during excavation at Lockport. ©CORBIS.

cember 1815 produced a persuasive memorandum by state Republican Party leader Clinton, which was circulated throughout the state and brought the question of construction before the legislature for the first time in 1816. Intense opposition came from Lake Ontario interests and regions distant from the canal line, especially New York City, whose merchants feared heavy taxes to support an expensive upstate project. Political interests, centered on Clinton's emerging Republican rival Martin Van Buren, feared that Clinton, narrowly defeated for the presidency in 1812 while running as a Federalist, was using the canal for personal political gain. Others questioned whether country surveyors with no engineering education or experience could build a canal more than ten times longer than the nation's only other significant canal. The twenty-seven-mile Middlesex Canal in Massachusetts was notorious for staggering construction costs and delays and financial strain on its prominent private investors.

Clinton settled for another round of surveys but claimed leadership of a new five-man canal commission stacked with supporters. They included Joseph Ellicott (1760–1826), influential agent for the Hol-

land Land Company, which owned 3.3 million mostly vacant acres of westernmost New York that the canal would profitably settle.

By 1817 popular imagination had overwhelmed political opposition sufficiently so that the legislature approved construction of the middle section of what the commissioners estimated to be a \$5 million project, by far the most expensive engineering project in the nation's history. Heeding its merchants' fears, none of the thirty New York City-area legislators voted in favor.

New York State moved ahead without any federal support. In 1809 President Thomas Jefferson called New York's project "madness," clinging to false hope that his own Virginia would be the first to reach the interior by canalizing the Potomac. On the final day of his presidency in 1817, Jefferson's successor and fellow Virginian, James Madison, vetoed a bill that would have provided federal money to canal projects like New York's. Madison's veto, on the grounds that Congress had no express constitutional authority to fund canals, came as New York's legislature was debating its canal bill; contrary to

what Madison might have wished, his veto helped unify opinion in New York behind the project.

A sophisticated canal fund, administered by a financial board separate from the canal commission that oversaw construction, featured state bonds, duties on auction and salt sales, taxes on steamboat passengers, and tolls. By 1833 total tolls surpassed the eventual construction cost of \$7 million; when tolls were abolished fifty years later, the canal had earned a profit of over \$40 million.

## CONSTRUCTION

The canal was constructed in three sections for engineering, financial, and political reasons. The commissioners initially sought approval in 1817 only to build the ninety-six-mile middle section, from Utica on the Mohawk River to Montezuma on the Seneca River, calculating that the legislature would be more willing to approve a limited objective and that quick progress on one section would win popular support and legislative approval for completion of the entire project. The middle section featured the fewest elevation changes (only nine locks) and no significant engineering challenges, and ran through country that was settled enough to provide local labor. The ceremonial first shovelful of dirt was turned near Rome on Independence Day 1817, and the section was completed and open for travel by October 1820.

The middle section established the pattern for future construction. The work was bid out in segments of generally less than one mile. The winning bidder, especially in the early years, was often the farmer whose land would be bisected by the canal; the laborers were his sons and farmhands. In later years, especially in the unsettled western region of the state, bidders took up multiple contracts and hired immigrant labor gangs to do the hardest and most dangerous work: mucking out malarial swamps that disabled many hundreds of workers and blasting through rock that killed or maimed dozens.

Most of the work was basic manual labor with axes and shovels, digging a ditch along a line laid out by country surveyors and assistants training themselves as practical engineers. Benjamin Wright (1770–1842) was a county judge and surveyor in Rome when he conducted some of the early canal surveys; named Erie chief engineer in 1817, Wright subsequently was involved in canal and railroad projects from Canada to Cuba and is regarded at the turn of the twenty-first century as the “Father of American Civil Engineering.” Erie principal engineer James Geddes (1763–1838) was a pioneer salt manufacturer in the area that became Syracuse when he

conducted the initial Erie survey in 1808, using a leveling instrument for only his second time; he later engineered canals for Ohio, Pennsylvania, and the federal government. Nathan Roberts (1776–1852), an itinerant math teacher when Wright hired him, designed the Lockport locks and later served as Erie chief during the canal enlargement begun in the 1830s. Among the notable young graduates of the so-called Erie School of Engineering were John Jervis (1795–1885) and Canvass White (1790–1834). Rome farm boy Jervis rose from Erie axeman chopping down trees for a survey crew to become Wright’s successor as chief engineer and to be counted among the country’s most innovative canal and railroad engineers. A grandson of the first white settler on the Upper Mohawk, White started as a Wright assistant and later developed and patented the hydraulic cement that made the Erie and subsequent canals watertight; his engineering career rivaled Jervis’s but was cut short by ill health.

Innovations multiplied along the Erie line, often created by the contractors themselves to maximize efficiency and improve what were often slender profit margins. Large trees were toppled by a cable attached high on the trunk and winched by a hand-cranked endless screw. Stumps were pulled by a cable on a huge overhead wheel turned by a harnessed team of oxen. Rome contractor Jeremiah Brainard developed a rounded-basin wheelbarrow that was lighter, sturdier, and easier to unload than the centuries-old box-shaped barrow.

When the middle section appeared headed to successful completion in 1819, the legislature approved construction of the eastern and western sections. The 109-mile eastern section, with its dozens of locks, was completed in 1823, ending nearly two centuries of frustrating navigation on the Mohawk River, which was consigned to supplying water for the canal built along its banks. The 158-mile western section featured a spectacular embankment spanning the Irondequoit Valley east of Rochester, a landmark bridge across the Genesee River, and the Lockport locks. The western section was completed in 1825 after a bitter struggle between Buffalo and neighboring Black Rock to be the canal’s western terminus. Black Rock lost and within thirty years was annexed into Buffalo, which the canal rapidly made into the state’s second-largest city. Beginning in late October 1825 DeWitt Clinton, once again governor, presided over grandiose, canal-length celebrations, culminating in New York City, which already was gaining fortune and fame from the canal it had opposed.

**LEGACY**

The Erie Canal launched the nation's canal era, which peaked in 1860, when over 4,200 miles of mainline and lateral canals linked the nation's natural waterways as far west as Illinois. The Erie's success also induced a canal mania that spawned numerous ill-conceived canal projects; the Panic of 1837 and the subsequent national depression was caused in part by a bust in canal stock, the country's first technology bubble.

The original canal was enlarged to seventy feet wide and seven feet deep between 1836 and 1862, but by the late 1800s railroads had dramatically reduced mule-pulled boat traffic. The enlarged canal was replaced entirely by a twelve-foot-deep canal, built from 1905 to 1918 and designed for motorized barges; in the early twenty-first century, traffic was primarily recreational boaters.

See also **New York City; New York State; Transportation: Canals and Waterways.**

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poetry and fiction, and French libertine novels, could be found in the libraries of many eighteenth-century American gentlemen. During the French Revolution, readers in the new Republic became especially interested in the memoirs and other licentious writing of the French *philosophes*.

Certainly one of the most popular works of erotica in America during this period was John Cleland's fictional classic, *Memoirs of a Woman of Pleasure*, or *Fanny Hill*. First published in two volumes in London between 1748 and 1749, Cleland's work consisted of two long letters recounting the life of a country girl forced by the death of her parents to move to the city and become a prostitute. Fanny's epistolary confessions described a wide range of sexual activities in explicit detail, including lesbianism, cross-dressing, flagellation, orgies, and public sex.

American printers showed an early interest in the *Memoirs*. In 1786 Worcester printer Isaiah Thomas Sr. wrote to an English bookseller seeking to buy a copy, probably with the intention of publishing his own edition. By the second decade of the nineteenth century, substantial numbers of the book were sold in rural bookstores and by itinerant peddlers in New England. In 1817 the final inventory of New Hampshire bookseller Anson Whipple, an affiliate of the Thomas firm, revealed 293 copies of the book in stock. Evidence from prosecution records in 1824 establishes that the *Memoirs* were also sold in New York City, though in an expensive imported edition accessible only to the wealthy.

Other genres of European writing, including anti-masturbation literature, sex manuals, and transcripts of adultery trials relating the sexual scandals of the aristocracy, probably provided erotic content for American readers. The quasi-pornographic anti-masturbation tract, *Onania, or, The Heinous Sin of Self-Pollution, and All Its Frightful Consequences in Both Sexes, Considered*, first published in England in 1708, was frequently reprinted in the colonies. Imported copies of *Aristotle's Master-Piece*, a collection of folklore about sex that first appeared in English in 1684 and contained extensive descriptions of female anatomy and reproduction, also circulated widely. As early as 1744, Northampton minister Jonathan Edwards initiated a church inquiry into the "lascivious expressions" of certain young men who had read the *Master-Piece* and had taunted local women with their newly acquired "unclean" knowledge. Between 1766 and 1831, American printers also published thirty-two native editions of the *Master-Piece*.

American authorship of erotica was evidently scarce before the mid-nineteenth century, when a

**EROTICA** The vast majority of erotica that circulated in the United States between 1750 and 1830 was of European provenance. According to the scholar Peter Wagner, a large number of erotic books, including classics by Ovid and Boccaccio, English erotic