



## **Essay About the Erie Canal Building the Grand Canal**

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On the morning of July 4, 1817, a group of dignitaries gathered on a plot of marshy ground south of the village of Rome, New York. There, they dug the symbolic first shovelful of earth that began construction of the Erie Canal.

The New York State Canal Commission, which oversaw the construction of the Erie Canal, drew up the first building contract a few days later. As usual, the work went to the lowest bidder. Contractor John Richardson and canal commissioners Myron Holley and Samuel Young signed the document on July 12, 1817.

It stipulated that Richardson would "grub, clear, excavate, embank, and construct in a good substantial and workmanlike manner a part of the first section of the canal." In keeping with the democratic reforms sweeping the country, the state government offered contracts for lengths of as little as one-quarter mile of ditch to allow as many people as possible to benefit from the project. Richardson contracted to build 61 chains and 50 links of canal, amounting to slightly more than three-quarters of a mile.

Building New York's "Grand Canal," as the Erie Canal often was called, involved excavating a ditch between the Hudson River at Albany and Lake Erie at Buffalo. The canal ditch was 363 miles long, 40 feet wide at the surface, 26 feet wide at the bottom, and 4 feet deep.

Before the contractors could begin excavation, engineering parties had to stake out the line. A party consisted of a principal engineer, one or more assistant engineers, targetmen, and axemen. Axemen were the lowest-ranking members of the party. Their job was to cut the stakes used in marking the canal line and to remove brush, small trees, and other similar obstructions.

Targetmen occupied the next level in survey parties. They held targets, which were rodlike instruments 10 feet long, used to help surveyors measure changes in elevation in order to maintain the necessary level.

In 1817, targetmen were paid three dollars a week. Engineers occupied the highest rank. They were responsible for making the three-dimensional measurements needed to construct the canal ditch. Engineers received at least a dollar a day plus expenses.

Nearly all the excavation was done by men using picks and shovels and by draft animals (animals that pull heavy loads). Workers used black gunpowder to blast through rock, with the powder holes drilled by hand. Very few machines were

available to supplement physical labor, but there was one machine to bring down trees and another to pull stumps.

The first machine worked by attaching a line near the top of a tree, then winding the line on an endless screw turned by a wheel, pulling the tree down.

The stump removal device had a huge axle 30 feet long and 20 inches in diameter - supported by two wheels, both 16 feet in diameter. In the middle of the axle was mounted a third wheel, 14 feet in diameter. Workers placed the machine over the stump and then attached the stump to chains wound around the axle. Draft animals pulled a rope wound around the center wheel and thus ripped the stump from the ground.

The Erie Canal contained locks, aqueducts, and waste-weirs (structures designed to eliminate excess water), as well as side walls in some places. Builders used cut stone to make almost all of these structures, parts of which were always submerged in water.

To build these structures, engineers needed hydraulic cement, which would harden under water, to hold the stone in place. This posed a serious problem: There seemed to be no source of cement in the United States; apparently, it would have to be imported from Europe at considerable cost.

Then limestone was discovered near Chittenango, New York. When burned, crushed, and mixed with sand, the limestone produced cement that hardened under water. Canvass White, a canal engineer and native New Yorker, is credited with inventing hydraulic cement in America.

By the end of the 19th century, the application of steam power to machinery altered canal construction methods. Steam shovels largely replaced pick-and-shovel excavation. Railroad locomotives and dump cars took over from teams and wagons, and steam drills bored holes for the placement of dynamite, the new high explosive.

Poured concrete reinforced with steel rods replaced stone in canal structures. When New York built the Barge Canal System in the early 20th century, all these machines and techniques were used, reducing the need for manual labor.

[http://www.archives.nysed.gov/projects/eriecanal/essays/ec\\_larkin.shtml](http://www.archives.nysed.gov/projects/eriecanal/essays/ec_larkin.shtml)