

The Conquest of Hell Gate



The Great Blast of Flood Rock in 1885 “The greatest quantity of explosives ever attempted in a single operation.” Fifty-thousand people crowded both shores of the East River to witness the great underwater explosion that leveled the rocky reef which made navigating Hell Gate very hazardous.

In the mid-1800’s, the New York Harbor Commission requested Federal assistance in opening up New York’s Hell Gate. The report requesting Federal aid for removing obstructions to navigation said, “For several years there has been a gradual but constant increase in the tonnage of vessels engaged in foreign commerce... and their draft is still increasing. It is imprudent to send a ship of the largest class to sea.”

Although that report asking for Federal support to open up a New York Harbor channel was written nearly 150 years ago, the need is still present today. The U.S. Army Corps of Engineers since its earliest days continues its mission of maintaining the depths of federal navigation channels in one of the nation’s busiest ports.

Recently, the Corps finished work on another difficult navigation project in New York Harbor—

dredging and underwater demolition to deepen Newark Bay and Kill van Kull to accommodate deeper draft ocean vessels. The Corps’ accomplishment brings to mind a famous earlier project, Hell Gate on the East River, a project that also called for underwater demolition work on even a grander scale.



Deepening today’s channels from 35 ft. to 40 ft. also required innovative demolition work but under much better controls, to be sure than those of a century ago.

The story of Hell Gate marks the beginning of the civil works mission performed by the U.S. Army Corps of Engineers. It was a massive challenge for the Corps fraught with “endless obstructions.”

Hell Gate is located on the East River at the confluence of the Harlem River. From Manhattan, Hell Gate runs from 90th to 100th

Streets. It connects Long Island Sound with New York Harbor.

Captains of vessels traversing this perilous one-mile passage of the East River described it in logs dating back to the early 1700's, as a key gateway to the Atlantic, marked with a giant whirlpool, punctuated with rocks, reefs, and islands. To a sea captain worth his salt, it must have appeared as the gate to Hell.

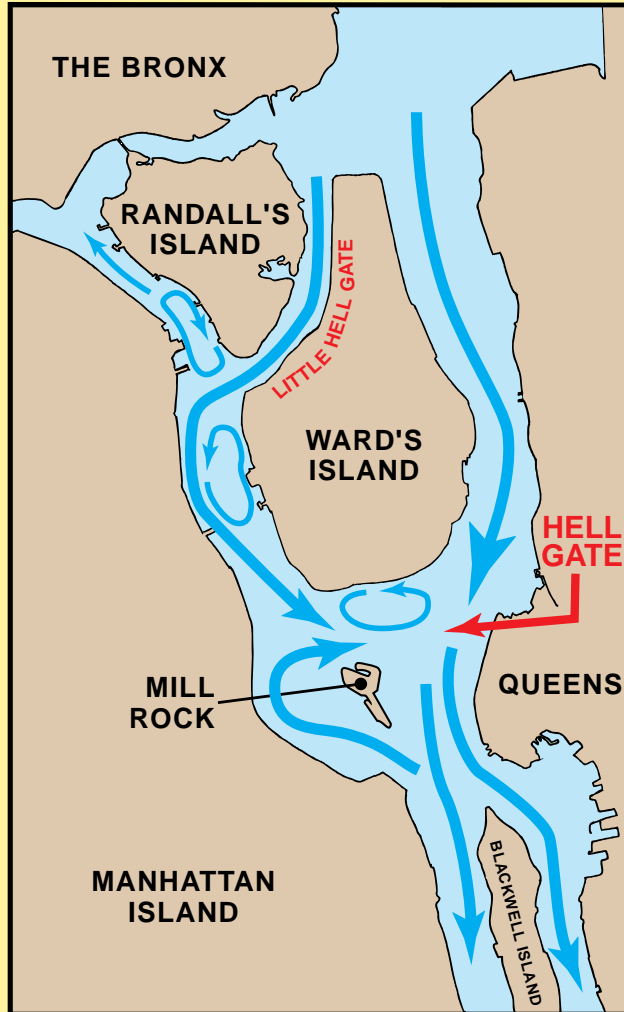
The reason sea captains viewed it as hellish was the fact that the East River is actually a tidal stream whose tides conflict with waters in Long Island Sound

As Claude Rust in an article for *Military Engineer* (1971) wrote, "When the tide rises on the eastern seaboard it sets into New York Harbor and, farther to the northeast, into Long Island Sound. At New York Bay it splits at the tip of Manhattan, one current pushing up the Hudson and through the Harlem River, the other entering the East River. Here, with the horizontal movement impeded by the opposite flow of the Harlem River and the narrowness of the channel up to the Sound, the huge basin of Hell Gate begins to fill.

The waters, like wild beasts, circle their confines, impatient for the chance to escape. The downcoming flow of the Harlem River is then stopped by the strength of the escaping currents and sent back up through Little Hell Gate and the Bronx Kills, and the channels to the west, like a sluiceway, is filled with swift seething water racing up to the Bronx shore.

This flow continues for hours, building up to a high tide along the East River shore. Then at a time when other waters would settle into slack, the downcoming tide, which has been delayed four hours by the distance and the drag of the Long

Island Basin, begins its relentless drive—and the struggle for mastery is on. Four hours after entering the sound this tide has changed the flow of the river which is now down the narrow 'sluiceway' from the Bronx and down Little Hell Gate Channel into Hell Gate Basin, counterclockwise around Millrock and as far down the river as the upcoming tide will allow.



Strong cross currents combined with shallow rocky waters earned Hell Gate its name and reputation for being a navigator's nightmare.

To this confusion of ebbs and flows, currents and eddies, add the rocks, reefs, and the freakish whims of the winds. At ebb tide the process was reversed, but no less confusing."

Other historians of the period reported that about one in 50 ships trying to run the gauntlet of Hell Gate was either damaged or sunk in the 1850's. In an average year, 1,000 ships ran aground in Hell Gate.

If Hell Gate could be made relatively safe for navigation, several ocean miles could be saved in reaching the Atlantic. No longer would ships sit idle burning coal and wasting money waiting for the tide. A French engineer, Monsieur Benjamin Maillefert, was hired in 1850 by Mr. E. Meriam, "a public-spirited citizen of New York," to remove some of the larger rocks in the Hell

Gate area. Meriam sought donations from New York merchants to remove some of the rock "primarily because Congress was not in a spending mood." Maillefert, who had worked with the British Royal Engineers agreed to remove Pot Rock and Ways Reef for \$15,000. The method of rock removal was unique for the time calling for "the blasting of rocks under water without drilling." Maillefert proposed to lower a canister of gunpowder to the rock by rope via a lengthy pole, and then set off the explosive from a safe distance.

The first blast knocked four feet off the top of Pot Rock and the project was on. The bombardment

continued for several months. A barrage of 284 charges set off on Pot Rock gave a clearance of 18 feet, and 240 on Frying Pan and Ways Reef lowered them 9 1/2 and 13 feet, respectively, from the surface.”

According to Rust’s account: “The relentless blasting of Hell Gate went on till March 1852, when the law of averages caught up with Maillefert. After placing a 125-pound charge of powder atop a rock, he took what he thought were the lead wires to the submerged mine and paid out the line till he and the supply boat were a safe distance from the explosion site. Upon touching the wires to the battery terminals in his boat, he blew the other boat clear out of the water and was thrown 50 feet in the air himself. Of the five men in the operation, three were killed and Maillefert and his assistant were disabled.”

Maillefert’s efforts dismantled the whirlpool almost entirely with the added benefit of easing tide flows. He claimed that if his operations were to continue that Hell Gate could be the safest entrance to the Harbor.

“These few words from a man of action did more to move Congress than all the pleas of the past. It suddenly appropriated \$20,000 for carrying on the work under Lt. Bartlett of the Army Corps of Engineers. But this fund was soon exhausted, along with the Frenchman’s verve, and the work once again came to a halt,” writes Rust.

Interest in clearing obstructions from Hell Gate languished until after Civil War hostilities. A city surveyor and civil engineer suggested filling in Hell Gate thereby making room for an anticipated growing population across the East River from Manhattan. However, Congress thought otherwise, saying it was more prudent in terms of costs to demolish the rocks at Hell Gate.

In January 1867, Maj. Gen. Andrew Humphreys, Chief of Engineers, assigned Lt. Col. John Newton from New York District to study the best plan of attack for removal of Hallet’s Point reef and the subsequent removal of Pot Rock, Frying Pan, Heel Tap, Shelldrake Rock, Ways Reef and other smaller rocks and reefs.



At 11:13:50.2 AM, on October 10, 1885, with all charges in place, the cavern at Flood Rock flooded with water —12 year old Miss Mary Newton pressed the key that set the charge and snapped the shutter of the camera that took this picture.

Newton awarded the contract for removal of Hallet's Point to Sidney Shelbourne who had invented a floating rig designed to make underwater demolition easy. Shortly into the operation, his rig was "run over by a tug, a brig, and a canal boat, destroying the equipment completely. The final blow fell on Shelbourne when his twice-extended contract expired three days after his drill rig was wrecked."

Enter the Frenchman, Mr. Maillefert, who won the contract to remove Pot Rock, Way's Reef and Shelldrake Rock at \$44.28 per cubic yard. His effort failed also.

Newton continued the effort with an invention of his own. He described it as, "A drilling machine with nine drills, or as many as may be convenient to place within it, 30 feet in diameter and, being furnished with self adjusting legs, is let down through the well hole to the rock. The drills are worked by steam or hand power and the holes charged with nitroglycerine or some powerful compound, and exploded."

Newton, in a 1871 report, related, "during the months of May and June, the drilling-boat encountered six collisions several of which did much damage by forcing the scow upon the dome... The delays and loss of time due to these collisions have been great."

The lesson learned: Any rock removal operation at Hell Gate would not be successful if conducted on top of the water.

Now a general, Newton, was given the task by Congress to continue his efforts at Hallet's Point Reef. He decided to employ "subaqueous tunneling."

One historian's account described how it worked this way: "The reef was to be undermined with a series of passageways, charged with explosives, and blown up. The initial step in this engineering project was the construction of a cofferdam at the water's edge to prevent flooding of the works at high tide. Inside this U-shaped wall, a deep pit was to be dug below the riverbed level and from this a series of tunnels were to radiate into the bedrock of Hallets Point Reef.

"For seven years the workmen labored, excavating the pit, then inching their way into the solid reef. Tons of rock were blasted from the reef, shoveled into mule carts, and hauled to the end of the tunnels to be hoisted to the surface. Finally there were ten headings fanning outward under the reef

connected by a number of gallery arcs from one end of the fan to the other.

The walls and ceilings of the tunnels were packed with 7,000 holes ready to receive the explosive charges. Of this number it was estimated that charging 4,000 would suffice to demolish the reef... A total of 30,000 pounds of explosives had been packed into the mines and the job of charging was completed."

Finally, on September 24, 1876 at 2:30 P.M., the mines were fired. According to Newton, "The explosion was distinguished by the absence of hurtful shocks in the atmosphere, in the water, or underground. The elevation of spray, vapor and gases projected upward, reached to the height of 123 feet, measured at the center and highest point. The explosive effort in the air was not perceptible, the glasses in buildings close to the dam and of one in particular along the shoreline of the shaft itself, not having in a single instance been broken.

"The new facts obtained by this experience, are...

1st. That an unlimited amount of explosives distributed in blast holes in moderate charges, proportioned to the work to be done, thoroughly confined in the rock and tamped with water, may be fired without damage to surrounding objects.

"2nd. That an unlimited number of mines may be simultaneously fired by passing electric currents through the platinum wire bridges of detonators."

After the successful blasting, the Atlantic Dredging Co. worked until 1882 to remove the 90,588 gross tons of broken rock at Hallet's Point that deepened the channel to 26 feet.

Newton's next target was Flood Rock.

According to Rust, "Of the Flood Rock area, only 230 square feet showed above the water. A sea wall was built around this area and, inside this enclosure, a large lift tower was built over the main shaft site and drilling was started... A 70 foot shaft was sunk, headings branched out at various levels and, in the other, a stairway led to these tunnels. The material excavated was hauled out to the lift by mules and men, raised to the surface and dumped over the sea wall to form an island for operations.

"For nine years this labor went on: 23 headings were dug running north and south and 46 galleries at right angles to them spaced 25 feet apart...

The reef was honeycombed with four miles of tunnels... 15,000 holes were drilled in the ceilings for the explosive charges.”

Meanwhile, at Mill Rock, an island northwest and nearby, workmen were busy preparing a powerful explosive mixture they dubbed “Rack-A-Rock.” Some 280,000 pounds of the mixture plus 5,000 pounds of dynamite were required for the demolition job.

“Of the 50,000 charges, only 3,000 were connected to wires, others would go off sympathetically,” reports Rust. Finally, on Oct. 10, 1885, Miss Mary Newton, daughter of General Newton, as she did at Hallet’s Point, pressed the key that simultaneously set off the charge.

The event was viewed by 50,000 spectators and 100 cameras.

Rust gives this account: “With a muffled rumble from the depths of Hell Gate, nine acres of the

river surface was lifted into the air, a tremendous mass of rock and foam 150 feet high. A sickening jar was felt on land, and seconds later waves lapped the shores. The greatest single explosion ever produced by man was over.”

Engineering News and American Contract Journal, a trade publication of the period, reported, “Although the volume of explosives used here exceeded six-fold the greatest charge ever previously fired in the world, the work of the engineers was so well done and the precautionary measures of Gen. Newton so well taken, that no accident or delay of any kind occurred.”

With the elimination of Flood Rock at Hell Gate vessels were able to navigate this passage easily. Shipping trade increased to some \$4 million worth of cargo a day, justifying the millions of dollars for the un snagging operation. A shot of new life was infused into the Port of New York, which was once again able to assert itself as the undisputed leading port in the nation at that time.