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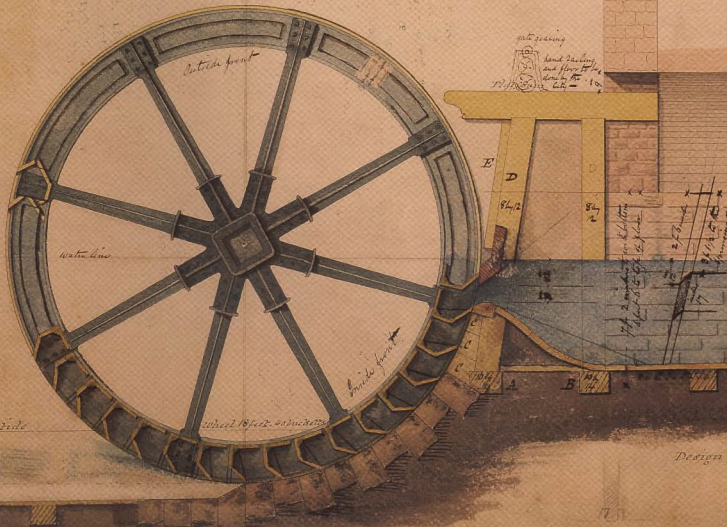
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# Fairmount Waterworks

24 feet



from the water works  
the water works in 18 feet  
Height 24 feet

Design

# The Fairmount Waterworks

Jane Mork Gibson  
*Social and Technological Historian*

Checklist of the Exhibition

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*Published on the occasion of the exhibition "The Fairmount Waterworks, 1812-1911" (July 23-September 25, 1988), which celebrates the restoration of the waterworks, a combined effort of the Fairmount Park Commission, the Philadelphia Water Department, and the Junior League of Philadelphia*

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## Preface

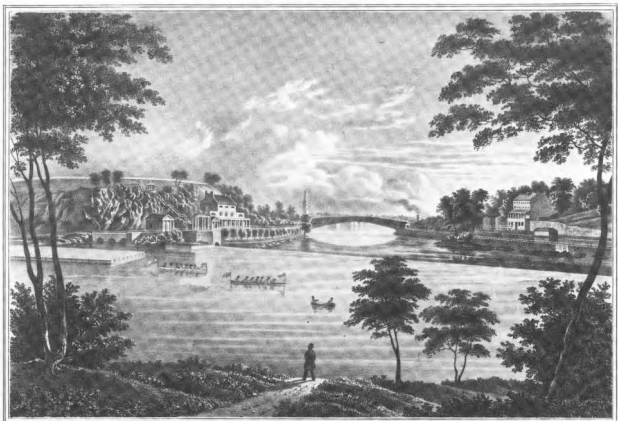
When Mark Twain was eighteen, serving as a substitute typesetter for the Philadelphia *Inquirer* in 1853, he wrote an enthusiastic, amusing letter to his brother in Hannibal, Missouri:

*Unlike New York, I like this Phila amazingly, and the people in it. . . . I went to the Exchange yesterday, and deposited myself in a Fairmount stage, paid my sixpence, or "fip," as these heathen call it, and started. We rolled along till we began to get towards the outskirts of the city, where the prettiest part of a large city always is. . . . We arrived at Fairmount. I got out of the stage, and prepared to look around. The hill, (Fairmount) is very high, and on top of it is the great reservoir. After leaving the stage, I passed up the road till I came to the wire bridge which stretches across the Schuylkill (or Delaware, dammed if I know which! . . .). This is the first bridge of the kind I ever saw. Here I saw, a little above, the fine dam, which holds back the water for the use of the Water Works. It forms quite a nice water-fall. Seeing a park at the foot of the hill, I entered—and found it one of the nicest little places about. Fat marble Cupids, in big marble vases, squirted water upward incessantly. Here stands in a kind of mausoleum, (is that proper?) a well executed piece of sculpture, with the inscription—"Erected by the City Council of Philadelphia, to the memory of Peter [i.e. Frederick] Craff, the founder and inventor of the Fairmount Water Works." The bust looks toward the dam. It is all of the purest white marble. I passed along the pavement by the pump-house (I don't know what else to call it) and seeing a door left open by somebody, I went in. I saw immense water-wheels, & c., but if you will get a back number of the Lady's Book, you will find a better description of the works. . . . [T]here was a long flight of stairs, leading to the summit of the hill. I went up—of course. But I forgot to say, that at the foot of this hill a pretty white Naiad stands on a projecting rock, and this, I must say is the prettiest fountain I have seen lately. A nice half-inch jet of water is thrown straight up ten or twelve feet, and descends in a shower all over the fair water spirit. Fountains also gush out of the rock at her feet in every direction. Well, arrived at the top of the hill, I see nothing but a respectable-sized lake, which is rather out of place in its elevated situation. I can't say I saw nothing else, either—for here I had a magnificent view of the city.\**

One hundred thirty-five years later, the vast neoclassical building of the Philadelphia Museum of Art has replaced the "respectable-sized lake," and the view of the city from Fairmount now encompasses City Hall Tower, the PSFS Building, and One Liberty Place, all three beyond Twain's wildest imaginings. But the Fairmount Waterworks, which he explored with such zest, has survived and still constitutes one of the most delightful nineteenth-century architectural complexes in any city in the United States. This issue of the Museum's *Bulletin* celebrates its elegant and venerable neighbor, and accompanies the exhibition "The Fairmount Waterworks, 1812-1911," organized by Darrel Sewell, Curator of American Art. Jane Mork Gibson has contributed the informative text, and her knowledge and enthusiasm for her subject have been helpful in many aspects of this project. We are deeply grate-

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\* Samuel Clemens [Mark Twain] to Orion Clemens, October 26, 1853. Published in Clive E. Driver, comp., *Passing Through: Letters and Documents Written in Philadelphia by Famous Visitors* (Philadelphia, 1982), pp. 77-81.



Engraved by J. H. Hill

Published by J. H. Hill & Co. Philadelphia, U.S.A.

**Fairmount**

*Historical Engraving of the Fairmount  
published at the Bazaar's year in advance including*



**Waterworks**

*Subscribers receive a family paper of the largest size  
and of the highest quality of this kind*

*Fairmount is one of the most beautiful spots in the world. There are no less than 100 bridges, views of which are shown in the engraving. Situated upon a high hill which the spring the waters of the city, the quantity of water only three to four miles from the source which are drawn by a chain of pumps from the river. They still afford a most pleasing supply to the inhabitants of the city, the Mills, Barges & Sawmills. The works are regarded a well-organized system.* Copyright secured by J. H. Hill & Co. 1838

ful to the lenders to the exhibition for parting with a lively variety of objects and works on paper, allowing us to trace the history of the waterworks over the course of a century. An impressive array of Philadelphia institutions preserve drawings, records, and views of the waterworks, and their collegial generosity has made the exhibition possible. The Pew Charitable Trusts have supported the project from its early planning phases. The major restoration of the waterworks, currently underway, has been a collaborative effort of the Fairmont Park Commission, the Philadelphia Water Department, and the Junior League of Philadelphia, and the Museum welcomes this opportunity to help focus attention on the history and the future of one of the city's most charming landmarks.

John Caspar Wild (American, born Switzerland c. 1804–1846)  
Printed by Wild & Chevalier, Philadelphia (active 1838–39)  
*View of Fairmount Waterworks* (supplement to the *Philadelphia Saturday Courier*), 1838  
Lithograph, 10 1/4 x 12 1/2 in (27.3 x 31.8 cm)  
Free Library of Philadelphia, Print and Picture Department

This view looking down the Schuylkill River toward Philadelphia was given to subscribers of a popular newspaper in 1838. Its romantic presentation of the scene, which is inscribed "one of the most beautiful spots in the world," is combined with factual information about the operation and cost of the works.

Anne d'Hamoncourt  
The George D. Widener Director



The Fairmount Waterworks occupies a unique position in the iconography of nineteenth-century Philadelphia. In the early part of the century it illustrated the romantic concepts of the era and was celebrated as a prime example of the blending of nature and technology. The latter half of the century witnessed the extension of its surroundings into a glorious park and the introduction of ever more efficient technology, but ended with distress and disrepair of the facility, anticipating its impending abandonment as a waterworks in 1911.

For foreign and native travelers in the nineteenth century making the grand tour of the United States it was unthinkable to be in Philadelphia without visiting the Fairmount Waterworks on the banks of the Schuylkill River. The waterworks and its surroundings were praised for their beauty in 1825 by a visitor to the city, John P. Sheldon, who wrote to his wife in Detroit:

*The celebrated works on the Schuylkill, by which the water of the river is raised to the top of an eminence which is elevated far above any house in the city, are beyond all praise. The reservoir upon this eminence includes an area of more than half an acre, and from the power of the works, a city of perhaps twice the extent of Philadelphia, could be supplied from the reservoir. The water of the Schuylkill is of an excellent quality, and . . . you can readily imagine the luxury in this respect, which is enjoyed by the inhabitants of Philadelphia. The scenery on the banks of the Schuylkill, particularly in the vicinity of the works alluded to, is of the most charming description. Delightful seats, surrounded by various kinds of trees and shrubbery, with gardens containing summer houses, vistas, embowered walks, &c meet your view in almost every direction, woods sloping gently to the river's edge, by the side of smooth lawns, add to the pleasing variety of the scene; and the Schuylkill, with its noble dam and bridges serves as a most beautiful finish to the foreground.<sup>1</sup>*

By the 1840s the chaste, neoclassical architecture of the buildings, the landscaped garden, and the promenades up to and around the reservoirs on "Fair Mount," as the rise was identified as early as 1687 on a map of Philadelphia, were major attractions. Ornamental sculptures, fountains, and airy gazebos added to the visual pleasure of the site. For the general public as well as for those with engineering or technical interests, the technological components at Fairmount made the waterworks a unique wonder—the turning of the massive waterwheels, the action of the powerful pumps, and the sparkling reservoirs containing the city's water supply. This was what made it different from other garden spots, and lent excitement and edification to the visit.

The development of this remarkable facility was not fully envisioned or planned as an entirety from the beginning; rather, it evolved over decades in response to happenstance, exigencies of the moment, and technological advances. From construction beginning in 1812 of a single building at Fairmount that housed two steam engines pumping river water to a reservoir on the hill

Tucker and Hemphill Factory (Philadelphia, 1832–38)

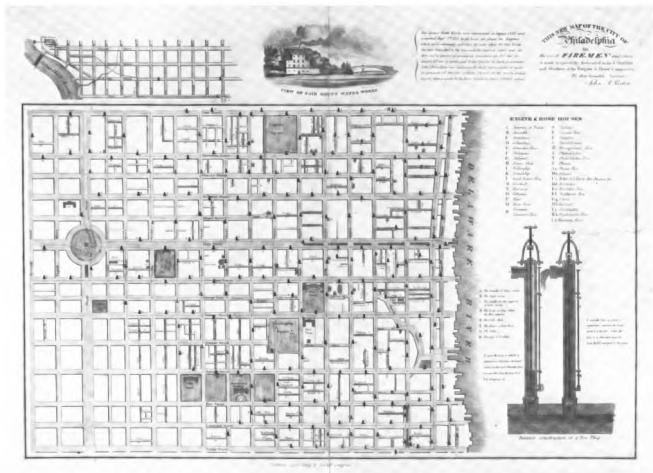
Pair of Vases, 1832–38

Glazed porcelain, painted and gilded, with lacquered brass handles; height 21 1/16" (53.5 cm) left, height 21 3/16" (53.8 cm) right

Philadelphia Museum of Art. Purchased: The Baugh-Barber Fund, the Thomas Skelton Harrison Fund, the Elizabeth Wandell Smith Fund, funds given in memory of Sophie E. Pennebaker, and funds contributed by The Barra Foundation, Mrs. Henry W. Breyer, Mr. and Mrs. M. Todd Cooke, The Dietrich American Foundation, Mr. and Mrs. Anthony N. B. Garvan, the Philadelphia Savings Fund Society, and Andrew M. Rouse. 1984-160-1,2

The Fairmount Waterworks was a popular subject for the decoration of porcelains and Staffordshire pottery; the Tucker china factory where these vases were made was in the building at the foot of Chestnut Street that originally had been a pumping station for Philadelphia's first waterworks from 1801 to 1815.

1. John P. Sheldon to Eliza Whiting Sheldon, December 10, 1825; "A Description of Philadelphia in 1825," *The Pennsylvania Magazine of History and Biography*, vol. 60, no. 1 (January 1936), p. 75.



above, the waterworks expanded to become the extensive technological system and public park so famous in later years. The Joint Committee on Supplying the City with Water, known as the Watering Committee, was a city agency formed in 1798, made up of members of the Select and Common councils, the city's legislative branch. Its concern was to establish a system that would provide an essential service for the citizens of Philadelphia—a plentiful supply of potable water. The nature of the early city was described as having a “merchant-led committee system” that functioned very well.<sup>2</sup> But there were problems, too, along the way as Philadelphia grew in size and population, as state-of-the-art technology enabled improvements in the system, and as the realities of economics and politics intruded.

2. Sam Bass Warner, Jr., *The Private City: Philadelphia in Three Periods of Its Growth* (Philadelphia, 1968), p. 104.

From 1815 to the consolidation of the city with its districts in 1854, Fairmount Waterworks was the sole pumping station supplying Philadelphia with water, and for part of that time it also supplied the districts of Spring Garden, Northern Liberties, and Southwark. After water power replaced steam, which used expensive fuel to power the waterworks' pumps, the financial rewards for the city were considerable. In 1844 the city purchased the Lemon Hill property, which had once belonged to Robert Morris and was directly upstream from the works, to prevent industries from locating on water lots so close to the city's water supply. The south garden at the waterworks had been built by 1835, and soon the idea of a large urban recreational park caught the fancy of many citizens, with additional land being acquired for today's Fairmount Park. By the time of the consolidation of the city in 1854, however, additional pumping stations that had already been erected by the districts along the river eliminated the city's dependency on water power at Fairmount. Although technological improvements were made with the installation of water turbines beginning in 1851, Fairmount Waterworks began to deteriorate by the 1880s. River pollution reached untenable proportions in the 1890s, and the facility was decommissioned as a pumping station in 1911.

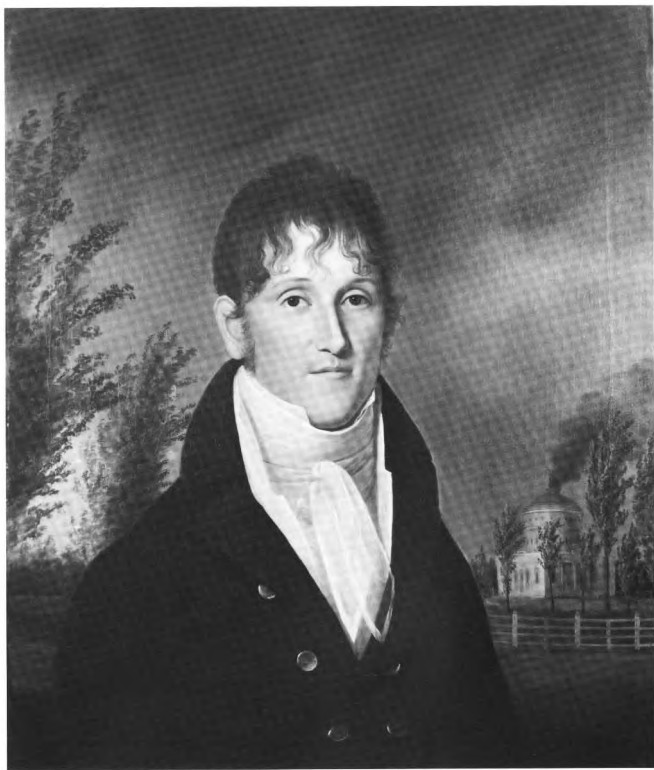
Many persons were instrumental in the creation and the operation of Fairmount Waterworks. Most noted among them were Frederick Graff (1774–1847) and his son, Frederic Graff, Jr. (1817–1890). As a young man, the elder Graff was an assistant to the architect and engineer Benjamin Henry Latrobe. Graff served as superintendent of the first Philadelphia Waterworks at Centre Square, the site today of City Hall, from 1805 and continued at Fairmount until his death in 1847. Responsible for the design of the Fairmount Waterworks facility—the buildings, most of the machinery, the distribution system, the gardens immediately surrounding the waterworks—he, in effect, ran the waterworks. Graff, Jr., continued the tradition, serving from 1847 to 1856 and again from 1867 to 1872, becoming a leading civil engineer in his own right, and playing a major role in the development of Fairmount Park.

Fairmount Waterworks today maintains its graceful presence in the Philadelphia landscape and serves as a picturesque reminder of the past when its buildings, gardens, and dam were depicted in drawings, paintings, woodcuts, lithographs, and engravings. Views of the waterworks were also transferred to porcelain and to pottery as the scene most representative of Philadelphia. These images and the remembrance of the days long gone enrich our perception of the present in contrast to the past—when a stroll in a garden and a viewing of waterwheels in motion were the grand moments of a Sunday afternoon.

John Adams Paxton (American, active Philadelphia 1810–19)  
*New Map of the City of Philadelphia for the Use of Firemen* (with a vignette view of the waterworks by Kneass, Young & Co., Philadelphia [active 1818–20], after William Strickland [American, 1788–1854]), c. 1819  
Engraving with hand coloring, 17<sup>1</sup>/<sub>4</sub> x 23<sup>7</sup>/<sub>8</sub>" (43.6 x 60.7 cm)  
CIGNA Museum and Art Collection, Philadelphia. 86.01.04

One of the first printed maps of the city's water distribution system includes the location and instructions for the operation of hydrants. Mains ran from Fairmount Waterworks in Spring Garden to the Centre Square pump house for distribution to the developed areas of the city, most of which were along the Delaware River.



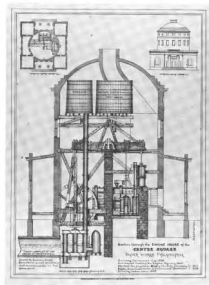


The need for an adequate, clean supply of water became critical after 1793, when the purity of the city's water supply from wells was questioned as a major yellow-fever epidemic plagued the city during the summer months and when there was not enough water to cleanse the streets or to fight fires. Members of the Select and Common councils debated how to remedy the situation, Philadelphia's active community of mechanics pondered the problem, and Benjamin Henry Latrobe, who was in Philadelphia in 1798 to build the Bank of Pennsylvania, was asked for his advice. It was found that water was being contaminated by cesspools located too close to the city's wells, which supplied water to public pumps and hydrants. The need for a speedy resolution was accentuated by another major recurrence of yellow fever in 1798. The solution to the problem was either to bring water by canal or aqueduct from a distance outside the city or to tap the abundant supply of water in the Delaware and the Schuylkill, the two rivers flanking the city. Latrobe recommended construction of a system to pump water from the Schuylkill River and distribution of it through mains made of bored logs to the settled areas of the city.

Latrobe proposed that power for the system be supplied by steam engines, although at this time there were reportedly only three in existence in the country and little was known about their construction or operation. The engines were to be housed in two separate structures, one at the foot of Chestnut Street, which would pump river water up to the level of a tunnel, where it would flow by gravity under Chestnut Street to Broad Street to a pump house at Centre Square (the intersection of Market and Broad streets), which would house another steam engine, a boiler, and a pump. The steam engine at that location would pump water to reservoir tanks at the top of the building; from there it would flow by gravity to a distribution chest and then through wooden log pipes to pumps, hydrants, and the buildings of subscribers.

Latrobe's drawings illustrating his proposal were impressive, and his Continental manners were evidently influential, for he was awarded a contract to build the system, with the stipulation by the Watering Committee that it would be in operation before October 1799. This was an extremely optimistic representation to the Watering Committee by Latrobe and his partner Nicholas Roosevelt, who was to construct the steam engines. The facility finally went into operation in January 1801, with a resulting overage in the estimated cost.

The Philadelphia Waterworks at Centre Square was an early example of Latrobe's influential neoclassical architectural style. The building was admired for its proportions and use of Greek prototypes. The Centre Square system illustrated the manner in which a purely utilitarian function could be housed in a structure that gave no indication of its purpose and was a harmonious and attractive addition to its surroundings. That all the parts of the steam engine, the boiler, and the pump did not easily fit into the space provided in the interior of



Frederic A. Wenderoth & Co. (active Philadelphia after 1860)  
After Frederic Graff, Jr. (American, 1817–1890)  
*Section, Plan, and Elevation of the Engine House at Centre Square, October 1876*  
Linecut, 12 $\frac{1}{16}$  x 8 $\frac{7}{16}$ " (31.3 x 22.5 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. III:3

The crowded interior of the pump house at Centre Square made maintenance and repair of the machinery difficult. The fly wheel of the steam engine had to be fitted into a space in the wall.

James Peale (American, 1749–1831)  
*Portrait of Frederick Graff, 1804*  
Oil on canvas, 27 $\frac{1}{2}$  x 23 $\frac{1}{2}$ " (69.8 x 59.7 cm)  
The Historical Society of Pennsylvania, Philadelphia

Before serving as superintendent of the Fairmount Waterworks, Frederick Graff, shown here at the age of thirty, worked at the Centre Square pump house, which appears behind him with smoke from the steam engine billowing from the chimney at the center of its domed roof.

Joshua Rowley Watson (English, 1772–1818, active Philadelphia 1816–17)  
*View of the Market Street Permanent Bridge and the Upper Ferry Bridge from the Centre Square Waterworks*, October 5, 1816  
Watercolor and ink wash over graphite on wove paper, 5<sup>1</sup>/<sub>8</sub> x 21<sup>1</sup>/<sub>2</sub>" (13.7 x 54.6 cm)  
Private collection

From a point just below the site of the Chestnut Street intake of the water supply for the Centre Square pump house, this drawing looks up the Schuylkill riverfront to the Market Street Permanent Bridge with the Upper Ferry Bridge in the distance; Fairmount is to the right with Lemon Hill just above it.

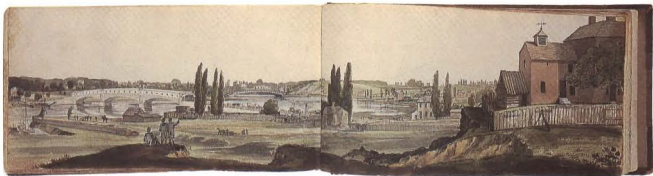
the building did not appear to disturb Latrobe or the Watering Committee. In practice, the close quarters made the operation of machinery difficult and created problems for Graff, who had been engaged by Latrobe to assist with the drawings and later with the operation of the works. In 1804 Latrobe described Graff as his first pupil.

The pump house at Chestnut Street on the Schuylkill River was the first to go into operation, and Thomas P. Cope, a member of the Watering Committee, recorded his jubilation at the time:

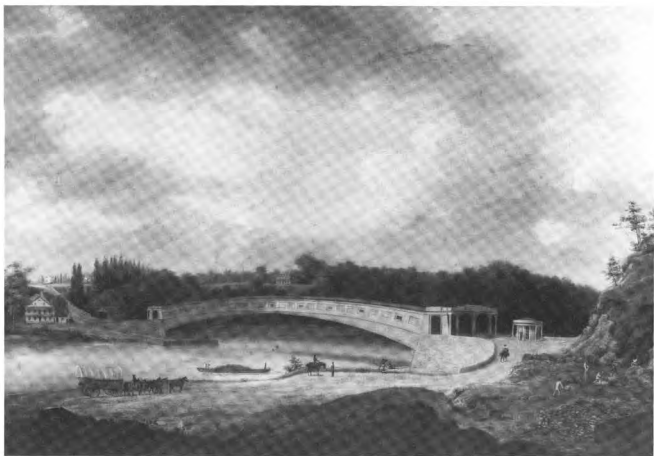
*It was an anxious moment & when the signal was given to put the engine in motion, my heart beat so furiously against my side I could scarce keep my feet. When I beheld the elevated fountain gush forth, tears of joy came to my relief.<sup>3</sup>*

But difficulties with the machinery and the management of the facility hampered the system even after it was in full operation. The Watering Committee had been successful in achieving its goal of supplying the city with water, although to a somewhat limited extent because the amount of water that the reservoir tanks held would be emptied out in twenty-five minutes if no additional water was pumped in. In addition, purchase of wood for fuel was expensive, the crude boilers were inefficient, and parts of the machinery frequently had to be replaced.

The continuing need for improvements in the water-supply system became desperate. The security of the city was at stake, for there was danger of not having sufficient water to fight fires that might occur when the reservoir tanks in the Centre Square pump house had been depleted or when either



3. Eliza Cope Harrison, ed., *Philadelphia Merchant: The Diary of Thomas P. Cope 1800–1851* (South Bend, Ind., 1978), p. 386.



one of the engines was not working. The health of the population was again threatened by yellow-fever epidemics that had recurred in 1802, 1803, and 1805. And, the cost of operation of the Centre Square system was high—so far above the estimated expense that prudence demanded a major revision.

A new solution was sought by the Watering Committee, which began to look for alternative methods of supplying the city with water. In 1811 the committee sent Latrobe's assistants John Davis and Graff to survey the situation. They investigated the same places that Latrobe had seen thirteen years earlier and arrived at a similar solution—pumping water from the Schuylkill River using steam power but from a new location. They proposed construction of a pumping station on the banks of the Schuylkill River at the foot of Fairmount (at one time called Morris Hill) and construction of a reservoir on top of the hill.

Thomas Birch (American, born England 1779–1851)  
*View of the Upper Ferry Bridge from the East Bank of the Schuylkill River*, 1813  
 Oil on canvas, 28 x 41" (71 x 104 cm)  
 The Historical Society of Pennsylvania, Philadelphia

With its single span of just over 340 feet, the Upper Ferry Bridge, designed by Lewis Wernwag and known as the Colossus, was considered a magnificent engineering accomplishment. To the right of the toll house men quarry at the base of Fairmount.



*View of Fairmount Waterworks (from The Port Folio), January 1819*  
Engraving, 6<sup>3</sup>/<sub>8</sub> x 4<sup>3</sup>/<sub>16</sub>" (16.8 x 10.6 cm)  
The Historical Society of Pennsylvania, Philadelphia

As this illustration from the cover of a Philadelphia literary magazine shows, Graff designed the engine house to disguise its utilitarian functions, making it look like a large country house, though unusually close to the river. The tall chimneys provided sufficient draft for boilers located in the one-story wings flanking the main building. Smoke indicates that the south engine was at work pumping water up to the reservoir.

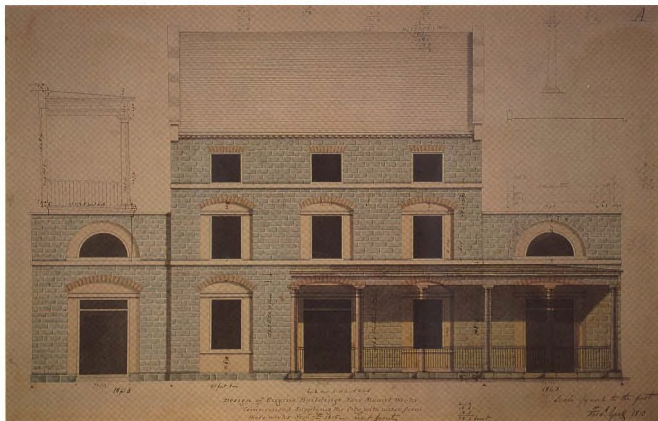
The selection of a new site for the waterworks at Fairmount, just beyond the city limits in the district of Spring Garden, was propitious. The Delaware and Schuylkill Canal Company had previously possessed the rights to supply water to the city from that area, but the failure of the company made it possible to obtain an otherwise unavailable location. Water could easily be drawn from the fast-flowing Schuylkill River by an intake leading directly to a pump house built at the river's edge, then pumped up to a reservoir located on top of the hill that rose precipitously behind, fifty-six feet above the highest ground in the city. From there the water could flow through the distribution system already in place throughout the populated areas of Philadelphia.

The district of Spring Garden lay to the north of the city and bordered the Schuylkill River. The area was mostly open land, with country seats farther out. Just downstream from Fairmount there was a major river crossing at Upper Ferry. The rocky cliffs, which were quarried, were scarcely far enough from the river's edge to allow space for Ferry Road. It was on this rock ledge next to the Schuylkill River that Graff located the first waterworks building at Fairmount, which was the engine house. The water main from the engine house ran under Ferry Road, then ascended through the rocky hill, where space for the main was excavated by blasting with black powder. The water was discharged into a basin, or reservoir, on top of the mount. Construction started August 1, 1812.

Graff was influenced by Latrobe's concept of designing an aesthetically pleasing building to house a potentially dangerous function, which the operation of stationary steam engines was considered to be at that time. From the outside, the engine house resembled a typical stuccoed house with Federal-period detail, with doors and windows belying the actual space of the interior, where the floor levels and supporting structure were determined by the great size and the location of the engine cylinders, the lever beams, the fly wheels, and the pumps.

A unique situation existed inside the engine house with its two very different steam engines side by side—a traditional low-pressure steam engine on the south side and a newly designed high-pressure steam engine on the north. Both steam engines were made by members of Philadelphia's mechanics community, a group of talented men who excelled in developing mechanical skills and techniques. By installing two steam engines in the pump house, the Watering Committee planned to overcome the problem of breakdowns. With such a backup system, they believed one of the engines would always be in working condition and the city would never be deprived of the means of supplying water to the reservoir.

The south engine was built by Samuel Richards, the proprietor of the Eagle Works, located on Upper Ferry Road at William Street (now Callowhill and 24th streets), and some of the castings were made at his Weymouth Furnace in South Jersey. This low-pressure engine was of the same design as that

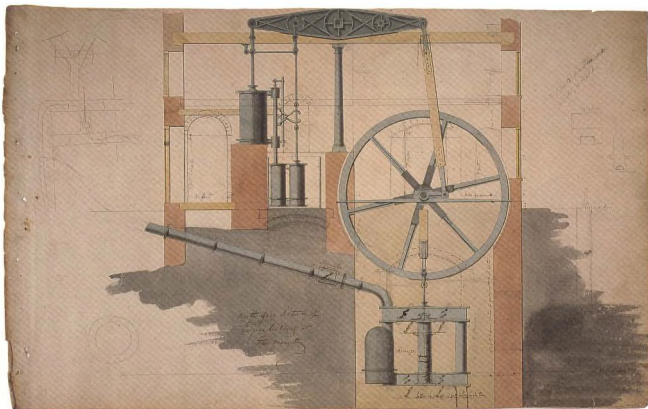


of the British manufacturers Boulton and Watts, and except for the use of cast iron for the lever beam and the fly-wheel arms and shafts, it was similar to the older engines at Chestnut Street and Centre Square. The boilers were a combination of wood, cast-iron, and wrought-iron parts. After some difficulties, the south engine was put into regular operation on September 7, 1815.

The north engine was made by Oliver Evans at his Mars Works on Ridge Road at Ninth and Vine streets, where his sons-in-law, James Rush and David Muhlenberg assisted. Although the original plan had been to move the old Centre Square low-pressure engine to the new engine house at Fairmount, the Watering Committee gambled in contracting for this new type of steam engine, the largest noncondensing high-pressure steam engine he had built up to that time, which Evans patriotically called a Columbian steam engine. Evans, who promised a savings in fuel and assured a large capacity of 3.5 million gallons in twenty-four hours, guaranteed to remove it at no cost if it failed to meet these standards. The Columbian engine was delivered by March 1815 and was used at intervals when the south engine was inoperable even though it was not officially accepted by the committee until December 15, 1817.

Frederick Graff (American, 1774–1847)  
*Western Elevation of the Engine House*, 1813;  
 portico added 1835  
 Watercolor, ink, and graphite on laid paper,  
 14 1/4 x 22 1/2" (36.2 x 57.6 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. GR-IV:10

Graff's skilled rendering of the engine house reflects Latrobe's tutelage, but the city chose a less expensive stucco exterior instead of the coursing of cut blue stone. Graff overrode his design to add the portico in 1835.



Frederick Graff (American, 1774–1847)  
*Transverse Section of the Engine House Showing  
 the South Engine with Pump and Air Chamber,*  
 c. 1813  
 Watercolor, ink, and graphite on laid paper,  
 14 1/4 x 22 5/8" (35.9 x 57.5 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr.IV:20

The great cast-iron lever beam, twenty-four feet long, and the cylinder of the low-pressure south engine challenged the capacity of the iron foundries where they were made. Casting the cylinder took all the iron the furnace could hold. The engine operated at 2.5 psi (later 4 psi) and raised 2.1 million gallons of water to the reservoir in twenty-four hours, using seven cords of oak wood.

Although the south engine with its twenty-four-foot lever beam was very impressive and, because of its large size and design, was known as the great English engine, George Escol Sellers reminisced in later years that most of the time it was the north engine that was working.<sup>4</sup>

The pumps were vertical double-acting force pumps and were connected to a single discharge pipe in the basement level of the engine house. Valves to control the water flow could be adjusted according to the engine being used, and Evans stated that, in his opinion, both pumps could be in operation at the same time. Air chambers such as the one Graff had designed for the Centre Square works to permit that pump to operate more efficiently by reducing water hammer were attached to the pumps. Throughout his period of service, Graff found it necessary to design several new components—hydrants, valve chests, and stopcocks—for the city system.

4. See Eugene S. Ferguson, ed., *Early Engineering Reminiscences (1815–40) of George Escol Sellers* (Washington, D.C., 1965), p. 38.

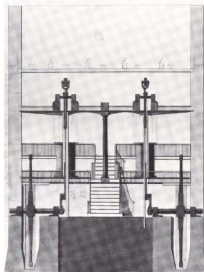
The reservoir had the capacity of 3 million gallons. Five wooden distribution mains, each with a six-inch diameter, led to the cast-iron distribution chest at the Centre Square works. The water then flowed as before through the already established distribution pipes to hydrants, pumps, business establishments, and dwellings in Philadelphia.

A system is only as good as any of its parts, and although the city had constructed a new pump house and installed state-of-the-art steam engines, the distribution system needed to be improved, for it had simply been patched onto the original one, which used bored logs. By 1817 there were over thirty-two miles of spruce and yellow pine pipes supplying about 3,500 houses and businesses, along with "upwards of 300 cistern pumps placed in the streets for public use."<sup>5</sup> Inquiries were begun on the use of cast-iron pipes to replace the old wood mains, which were joined by cast-iron connectors.

A water shortage in the summer of 1818 demonstrated that only 1 million gallons in twenty-four hours were able to be distributed to the city, even though the reservoir was full and an engine at work. The cause was the small internal bore of the pipes—three to six inches—and leakage at the connections. In 1819 improvements were made, such as the adoption of cast iron for new and replacement mains as well as the installation of a twenty-inch main from the Fairmount reservoir to Broad and Chestnut streets, past Centre Square. The spigot and faucet joint, which became standard in cast-iron pipes, together with curved pipes for going around corners, made the installation a successful resolution of the major problems of distribution. The distribution chest at Centre Square was abandoned, marking the end of that building's usefulness to the system, and Latrobe's handsome structure was torn down in 1829.

High costs continued to plague the system. Although the two engines were able to keep the reservoir filled with water as planned, there was no letup in the cost of operating the new facility, for the engines required large quantities of fuel. In 1819 Graff estimated that the annual cost of operation of each engine to raise a safe load of 2.3 million gallons in twenty-four hours was \$30,858, the major expense being the purchase of 3,650 cords of wood per year. This report discouraged the Watering Committee from plans to install an additional discharge pipe to the reservoir so that both engines could work at the same time. Further distress was caused by disastrous events in 1818 and 1821, when the boilers exploded, resulting in the deaths of three men.

For the Watering Committee, the use of steam engines at Fairmount had been a noble experiment for seven years. But, as with the earlier system at Centre Square, water was provided as promised but still at too great a cost.

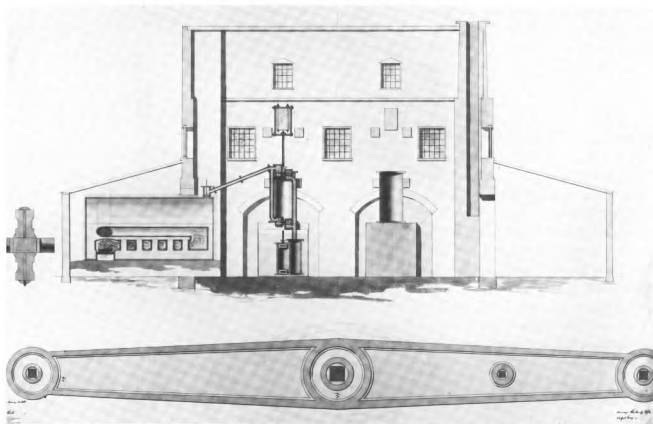


Frederick Graff (American, 1774–1847)  
*Proposed Partial Longitudinal Section of the Engine House*, c. 1813  
Watercolor, ink, and graphite on wove paper,  
18 x 13<sup>5</sup>/<sub>8</sub>" (45.8 x 34.5 cm)  
The Franklin Institute Science Museum,  
Philadelphia. Gr.IV:17

Graff's symmetrical drawing, made when two low-pressure steam engines were planned for the engine house, shows the interior with the massive foundations necessary to support the machinery and the arrangement proposed for the fly wheels.

5. Frederick Graff to Joseph S. Lewis, December 22, 1817. Watering Committee archives, City Hall Annex, Room 523, Philadelphia.





Frederick Graff (American, 1774–1847)  
*Longitudinal Section of the Engine House with  
 Detail of Lever Beam*, c. 1813  
 Watercolor, ink, and graphite on wove paper,  
 18<sup>3</sup>/<sub>16</sub> x 26<sup>1</sup>/<sub>8</sub>" (47.9 x 66.2 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr.IV:13

This drawing is an early study by Graff for the works at Fairmount; the engine house and steam engine were finally built in a slightly different form. The drawing of the lever beam at the bottom of the sheet shows one improvement Graff incorporated into his final design: the lever beam for the low-pressure engine was made of cast iron instead of wood as at Centre Square.

Both steam systems had operated on the cutting edge of technology, and now the city made plans to revert to the use of an older power source—water. The majestic steam engines had made a mighty effort, but they were retired when the waterwheels took over the duty. On October 24, 1822, the steam engines were stopped, never to be used again. Although initially held in reserve for emergencies, they soon deteriorated and were sold for scrap in 1832. A few years later the utilitarian engine house was converted to a public saloon, where refreshments were provided for ladies and gentlemen, and its surroundings were developed into a public garden. The true magnificence of Fairmount Waterworks was just beginning.

The first step in constructing a water-powered system at Fairmount involved damming the Schuylkill River. In 1819 an opportunity presented itself that seemed to be the solution to the city's water-supply problem both for the present and for the future—converting Fairmount Waterworks to water power, a most inexpensive source of power. In this endeavor, the activities of the Watering Committee were influenced by outside events. Josiah White, a local manufacturer, who with Joseph Gillingham owned the water-power rights at East Falls on the Schuylkill River, had proposed the construction of a dam at or near Fairmount in conjunction with the city in order to harness the abundant water power but had met with no success. In 1815 the Commonwealth of Pennsylvania granted a franchise to the Schuylkill Navigation Company to erect dams and canals, but the company found itself in financial difficulty by the time the final canal and lock were to be constructed near Fairmount. This final stage in the construction of the Schuylkill Navigation Company's slackwater canal system was the impetus for the shift to water power for the waterworks.

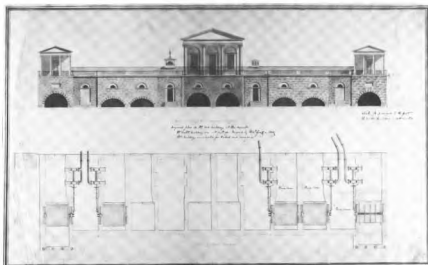
A plan was developed for the city to purchase the rights to the water power, to throw a dam across the Schuylkill River at Fairmount, and to construct a canal and locks for the Navigation Company, guaranteeing to maintain a sufficient water level at the dam for lockage. The city would have an ample supply of water both for distribution and for power to turn water-wheels, thus operating the pumps without the continual, exorbitant expense for fuel. With such a dam, the water would be backed up to the normal fall



Robert Tiller (active Philadelphia 1818–24)  
 After Thomas Birch (American, born England  
 1779–1851)  
*Ground Plan and Elevation of the Fairmount Dam  
 and Waterworks* (in *Report of the Watering  
 Committee, to the Select & Common Councils of the  
 City of Philadelphia, Relative to the Fair Mount  
 Water Works. Read January 9, 1823*), 1822  
 Engraving, 13<sup>15</sup>/<sub>16</sub> × 18<sup>7</sup>/<sub>16</sub>" (35.4 × 46.9 cm)  
 Collection of J. Welles Henderson

Frederick Graff (American, 1774–1847)  
*Plan and Western Elevation of the Mill House with  
 Proposed Center Pavilion and Cupolas, 1820*  
 Watercolor and ink over graphite on wove  
 paper, 22<sup>3</sup>/<sub>4</sub> x 37<sup>7</sup>/<sub>8</sub> (58.1 x 93.9 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr.V:23

Graff's presentation drawing shows several possible design details for the mill house. Frederic Graff, Jr., later referred to his father's original conception when remodeling the building and adding the central pavilion in 1872.



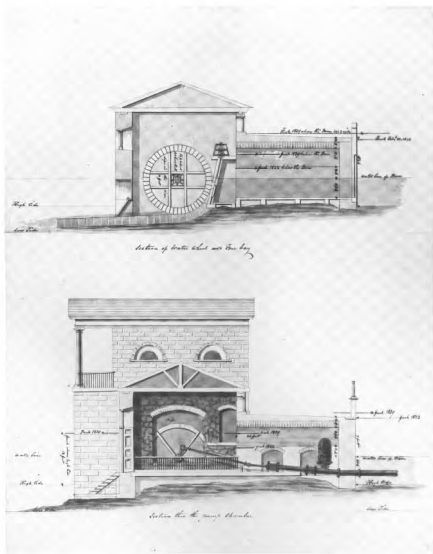
David Johnston Kennedy (American, born  
 Scotland 1816 or 1817–1898)  
*Waterwheels at Fairmount, 1836*  
 Watercolor on paper, 6<sup>1</sup>/<sub>4</sub> x 10<sup>7</sup>/<sub>8</sub> (17.2 x 25.3 cm)  
 (image)  
 The Historical Society of Pennsylvania,  
 Philadelphia

The sight of the powerful waterwheels at work was an attraction at the waterworks as much remarked upon as the landscape. This wheel, sixteen feet in diameter and turning at 13 rpm, was joined by a connecting rod to the pump located under the visitor's gallery.

line at East Falls, creating the Fairmount pool, an extensive slackwater pond for water storage and recreation, which was to be utilized by the rowing clubs, or what was called the Schuylkill Navy in later years. Not only would this plan yield a good return to the city but additional revenue could be obtained by selling surplus water to nearby districts.

The Watering Committee realized that if the city failed to act at this time and if a dam were to be constructed by another party at a different location, the opportunity would forever be lost for the city to harness the Schuylkill River's water power. Members of the committee and Graff traveled to the Gilpin paper mills on the Brandywine River to observe newly installed breast wheels—wheels that receive water in buckets higher than is customary on undershot wheels—which were reported to be highly efficient in similar conditions. Led by Chairman Joseph S. Lewis, the Watering Committee promptly decided to undertake the project of converting to water power at Fairmount. At this time, according to Graff, except for the dam and the waterwheel, no thought was given to the "specific plan or design . . . with regard to the buildings, or the location or form of any part of the works."<sup>6</sup> There was no prototype for the scale and configuration of the kind of structure that would be needed to contain multiple waterwheels, so Graff set out to design the mill house through which the water would flow. His drawings show his indebtedness to Latrobe in the neoclassical exterior design of the buildings. The complex was designed to harmonize with the surroundings

6. Frederick Graff to the Select and Common Councils of the City of Philadelphia: The Memorial of Frederick Graff, April 17, 1833, p. 5. Watering Committee archives, City Hall Annex, Room 523, Philadelphia.



Frederick Graff (American, 1774–1847)  
*Sections of the Mill House Showing Waterwheels  
 and Pump Chamber*, c. 1820, with later notations  
 Watercolor and ink over graphite on wove  
 paper, 16 $\frac{1}{4}$  x 12 $\frac{3}{8}$ " (42.2 x 32.1 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr. V:36

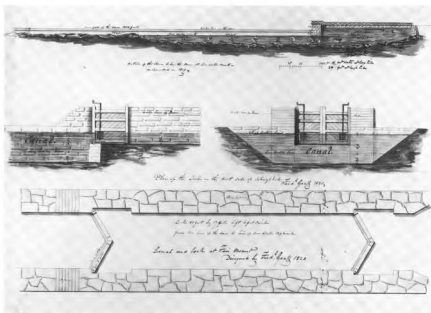
Water at the level of the dam fills the buckets on the wheel causing it to turn clockwise; water leaves the buckets at river level. The crank converts the rotary motion of the waterwheel to reciprocating motion needed to operate the pump, which the air chamber protects from back pressure.

and be pleasing to the eye. A neoclassical effect was provided by the small templelike structures placed at each end, which provided needed administrative space.

The mill house was a monumental structure 238 feet long, situated along the rocky east bank of the river, which required extensive blasting to construct. Graff never lost sight of the function of the works, and his layout of the interior was simple and efficient. The mill house was divided into twelve so-called apartments, eight for wheels and four for the pumps. At first only three wheels were installed, although space was provided for eight fifteen-foot-wide breast wheels. Each wheel operated a pump placed almost horizontally, which was activated by a connecting rod attached to a crank on the waterwheel, connected to the shaft of the waterwheel. Because the Schuylkill is a tidal river at

Frederick Graff (American, 1774–1847)  
*Plan and Sections of the Canal and Lock, with  
 Section of the River Below Dam, 1820*  
 Watercolor and ink over graphite on wove  
 paper, 12<sup>3</sup>/<sub>8</sub> x 16<sup>5</sup>/<sub>8</sub>" (32.1 x 42.2 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr. VIII:1

The Fairmount dam backed up the river as far as Manayunk, creating a slackwater pool along which canal boats could easily travel using a towpath on the west bank. The canal lock was necessary to raise or lower boats to the level of the water above or below the dam; it also provided a fish ladder so that shad and other fish could swim upstream or down.



Fairmount, the water in the tailrace, where water exits from the waterwheels, rises and falls with the tide. The bottoms of the waterwheels were placed two feet below high water and could operate in up to sixteen inches of backwater; thus the wheels were necessarily idle twice a day during high tide, and the pumps also remained idle.

Experts were called upon for the design of the Fairmount dam. Only a few years earlier, White noted that there had never been a dam attempted across such a wide expanse of a river with the peculiarities of the Schuylkill.<sup>7</sup> Not only was the river subject to sudden freshets, or floods, but in the winter ice breaking up could do extensive damage. Capt. Ariel Cooley of Chicopee, Massachusetts, was just completing the Flat Rock Dam above Manayunk for the Schuylkill Navigation Company, and it was his proposal that was accepted by the Watering Committee.

In order to direct destructive currents of the river away from the mill house on the east bank, the dam was laid out diagonally upstream in a line 1,204 feet long from the mill house to the west bank, where it had been determined that the canal would be located. As it neared its western terminus where it joined the guard locks of the canal, the dam made a sharp angle to permit the breaking up of sheets of ice when they reached the overfall of the

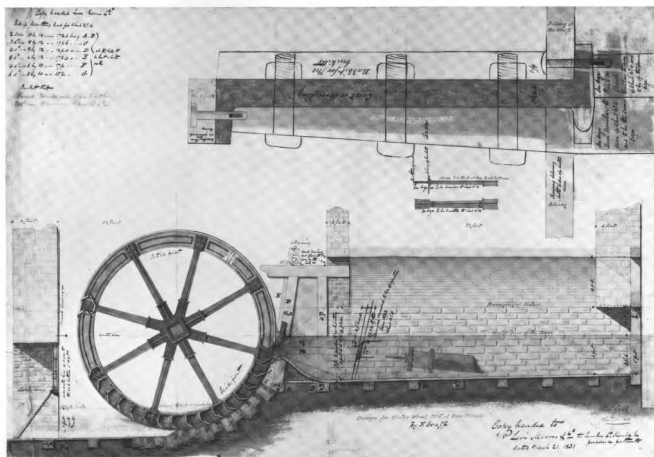
7. See Josiah White, *Josiah White's History Given by Himself* (n.p. [1909]; reprint, Carbon County Board of Commissioners, Jim Thorpe, Pa., 1979), p. 13.

dam. (In later years, damage from ice was prevented by a guard pier constructed on the eastern side of the river to protect the entrance to the millrace itself.) The dam was built of cribs of hickory logs filled with stone that were sunk in the river and fastened to each other and to the rock bed of the river. At the east bank, a mound dam 270 feet long was constructed because the riverbed at that location consisted of eleven feet of mud above the rock bottom, allowing no possibility of anchoring a structure of any kind. Beyond this three head arches formed a bridge, 104 feet overall, with gates that controlled the entrance to the millrace, or forebay. The millrace had to be cut out of solid rock and was 419 feet long, 90 feet wide, and from 16 to 60 feet deep.

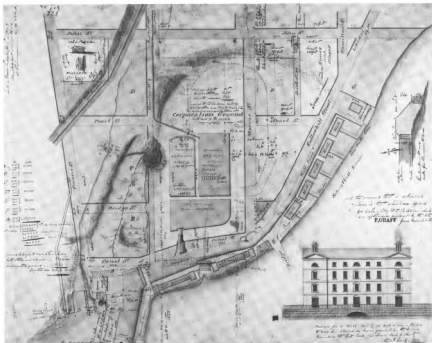
The councils approved the plan on April 8, 1819, and work was started on the dam ten days later. It was 1821 before the last crib was put in place, and July 23, 1821, saw the first water over the dam. The first wheel went into operation July 1, 1822.

Frederick Graff (American, 1774-1847)  
*Design for Waterwheel Number 5 with Detail of Cast and Wheel Arm, January 11, 1831*  
Watercolor and ink over graphite on wove paper, 20 1/8 x 29 1/16" (51.8 x 74.4 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:38

In this highly detailed working drawing Graff's design of cast-iron wheel number 5 became the prototype for subsequent wheels. Water at the level of the dam fell into buckets placed just below the shaft on the breast wheel.







Frederick Graff (American, 1774–1847)  
*Site Plan with Elevation of an Industrial Mill*, 1822  
 Watercolor, ink, and graphite on wove paper,  
 17<sup>1</sup>/<sub>2</sub> x 22<sup>7</sup>/<sub>8</sub>" (45.5 x 58.1 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr. V:2

From 1822 to 1829 Graff developed several plans for an industrial complex along the east bank of the Schuylkill River—to the south of the waterworks and continuing below the Upper Ferry Bridge—but none of them were ever carried out.

At the time of the conversion of Fairmount Waterworks from steam to water power, Philadelphia was actively promoting industry and commerce in Pennsylvania in an effort to compete successfully with other East Coast states for linkage and trade with the developing western lands on the Ohio River. One of the proposals called for a canal to cross the city from the Schuylkill to the Delaware River, with a Schuylkill Navigation Company canal lock at Fairmount on the east bank. Although this earlier plan had been discarded and the canal lock was constructed on the west bank, the Watering Committee continued to think in terms of profiting from the surplus water power by extending the millrace on the east bank of the river and by building or leasing factories there to purchase the power. Graff made drawings that show several plans for an industrial complex south of the engine house, but no mills or factories were ever built. Legal difficulties arose concerning water rights of persons from whom the city had purchased land, and the geological formations of the area were such that additional blasting for a canal on the east bank would have been extremely difficult and imminently dangerous to the existing structures. The plans to create an industrial complex next to the waterworks were abandoned by 1829. Happily, the area was developed as the south garden within six years.

Thomas Doughty (American, 1793–1856)  
*View of the Waterworks from the Top of Fairmount*,  
 1826  
 Oil on canvas, 16<sup>1</sup>/<sub>2</sub> x 24<sup>3</sup>/<sub>4</sub>" (41.2 x 61.4 cm)  
 Private collection

The appeal of Fairmount as a beautiful spot to visit is captured in a pair of paintings made before the site was developed as a park. William Rush's carved allegorical figures are visible above the entranceways to the mill house gallery, and the rods that raise the gates to admit water to individual flumes are lined up along the forebay.

Thomas Doughty (American, 1793–1856)  
*View of the Waterworks from the West Bank of the Schuylkill River*, 1826  
 Oil on canvas, 16<sup>1</sup>/<sub>2</sub> x 24<sup>3</sup>/<sub>4</sub>" (42.2 x 61.4 cm)  
 Private collection

In the view from across the river, the eight arched openings at river level in the mill house are the tailraces through which water returned to the river after driving the waterwheels.





J. Giles (English)  
 After William Henry Bartlett (English,  
 1809–1854)  
*View of Fairmount Gardens and the Upper Ferry  
 Bridge*, 1839  
 Etching and engraving with hand coloring,  
 4<sup>13</sup>/<sub>16</sub> x 7<sup>1</sup>/<sub>16</sub>" (12.2 x 18.2 cm) (image)  
 Collection of Mr. and Mrs. James Nelson Kise

Well-dressed visitors stroll up the side of Fairmount, which has been improved by fenced paths. Behind is the south garden with formal plantings and a fountain, and at the end of the Upper Ferry Bridge across the river is Harding's Hotel, a popular resort.

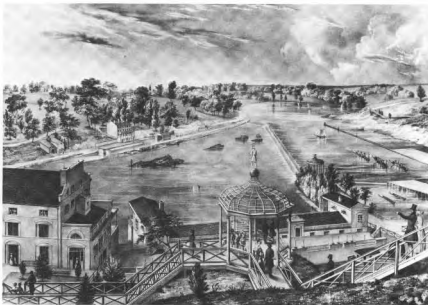
*View of Fairmount Watersworks with the Schuylkill  
 River in the Distance*, 1838  
 Printed and published by John T. Bowen  
 (American, born England 1801–1856)  
 Lithograph, 13<sup>1</sup>/<sub>2</sub> x 19<sup>7</sup>/<sub>16</sub>" (34.5 x 50.5 cm)  
 (image)  
 The Historical Society of Pennsylvania,  
 Philadelphia

Bowen's lithograph captures the pleasures of Fairmount in its heyday. The neat beauty of the works set into a gentle landscape, steep paths and steps that offered an exhilarating contrast to the general flatness of Philadelphia, as well as the excitement of boat races on the river and the refreshments offered in the former engine house all prompted the admiring comments of visitors.

With the construction of the mill house and the adoption of water power, Fairmount entered a new era. The employment of water power proved a great success, enabling the city to reverse the financial losses of previous years; the development of the gardens was also a fortuitous decision.

The garden in the area south of the engine house and the esplanade below, where boats docked, were completed by 1835. Several factors contributed to this development over a period of a few years. By the time plans to industrialize the site had been abandoned, the Watering Committee had begun filling in the quarry hole, constructing a retaining wall, and building up and leveling off the area from the engine house to the Upper Ferry Bridge. Walkways around the reservoir and plantings to hold the soil had been established, and extensive repairs were made to the engine house following the removal of the steam engines in 1832. Philadelphia's public gardens were popular places for recreational activities, and the natural beauty of the waterworks at the edge of the city, together with its neoclassical structures and attractive garden, had enormous appeal in an age that embraced the romantic concept of taming nature for the use of man without destroying it. Also, adjacent to the garden, another graceful engineering wonder spanned the Schuylkill River in the form of Lewis Wernwag's Upper Ferry Bridge, called the Colossus of Fairmount, astride a major waterway.

The south garden was laid out with geometrically ordered walks and plantings, a marble fountain was placed at the center, and ornamental railings were erected along the retaining wall and on the walkway that led up the side





of the hill to the reservoir, with a gazebo built on a resting platform halfway up. The interior of the engine house was redesigned as an attractive hall and outfitted with benches to become a public saloon selling refreshments to visitors to the site; the portico on the river side was added in 1835. When the opportunity arose for the city to purchase additional land from the Lancaster Bridge Company, which operated the tollhouse at Upper Ferry Bridge, the garden was extended to Callowhill Street. Meanwhile, at the northern end of the works, the walkway along the mound dam was improved so that people could walk to its end, where another gazebo was constructed from which visitors could look out over the river and, if the water was high, watch the overflow of the dam—a sight that in the eyes of the engineer demonstrated a power to be harnessed but to the passerby represented the romantic movement of primeval forces.

Seeing the waterwheels at full force was a highlight of a visit to the works. The interior of the mill house was designed so that the public could observe the machinery in operation, with two entrances leading to a gallery from which to view the massive wheels—fifteen feet wide and fifteen to

Thomas Birch (American, born England 1779–1851)  
*The Fairmount Waterworks*, 1821; gazebo added later  
 Oil on canvas, 20 $\frac{1}{8}$  x 30 $\frac{1}{16}$ " (51.1 x 76.4 cm)  
 The Pennsylvania Academy of the Fine Arts, Philadelphia. Bequest of the Charles Graff Estate. 1845.1

This view of the waterworks from the south was one of the most widely reproduced versions of the scene. Although the gazebo on the dam was built in 1835, landscaping of the grounds is consistent with the earlier date of 1821 inscribed on the painting. The waterwheels were not in operation yet, and the supply of wood, piled against the engine house, was used to fire the boilers.



William Rush (American, 1756–1833)  
*Allegory of the Schuylkill River in Its Improved State (The Schuylkill Chained)*, 1825  
 Spanish cedar, painted white; length 87 1/4" (221.6 cm)

On loan to the Philadelphia Museum of Art from the Commissioners of Fairmount Park

As it had for Centre Square, the Watering Committee commissioned William Rush to make "emblematic" sculpture to decorate the buildings at Fairmount. Rush and his son John carved two figures to be installed over the entrances to the mill house. The wild male figure, modeled upon a traditional allegorical representation of a river god, struggles against chains that represent control of the river effected by construction of the dam and locks.

eighteen feet in diameter—as water flowed into their buckets and the wheels silently turned, activating connecting rods that moved the pistons in the cylinders of the pumps, drawing water from the individual forebays, or flumes, allotted to them. Visitors found an endless fascination in the practically noiseless flowing of the water, the turning of the wheels, and the movement of the pumps.

Describing a visit to Fairmount in 1840, Thomas Ewbank, inventor and manufacturer, wrote:

*It is impossible to examine these works without paying homage to the science and skill displayed in their design and execution; in these respects no hydraulic works in the Union can compete, nor do we believe they are excelled by any in the world. Not the smallest leak in any of the joints was discovered; and, with the exception of the water rushing on the wheels, the whole operation of forcing up daily millions of gallons into the reservoirs on the mount, and thus furnishing in abundance one of the first necessities of life to an immense population—was performed with less noise than is ordinarily made in working a smith's bellows! The picturesque location, the neatness that reigns in the buildings, the walks around the reservoirs and the grounds at large, with the beauty of the surrounding scenery, render the name of this place singularly appropriate.<sup>8</sup>*

8. Thomas Ewbank, *A Descriptive and Historical Account of Hydraulic and Other Machines for Raising Water*, 4th ed. (New York, 1850), p. 301.



By 1843 there was a full complement of eight breast wheels in the mill house. The original three wheels were made of wood, designed by Thomas Oakes and constructed by millwright Drury Bromley, both of whom had worked previously in England with John Smeaton, a prominent engineer. The five other wheels were made of cast iron, with wood buckets, designed by Graff and built by members of the mechanics' community in Philadelphia: Rush and Muhlenberg of Oliver Evans's Mars Works, Levi Morris, and Merriek & Towne Company. The I. P. Morris Company replaced the first three wheels in 1846 with wheels of the original design. The pumps were designed by Graff and built by members of the same group.

The atmosphere of the waterworks was one of quiet beauty, and the additions to nature included ornamental sculpture, which was strategically placed in, at, and on the buildings and gardens. The sculptor William Rush was chairman of the Watering Committee's Building Committee in 1822 and an active member of the Watering Committee from its early years until 1826, and his son served as registrar. Two carved figures by Rush were commissioned to be placed over the entranceways to the mill house, *Allegory of the Schuylkill River in Its Improved State (The Schuylkill Chained)* and *Allegory of the Waterworks (The Schuylkill Freed)*. His white-painted wooden sculpture *Allegory of the Schuylkill River*, a graceful figure of a woman sometimes called *Water Nymph and Bittern*, was moved to Fairmount from Centre Square in 1829 and placed at the base of the hill, on the edge of the millrace, where it

William Rush (American, 1756–1833)  
*Allegory of the Waterworks (The Schuylkill Freed)*,  
 1825  
 Spanish cedar, painted white; length 87<sup>1</sup>/<sub>16</sub>"  
 (221.1 cm)  
 On loan to the Philadelphia Museum of Art  
 from the Commissioners of Fairmount Park

The female figure of the pair of Rush's figures over the mill house personified the waterworks. Behind her is an urn representing the reservoir, and her gracefully extended arm signifies the force of water power.



View of Fairmount from the First Landing, 1836  
 Published by John F. Nunnis (active  
 Philadelphia 1833–42)  
 Lithograph, 11<sup>7</sup>/<sub>16</sub> x 8<sup>1</sup>/<sub>4</sub>" (29.1 x 21 cm)  
 The Historical Society of Pennsylvania,  
 Philadelphia

Made for the cover of the sheet music for "The Fairmount Quadrilles," by John H. Hewitt, this romantic view of Fairmount by an unknown artist celebrates the charm and manicured beauty of the waterworks.

was in strong contrast with the black rocks that rose behind it to the reservoir. A figure of Mercury by Rush was mounted atop a gazebo. Other statuary that adorned the garden included a marble statue of Diana at the foot of the walkway to the reservoir and the marble *Boy and Dolphin* placed in the center of the marble fountain about 1835.<sup>9</sup>

The golden age at Fairmount Waterworks covers the period roughly from 1830 to 1850. Receipts were well over expenditures, the waterwheels were operating efficiently, and the public was enthusiastically responsive to the well-designed buildings and the picturesque setting. During this time European visitors were greatly impressed with the beauty and the power of the works, especially since it had been conceived and built in this country by locally trained engineers. Frances Trollope had high praise for Fairmount as she recorded her visit to the waterworks in 1830:

*The water-works of Philadelphia have not yet perhaps as wide extended fame as those of Marley [at Versailles], but they are not less deserving it. At a most beautiful point of the Schuylkill River the water has been forced up into a magnificent reservoir, ample and elevated enough to send it through the whole city. The vast yet simple machinery by which this is achieved is open to the public, who resort in such numbers to see it, that several evening stages run from Philadelphia to Fair Mount for their accommodation. But interesting and curious as this machinery is, Fair Mount would not be so attractive had it not something else to offer. It is, in truth, one of the very prettiest spots the eye can look upon. A broad weir [weir] is thrown across the Schuylkill, which produces the sound and look of a cascade. . . . The works themselves are enclosed in a simple but very handsome building of freestone, which has an extended front opening upon a terrace, which overhangs the river: behind the building, and divided from it only by a lawn, rises a lofty wall of solid lime-stone rock, which has, at one or two points, been cut into, for the passage of the water into the noble reservoir above. From the crevices of this rock the catalpa was every where pushing forth, covered with its beautiful blossom. . . . At another point, a portion of the water in its upward way to the reservoir, is permitted to spring forth in a perpetual jet d'eau, that returns in a silver shower upon the head of a marble naïad of snowy whiteness. The statue [Rush's Allegory of the Schuylkill River] is not the work of Phidias, but its dark, rocky back-ground, the flowery catalpas which shadow it, and the bright shower through which it shews itself, altogether make the scene one of singular beauty.<sup>10</sup>*

In his *American Notes for General Circulation*, Charles Dickens recorded his 1840 visit to Fairmount:

*Philadelphia is most bountifully provided with fresh water, which is showered and jerked about, and turned on, and poured off everywhere. The Water-works, which are*

9. *Boy and Dolphin* was replaced by a bronze casting of Rush's *Allegory of the Schuylkill River* in 1872. In 1935 the bronze was moved to the Philadelphia Museum of Art on loan from the Commissioners of Fairmount Park. The original wood version remained at its place at the side of the millrace until it became badly deteriorated and was removed about 1900.

10. Frances Trollope, *Domestic Manners of the Americans* (London, 1832), vol. 2, pp. 74–76.



on a height near the city, are no less ornamental than useful, being tastefully laid out as a public garden, and kept in the best and neatest order. The river is dammed at this point, and forced by its own power into certain high tanks or reservoirs, whence the whole city, to the top stories of the houses, is supplied at a very trifling expense.<sup>11</sup>

By the 1830s Fairmount had become the prototype of a water-supply system for growing urban areas in the United States and abroad. Graff acted as consultant for more than thirty-seven other waterworks, and Philadelphia became the “mecca of the hydraulic engineer,” according to Emile Geyelin in 1891.<sup>12</sup> In 1844 the system supplied an average of 5.3 million gallons of water per day to 28,082 water tenants, expenditures were \$29,713, and the amount paid into the treasury was \$151,501. This marked a high point for revenues,

Nicolino (Visconte di) Calyo (American, born Italy 1799–1884)  
*The Fairmount Waterworks*, 1835–36  
 Gouache on paper, 44 $\frac{1}{4}$  x 59 $\frac{1}{2}$ " (112.4 x 151.1 cm)  
 Mellon Bank Corporation, Pittsburgh. A0218

The Schuylkill Navigation Company did a thriving business and required a large quantity of water to operate the canal locks on the west bank shown in the left midground. On the east bank is the engine house; the high retaining wall was constructed to allow development of the south garden. Calyo's view shows the completion of the first phase of landscaping around the waterworks and on the Fairmount hillside.

11. Charles Dickens, *American Notes for General Circulation* (London and New York, 1842; reprint New York, 1985), p. 89.

12. Emile E. Geyelin, “Growth of the Philadelphia Water Works.” In *Proceedings of the American Water Works Association* (Philadelphia, 1891), p. 21.



George Lehman (American, c. 1800–1870)  
 Printed by Peter S. Duval (American, born  
 France, active Philadelphia 1831–79)  
*View of the Wire Bridge*, 1843  
 Lithograph with hand coloring, 12<sup>1</sup>/<sub>16</sub> x 20<sup>1</sup>/<sub>16</sub>"  
 (32.9 x 51.8 cm) (image)  
 Private collection

This suspension bridge, designed and erected by Charles Ellet in 1842, was the first of its size and kind in the country to use wire for its cables. It replaced the Upper Ferry Bridge, which was destroyed by fire in 1838.

Thomas P. Collins and David C. Collins  
 (active Philadelphia 1844–51)  
*The Fairmount Waterworks*, 1846  
 Six half-plate daguerreotypes in ornamental  
 frame, 13<sup>1</sup>/<sub>16</sub> x 41<sup>1</sup>/<sub>16</sub>" (33.2 x 106 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr.V:62

With the advent of photography, the waterworks became as popular a subject for photographers as it was for painters and printmakers. This panoramic view, a virtuoso demonstration of the Collines' technique, introduces a new element of realism into representation of the waterworks and its surroundings.

generated, in part, by water rates paid by neighboring districts where assessments were fifty percent above the rates paid by Philadelphians.

As the population of both the city and the districts increased, the demand by the districts for cheaper rates and the need for an additional supply of water resulted in the construction of other pumping stations by the districts, taking water from the Fairmount pool. These pumping stations employed the latest in steam engines for power, and the city objected to the lowering of the level of water at the dam caused by the new facilities. Although the city contended that it possessed through purchase all the rights to the Schuylkill water, the Pennsylvania Supreme Court ruled against the city in 1847, stating that water in its natural course has from earliest times been for common domestic use, as opposed to being a power source, and thus belonged to all the municipalities bordering the river.<sup>13</sup>

The Schuylkill River provided plentiful water through most of the year, but in the late summer and fall there was not enough to keep the wheels turning and the pumps running all the time while continuing to provide sufficient water at Fairmount for lockage on the canal. From the beginning, the city had

13. *Mayor of Philadelphia v Commissioners of Spring Garden*, Pennsylvania State Reports, VIII, p. 363. Cited in Nelson Manfred Blake, *Water for the Cities: A History of the Urban Water Supply Problem in the United States* (Syracuse, N.Y., 1956), pp. 97–98.

experienced major differences with the Schuylkill Navigation Company in trying to control the loss of water through leakage or improper operation of the locks at Fairmount. Joseph Lewis, who had been chairman of the Watering Committee for seven years, became the president of the Schuylkill Navigation Company in 1825 and its champion in bitter struggles with the city over control of the water. During the 1830s and 1840s Graff diligently fought incursions on the Fairmount Waterworks by many other projects such as the proposed routing of railways, plans for additional canals, and even the widening of a street that would encroach on the guard pier.

Fairmount Park was established as a way to maintain a potable water supply for the city. In the early part of the nineteenth century, the area near Fairmount had been a bucolic retreat, and the river was bordered by the country seats of the gentry, not by industrial complexes. As East Falls, Manayunk, Conshohocken, Pottsville, and other municipalities built factories and other industrial enterprises, they used the river not only for transport and power but as a convenient sewer. Testing of the water in the 1840s revealed levels of pollution that were not as high as those reported in other urban water supplies; however, when the property at Lemon Hill came on the market in 1844, the city was convinced that this was an opportunity to see that the land immediately above the works, at least, would be protected from industrial growth, and Lemon Hill was purchased for that reason.

Since the days of William Penn when public squares were laid out within the city, there had been a recognition of the value of open space in an urban area. Therefore, when Graff, Jr., took over as superintendent of Fairmount Waterworks on his father's death in 1847, it was no surprise that he would press for an increase in the protected area for the waterworks supply and recognize the value of an extension of the recreational area that had been started at the south garden years before. He recommended the extension in a public statement in 1851, finally gaining public support for action in 1855. When the Fairmount Park Commission was established in 1867, Graff, Jr., as chief engineer of the Water Department, became one of its commissioners. The commission's report in 1870, which he prepared, states that the encroachment of industries on the water supply was the reason for the establishment of the park.



John Egan (American or Irish, active Philadelphia c. 1850–51)  
*The Frederick Graff Memorial*, c. 1850  
 Oil on canvas, 33 x 26<sup>7</sup>/<sub>8</sub>" (83.8 x 68.2 cm)  
 Atwater Kent Museum, Philadelphia. 57.10.3

Upon Graff's death in 1847 the Watering Committee commissioned this bust to be placed in a monument on the edge of the south garden as a memorial to Graff for his thirty-five years of service to the Fairmount Waterworks.







Hugo Sebald (active Philadelphia 1855–1902)  
*Advertisement for Clarenbach & Herder,  
 Manufacturers of Skates, 1862*  
 Wood engraving with hand coloring, 11 7/8 x  
 18 3/4" (30.2 x 46.6 cm)  
 Private collection

The waterworks was popular in advertisements as well as in views by contemporary artists. Here, canal boatmen observe an improbable scene, showing skaters perilously close to the dam, both above and below the overfall.

## SHIFT TO HYDRAULIC TURBINES

The first hydraulic turbine was installed at Fairmount in 1851, a harbinger of major change. Again the city embraced new technology to increase the supply of water and to improve service. The physical plant was altered by creating a turbine room between the mill house and the engine house and a pump room under the engine-house terrace. Graff, Jr., installed an experimental Jonval turbine, a type of horizontal waterwheel introduced in this country by the French engineer Emile Geyelin.<sup>14</sup> A new mill house was constructed on the mound dam in 1859–62 and the old mill house was altered in 1868–72 to convert the rest of the system from eight water wheels to six state-of-the-art Jonval turbines and more powerful pumps.

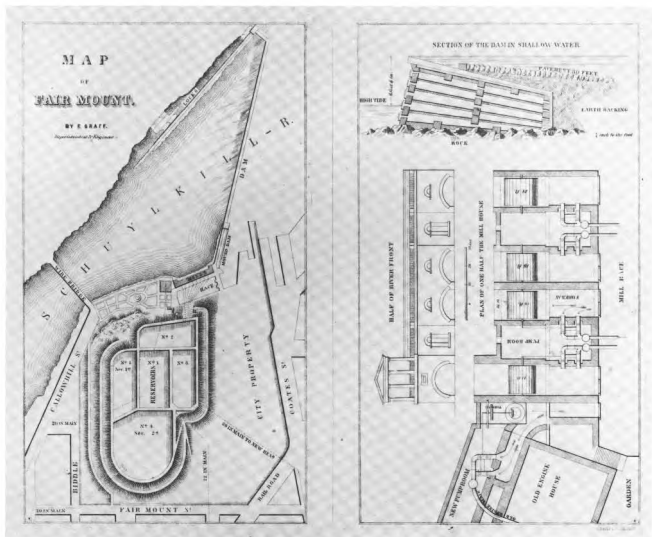
The population of the city had increased and the works expanded to meet the need. With the consolidation of the city in 1854, the steam-powered pumping facilities of the districts were taken over, but Fairmount's water power was still the means of considerable financial benefit to the city and, when there was a sufficient flow in the river, saved on operating expenses. The problem of pollution persisted, however. Although Fairmount had been able to keep up with demand by the shift to turbines and by an ever-expanding distribution system, there was no way to increase the landmass on Fairmount in order to add a filtration system to the five reservoirs that had been constructed there over the years.



Frederic Graff, Jr. (American, 1817–1890)  
Printed by Louis Napoleon Rosenthal  
(American, born Poland, active Philadelphia  
1850–75)  
Plan of Lemon Hill and Sedgley Park, October 15,  
1851  
Chromolithograph, 16<sup>1</sup>/<sub>16</sub> x 17<sup>1</sup>/<sub>16</sub>" (41.1 x 45.1  
cm)  
The Franklin Institute Science Museum,  
Philadelphia. Gr.V:21

In 1851 Graff, Jr., proposed the development of a large recreational area above the waterworks. Although the city was at first unwilling to purchase the private and commercial properties between the works and Lemon Hill, public sentiment became aroused on the issue and Fairmount Park was established in 1853. Above Sedgley Park is the waterworks of the district of Spring Garden.

14. Portions of the 1851 turbine, gearing, and pumps remain *in situ* at the Fairmount Waterworks.



Frederic Graff, Jr. (American, 1817-1890)  
 Printed by Peter S. Duval (American, born  
 France, active Philadelphia 1831-79)  
*Map of Fairmount: Site Plan of Waterworks with  
 Elevation and Plan of the Mill House and Section of  
 Dam, 1851-52*  
 Lithograph, 8<sup>7</sup>/<sub>16</sub> x 10<sup>9</sup>/<sub>16</sub>" (21.5 x 26.2 cm)  
 The Franklin Institute Science Museum,  
 Philadelphia. Gr.V:18

Published in the Annual Report of the Watering  
 Committee of 1852, which surveyed the  
 history of the waterworks, this print shows the  
 location of the new, experimental turbine that  
 preceded the total conversion to the turbines  
 that would power the pumps for the next sixty  
 years. The waterwheels are still in place.

The addition of the first Jonval turbine in 1851 created the need for another reservoir, and land for this purpose was purchased at Corinthian Avenue between Poplar and Parrish streets, about a quarter of a mile away. Because this new reservoir was at a higher elevation than the existing reservoirs on Fairmount, a standpipe four feet in diameter was built of sufficient height so that water pumped into it could flow by gravity to the Corinthian Avenue reservoir, from whence it was redirected to the Fairmount basin or distributed to the city. Graff, Jr., designed the standpipe to be protected from frost by ornamental brickwork and to resemble an Italian bell tower rising above the rocks on the cliff behind the works and giving little indication of its utilitarian function. With the addition of three more turbines and the construction of the new mill house, a decorative stone distribution arch was added to the complex in 1860 with a sixty-inch cast-iron main running through it, which served as a

link to the standpipe. The Victorian visitor enjoying the beauty of the park, with its gazebos, fountains, and inviting pathways, found the standpipe and the distribution arch simply attractive additions to an already enticing landscape.

The 1859–62 construction of the new mill house on the mound dam presented special difficulties. There was the danger that the mound dam might give way during the excavation to the depth required for the wheel pits of the three large Jonval turbines to be installed. There were some close calls when the cofferdams were in use, but the new mill house was successfully completed. Henry P. M. Birkenbine was then the chief engineer of the Water Department and his design was entirely utilitarian. The roof of the new building was made into a terrace.

The alterations to the old mill house in 1868–72 that were required to install three more large turbines, however, were supervised by Graff, Jr., who was again the chief engineer. The extension of the river wall by eight feet and the reorganization of the interior caused extensive changes to the exterior

Julius Bien (American, born Germany  
1826–1909)  
After Jacob Kiehn (active Philadelphia  
1865–69)  
*View of Fairmount Waterworks from the Landing*,  
1867  
Chromolithograph with hand coloring, 11 7/8 x  
15 1/2" (30.1 x 40.6 cm) (image)  
Collection of S. Robert Teitelman

The roof of the new mill house, built in the mound dam to hold turbines, was used as a large terrace overlooking the boat landing, which served as a terminus for paddle steamboats traveling up to East Falls and Manayunk.

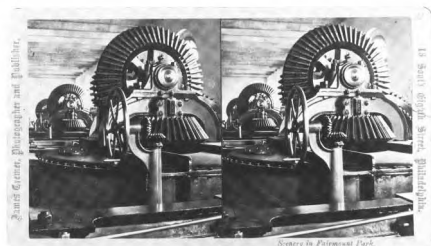


James Cremer (American, born England  
1821–1893)  
*Visitors Looking Down the Schuylkill River from  
the Gazebo on the Mound Dam* (from the series  
"Scenery in Fairmount Park"), c. 1875  
Albumen stereograph,  $3\frac{1}{16} \times 7"$  (10 x 17.7  
cm) (including mount)  
The Commissioners of Fairmount Park

Fairmount was one of the most popular  
subjects for stereoscopic photographs, which  
resolved into a single, three-dimensional image  
when seen through a special viewer. So many  
photographs were made that a complete walk  
around the waterworks and its grounds could  
be recreated without leaving the parlor.



James Cremer (American, born England  
1821–1893)  
*Massive Gears of the Turbines in the New Mill  
House* (from the series "Scenery in Fairmount  
Park"), c. 1875  
Albumen stereograph,  $3\frac{1}{16} \times 7"$  (10 x 17.7  
cm) (including mount)  
The Commissioners of Fairmount Park



structure, but Graff's design was able to maintain the original ambience of the works. The size of the machinery necessitated both deepening the wheel pits and raising the level of the deck. Utilizing a design of his father's from 1820 that had been made when the water-power facility was being developed, Graff placed a large, airy pavilion at the center of the new deck of the remodeled old mill house. This was flanked by entrance houses affording access to the interior below, and the carved wood figures by Rush were relocated above the doorways. The gallery overlooking the waterwheels was removed, and although the entrances still made it possible for the public to observe the new machinery, there was no visible flowing of water since the flumes for the turbines and the moving parts of the turbine wheels were completely enclosed by iron casings. What could be seen in action, however, was the massive gearing that enabled each turbine to power two equally massive pumps. Although one of the old breast wheels remained in place until 1883, it was in poor condition and was not in use.

Rehabilitation of the garden area at Fairmount also took place in this period. In 1866 rustic summer houses were built at Fairmount and benches installed. One summer house was near the lower fountain to the north of the works, an area that had been run down until it was made into a park in the 1860s, with an entrance at Green Street. Graff designed a small building there that housed a steam engine to supplement the turbines during the dry season when the river was low, as well as an attractive terminus for the passenger steamboats going up the river to Manayunk and beyond. The use of the Fairmount pond for sculling and for boat races had begun in 1835 and the Schuylkill Navy was organized in 1858. Permanent boathouses were built to the north of Fairmount's gardens beginning in 1860. In the wintertime the river teemed with ice skaters.

The politics of the city had been irrevocably altered with its consolidation in 1854. Not only was the works at Fairmount no longer the sole supplier of water for the city, but the political system grew more complex than the small group of merchants that had been so interested in promoting the city and its waterworks. The opportunity for political patronage did not go unnoticed in the Water Department's continual need for unskilled workers, who were often new immigrants, Philadelphia's newest voters. However, the first evidence of

Thomas Henry Smith (American, active Philadelphia 1861–96)  
*The Fairmount Waterworks*, 1871  
Oil on canvas, 30 1/4 x 46 1/2" (77.2 x 117.5 cm)  
Philadelphia Museum of Art. Purchased:  
Bloomfield Moore Bequest Fund. 66-4-1

Vegetation and industry both have grown in the years between this bucolic scene and the earlier representations by Birch and Doughty. Two new elements in the waterworks landscape are evident—the Italianate standpipe built in 1852 and the distribution arch of 1860. The Wire Bridge, which was replaced the following year by a double-deck bridge, is just visible in the distance against the roofs and smokestacks beyond.



William H. Rease (American, born c. 1818,  
active Philadelphia 1844–72)  
*Rialto House, 1868*  
Color lithograph, 6<sup>5</sup>/<sub>16</sub> x 9<sup>3</sup>/<sub>16</sub>" (16 x 25.2 cm)  
(image)  
Atwater Kent Museum, Philadelphia. 43.25.12

Recreational activities were abundant north of the waterworks near the popular Rialto House, a tavern owned by Christopher Dusch. In the left background boathouse row is beginning to take shape.



Robert Newell (active 1856–1903)  
*Rustic Summer House on Fairmount, c. 1876*  
Albumen print, 9<sup>1</sup>/<sub>8</sub> x 7<sup>1</sup>/<sub>8</sub>" (23 x 18.4 cm)  
The Library Company of Philadelphia.  
P.9060.86

Decorative improvements to the waterworks' grounds reflected the changing taste of the times. The simple geometry of the original, white-painted wooden handrails was replaced by the baroque forms of cast-iron screens and balustrades. In 1866 several pavilions in the fashionable rustic style were installed to emphasize the naturalness of the scene. This elaborate but rough structure stands in marked contrast to the pavilions designed by Graff thirty years earlier.



a major shift in management came when Graff, Jr., relinquished his office as chief engineer at Fairmount in 1856, dismayed by the new government then in power in the city. Following the brief terms of Samuel Ogdin, Henry P. M. Birkenbrine, and Isaac S. Cassin, Graff returned to serve from 1867 to 1872. The chief engineers after 1872 had interests and abilities more in the area of steam power, which had become the standard—as opposed to experimental status—source of power for Philadelphia's pumping stations. The knell for Fairmount came in 1899 when a report on the pollution in the river was released. Although there had been laws against it for many years, industry had continued using the river as a sewer. Pollution, together with deterioration of the machinery when the inevitable abandonment of the works became apparent, spelled the end of the active life of this pioneer waterworks. By 1909, when filtration plants had been erected in other parts of the city to take over the duty, plans for decommissioning Fairmount Waterworks were begun.

In 1911 the city passed an ordinance giving the Fairmount buildings along the river to the mayor for use as a public aquarium and another ordinance giving the site of Fairmount's reservoirs to the Commissioners of Fairmount Park for construction of a public art museum. Fairmount Waterworks, with its history of devotion to the public good, would still play an active role in the lives of Philadelphia's citizens.

The significance of the buildings of the Fairmount Waterworks continued in the next fifty years as the Philadelphia Aquarium occupied the waterworks facility and helped the public become better acquainted with the habitat, breeding, and activities of freshwater and saltwater fish, especially those native to Pennsylvania. In 1911 this was a new concept, which had grown out of the exhibitions of fisheries at the world's fairs in Chicago in 1893 and St. Louis in 1904.

Under the direction of William E. Meehan, the Philadelphia Aquarium opened on Thanksgiving Day 1911, with nineteen small tanks set up in the engine house, and in December the first of regular lectures on marine life was given. The machinery was removed from both mill houses in 1912 and they were eventually refitted with the latest in aquarium equipment. In 1929 Philadelphia had one of the four largest aquariums in the world. In the early years, seals and sea lions frolicked in the forebay, much to the enjoyment of the public, but the animals became ill and later the forebay was filled in to become Aquarium Drive. Although the 1851 turbine and pump, together with the standpipe, remained in place, they were used only for a short period before repairs were necessary and city water was found to be purer and more beneficial for the fish than the untreated water from the then polluted Schuylkill River.

A few months after its opening, the aquarium was turned over to Fairmount Park and its history is a record of ups and downs as pleas for adequate funding were met with acceptance or rejection. The aquarium closed its doors at the end of December 1962, a victim of neglect and political maneuverings, despite the efforts of many dedicated parties to save it.

In the nineteenth century the small temples of Fairmount Waterworks arranged at the water's edge had become a symbol of Philadelphia. Now what might be considered a twentieth-century symbol stands grouped on the top of Fairmount in the connected large temples that form the Philadelphia Museum of Art. The construction of the Museum was begun in 1919 on the site of the reservoirs on Fairmount, fulfilling a desire for a public art gallery, which had been proposed for various locations in the city since the 1876 Centennial exhibition. The monumental building of the Museum serves as one terminus of the Benjamin Franklin Parkway, with City Hall at the other end. During the construction phase, the standpipe, along with the distribution arch, was blasted into a pile of rubble, although it had been delineated on the architect's drawings for the Museum complex.

In recent years the Fairmount Waterworks has been recognized as a national treasure by the federal government and by two professional engineering societies. In 1975 the American Society of Civil Engineers declared Fairmount

William Rush (American, 1756–1833)  
*Allegory of the Schuylkill River (Water Nymph and Bittern)*, 1809; bronze cast 1872  
 Bronze, originally painted pine; height 90<sup>3</sup>/<sub>4</sub>"  
 (230.5 cm)  
 On loan to the Philadelphia Museum of Art  
 from the Commissioners of Fairmount Park







Joseph Pennell, (American, 1837–1926)  
*The Classic Fairmount, 1920*  
Etching, 7<sup>15</sup>/<sub>16</sub> x 9<sup>7</sup>/<sub>8</sub>" (20.1 x 25 cm)  
Philadelphia Museum of Art.  
Gift of Samuel L. Gerstley. 55-48-46

Pennell's elegiac evocation of the waterworks, probably created on the spot and thus reversed in the final image, shows William Rush's *Allegory of the Schuylkill River (Water Nymph and Bittern)* in the south garden shortly before the reservoirs, standpipe, and distribution arch were demolished to make way for construction of the Museum on the top of Fairmount. The inscription scratched into the plate reads: "What the city built beautifully is destroy[ed] ruthlessly."

Waterworks a National Historic Civil Engineering Landmark and on May 11, 1976, it was designated a National Historic Landmark by the U.S. Secretary of the Interior. In 1977 the American Society of Mechanical Engineers made the waterworks a National Historic Mechanical Engineering Landmark. Despite its multiple-award status, the facility continued to deteriorate and in 1984 was included in the report to Congress by the Secretary of the Interior on damaged and threatened national landmarks.

Local Philadelphia institutions became interested in saving Fairmount Waterworks even before its landmark designation. In a revival of the spirit of yesteryear when the Fairmount Waterworks was a local spot of charm and beauty, efforts have been mounted to restore the buildings and the gardens to serve the public, with the added attractions of a restaurant and an interpretive center focusing on the history of the works and the importance of water to civilization. In 1974 the Junior League of Philadelphia began a campaign to restore and preserve the waterworks, and dedication to this goal has continued to the present. The Philadelphia Water Department and the Fairmount Park Commission have joined in the effort to restore this landmark facility to its former status as a prime recreational area. As part of the preservation activity, the Historic American Engineering Record made Fairmount Waterworks a Summer Recording Project in 1978, and the resulting drawings together with historical reports on the technology and architecture of the works are deposited in the Library of Congress.<sup>15</sup> Through public and private funding, the small buildings for the Watering Committee and the caretaker have been restored, the old mill house has been stabilized, its interior cleared, its roof redecked, and the large central pavilion is undergoing restoration. Additional work will be done as funds are available.

William Rush's *Allegory of the Waterworks* depicts a gracious woman reclining, with one hand guiding a waterwheel, and the water of the river cascading from a cast-iron main behind her. It is this spirit that is now being summoned to provide Philadelphia with another necessity—appreciation of the city's past when Fairmount was recognized as the very best in hydraulic engineering and when the park and gardens were known throughout the world. The collection of images celebrating this fact makes history more vivid, and the viewer is transported to a time when wheels were turning at the Schuylkill's edge and water was glistening in the reservoirs atop Fairmount.

15. Jane Mork Gibson, Historical Report, and Susan Stein, Architectural Report, Historic American Engineering Record Collection, Fairmount Water Works HAER PA-51, Library of Congress, Prints and Photographs Department, Room 338, Madison Building, Washington, D.C.

Unless stated otherwise, dimensions given for etchings, engravings, and aquatints refer to the size of the plate/matrix; those for lithographs to the size of the entire composition, including inscriptions, and those for wood engravings to the size of the block.

American Photo View Company  
View of the Waterworks from the Terrace on the New Mill House, late 19th century  
Albumen print  
6 1/4 x 8 1/2" (17.2 x 21.3 cm)  
Atwater Kent Museum, Philadelphia

Jean Baptiste Amour  
French, 1788–after 1865  
After Jacques Gérard Milbert  
French, 1767–1840  
Printed by Henri Gauguain  
French, active first half of the 19th century  
Waterworks on the Schuylkill River (from *Picturesque Itinerary of the Hudson River and the Peripheral Parts of North America*), Paris, 1828–29  
Lithograph with hand coloring  
8 1/8 x 11 9/16" (21.2 x 29.4 cm)  
Private collection

John Bachman  
American, active 1850–77  
*Bird's-Eye View of Philadelphia*, 1857  
Watercolor on paper  
26 x 37" (66 x 94 cm) (sight)  
Free Library of Philadelphia, Rare Book Department

Bartlett and French  
Active Philadelphia 1867–69  
*The Frederick Graff Memorial at Fairmount*, c. 1867  
Albumen stereograph  
3 1/4 x 6 1/4" (8.2 x 17.1 cm)  
The Library Company of Philadelphia.  
(3)1322.F.106b

Julius Bien  
American, born Germany 1826–1909  
After Jacob Kiehn  
Active Philadelphia 1865–69  
View of Fairmount Waterworks from the Landing, 1867  
Chromolithograph with hand coloring  
11 7/8 x 15 1/16" (30.1 x 40.6 cm) (image)  
Collection of S. Robert Teitelman

Thomas Birch  
American, born England 1779–1851  
View of the Upper Ferry Bridge from the East Bank of the Schuylkill River, 1813  
Oil on canvas  
28 x 41" (71 x 104 cm)  
Inscribed, lower right: T. Birch 1813  
The Historical Society of Pennsylvania, Philadelphia

Thomas Birch  
The Fairmount Waterworks, 1821; gazebo added later  
Oil on canvas  
20 1/8 x 30 1/8" (51.1 x 76.4 cm)  
Inscribed, lower left: T. Birch 1821  
The Pennsylvania Academy of the Fine Arts, Philadelphia. Bequest of the Charles Graff Estate. 1845.1

*Bird's-Eye View of the Watering Committee Building and the New Mill House*, late 19th century  
Albumen print  
7 1/8 x 9 1/16" (18.1 x 23.7 cm) (sight)  
The Commissioners of Fairmount Park

Breuker and Kessler  
Founded c. 1868 by George W. Breuker, active Philadelphia 1866–96, and Harry C. Kessler, active Philadelphia 1867–76  
The Lincoln Monument in Fairmount Park (annual greeting of the carriers of *The Press* to their patrons), 1872  
Lithograph with hand coloring  
10 7/8 x 15 9/16" (27.6 x 39.6 cm)  
Private collection

Hugh Bridport  
American, born England 1794–c.1869  
The Pagoda and Labyrinth Garden, near Fairmount Waterworks, 1828  
Lithograph  
13 1/2 x 17 3/8" (34.3 x 44.2 cm)  
The American Philosophical Society, Philadelphia

Nicolino (Visconte di) Calyo  
American, born Italy 1799–1884  
The Fireman of Philadelphia, c. 1830  
Watercolor on wove paper  
14 1/16 x 10 1/8" (35.7 x 26.2 cm)  
Private collection

Nicolino (Visconte di) Calyo  
The Fairmount Waterworks, 1835–36  
Gouache on paper  
44 1/4 x 59 1/8" (112.4 x 151.1 cm)  
Mellon Bank Corporation, Pittsburgh. A0218

Nicolino (Visconte di) Calyo  
View of the Waterworks, 1835–36  
Watercolor and gouache on paper  
26 1/8 x 36 1/8" (66.3 x 92 cm)  
Private collection

Cephas Grier Childs  
American, 1793–1871  
After Thomas Doughty  
American, 1793–1856  
View of Fairmount Waterworks (with dedication to Joseph S. Lewis), c. 1826  
Etching and engraving  
17 1/16 x 21 1/8" (44.2 x 55 cm)  
Private collection

Thomas P. Collins and David C. Collins  
Active Philadelphia 1844–51  
The Fairmount Waterworks, 1846  
Six half-plate daguerreotypes in ornamental frame  
13 1/16 x 4 1/4" (33.2 x 106 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V.62

Joseph Cone  
American, active 1814–30  
After Thomas Doughty  
American, 1793–1856  
Published by Cephas Grier Childs  
American, 1793–1871  
The Fairmount Waterworks, from the West Bank of the Schuylkill River (from Childs's *Views in Philadelphia*, 1830), 1828  
Engraving  
6 1/8 x 8 7/8" (16.2 x 22.5 cm)  
Collection of Mr. and Mrs. James Nelson Kise

James Cremer  
American, born England 1821–1893  
Views of the Waterworks and Fairmount Park (from the series "Scenery in Fairmount Park"), 1870–76  
37 albumen stereographs  
3 1/16 x 7" (10 x 17.7 cm) (each); 3 7/16 x 6 1/8" (8.7 x 17.6 cm) (one)  
The Commissioners of Fairmount Park

James Cremer  
The Fairmount Waterworks (in *Views of Fairmount Park*), 1876  
Albumen print in a bound album of 19  
5 1/4 x 7 1/8" (14.6 x 19.5 cm)  
The Library Company of Philadelphia.  
P.8465.1–19

Thomas Doughty  
American, 1793–1856  
The Fairmount Waterworks, c. 1826  
Oil on canvas  
21 1/4 x 29" (51.4 x 73.7 cm)  
Inscribed, lower right: Thomas Doughty Hirschl & Adler Galleries, Inc., New York

Thomas Doughty  
View of the Waterworks from the Top of Fairmount, 1826  
Oil on canvas  
16 1/4 x 24 1/8" (41.2 x 61.4 cm)  
Inscribed, lower right: Doughty. /1826  
Private collection

Thomas Doughty  
View of the Waterworks from the West Bank of the Schuylkill River, 1826  
Oil on canvas  
16 1/8 x 24 1/8" (42.2 x 61.6 cm)  
Inscribed, lower right: Doughty. 1826  
Private collection

Auguste (Augustin-Amant-Constant-Fidèle)  
Edouard

French, 1789–1861

Active America 1839–49

*Silhouette of Frederick Graff*, 1843

Painted and unpainted paper with graphite and lithographed details, glued to color lithograph background, with ink wash

11<sup>1</sup>/<sub>16</sub> x 8" (29.3 x 20.3 cm)

The Historical Society of Pennsylvania,  
Philadelphia

John Egan

American or Irish, active Philadelphia  
c. 1850–51

*The Frederick Graff Memorial*, c. 1850

Oil on canvas

33 x 26<sup>7</sup>/<sub>16</sub>" (83.8 x 68.2 cm)

Atwater Kent Museum, Philadelphia. 57.10.3

Benjamin Ridgeway Evans

American, 1834–1891

*Landing and Coates Streets*, 1884 (after earlier  
view of 1868)

Ink and watercolor over graphite on wove  
paper

15<sup>3</sup>/<sub>16</sub> x 37<sup>9</sup>/<sub>16</sub>" (39 x 95.4 cm)

The Historical Society of Pennsylvania,  
Philadelphia

*Fairmount Park, Philadelphia* (from "American  
Views, Peoples' Series"), c. 1876

Albumen stereograph

3<sup>1</sup>/<sub>2</sub> x 7" (8.8 x 17.6 cm)

The Library Company of Philadelphia.

8353.F.25

John Filmer

After Harry Fenn

American, born England 1845–1911

Published by D. Appleton & Co., New York  
*Fairmount, Philadelphia* (art supplement to

*Appleton's Journal*), 1869

Wood engraving

8<sup>1</sup>/<sub>2</sub> x 28" (21.6 x 71.1 cm)

Free Library of Philadelphia, Print and Picture  
Department

J. Giles

English

After William Henry Bartlett

English, 1809–1854

*View of Fairmount Gardens and the Upper Ferry  
Bridge*, 1839

Etching and engraving with hand coloring

4<sup>1</sup>/<sub>16</sub> x 7<sup>1</sup>/<sub>16</sub>" (12.2 x 18.2 cm) (image)

Collection of Mr. and Mrs. James Nelson Kise

Frederic Graff, Jr.

American, 1817–1890

*Elevation, Plan, and Detail of Pump and Air  
Chamber in the Mill House*, February 4, 1843

Watercolor and ink over graphite on wove  
paper

24<sup>9</sup>/<sub>16</sub> x 25<sup>1</sup>/<sub>16</sub>" (62.4 x 65.4 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.V:48

Frederic Graff, Jr.

*Section of the Mill House*, February 27, 1847

Black and colored inks and gray wash over

graphite on wove paper

14<sup>1</sup>/<sub>16</sub> x 17<sup>1</sup>/<sub>16</sub>" (35.8 x 44.7 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff, Jr.

*Proposed Improvement of the Grounds near the  
Wire Bridge*, April 23, 1847

Watercolor, ink, and graphite on wove paper

14<sup>1</sup>/<sub>16</sub> x 17<sup>1</sup>/<sub>16</sub>" (35.9 x 45.5 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff, Jr.

*Designs for Cast-Iron Railing for the Fairmount  
Waterworks*, April 30, 1847

Watercolor, ink, and graphite on wove paper

14 x 17<sup>1</sup>/<sub>16</sub>" (35.5 x 45.2 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff, Jr.

*Elevation, Plan, and Section of the Engine House,  
Showing 1815 Oliver Evans High Pressure  
Columbian Steam Engine*, September 9, 1848

Ink on wove paper

14<sup>1</sup>/<sub>16</sub> x 18" (36.4 x 45.7 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff, Jr.

Printed by Louis Napoleon Rosenthal  
American, born Poland, active Philadelphia  
1850–75

*Plan of Lemon Hill and Seigley Park*, October

15, 1851

Chromolithograph

16<sup>3</sup>/<sub>16</sub> x 17<sup>1</sup>/<sub>16</sub>" (41.1 x 45.1 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.V:21

Frederic Graff, Jr.

*Design for the Standpipe*, 1851–52

Watercolor and ink over graphite on wove  
paper

20<sup>1</sup>/<sub>16</sub> x 11<sup>1</sup>/<sub>16</sub>" (51.2 x 29.2 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff, Jr.

*Design for the Standpipe*, 1851–52

Ink and wash over graphite on wove paper

20 x 11<sup>1</sup>/<sub>16</sub>" (50.8 x 30 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff, Jr.

Printed by Peter S. Duval

American, born France, active Philadelphia  
1831–79

*Map of Fairmount: Site Plan of Waterworks with  
Elevation and Plan of the Mill House and Section of  
Dam*, 1851–52

Lithograph

8<sup>7</sup>/<sub>16</sub> x 10<sup>1</sup>/<sub>16</sub>" (21.5 x 26.2 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.V:18

Frederic Graff, Jr.

*Design for a Steamboat Pavilion*, 1865–76

Watercolor, ink, and graphite on wove paper

12<sup>3</sup>/<sub>16</sub> x 14<sup>1</sup>/<sub>16</sub>" (31.3 x 37.8 cm)

Philadelphia Museum of Art. Bequest of Mrs.  
Frederic Graff

Frederic Graff

American, 1774–1847

*Longitudinal Section of the Engine House with  
Detail of Lever Beam*, c. 1813

Watercolor, ink, and graphite on wove paper

18<sup>7</sup>/<sub>16</sub> x 26<sup>1</sup>/<sub>16</sub>" (47.9 x 66.2 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.IV:13

Frederic Graff

*Proposed Partial Longitudinal Section of the Engine  
House*, c. 1813

Watercolor, ink, and graphite on wove paper

18 x 13<sup>1</sup>/<sub>16</sub>" (45.8 x 34.5 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.IV:17

Frederic Graff

*Transverse Section of the Engine House Showing  
the South Engine with Pump and Air Chamber*,  
c. 1813

Watercolor, ink, and graphite on laid paper

14<sup>1</sup>/<sub>16</sub> x 22<sup>1</sup>/<sub>16</sub>" (35.9 x 57.5 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.IV:20

Frederic Graff

*Western Elevation of the Engine House*, 1813;  
portico added 1835

Watercolor, ink, and graphite on laid paper

14<sup>1</sup>/<sub>16</sub> x 22<sup>1</sup>/<sub>16</sub>" (36.2 x 57.6 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.IV:10

Frederic Graff

*Partial West Elevation of the Mill House*, 1819

Watercolor and ink on wove paper

12<sup>5</sup>/<sub>16</sub> x 16<sup>9</sup>/<sub>16</sub>" (32 x 42.1 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.V:29

Frederic Graff

*Plan of the Original Three Wooden Wheels and  
Pumps in the Mill House*, 1819

Watercolor, ink, and graphite on wove paper

12<sup>5</sup>/<sub>16</sub> x 16<sup>9</sup>/<sub>16</sub>" (32.2 x 42.1 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.V:22

Frederic Graff

*Plan of Water Mains and the Distribution System*,  
1819

Watercolor, ink, and graphite on wove paper

17<sup>1</sup>/<sub>16</sub> x 10<sup>1</sup>/<sub>16</sub>" (44.1 x 27.2 cm)

The Franklin Institute Science Museum,  
Philadelphia. Gr.VI:1

**Frederick Graff**

*East and West Elevations of the Proposed Mill House for Six Wheels*, c. 1820  
Watercolor and ink on wove paper  
12<sup>1</sup>/<sub>16</sub> x 14<sup>1</sup>/<sub>16</sub>" (31 x 37.6 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:26

**Frederick Graff**

*Elevation of the Head Arches and South Elevation of the Caretaker's House*, c. 1820  
Watercolor and ink over graphite on wove paper  
16<sup>9</sup>/<sub>16</sub> x 12<sup>9</sup>/<sub>16</sub>" (42 x 32.1 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:31

**Frederick Graff**

*Partial East Elevation of the Mill House*, c. 1820  
Watercolor, ink, and graphite on wove paper  
12<sup>5</sup>/<sub>8</sub> x 16<sup>5</sup>/<sub>8</sub>" (32 x 42.2 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:27

**Frederick Graff**

*Plan and Sections of the Canal and Lock, with Section of the River Below Dam*, 1820  
Watercolor and ink over graphite on wove paper  
12<sup>5</sup>/<sub>8</sub> x 16<sup>5</sup>/<sub>8</sub>" (32.1 x 42.2 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. VIII:1

**Frederick Graff**

*Plan and Western Elevation of the Mill House with Proposed Center Pavilion and Cupolas*, 1820  
Watercolor and ink over graphite on wove paper  
22<sup>7</sup>/<sub>8</sub> x 37" (58.1 x 93.9 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:23

**Frederick Graff**

*Plan of Iron Pipes and Hydrants in the East Section of the City*, c. 1820, with later notations  
Watercolor, ink, and graphite on wove paper  
22<sup>3</sup>/<sub>16</sub> x 30<sup>1</sup>/<sub>16</sub>" (56.4 x 76.7 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. VII:2

**Frederick Graff**

*Proposed Entrance to the Mill House with Proposed Sculpture*, c. 1820  
Watercolor and ink on wove paper  
11<sup>1</sup>/<sub>8</sub> x 15" (28.2 x 38.1 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:32

**Frederick Graff**

*Sections of the Mill House Showing Waterwheels and Pump Chamber*, c. 1820, with later notations  
Watercolor and ink over graphite on wove paper  
16<sup>5</sup>/<sub>8</sub> x 12<sup>5</sup>/<sub>8</sub>" (42.2 x 32.1 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:36

**Frederick Graff**

*Site Plan with Elevation of an Industrial Mill*, 1822  
Watercolor, ink, and graphite on wove paper  
17<sup>1</sup>/<sub>16</sub> x 22<sup>7</sup>/<sub>16</sub>" (45.5 x 58.1 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:2

**Frederick Graff**

*Site Plan of Fairmount Showing Proposed Railroad Bridge*, 1827–29, with later notations  
Watercolor and ink on wove paper  
21<sup>1</sup>/<sub>16</sub> x 30<sup>1</sup>/<sub>4</sub>" (55.5 x 76.7 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:20.1

**Frederick Graff**

Or Frederic Graff, Jr.  
*Boy and Dolphin Fountain*, c. 1829 or c. 1872  
Watercolor and ink over graphite on wove paper  
17<sup>3</sup>/<sub>8</sub> x 13<sup>3</sup>/<sub>8</sub>" (44.8 x 33.8 cm)  
Philadelphia Museum of Art. Bequest of Mrs. Frederic Graff

**Frederick Graff**

*Design for Waterwheel Number 5 with Detail of Cant and Wheel Arm*, January 11, 1831  
Watercolor and ink over graphite on wove paper  
20<sup>3</sup>/<sub>8</sub> x 29<sup>5</sup>/<sub>16</sub>" (51.8 x 74.4 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:38

**Frederick Graff**

Engraving by Benjamin Tanner  
American, 1775–1848  
*Plan of the Schuylkill River, Showing Proposed Canal from Fairmount Pond to the Delaware River* (modifications to *Chart of the River Schuylkill from Fairmount to Its Mouth*, 1828), January 7, 1835  
Engraving with additions in ink and watercolor  
10<sup>1</sup>/<sub>16</sub> x 26<sup>9</sup>/<sub>16</sub>" (27.1 x 67 cm) (sheet)  
Philadelphia Museum of Art. Bequest of Mrs. Frederic Graff. 56–25-7

**Frederick Graff**

*Plans and Elevations for the Gazebo on the Mound Dam*, February 3, 1835  
Watercolor, ink, and graphite on wove paper  
16<sup>3</sup>/<sub>16</sub> x 19<sup>1</sup>/<sub>8</sub>" (42.7 x 48.6 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:34

**Frederick Graff**

*Plan of the Gates for the Head Arches*, November 1, 1839  
Watercolor and ink over graphite on wove paper  
14<sup>1</sup>/<sub>4</sub> x 24<sup>1</sup>/<sub>16</sub>" (37.5 x 62.8 cm)  
Philadelphia Museum of Art. Bequest of Mrs. Frederic Graff

**Frederick Graff**

*Site Plan of Reservoirs and Gardens*, November 1839  
Watercolor, ink, and graphite on wove paper  
15<sup>1</sup>/<sub>16</sub> x 23<sup>9</sup>/<sub>16</sub>" (38.2 x 59.9 cm)  
The Franklin Institute Science Museum, Philadelphia. Gr. V:17

## Attributed to Frederick Gutekunst

American, 1831–1917  
or James Cremer  
American, born England 1821–1893  
*Panoramic View of the Fairmount Waterworks from the West Bank of the Schuylkill River*, c. 1885  
Albumen print  
9<sup>3</sup>/<sub>8</sub> x 31" (24.5 x 78.5 cm)  
Atwater Kent Museum, Philadelphia. 77.671

## George G. Heiss

American, c. 1823–after 1860  
Printed by Wagner & McGuigan  
Active Philadelphia 1846–58  
*Fairmount Fire Company*, 1855  
Lithograph  
13 x 18<sup>1</sup>/<sub>2</sub>" (33 x 47.6 cm)  
CIGNA Museum and Art Collection, Philadelphia. V235

## John Hill

American, born England 1770–1850  
After John William Hill  
American, born England 1812–1879  
Published by James E. Betts, New York  
*Philadelphia from Fairmount, Looking down the River Schuylkill*, 1836  
Etching and aquatint with hand coloring  
16<sup>1</sup>/<sub>16</sub> x 23<sup>3</sup>/<sub>16</sub>" (40.8 x 59.4 cm) (image)  
Private collection

## William Nicholson Jennings

American, born England 1860–1946  
*View of Fairmount from the Observatory, Lemon Hill*, c. 1900  
Gelatin silver print  
6<sup>1</sup>/<sub>8</sub> x 8<sup>1</sup>/<sub>8</sub>" (15.6 x 21.2 cm)  
The Commissioners of Fairmount Park

## David Johnston Kennedy

American, born Scotland 1816 or 1817–1898  
*Waterwheels at Fairmount*, 1836  
Watercolor on paper  
6<sup>1</sup>/<sub>4</sub> x 10" (17.2 x 25.3 cm) (image)  
The Historical Society of Pennsylvania, Philadelphia

## David Johnston Kennedy

*Southwest End of Fairmount Park Adjoining the Wire Suspension Bridge*, December 17, 1870  
Watercolor over graphite on paper  
7<sup>1</sup>/<sub>8</sub> x 14<sup>5</sup>/<sub>8</sub>" (18.8 x 37.2 cm) (image)  
The Historical Society of Pennsylvania, Philadelphia

## Augustus Kolbner

American, born Germany 1813–1906  
*Opposite Fairmount (from American Scenery)*, 1846  
Etching with hand coloring  
3<sup>1</sup>/<sub>8</sub> x 5<sup>1</sup>/<sub>16</sub>" (8.7 x 13.2 cm) (image)  
The Historical Society of Pennsylvania, Philadelphia

- Attributed to George Lehman  
American, c. 1800–1870  
*The Fairmount Waterworks*, c. 1829  
Oil on canvas  
12 1/2 x 17 1/4" (31.7 x 45.1 cm)  
The American Philosophical Society,  
Philadelphia
- George Lehman  
Published by Cephas Grier Childs  
American, 1793–1871, and R. H. Hobson  
Active Philadelphia 1828–c. 1834  
*Fairmount Waterworks from the Basin*, 1829  
Aquatint  
7 7/8 x 9 1/16" (20.1 x 25 cm)  
Atwater Kent Museum, Philadelphia
- George Lehman  
Published by Cephas Grier Childs and R. H.  
Hobson  
*Upper Ferry Bridge, West View*, 1829  
Aquatint  
7 5/16 x 9 9/16" (20.2 x 24.9 cm)  
Atwater Kent Museum, Philadelphia. 77.638.8
- George Lehman  
*Fairmount from the West Bank of the Schuylkill  
River*, 1842  
Watercolor and gouache on wove paper  
18 1/16 x 26 3/16" (45.8 x 68.4 cm)  
CIGNA Museum and Art Collection,  
Philadelphia. Z5
- George Lehman  
Printed by Peter S. Duval  
American, born France, active Philadelphia  
1831–79  
*View of the Wire Bridge*, 1843  
Lithograph with hand coloring  
15 9/16 x 21 5/16" (39.5 x 53.5 cm)  
Private collection
- Thomas W. Mason  
American, c. 1820–1899  
Fairmount Fire Company Engine Model,  
1842–70  
Painted and natural wood, and brass  
Length 24" (61 cm)  
CIGNA Museum and Art Collection,  
Philadelphia. 1-16
- James Earle McClees  
American, 1821–1887  
*William Rush's "Water Nymph and Bittern" on the  
Side of Fairmount, Viewed from across the Forebay*,  
1858  
Albumen print  
9 1/4 x 12 1/4" (24.2 x 32 cm)  
The Library Company of Philadelphia.  
(6)1322.F.152
- Model of the Fairmount Waterworks, c. 1875  
Painted and unpainted woods, painted and  
unpainted metals, mirrored glass, sand, papier-  
mâché, cork, and cardboard  
Length 42 3/8" (107.7 cm)  
Collection of Priscilla Grace
- John Moran  
American, born England 1831–1903  
*The Fairmount Waterworks*, c. 1862  
Albumen stereograph  
3 1/4 x 6 1/16" (8.2 x 17.2 cm)  
The Library Company of Philadelphia.  
P.8992.13
- John Moran  
*Fairmount Waterworks from the Philadelphia  
Skating Club and Humane Society* [Philadelphia  
Girls Rowing Club], c. 1865  
Albumen print  
4 1/4 x 5 7/8" (10.6 x 15.1 cm)  
The Library Company of Philadelphia.  
(3)1322.F.118d
- John Moran  
*Fairmount Waterworks from the West Bank of the  
Schuylkill River*, c. 1864  
Albumen print  
5 7/8 x 6 9/8" (15 x 16.8 cm)  
The Library Company of Philadelphia.  
(3)1322.F.118b
- Robert Newell  
Active 1856–1903  
*Construction of the New Mill House in the Mound  
Dam, Showing the Cofferdam on the North Side*,  
1859  
Albumen print  
5 1/2 x 7 5/8" (14 x 19.3 cm)  
The Library Company of Philadelphia.  
P.9057.237
- Robert Newell  
*Fairmount*, c. 1875  
Albumen stereograph  
3 1/4 x 6 1/16" (8.2 x 17.2 cm)  
The Library Company of Philadelphia.  
P.9171.1
- Robert Newell  
*View up the Schuylkill River from Fairmount  
Showing the Race Bridge and the Terrace on the  
New Mill House in the Foreground, with the  
Philadelphia Skating Club and Human Society in  
the Distance*, c. 1872  
Albumen print  
5 9/16 x 7 1/8" (14.1 x 19.8 cm)  
The Library Company of Philadelphia.  
P.9060.6a
- Robert Newell  
*Rustic Summer House on Fairmount*, c. 1876  
Albumen print  
9 1/4 x 7 1/4" (23 x 18.4 cm)  
The Library Company of Philadelphia.  
P.9060.86
- Robert Newell  
*The Standpipe and Distribution Arch* (from an  
album of photographs), c. 1876  
Albumen print  
7 1/2 x 9 1/4" (18.9 x 23.5 cm)  
The Library Company of Philadelphia.  
P.9062.87a
- Robert Newell  
*The Waterworks and Fairmount* (from an album  
of photographs), c. 1876  
Albumen print  
7 1/4 x 9 9/16" (18.2 x 23.3 cm)  
The Library Company of Philadelphia.  
P.9062.87b
- Robert Newell  
*Lafayette, a Schuylkill River Steamboat*, c. 1890  
Gelatin silver print  
8 1/4 x 10 1/16" (21 x 27.7 cm)  
The Library Company of Philadelphia.  
P.9061.42
- Andrew Palles  
American, active Philadelphia 1856–60  
Printed by Louis Napoleon Rosenthal  
American, born Poland, active Philadelphia  
1850–75  
*Plan of Fairmount Park as Adopted by City  
Council, with the Proposed Addition of the  
West Bank of the River Schuylkill*, 1859  
Chromolithograph  
28 7/8 x 20 7/16" (73.4 x 51.9 cm)  
The Historical Society of Pennsylvania,  
Philadelphia
- Parade Hat for Fairmount Fire Company,  
c. 1847  
Painted leather  
Length 14 1/8" (35.9 cm)  
CIGNA Museum and Art Collection,  
Philadelphia. O-15
- Jeremiah Paul  
American, first recorded 1790, died 1820  
*A View near the Upper Ferry on Schuylkill* (in a  
sketchbook from the summer of 1794), July 10,  
1794  
Ink, ink wash, and watercolor on laid paper  
6 7/16 x 7 5/8" (16.3 x 19.3 cm) (sheet)  
The Historical Society of Pennsylvania,  
Philadelphia
- Pavilion, Fairmount* (number 9 from the series  
"Fairmount Park, Philadelphia"), c. 1875  
Albumen stereograph  
3 7/16 x 6 1/16" (8.7 x 17.6 cm)  
Philadelphia Maritime Museum. 78.41.9
- Pavilion, Fairmount* (number 12 from the series  
"Fairmount Park, Philadelphia"), c. 1875  
Albumen stereograph  
3 7/16 x 6 1/16" (8.7 x 17.6 cm)  
Philadelphia Maritime Museum. 78.41.10
- John Adems Paxton  
American, active Philadelphia 1810–19  
*New Map of the City of Philadelphia for the Use of  
Firemen* (with a vignette view of the  
waterworks by Kneass, Young & Co.,  
Philadelphia [active 1818–20], after William  
Strickland [American, 1788–1854]), c. 1819  
Engraving with hand coloring  
17 1/4 x 23 3/8" (43.8 x 60.7 cm) (composition)  
CIGNA Museum and Art Collection,  
Philadelphia. 86.01.04

- James Peale  
American, 1749–1831  
*Portrait of Frederick Graff*, 1804  
Oil on canvas  
27 1/4 x 23 1/2 (69.8 x 59.7 cm)  
Inscribed, lower left: I. Peale/1804  
The Historical Society of Pennsylvania,  
Philadelphia
- Joseph Pennell  
American, 1857–1926  
*Old Fairmount Waterworks and the Basin*, 1912  
Lithograph  
16 7/8 x 22 1/8" (42.9 x 56.4 cm)  
Philadelphia Museum of Art. Gift of John F.  
Braun. 29-61-3
- Joseph Pennell  
*The Classic Fairmount*, 1920  
Etching  
7 1/16 x 9 1/4" (20.1 x 25 cm)  
Philadelphia Museum of Art. Gift of Samuel L.  
Gerstley. 55-48-46
- Joseph Pennell  
*The Seal Pool, Fairmount Park*, 1920  
Etching  
8 x 9 7/8" (20.2 x 25.1)  
Philadelphia Museum of Art. Gift of Samuel L.  
Gerstley. 55-48-45
- Joseph Pennell  
*The Waterworks, Philadelphia*, 1920  
Etching  
7 7/8 x 9 1/4" (20 x 24.8 cm)  
Philadelphia Museum of Art. Gift of Samuel L.  
Gerstley. 55-48-59
- William H. Rease  
American, born c. 1818, active Philadelphia  
1844–72  
*Rialto House*, 1868  
Color lithograph  
6 9/16 x 9 1/16" (16 x 25.2 cm) (image)  
Atwater Kent Museum, Philadelphia. 43.25.12
- William Rush  
American, 1756–1833  
*Allegory of the Schuylkill River (Water Nymph  
and Bittern)*, 1809; bronze cast 1872  
Bronze, originally painted pine  
Height 90 9/16" (230.5 cm)  
On loan to the Philadelphia Museum of Art  
from the Commissioners of Fairmount Park.
- William Rush  
*Allegory of the Schuylkill River in Its Improved  
State (The Schuylkill Chained)*, 1825  
Spanish cedar, painted white  
Length 87 1/4" (221.6 cm)  
On loan to the Philadelphia Museum of Art  
from the Commissioners of Fairmount Park
- William Rush  
*Allegory of the Waterworks (The Schuylkill Freed)*,  
1825  
Spanish cedar, painted white  
Length 87 1/16" (221.1 cm)  
On loan to the Philadelphia Museum of Art  
from the Commissioners of Fairmount Park
- Hugo Sebald  
Active Philadelphia 1855–1902  
*Advertisement for Clarenbach & Herder,  
Manufacturers of Skates*, 1862  
Wood engraving with hand coloring  
11 7/8 x 18 1/8" (30.2 x 46.6 cm)  
Private collection
- Montgomery P. Simons  
American, 1816–1877  
*View of the Waterworks and the Steamboat Landing*  
(from the series "Beauties of Fairmount"),  
1866–72  
Albumen stereograph  
3 1/2 x 6 1/8" (8.4 x 17.5 cm)  
Collection of David Warner Wolfe
- Montgomery P. Simons  
*Fairmount Park*, c. 1872  
Albumen stereograph  
3 1/8 x 6 1/8" (8.6 x 17.6 cm)  
The Library Company of Philadelphia.  
P.9058.163
- Montgomery P. Simons  
*Fairmount and Vicinity*, c. 1872  
Albumen stereograph  
3 1/8 x 6 1/8" (8.6 x 17.6 cm)  
The Library Company of Philadelphia.  
P.9058.159
- Thomas Henry Smith  
American, active Philadelphia 1861–96  
*The Fairmount Waterworks*, 1871  
Oil on canvas  
30 1/8 x 46 1/4" (77.2 x 117.5 cm)  
Inscribed, lower left: T. Henry Smith/1871  
Philadelphia Museum of Art. Purchased:  
Bloomfield Moore Bequest Fund. 66-4-1
- Joseph Stubbs, Dale Hall Works, Burslem,  
Staffordshire  
English, active 1820–34  
Platter, c. 1830  
Glazed earthenware, transfer-printed in  
underglaze blue  
16 1/4 x 20 1/2" (42.5 x 52.1 cm)  
Philadelphia Museum of Art. Bequest of R.  
Wistar Harvey. 40-16-434
- Joseph Stubbs, Dale Hall Works, Burslem,  
Staffordshire  
Tureen and Cover, Underplate, and Ladle,  
c. 1830  
Glazed earthenware, transfer-printed in  
underglaze blue  
tureen, with cover: height 12 3/8" (31.4 cm);  
underplate: length 14 7/16" (36.7 cm); ladle:  
length 10 1/2" (26.7 cm)  
Private collection
- Robert Tiller  
Active Philadelphia 1818–24  
After Thomas Birch  
American, born England 1779–1851  
*Ground Plan and Elevation of the Fairmount Dam  
and Waterworks (in Report of the Watering  
Committee, to the Select & Common Councils of  
the City of Philadelphia, Relative to the Fair  
Mount Water Works. Read January 9, 1823)*, 1822  
Engraving  
13 1/16 x 18 1/16" (35.4 x 46.9 cm)  
Collection of J. Welles Henderson
- Attributed to James Trenchard  
American, 1747–after 1793  
Probably after Charles Willson Peale  
American, 1741–1827  
*A View on Schuylkill, near Philadelphia (from  
Columbian Magazine)*, November 1789  
Engraving  
3 1/8 x 6 1/16" (9.2 x 17.6 cm)  
Collection of S. Robert Teitelman
- William E. Tucker  
American, 1801–1857  
After Thomas Doughty  
American, 1793–1846  
Published by Cephas Grier Childs  
American, 1793–1871  
*View of the Fairmount Waterworks from the  
Reservoir (from Childs's Views in Philadelphia,*  
1830), 1839  
Engraving  
5 1/2 x 8 1/4" (13.7 x 22.5 cm)  
Atwater Kent Museum, Philadelphia. 81.5.52
- William E. Tucker  
*View of Fairmount Waterworks from the West  
Bank of the Schuylkill River*, c. 1850  
Steel engraving  
5 x 8 1/8" (12.7 x 20.8 cm)  
Philadelphia Museum of Art. Gift of Mrs.  
Benjamin Rush. 54-37-1
- Tucker and Hemphill Factory  
Philadelphia, 1832–38  
Tea Light, c. 1833–35  
Glazed porcelain, painted and gilded  
Height 11 1/4" (28.5 cm)  
Philadelphia Museum of Art. Bequest of  
Bertha L. Landis. 44-21-12-d
- Tucker and Hemphill Factory  
Pair of Vases, 1832–38  
Glazed porcelain, painted and gilded, with  
lacquered brass handles  
Height 21 1/16" (53.8 cm); 21 1/16" (53.5 cm)  
Philadelphia Museum of Art. Purchased: The  
Baugh-Barber Fund, the Thomas Skelton  
Harrison Fund, the Elizabeth Wandell Smith  
Fund, funds given in memory of Sophie E.  
Pennebaker; and funds contributed by The  
Barra Foundation, Mrs. Henry W. Breyer,  
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Society, and Andrew M. Rouse. 1984-160-1,2

Tucker and Hemphill Factory

Scent Bottle, 1835-37  
Glazed porcelain, painted and gilded  
Height 1 9/16" (4 cm)  
Philadelphia Museum of Art. Gift of Miss  
Anne Tucker Earp. 51-17-2

*View of Fairmount from the First Landing* (cover  
of "The Fairmount Quadrilles," by John H.  
Hewitt), 1836  
Published by John F. Nunns  
Active Philadelphia 1833-42  
Lithograph  
11 7/16 x 8 1/4" (29.1 x 21 cm)  
The Historical Society of Pennsylvania,  
Philadelphia

*View of Fairmount Waterworks* (from *The  
Portfolio*), January 1819  
Engraving  
6 5/8 x 4 1/16" (16.8 x 10.6 cm)  
The Historical Society of Pennsylvania,  
Philadelphia

*View of Fairmount Waterworks with Four Lines of  
Poetry*, 1822-28  
Ink and wash on wove paper  
1 3/16 x 2 1/4" (2 x 6 cm) (image)  
Philadelphia Museum of Art. Gift of Mrs.  
Arthur J. Sussel in memory of Arthur J. Sussel.  
58-102-3

*View of Fairmount Waterworks with the Schuylkill  
River in the Distance*, 1838  
Printed and published by John T. Bowen  
American, born England 1801-1856  
Lithograph  
13 1/2 x 19 3/8" (34.5 x 50.5 cm) (image)  
The Historical Society of Pennsylvania,  
Philadelphia

*View of Fairmount Waterworks from the West  
Bank*, c. 1860-66  
Printed and published by Herline & Hensel  
Active Philadelphia 1859-66  
Chromolithograph  
19 7/8 x 32 7/8" (50.5 x 83.5 cm)  
Arwater Kent Museum, Philadelphia. 77.1416

*View in the South Garden Showing the Old Engine  
House and the Frederick Graff Memorial*, early  
20th century  
Albumen print  
4 3/4 x 6 1/4" (12.1 x 17.3 cm)  
Arwater Kent Museum, Philadelphia. 44.3.3

*View of the Waterworks from the West Bank*, after  
1839  
Oil on canvas  
21 3/4 x 26 1/2" (55.2 x 67.3 cm) (sight)  
The Commissioners of Fairmount Park

*View of the Waterworks from the West Bank*, early  
20th century  
Albumen print  
4 3/4 x 6 1/4" (12.1 x 17.3 cm)  
Arwater Kent Museum, Philadelphia. 44.3.2

Joshua Rowley Watson

English, 1772-1818, active Philadelphia  
1816-17  
*View of the Market Street Permanent Bridge and  
the Upper Ferry Bridge from the Centre Square  
Waterworks* (in a sketchbook from 1816-17),  
October 5, 1816  
Watercolor and ink wash over graphite on  
wove paper  
5 1/4 x 21 1/2" (13.7 x 54.6 cm)  
Private collection

Frederick A. Wenderoth & Co.  
Active Philadelphia after 1860  
After Frederic Graff, Jr.  
American, 1817-1890  
*Section, Plan, and Elevation of the Engine House at  
Centre Square*, October 1876  
Linecut  
12 5/16 x 8 7/8" (31.3 x 22.5 cm)  
The Franklin Institute Science Museum,  
Philadelphia. Gr. III:3

John Caspar Wild

American, born Switzerland, c. 1804-1846  
Printed by Wild & Chevalier, Philadelphia  
Active 1838-39  
*Old Rosin the Beau*, arranged by J. C. Beckell  
(sheet music cover), 1838  
Lithograph  
9 1/16 x 8 3/16" (24.6 x 21 cm)  
The Historical Society of Pennsylvania,  
Philadelphia

John Caspar Wild

Printed by Wild & Chevalier  
*View of Fairmount Waterworks* (supplement to  
the *Philadelphia Saturday Courier*), 1838  
Lithograph  
10 1/2 x 12 1/16" (27.3 x 33 cm)  
Free Library of Philadelphia, Print and Picture  
Department

Worley & Bracher

Active Philadelphia 1859-c.1880  
Printed by Frederick Bourquin  
American, born Switzerland 1808, active  
Philadelphia 1843-97  
*Map of Fairmount Park* (from *First Annual Report  
of the Commissioners of Fairmount Park*, 1869),  
1868  
Color lithograph  
24 1/8 x 16 1/16" (61.3 x 41.5 cm)  
Free Library of Philadelphia, The Map  
Collection. 6790

Maurice J. Zardus

*Greaves Mansion, Fairmount Waterworks: West  
and South Elevations* (in *Old Philadelphia Survey:  
Drawings by the Philadelphia Chapter of the  
American Institute of Architects*, 1931-32, vol. 11),  
1932  
Ink on wove paper in bound volume  
21 1/8 x 17 3/8" (55 x 44.7 cm)  
Free Library of Philadelphia, The Art  
Department

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Darrel Sewell  
*The Robert L. McNeil, Jr., Curator of American Art*

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