S
uper heroes can do it — and now you can, too: use X-ray vision to learn more about what’s around you in the park.

Peer through the walls of a 19th century mill to observe how the creek powers a marvelous array of elevators, augers and millstones. Use your new superpower to see that the boulders of Boulder Bridge are only a facade and the graceful arches of the Taft Bridge are made of simple concrete poured into forms. Look underwater at a fish ladder that provides a path around a waterfall. And discern the forest’s natural cycle in which trees take in carbon, nitrogen and other elements and return them into the environment.

The descriptions below refer to drawings in the graphics version of this entry.

**Hardly Run-of-the-Mill**

Peirce Mill embodies what had been revolutionary advances in the milling industry. In constructing the mill in the 1820s, the Peirce family incorporated innovative designs and labor-saving devices first described in 1795 by Delaware miller Oliver Evans.

The cutaway view (left) shows how grain loaded into the receiving hopper (1) falls to the basement, where an elevator (2) lifts it to the top floor. A rolling screen (3) separates out foreign objects and deposits the grain into a storage bin (4). When it is ready for milling, the grain drops into a hopper (5) which releases a regulated flow of grain onto the lower millstone, called the bedstone (6). The top stone, called the runner stone, rotates at about 125 revolutions per minute a fraction of an inch above the bedstone, cutting the grain to produce a warm, moist meal. The meal falls down a chute to the basement where another elevator (7) lifts it to a hopper (8) on the top floor to cool and dry. An auger (9) continues the drying process and advances the meal to the bolter (10). Fine and medium mesh screens in the bolter separate the meal into flour, middlings and bran that are stored in separate holding bins (11).
During the 19th century, Rock Creek flowed higher and faster than it does today, powering numerous mills conveniently located just a wagon ride away from the port of Georgetown. Water from the stream, channeled through a trough called a millrace, turned the wooden waterwheel outside each mill — which, linked by gears and belts, powered the movement inside. Peirce Mill has employed two different wheel configurations: an overshot wheel and a breast wheel. Water pours onto an overshot wheel just past the wheel’s highest point, while the current strikes a breast wheel at about axle height.

**Boulders of Beauty**

Boulder Bridge serves as one of the enduring symbols of Rock Creek Park. Its huge stones — some of them weighing more than half a ton — were carefully selected to harmonize with the rocks in the creek and on the hillsides. But they are only decoration, attached by wrought iron “cramps” to the steel girders that support the span (inset below).

The builders had to pay a royalty to use the Melan method of construction, patented just nine years before the bridge was completed in 1902. Under this process, a series of steel lattice arches (seen in the cutaway below) was arranged side by side across the creek, supported by concrete abutments on each bank. Then the girders themselves were encased in concrete.

Boulder Bridge was built under the direction of Lansing Beach of the US Army Corps of Engineers, who served as Rock Creek Park supervisor and DC engineer commissioner. He also supervised the construction of Rock Creek Drive, which was renamed Beach Driveway — and then Beach Drive — in his honor.
**Tree-cology**

When nature is in balance, the forest is part of a grand cycle. Carbon, nitrogen, calcium and other key nutrients are transferred from the trees to the soil to the air and then back to the trees through processes such as uptake, respiration and decomposition. During photosynthesis, the leaves use energy from sunlight to make food (glucose) from carbon dioxide and water in a reaction that also releases oxygen into the air.

Within the trunk of a tree, each layer has a function. The bark protects the tree. Food made in the leaves flows down through the phloem to be stored or used in the cambium to create a new ring of sapwood (xylem) each year. The xylem draws water and nutrients up from the roots. The inactive cells of the heartwood provide stability and surround the narrow channel called the pith.

**Bypass along Herring Highway**

Until a fish ladder was completed in 2006, the dam and ornamental waterfall near Peirce Mill blocked the path of migrating fish. The fishway now allows species like blueback herring, alewife and striped bass to swim around the waterfall to reach ancestral spawning habitats upstream.

Their route from the Potomac River to upper Rock Creek has been dubbed Herring Highway. At one time, streams like Rock Creek teemed with fish during their spring migration. As historian Robert Beverley wrote in 1705, “Herrings come up in such abundance into their brooks and fords that it is almost impossible to ride through without treading on them.”

The view from above (left) shows how fish bypass the waterfall by entering at A and swimming “uphill” from B to C. As water pours into the fishway at C, baffles installed in slots between B and C regulate the current. They also provide resting spots for fish between the baffles. The side view (below) shows the placement of the baffles, with an inset drawing of how they would appear from C.

Researchers can climb down into the “vault” and look through a window at fish exiting the ladder.
Taft Bridge: Grace Under Pressure

Originally called simply the Connecticut Avenue Bridge, the elegantly arched Taft Bridge carries Connecticut Avenue high over Rock Creek valley. When it was finished in 1907, it was said to be the largest unreinforced concrete structure in the world. The popular term for the new span was the Million Dollar Bridge, though that overstated its cost by about 18 percent. It was renamed for President William Howard Taft in 1931.

Archs are able to support weight because the stones in an arch press against each other, creating an upward force equivalent to the downward pull of gravity. Multiple arches also buttress one another, adding extra support and allowing the piers between them to be smaller.

Instead of stone, the seven graceful arches of the Taft Bridge are made of unreinforced concrete. In the drawing (above), workers near the derrick are pouring concrete into a form near the crown of one of the arches.

Each pier is comprised of four “diaphragms” for added strength. While most of the arches have a span of 150 feet, the ones on each end only span 82 feet. That results in a greater load on the end piers, which had to be nearly twice as wide as the others.