

(historical note)

A naturally occurring pond of water that was made a part of the C&O Canal when it was first dug, Big Pool, at Fort Frederick in Maryland, is approximately 100 ft. wide. Most of the C&O Canal is approximately 60 ft. in width. Photo courtesy the C&O Canal.



The C&O Canal

Nearly 200 years of history in the mid-Atlantic region

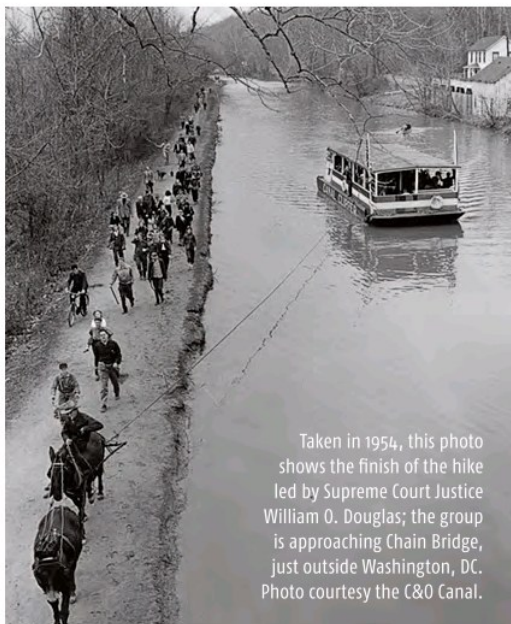
BY NORBERT DOERRY

SENAME headquarters is located at 99 Canal Center Plaza in Alexandria, VA, near the location of the terminus of the seven-mile-long Alexandria Canal, which operated between Alexandria and Georgetown from 1843 until it was abandoned in 1886. This canal crossed the Potomac River via the Aqueduct Bridge and connected to the Chesapeake and Ohio (C&O) Canal near the current location of the Francis Scott Key Bridge. The Alexandria Canal enabled barges from the C&O Canal to travel directly to the port of Alexandria and unload onto wharves or sailing vessels. It also enabled Alexandria to compete with Georgetown for commerce with the nation's interior.

The C&O Canal itself was a response of mid-Atlantic politicians to the threat posed to trade with the interior of the U.S. by New York's Erie Canal. In the early 19th century, the major port cities recognized that a dependable transportation network inland was crucial to their continued survival. At that time, canals

were a mature and dependable technology. Studies for determining the feasibility of connecting the tidewater on the Potomac River with the Ohio River were conducted between 1820 and 1822. Planning for the C&O canal began in 1823, two years before the completion of the Erie Canal. The influence of tide on the Potomac River ends just below Little Falls near Georgetown, signifying that ocean-going vessels could sail this far. Therefore, planners decided that the canal would begin near Georgetown, generally follow the Potomac River to Cumberland, MD, cross the Appalachian Mountains, then follow westward-flowing rivers to the head of the Ohio River in Pittsburgh, PA.

With Georgetown established as the terminus of the C&O canal, Baltimore merchants and bankers turned to a new, unproven technology in hopes of preserving their competitiveness. In 1827, the Baltimore and Ohio (B&O) Rail Road Company was chartered to build a railroad connecting Baltimore to the Ohio



Taken in 1954, this photo shows the finish of the hike led by Supreme Court Justice William O. Douglas; the group is approaching Chain Bridge, just outside Washington, DC. Photo courtesy the C&O Canal.



The C&O Canal is now a National Historical Park, and the towpath offers nearly 185 miles of hiking and biking, along with campsites that are open year-round.

River. The history of the B&O railroad and the C&O canal would be intertwined for more than 100 years. In fact, both endeavors held groundbreaking ceremonies on the same day—July 4, 1828.

The C&O canal stretches for nearly 185 miles. Some 74 lift locks are used to raise and lower the canal boats 605 ft., and 11 aqueducts are used to cross major streams. The 950 m Paw Paw Tunnel enabled the canal to bypass a 6-mile section of cliff-faced horse-shoe-shaped bends of the Potomac River.

Slow progress

Construction on the C&O canal progressed slowly over the next 22 years. The availability of funding, laborers and critical supplies, such as hydraulic cement, were challenging enough. Added to these were the legal challenges with the B&O railroad over right-of-way in the narrow passage at Point of Rocks. During the construction of the canal, revenue from the completed sections did not significantly offset the construction costs. Due to a lack of funds in 1842, construction came to a halt with 135 of the 185 miles to Cumberland in service. Of the remaining 50 miles, only 18 miles of scattered sections remained to be completed. In contrast, the B&O railroad reached Cumberland in 1842 and the Ohio River at Wheeling, WV (then Virginia) in 1853.

Design changes also contributed to the financial challenges. Originally, the canal was to be 40 ft. wide at the surface, 28 ft. wide at the bottom, and 4 feet deep. Based on a cost-benefit analysis, these dimensions were increased to 60 ft. wide at the surface, 48 ft. at the bottom, and 6 ft. deep.

Plans to continue the C&O canal past Cumberland were dropped as funding was sought to open the remaining 50-mile

segment. In 1846, with additional loan guarantees provided by Maryland, work resumed to finish the canal to Cumberland. Later that year, work came to a halt again when congress sought \$10 million in loans to finance the Mexican-American War, thereby diverting available funding away from the canal loans. Financial conditions improved in 1847 and construction resumed that November. To reduce costs, construction specifications were relaxed on these final segments. On October 10, 1850, the entire length of the canal from Georgetown to Cumberland was placed in service.

While the canal boats were privately owned, they were required to adhere to specifications. In 1851, seven classes of boats were defined. Nearly half of the boats registered were “class C” with a length between 70 and 90 ft., width of between 11 ft. 9 in. and 14 ft. 7 in., empty draft between 10 and 18 in., and loaded draft between 3 ft. and 4 ft. 6 in. The average canal boat at this time cost approximately \$1,200 (\$37,500 today). Most of the boats could carry between 100 and 120 tons of cargo and could complete the passage from Cumberland to Georgetown in approximately seven days. The vast majority of the boats were engaged in the coal trade. Coalmines near Cumberland used the canal boats to ship their coal to Georgetown and Alexandria for further distribution. While passenger service on packets was attempted on several occasions, it never proved profitable and was quickly abandoned.

With the canal completed, revenue slowly grew, but the C&O Canal struggled with the enormous debt from its construction. Costly repairs following severe weather and flooding repeatedly threatened insolvency. The Civil War resulted in the damage and

The C&O Canal *continued*

Planning for the C&O canal began in 1823, two years before the completion of the Erie Canal.

destruction of countless canal boats, and many canal boats also were appropriated by the military.

Profitable period

The C&O Canal did survive the Civil War and even benefitted from the wartime economy. The period from 1865 to 1880 proved very profitable for the canal. By 1874, more than 500 boats operated on the canal. It was still cheaper to ship coal by canal than by railroad. Congestion at Georgetown even led to the construction of an "inclined plane"

that went into service in 1877 roughly a mile north of the Aqueduct Bridge. Canal boats would float in a caisson, which would travel on rails from the canal to the river. Cables and counterweights limited the amount of power required to raise and lower the caisson.

By the late 1870s, however, improvements in railroad technology enabled the railroads to lower their freight rates below the costs of a canal boat. Traffic on the canal steadily decreased during the 1880s. In 1889, a devastating flood caused

\$1 million in damage that the canal company could not afford. Remarkably, the fate of the C&O Canal was determined by the B&O railroad. In order to prevent competing railroads from using the C&O Canal corridor to build competing track, the B&O bought the canal, repaired the storm damage and continued to minimally operate it for another 35 years. Following another flood in 1924, the B&O railroad could not justify further expenditure on repairs and suspended canal operations. The U.S. government took ownership of the canal in 1938.

Following World War Two, plans were developed to build flood control dams on the Potomac, which would submerge much of the canal. Other plans would have converted the C&O Canal into a parkway, similar to Skyline Drive in the Shenandoah Mountains. In 1954, following an endorsement of the parkway plan by the Washington Post, Supreme Court Justice William O. Douglas wrote a letter to the editors inviting them to accompany him on a walking tour of the towpath. The walking tour publicized the need to preserve the canal towpath and its history. Finally, in 1971, the C&O Canal was designated a National Historical Park.

The C&O Canal towpath offers nearly 185 miles of hiking and biking. Campsites are available at regular intervals and are open all year. In June 2013, the Great Allegheny Passage (GAP), a rail trail connecting Cumberland to Pittsburgh was completed using abandoned track beds from railroads, including the B&O. With the completion of the GAP, it is now possible to depart SNAME headquarters on the Potomac River (part of the Chesapeake tide water), travel only on trails, and arrive at the beginning of the Ohio River (part of the Mississippi River system) at Point State Park in Pittsburgh. For the recreational hiker or bicyclist, the Chesapeake and Ohio are now connected. **MT**

Norbert Doerry is the technical director of the NAVSEA Technology Office and the chair of the (mt) magazine editorial board.

General Hydrostatics (GHS)
Ship Stability/Strength Software

- * Unmatched flexibility.
- * Widely recognized and respected.
- * Rendered Graphics (new).
- * Easy migration to the onboard version.
- * Clean, fast, reliable code.
- * The best support in the industry!

www.ghsport.com

GHS

General HydroStatics

Ship Stability and Strength Software

GHS	Full-featured naval architect's system
GHS Load Monitor (GLM)	Onboard configuration
BHS	Basic hydrostatics and stability

Creative Systems, Inc.
Creators of GHSSM

P.O. Box 1910 Port Townsend, WA 98368 USA
phone: (360) 385-6212 email: sales@ghsport.com
www.GHSport.com

For 44 years, the software that naval architects love.