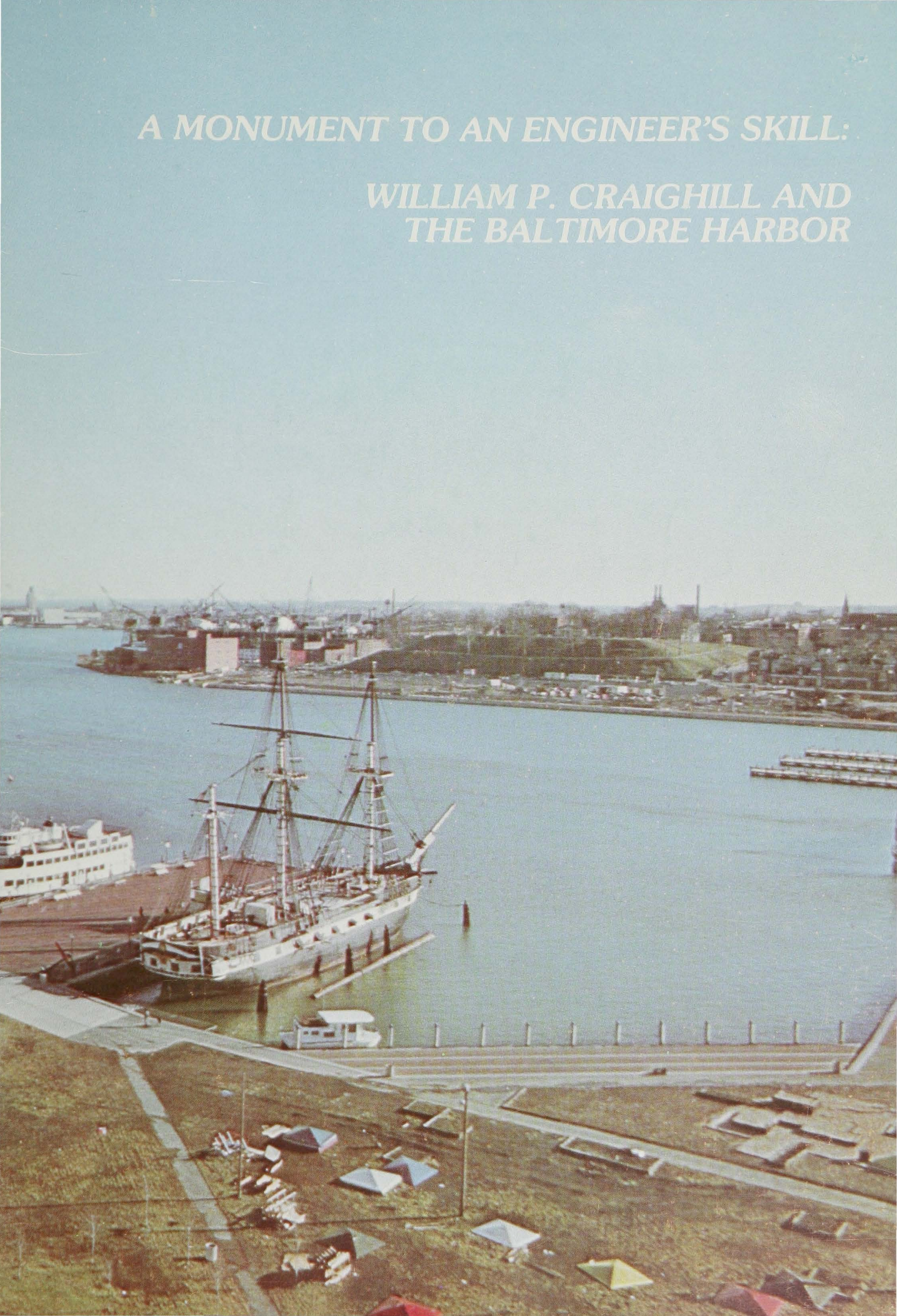
A MONUMENT TO AN ENGINEER'S SKILL:

WILLIAM P. CRAIGHILL AND THE BALTIMORE HARBOR



As seen in this view of Baltimore from the telegraph painted and engraved in 1847 by Robert Havell sailing vessels and steamboats dominated trade along the Patapsco River. — Library of Congress

A MONUMENT TO AN ENGINEER'S SKILL: WILLIAM P. CRAIGHILL AND THE BALTIMORE HARBOR

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by
Dr. Harold K. Kanarek

About the Author

Dr. Harold K. Kanarek received his undergraduate education at Hiram College in Ohio and earned both his M.A. and Ph.D. in American history from the University of Virginia. His publications include "The Pennsylvania Anthracite Strike of 1922" in the *Pennsylvania Magazine of History and Biography* (April 1975) and "Disaster for Hard Coal: The Anthracite Strike of 1925-26" in *Labor History* (Winter 1974). Presently, he is writing a complete history of the U.S. Army Engineer District of Baltimore and teaching at George Mason University in Virginia.

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Foreword

The history of the Baltimore District, U.S. Army Corps of Engineers, encompasses more than 100 years of Baltimore City and Harbor history.

Baltimore has become one of the leading ports in the world, but it was not without the persistent effort of Brigadier General William Craighill who arrived in the city as a Major in 1865 and left 30 years later to become Chief of Engineers, Washington, D.C.

Before Craighill undertook the massive excavation of the Patapsco, most of the commerce coming into the Port of Baltimore had to be unloaded on lighters 20 miles from the inner harbor.

This fascinating chapter on the harbor history and Craighill, the man who fought for the completion of the channel which bears his name, has been taken from a complete history of the Baltimore District soon to be published. It tells of the irritating problems which had to be solved, his relationships with members of Congress, Baltimore City civic leaders, and his open and private campaign to obtain funds for his project. There was opposition to the dredging as there is today but when Craighill completed the project, he reminded the officials of Baltimore City that, "it is not to be forgotten that this channel is an artificial road or highway . . . . it did not exist by nature. It was made, and to be kept in good condition it requires care in its use and annual repairs." We the members of Baltimore District, U.S. Army Corps of Engineers have devoted ourselves to total performance of missions assigned us. This is the story of one individual, his hopes, his despairs, and his success.

ROBERT S. McGARRY
Colonel, Corps of Engineers
District Engineer

A Monument to an Engineer's Skill: William P. Craighill and the Baltimore Harbor

I

Of all the contributions that the Baltimore District of the Army Corps of Engineers made to the Baltimore metropolitan area, the excavation of the Baltimore Harbor stands as the foremost achievement. The widening and deepening of the water approaches to the city and the creation of new channels propelled Baltimore into becoming the second largest Atlantic port to New York City. The water highway connected the Atlantic coast and the Mid-West to Europe and South America at a time when water transportation was the most efficient and least expensive means of hauling manufactured commodities and raw materials.

Baltimore has ideal geographical advantages. Most importantly, she is the westernmost of all Atlantic ports. Yet she is only ten miles from the Chesapeake Bay on the Patapsco River and 150 nautical miles from the Virginia Capes, the entrance to the Atlantic Ocean. As the Baltimore and Ohio railroad surged westward, the tie between the port and the interior solidified. The tonnage of traffic moving to and from the Mid-West through the harbor spiraled upward. More American and foreign ships visited the Patapsco shores annually.

The swift clipper ship dominated trade until the Civil War and Baltimore led in the construction of these sailing vessels. But by mid-century, the desire for increased cargo capacity meant that the clipper ships could not survive. Large steam powered crafts soon dominated sea traffic. Naturally as the size of ocean vessels grew, the need to enlarge the Patapsco River's approaches to the city became imperative.

II

Even before the advent of steam ocean cruisers, Baltimoreans had an abiding concern in maintaining the water avenues to their city. After the American Revolution, the mayor appointed a Board of Port Wardens to control harbor traffic and keep the navigation channels open. The Board built its own primitive dredge. From 1798 on the city spent money dredging the inner harbor.[1]

Outer harbor improvement resided with the federal government. As early as 1826 the Secretary of the Navy submitted a report on a survey of the harbor to Congress. The depth of the main channel at mean low water measured seventeen feet. The Secretary noted that "the water can be readily, and at inconsiderable expense, deepened to 20 feet, by means of the admirable mud-excavators now in operation in the harbor."[2] In 1830 the army engineers surveyed the harbor and in 1836 Congress appropriated $20,000 for deepening the entrance channels. The law stipulated no specific dimensions. Congress placed the money in the hands of the Board of Port Wardens which used it to hire the dredging apparatus belonging to the city to execute the improvements.[3] By 1838 an additional $35,000 in federal money had been spent on dredging the Patapsco. The Engineer Department requested that the Congress appropriate $25,000 annually for the harbor's maintenance. But river and harbor improvements encountered vociferous political and constitutional criticism after 1838. The Baltimore Harbor received no more federal funds until 1852.[4]

III

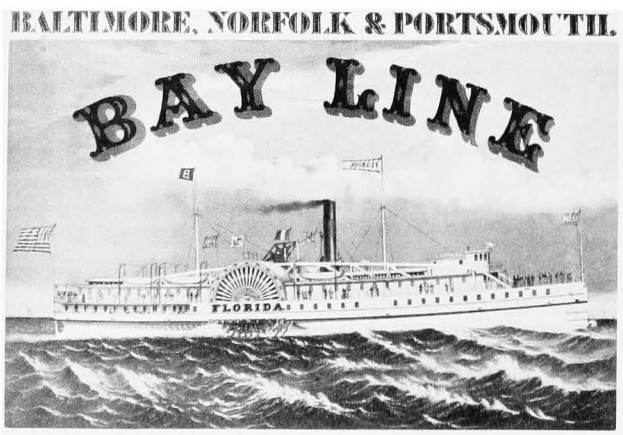
When Captain Henry Brewerton became the Baltimore District Engineer in 1852, his appointment coincided with a reawakened Congressional generosity in allotting funds for internal improvements. Hence new federal money became available for the Baltimore Harbor project. Besides overseeing the construction of Fort Carroll in the Patapsco River, the excavation of the harbor became Brewerton's main responsibility.

Born in New York City at the dawn of the nineteenth century, Brewerton entered West Point at the age of twelve and subsequently served in the Corps of Engineers for nearly half a century until his retirement in

1867. Before coming to Baltimore he already possessed an outstanding reputation from his years in charge of navigation and defenses in the Mississippi Delta and at the Charleston Harbor in South Carolina. At both places he contracted debilitating illnesses which sapped his energy for the balance of his life. Nevertheless, he vigorously pursued all his remaining responsibilities both as superintendent of the United States Military Academy from 1845 to 1852 and as Baltimore District Engineer from 1852 to 1864.

Brewerton's first task upon his arrival in Baltimore was to examine various types of dredging machines and select the most efficient model for use in the Patapsco. In all, he envisioned that three dredges would be necessary to excavate the Patapsco to a depth of twenty two feet. He finally settled on a single bucket type dredge which worked two cranes and two scoops at the same time. Such a machine had the capability of excavating around 100 cubic yards of mud per hour. Of course, steam boats would be required for towing dumpers into shallow water where the excavated matter was to be deposited.[5] Both the city and the army engineers initially contracted for construction of their own single dipper dredge. The city was vitally interested in improving the harbor, particularly with the completion of a railroad network leading to the port. As Brewerton noted, "it is intended that the steam-dredge recently constructed for the water of the Chesapeake Bay and Atlantic Coast, shall for the present cooperate with the new steam-dredge belonging to the City of Baltimore . . . " The city also agreed to tow the government's dredge with their steam tug. Since they would be working so closely together, Brewerton appointed the city dredging superintendent to serve in the same capacity for the engineers.[6] By November 1853 both dredges, having been tested and paid for, were working in the Patapsco River.[7]

The area to be improved divided itself into two sections. The upper branch started at Fort McHenry and extended six miles down the river to a point one and a half miles below Fort Carroll. The average natural depth of this branch ranged from nineteen to twenty one feet. The lower division ran nine miles from the point one and a half miles below Fort Carroll to four miles beyond North Point. The average depth here was only sixteen to eighteen feet.[8]



Steamboat of the Baltimore, Norfolk and Portsmouth Bay Line, n.d. — Library of Congress

Brewerton concentrated his efforts entirely on this lower branch. He surveyed the route and marked out the most suitable course for the proposed excavation. He had buoys placed about every half mile, red on the eastern side and white on the western. The goal was to form a channel 150 feet wide and twenty two feet deep.[9]

The dredging, which began on the lower branch in the fall of 1853, continued until the Civil War. Gradually the channel took shape. At first the city and the United States employed a force of one dredge each. In July 1854, however, the city added a third dredge to the fleet. In 1857 the federal government contributed two more dredges and a tug boat to the project. By the end of 1858 the channel could support vessels drawing about twenty feet of water. On August 7, 1858 the *Empress of the Seas*, the largest ship ever to enter the port of Baltimore up to that time, arrived through the new channel drawing nineteen and a half feet water depth. The Chief of Engineers General Joseph Totten proudly announced that the "vessel could no doubt, have carried through the new channel with a draught of 21 feet, as there were no indications that the ship's keel was near the bottom."[10] Brewerton urged that the channel be completed as soon as possible in order that it could be used by the largest class of vessels desiring to visit the port. He wanted $100,000 for the channel for the next fiscal year.[11]

No new money was forthcoming. Operations on the Patapsco River had to be suspended. They did not resume again until 1866. Although the engineers regretted the abrupt termination of the project, they could be proud of what had been accomplished. A survey made in November 1859 showed that six miles of the channel had been dredged to an average depth of twenty three and a half feet. In order to demonstrate their gratitude for the government aid they received, the Board of Commissioners of Baltimore named the channel in honor of army engineer Henry Brewerton whose tireless energy had turned the excavation into a success.[12] The digging of the Brewerton Channel was not only a personal triumph for Brewerton, but a testimony to what could be achieved in a true cooperative effort between local city officials and the federal government. The two jurisdictions worked side by side with no apparent friction. They assisted each other at every turn by using common personnel and equipment. This collaboration was all the more impressive because it occurred at a time when the federal system was on the verge of blowing apart.[13]

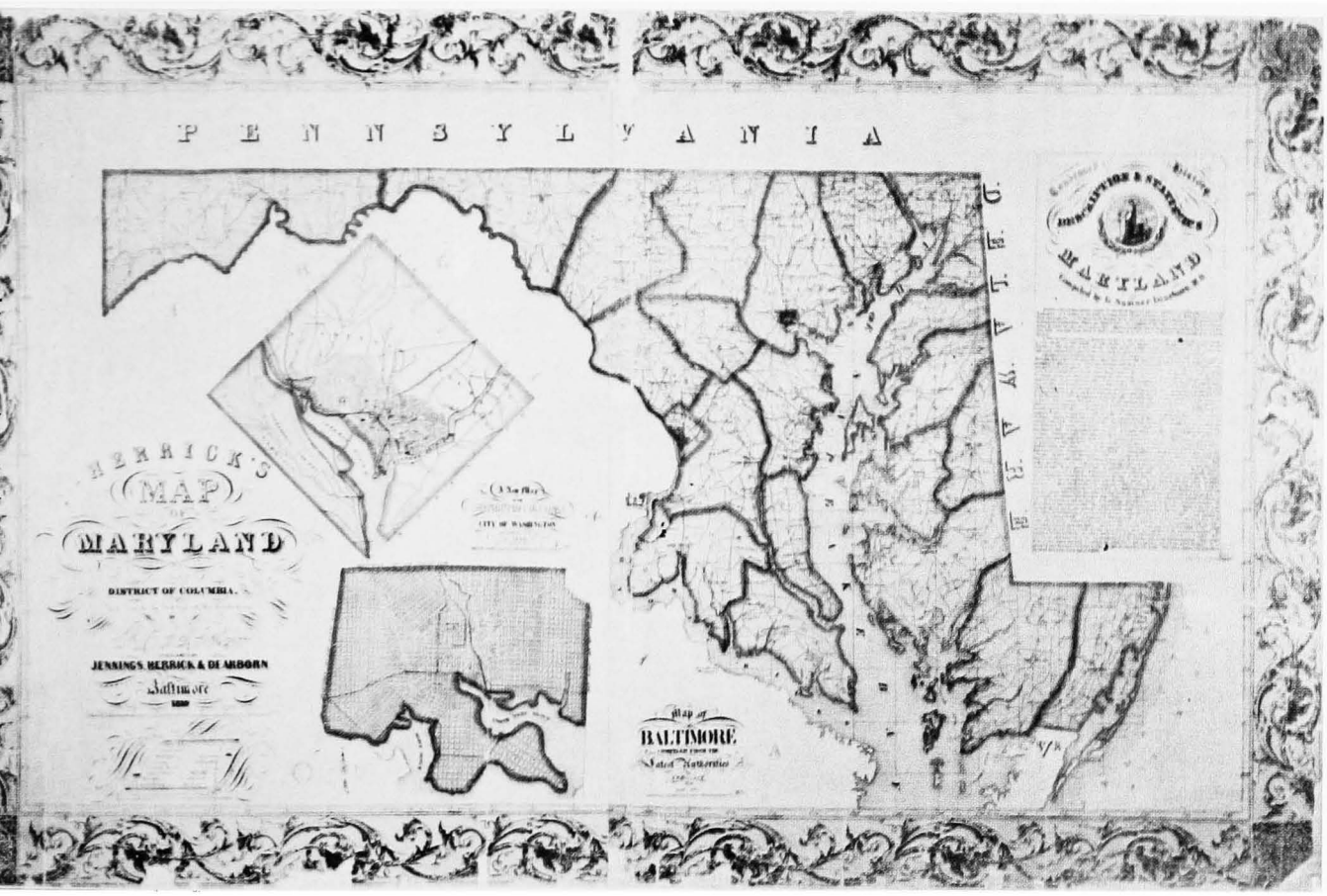
The Brewerton Channel, however, was not complete. Three miles remained to be dredged. And already the city business interests and the army engineers were urging that the excavation be carried on until the whole length of the channel was cut to a depth of twenty five feet. Such a depth was mandatory to accommodate the new large coal suppliers. A twenty five foot channel would benefit the federal government, one army engineer observed, because it would "open to the U.S. steamers a cheap and excellent coal market . without the extra cost of freight."[14] But further development of the Baltimore Harbor would have to wait until after the Civil War. During the military emergency the army engaged most Corps' officers in the field. Internal improvements ceased. The army engineers loaned the dredges themselves to the Quartermaster and Navy Departments for military purposes.[15]

IV

When work resumed on the Baltimore Harbor in 1866 the first order of business was to measure the Brewerton Channel in order to ascertain how well its depth had been maintained and what further dredging would be required.[16] Major William P. Craighill was now the District Engineer. He would dominate District affairs until the late nineteenth century.

Craighill was one of the Corps of Engineers' true intellectuals who was equally at home reading history as in performing his tasks as a technical engineer. Throughout his life he surrounded himself with books and he read avidly. "His love of home, books and family kept him apart from club life," the *Baltimore Sun* observed on his death on January 18, 1909, "and his chief hobby was his work — military engineering."[17]

Born in Charles Town, Jefferson County, Virginia on July 1, 1833, Craighill was one of the many Southerners of his generation to distinguish himself in military service. He became a cadet at the United States Military Academy at West Point in 1849 at the age of sixteen and he graduated four years later being the youngest member of his class, but ranking second in academic achievement. His pre-Civil War experience was extensive and varied encompassing tours of duty on the Savannah River, Georgia, Charleston Harbor, South Carolina and in building Fort Jefferson, Tortugas, Florida



Commercial Map of Maryland and Baltimore, 1859. — National Archives

William P. Craighill — National Archives

and Fort Delaware on the Delaware Bay. He also served as Assistant to the Chief of Engineers in Washington, D.C. and as assistant professor of engineering at West Point.

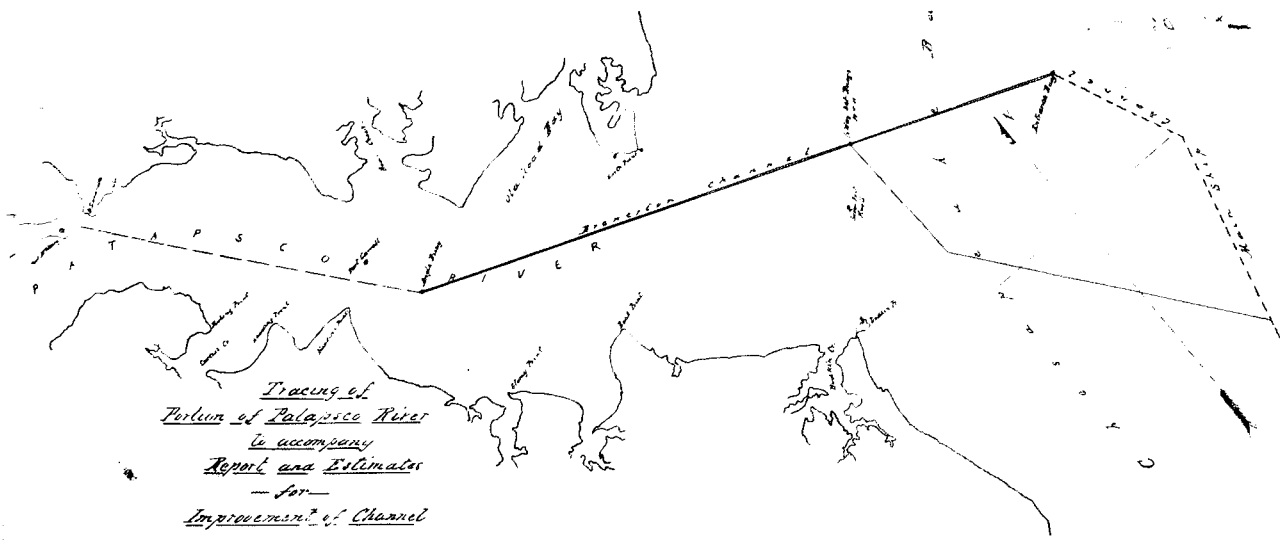
His literary talents and linguistic ability became evident during the Civil War when he compiled the "Army Officers' Pocket Companion" in 1861 principally designed for staff officers in the field. He also translated two French books on military theory, Guillaume Henri Dufour's *Strategy and Tactics* and Henri Jomini's *The Art of War.*

The Civil War deeply troubled Craighill's soul. He did not want to be placed in the position of having to fight against his southern friends, but at the same time he was an ardent opponent of secession. He agonized deeply over the divisions within the country, but ultimately, under the influence of fellow Virginian General Winfield Scott, he stuck by the Union. He became engaged in the construction of defenses at Cumberland Gap, Tennessee and Pittsburgh, Pennsylvania. During 1863 and 1864 he served as an assistant to Brewerton in the Baltimore Harbor. Despite remaining a strong advocate of military preparedness throughout his entire career, his wartime experience brought out his hatred for war and the realization that in battle it was usually the innocent victims such as women and children who bore the brunt of the suffering. He blamed the conflict on "a few miserable corrupt accursed politicians, who tricked the honest people of the South into retaining their insane folly by practicing the most erroneous deceptions that were ever attempted with any people." Because of this deception, he asked in a letter to his West Point classmate and friend James B. McPherson who was felled by a Confederate bullet in July 1864, "how many innocent men, women and helpless children must suffer; how many indeed have already suffered? This is one of the mysterious orderings of Providence in the management of the affairs of the world that I cannot understand."[18]

When Craighill became Baltimore District Engineer on November 10, 1865 he still had most of his career ahead of him. He would spend the better part of the next quarter of a century in Baltimore.No other single individual did more to shape the city's harbor.

After consulting with Colonel Brewerton in the spring of 1866 as to the dredging previously accomplished on the Patapsco River, Craighill immediately set about the task of surveying the Brewerton Channel to determine its present navigable condition.[19] What he discovered proved alarming. The lower portion of the Brewerton Channel heading straight out into the Chesapeake Bay had shoaled considerably. The tides and currents coming down from the upper Bay and the Susquehanna River north of the channel had injured the excavations made below North Point. It had been hoped that a straight channel going out into the Bay might be permanent due to the sluggish current and undramatic tide changes in the Patapsco River. This expectation proved correct until the channel passed North Point and headed straight out into the Bay where the conflicting currents from the Susquehanna and Patapsco Rivers and the Chesapeake Bay caused the formation of a large shoal. "It is my belief," Craighill lamented, "that the straight cut below Fort Carroll will in time fill up to a certain extent if left entirely to the action of natural causes . "[20]

In order to remedy the situation, Craighill proposed that a new cut be constructed to alter the direction of the channel. Instead of going straight out into the Bay, the channel would run due south for a distance of about three miles and then turn off in a southeasterly



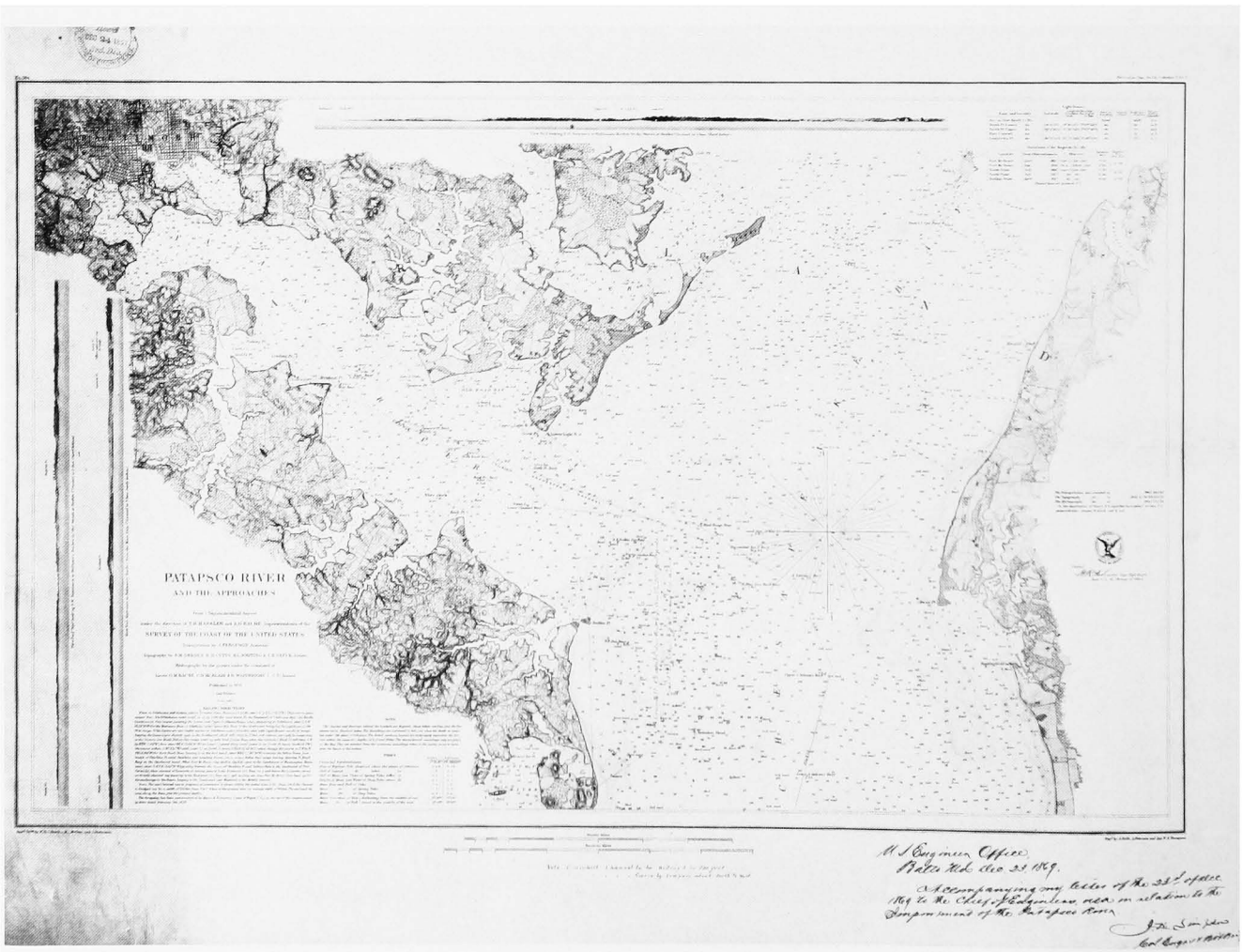
The Patapsco River Channel as it appeared in 1866 — National Archives

direction. This course would correspond to the current of the Patapsco and Susquehanna Rivers. The principal obstructions in the intended route modification were lumps which dredging could eradicate.[21]

The Engineer Department approved Craighill's plan and three dredges with their complement of scows and one tug boat began to build the new water passageway. While Craighill himself served as assistant to the Chief of Engineers in Washington from October 19, 1866 until March 31, 1870, Major General John G. Parke and Colonel John H. Simpson supervised the digging of the new cut. The goal was for a channel 200 feet wide and twenty two feet deep. It was Simpson who designated the highway the Craighill Channel. Upon learning that he was to be immortalized in such a way, Craighill professed embarrassment.[22]

By the summer of 1869 the Craighill Channel was almost ready for commercial traffic. In August Simpson ordered a final sounding to mark any lumps that may have been missed with buoys "so that the dredges may remove the lumps with certainty."[23] An innovative method employed for searching the bottom was successful. Boatsmen attached to each side of a tug two poles marked to twenty two feet with an iron shoe at the bottom. Several tugs, with poles thus affixed, traveled slowly up and down the river. Using this arrangement, Simpson reported, "the channel was quite thoroughly swept, and every lump or knoll . . . indicated by the rising of the pole, and the exact depth shown on the pole to which the channel at those points should still be dredged."[24] The elimination of the lumps was so effectively accomplished that in October Simpson opened the channel to vessels drawing less than twenty one feet. The new water artery, he proclaimed, "will very materially benefit the commerce of the harbor in shortening the distance about 3½ miles to the city and enabling vessels of greater draft to approach nearer to it."[25] Not only would the new channel save distance and not shoal, but it would avoid the hazard caused by the accumulation of ice in the lower part of the old Brewerton Channel during the winter.[26]

In the short run, the Craighill Channel failed to fulfill expectations. It was not wide enough. Large steamships and sailing vessels seldom ventured into the waterway for fear of grounding on the oyster banks



The Patapsco River Approach Channels, 1869. — National Archives

which bordered it on either side. In order to transform the channel into a perfectly safe and desirable course for large ships, Simpson declared, it should be widened to 500 feet.[27]

V

The most vexing problem Simpson confronted during his term in Baltimore concerned a dispute over his firing of the civilian superintendent of the dredges, a Mr. John Lloyd. Simpson discharged Lloyd on August 12, 1869 for his alleged inability to perform his duties and insubordination; Lloyd had hired a man to operate one of the dredges against Simpson's direct order.[28] Lloyd did not take his dismissal lying down. He accused Simpson of political favoritism and even went so far as to intimate that Simpson employed a conscious policy of firing union men and replacing them with ex-confederates. This sent the Baltimore District Engineer into a rage. He termed Lloyd so incompetent, vain, arrogant and ignorant "as to bring the whole business of dredging the channel of the Patapsco river into disrepute . . . "[29] Mr. N. H. Hutton, ex-assistant United States engineer, who in the 1880's became embroiled in a controversy with dredging companies over his close supervision of contracts, came to Simpson's defense. To Hutton, there was absolutely no basis to the charge that Colonel Simpson discriminated against Mr. Lloyd for political reasons. He fired Lloyd for being incompetent. Furthermore, his replacement, a Mr. D. C. Ronsaville, was a well-known union man and Republican. Finally Lloyd's wild assertation that on the day of the 1868 presidential election Simpson arranged for a government tug to bring men to town to vote for the Democratic candidate Horatio Seymour, while known advocates of Republican Ulysses S. Grant were forced to hire a boat for themselves, was a lie. Hutton, who was Simpson's assistant engineer at the time, claimed to be "cognizant of the details of all such matters and I can most positively affirm that the statement [of Mr. Lloyd] is not true."[30]

The appointment of the superintendent of dredging, however, was based on political favoritism, but Colonel Simpson had nothing to do with it. It was a patronage job which the United States Postmaster General awarded. In the summer of 1870 Postmaster General John A. Creswell, acting through the War Department, replaced Ronsaville, who had been Simpson's choice, with a Mr. John M. Dempsey. Simpson was chagrined. He would carry out orders, and employ Dempsey, he wrote the Postmaster General, "but I feel it to be my duty as your friend to say that by doing so, a very respectable, honest and capable citizen, Mr. D. Ronsaville, a Republican, will be sacrificed whose integrity and experience . can ill be spared at this time."[31] Craighill also lauded Ronsaville for having "served long and faithfully in the Engineer department and with great acceptability to every officer having charge of the work upon which he has been engaged."[32] Simpson was frustrated. He complained that his orders were being constantly disregarded and he despairingly wrote his superior that "I feel like an officer, who, while the government imposes on him all the responsibility of the disbursements and efficient working of his department, yet has in a manner subjected him to an employe who will bring certain ruin to the government operations with which he has been entrusted. . "[33] Finally Simpson's pleading succeeded. By mid-October, two weeks before Craighill's return, Dempsey had been replaced.[34]

VI

By 1870 the Baltimore Harbor compared favorably with all other Atlantic ports. United States dredges had toiled in the Brewerton Channel off and on for about fifteen years and in the Craighill Channel for five or six with no serious accidents. But the equipment was old and worn requiring frequent and costly repair. The army did not want to have to funnel all future appropriations into equipment maintenance. Therefore, during the winter of 1871-72 it sold all of its dredges and scows and decided to prosecute future work primarily by contract.[35]

Craighill was particularly pleased with the results. With the $50,000 appropriated in March 1871 he let two contracts with New York dredging companies for the removal of 310,000 cubic yards of material from the Brewerton Channel. Craighill happily noted that the companies discharged the contracts "with a marked increase in rapidity of execution and an equally marked decrease in cost."[36] In short, the government received more dredging for its money.

As the harbor improved, the number of ships using the port increased. In 1870, 735 foreign vessels entered the harbor compared to 650 in 1869. In the first half of 1871 the total reached 508 ships.[37] The city of Baltimore prospered. And the dredging performed in the harbor's channels under the direction of the U.S. Army Corps of Engineers was significantly responsible for stimulating this prosperity.

Baltimore's leaders desired that their port continue to grow. The extension in the commercial importance of Baltimore since the Civil War, especially with foreign vessels, only intensified the pressure for more rapid progress in dredging operations. The Baltimore City Council, the Board of Trade and the Corn and Flour Exchange all urged Craighill to push for a deeper approach channel. At present, ships drawing more than twenty feet of water ran grave risks of grounding if they dared to venture into the port. The Corn and Flour Exchange went so far as to ask the city to appropriate massive funds for the improvement of the

harbor to a depth of twenty four feet without waiting for the United States Congress.[38] Baltimore's Mayor Joshua Vansant agreed that the "matter of sea navigation is too important to all the great producing and commercial interests of Baltimore to be allowed to depend on the contingency of national aid." He therefore requested the city council to grant liberal appropriations for the harbor's expansion.[39]

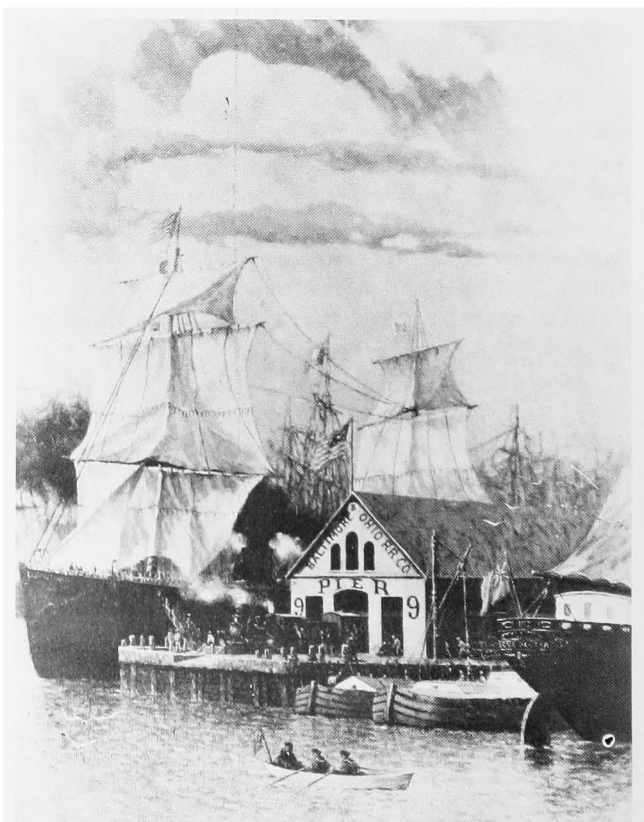
The *Baltimore Sun* joined in the chorus of those who sought more money to dredge the Patapsco River leading to the inner port. To the paper, a federal appropriation of at least $300,000 would be reasonable. "Our representatives in Congress should direct their earnest and united efforts," the paper exhorted, "to secure, at the earliest possible day, such an appropriation."[40] A subsequent editorial claimed that since Baltimore was 200 miles nearer St. Louis than New York, and relatively closer to other leading Western points, Congressmen from the immense grain producing regions of the West should also lobby for a large federal grant for Baltimore's port.[41] The Collector of the Port of Baltimore agreed. He wrote Craighill that "the affinities of trade subsisting between Baltimore and throughout the country, and especially the West, make . . . improvement of national as well as local concern."[42]

This campaign for a large infusion of funds for Baltimore's harbor improvement paid-off handsomely in 1872. In that year the city organized a Board of Improvement and provided it with $200,000 for immediate expenditure on the harbor. The United States Congress appropriated $100,000 for the project. Craighill would supervise the concurrent federal and city operations.[43]

During the spring of 1872 Craighill revised the entire project. Now it would be possible to widen and deepen the harbor approaches on a massive scale. The goal expanded to a channel twenty four feet deep throughout. The deeper waterways were mandatory in order to accommodate the growing size of ocean steam cargo ships. In addition, the width dimensions would be enlarged to 250 feet from Fort McHenry through the Brewerton channel and to 400 feet through the oyster beds and hard lumps of the lower Craighill Channel.

By the summer of 1872 the army and the city had thirteen dredges, three of them being the new clam-shell type, employed in the harbor, forming at that time the largest force of dredges ever used on the same project. The clam style dredge excavated three times as quickly as the old dipper model. The common dipper dredge had a single bucket with a scoop attached to a long handle. The clam dredge improved the scoop by equipping it with two jaws or shells which could open and close and dig more effectively. Most of the force scraped the bottom on the northern side of the Brewerton Channel widening the approach 100 additional feet over a distance of six and three quarters miles. Three dredges were engaged on the lower portion of the Craighill Channel. The widening of the Brewerton Channel was complete by the end of 1872. Craighill raved about the superiority of the digging of the clam-shell dredges particularly during the winter months. The amount of material excavated during December 1872, he noted, exceeded any December to date and compared favorably with the averages of the more genial months. "This I think shows the superiority for this particular work of the 'clam shell' type of 'Dredge'," he wrote the chairman of the Patapsco River Improvement Board, "as it would have been almost impossible for the 'Dipper' type to have worked during December in the Brewerton Channel."[44]

During 1873 Craighill had $400,000 to spend on dredging the harbor with the city and the federal government contributing equal shares. He let contracts for the removal of over two million cubic yards of material, the major portion of which was accomplished during the year. The dredging progressed swiftly with no significant setbacks during the entire operation. The only port mishap occurred on the night of April 14, 1873 when a small steamer, failing to slow down, brushed a dredge carrying away quarter lines.[45] The city contracted dredges labored in the Brewerton Channel while the dredges under contract to the United States government



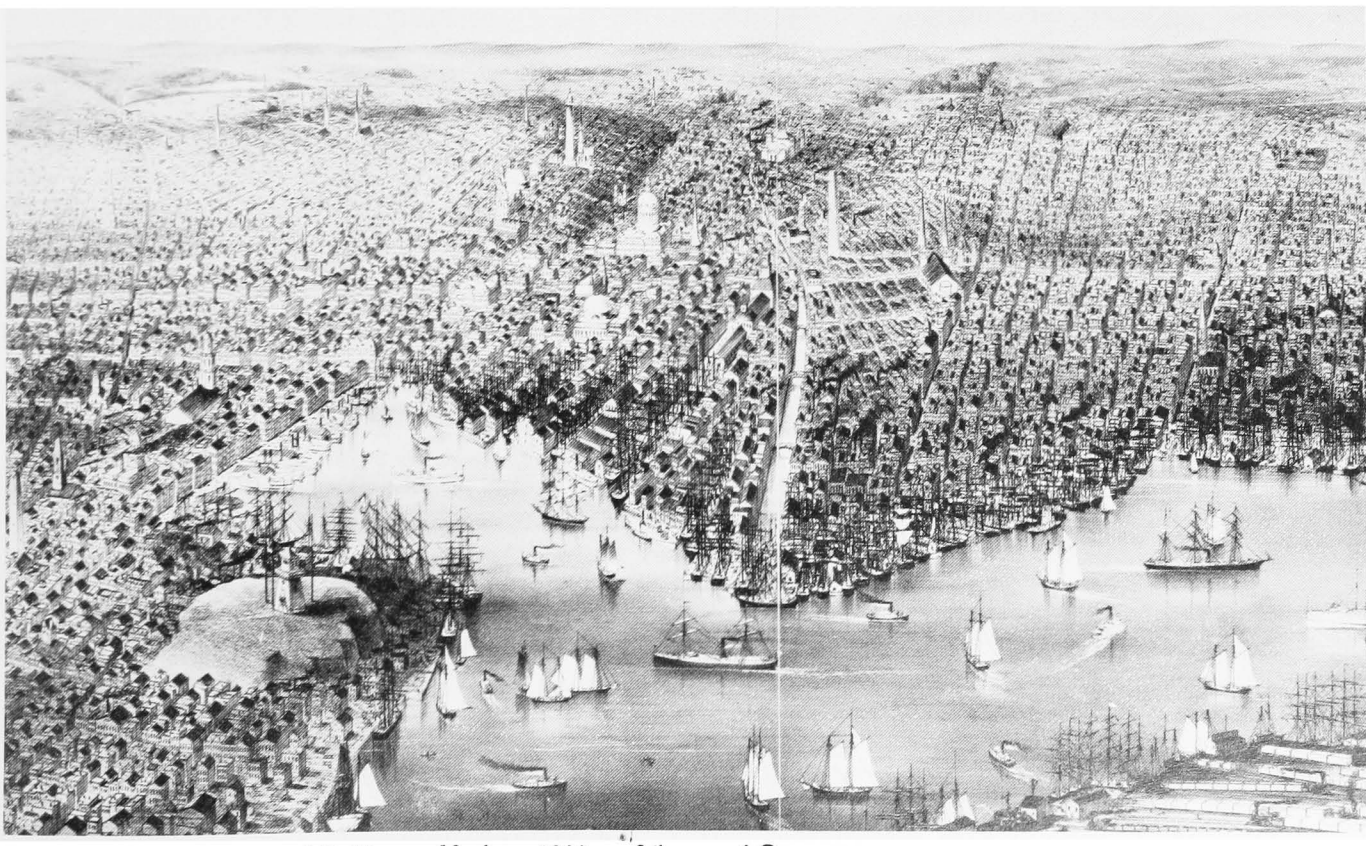
Baltimore and Ohio Railroad Pier, Locust Point, Ca. 1875.

excavated in the Craighill Channel and in the region between Fort McHenry and Fort Carroll.[46] Because of successful cooperative effort Craighill could report by the end of 1874 that he had attained completion of the entire channel to a depth of twenty four feet. Now the world's largest ships could ply the waters of the Patapsco without fear of grounding. The width was 250 feet as projected and 400 feet in the lower Craighill Channel. At the turn from the Brewerton to the Craighill Channel, an angle of ninety degrees, the width was 1,000 feet to facilitate easy turns by larger vessels. Although Craighill was pleased, he emphasized that he regarded the present width of the entire channel as the minimum acceptable. He noted that "the sides are likely to be occasionally struck by large vessels, especially steamers, whose length are greater than the width of the channel ."[47]

Again, Craighill singled out the clam dredge for praise. He estimated that without it the same excavation would have taken five to eight years. Statistics graphically supported this assertion. From April 1873 to April 1874 seven clam-shell type dredges removed an average of 900 cubic yards each of mud per day. The old dipper dredges only averaged 250 yards daily. This advanced proficiency also slashed the cost of dredging from thirty seven cents per cubic yard in 1871 to twenty two cents in 1873.[48]

The opening of the twenty four foot deep ship channel required appropriate celebration. Therefore, the Patapsco River Improvement Board invited sixty of Baltimore's most prominent citizens for a twenty mile excursion down the river on July 2, 1874 to examine the just completed artery. The *Baltimore Sun* described the event as "one of the most important to the present and future of Baltimore occurring in many years . . " Speeches congratulated those responsible for the successful dredging operation and Mayor Joshua Vansant, referring to Colonel Craighill's part in the work, said that "he had labored most assiduously and systematically and economically."[49]

The creation of passable channels to the port of Baltimore had required the patient and persistent labor of many people including both city and federal government officials over the years. Certainly Henry Brewerton, John Simpson and William P. Craighill all deserved credit. In 1874 Craighill thought it was important to also underline the contribution made by the city's chief engineer Mr. N. H. Hutton, who had formerly served in the Corps. Baltimore owed more to Mr. Hutton for the harbor improvement, Craighill declared, than to any other individual. "I feel under great personal obligation to him, while assisting me in the performance of my duty," Craighill wrote, "for the exhibition of much energy, patience, and skill by him . . He has had the immediate charge of the operations."[50]



Currier and Ives drawing of Baltimore Harbor, 1880. — Library of Congress.

Although compliments were in order, they meant nothing if the work was not maintained and improved. "It is not to be forgotten," Craighill reminded the Baltimore city fathers, "that this channel is an artificial road or highway . . . It did not exist by nature. It was made, and to be kept in good condition it requires care in its use and annual repairs."[51]

VII

Not everyone favored the dredging of the Patapsco River leading to Baltimore. Some questioned whether "improvement" was really the proper word to describe the excavation of the approach channels from the Chesapeake Bay. Craighill noted in a letter to the Chief of Engineers in 1872 that there were a few people who were hostile to dredging in the Patapsco because they feared it would "diminish their pecuniary receipts."[52] He did not refer to any specific groups or interests, but it is probable from future protests and conflicts that he was talking about oyster fishermen. They were particularly upset because the dredging had destroyed the oyster beds in the Craighill Channel. In addition, it was illegal to trawl for oysters that remained in the newly buoyed and lighted waterway. Oystermen continually violated this state statute much to Craighill's chagrin. He hoped the state would enforce the law strictly, he wrote in 1876, in order to prevent oystermen from injuring the channel. He acknowledged, however, that "it is very difficult to obtain such evidence as would convict the violator."[53]

For the business community as a whole the channel improvement was a tremendous benefit. What had once been a narrow zigzag channel of seventeen foot depth to the port was now straighter, wider and deeper. This resulted in an increase in the volume of commerce which made Baltimore one of the main gateways to the Atlantic. The number of heavy draught vessels drawing more than eighteen feet of water using the port jumped from thirty nine in 1872 to fifty seven in 1875.[54] In a letter to Craighill the Vice President of the Baltimore and Ohio Railroad expressed satisfaction over the port's growing commerce. He predicted greater volume in the future when "it becomes widely understood that vessels of heavy draft can pass freely through the improved channel."[55] Despite the decline in imports in 1877 due to the financial crisis and depression of that year, exports from the port of Baltimore continued to rise. At the close of the fiscal year ending June 30, 1871 the value of domestic foreign exports was more than $15 million. By the end of fiscal year 1876 exports amounted to over $31 million and for fiscal year 1877 they totaled $40 million. The aggregate amount of tonnage entering and departing the harbor increased from fiscal year 1876 to fiscal year 1877 by 1,322,586 tons.[56]

The additional volume of trade meant the expansion of manufacturing and port facilities in Baltimore. For example, the growth of the export trade stimulated the opening of a number of cotton mills around the city.[57] Besides cotton material, other chief commodities exported included grain, flour, petroleum, tobacco, live stock and canned fruits.[58]

The Baltimore and Ohio and the Northern Central railroads built huge wharfs, docks, grain elevators and storehouses at the port to handle the burgeoning commerce. The construction of a dry-dock in 1879 on part of the Fort McHenry reservation adjoining the property of the Baltimore and Ohio Railroad at Locust Point was intended to accommodate large steamships in need of repairs. It was anticipated that this dry-dock would further encourage large cruisers to venture into the port.[59]

VIII

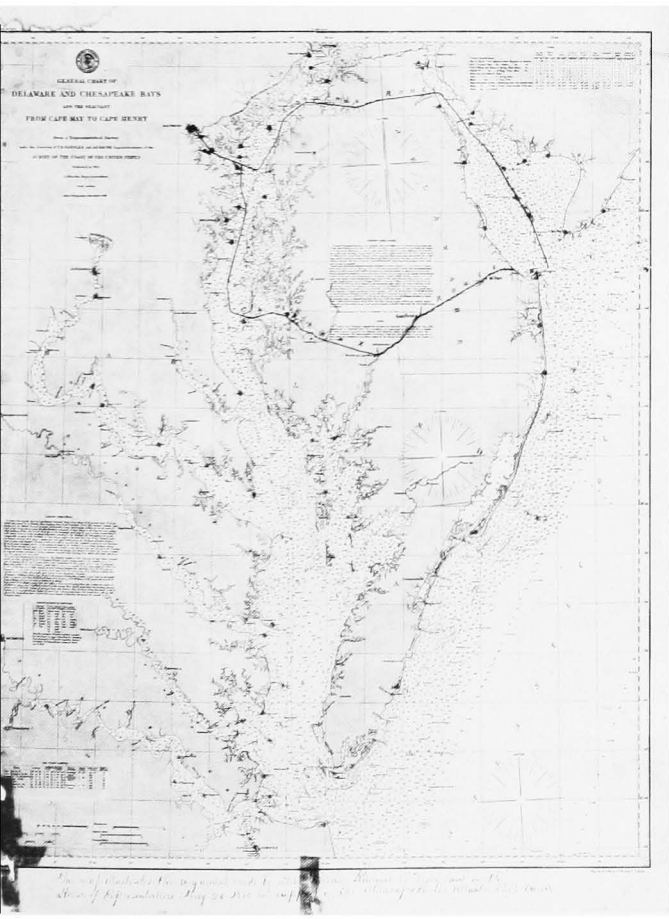
There were no dramatic changes in the Patapsco channels between 1874 and 1881. The federal appropriations, usually amounting to $75,000 annually, went to maintenance. Little money remained for new work. In 1876 Craighill did supervise the enlargement of the turning space at the junction of the Brewerton and Fort McHenry channels near Fort Carroll. At the same time he contracted for the widening of the Craighill Channel to 330 feet at those portions where it had a less width and an enlargement of the Brewerton Channel to a 300 foot width throughout.[60]

During this entire period Craighill kept exhorting for more federal money to facilitate Baltimore's port development. In his position in charge of the dredging of the Baltimore Harbor he did not merely act as a conduit carrying out the wishes of Congress through the War Department. He did not steer clear of politics, but instead assumed the role of an advocate who tried to increase the federal commitment to the improvement of the Baltimore Harbor. He expressed his opinions forcefully to the Chief of Engineers and publicly and privately to the leading citizens of Baltimore. His constant theme was the need for more money for further channel excavation.

In his 1876 report to the Chief of Engineers, Craighill decried the inadequacy of the channel's present width. "Any increase of width," he declared, "would be an improvement."[61] The channel could be maintained in its present condition for the sum of $50,000 per annum, he estimated, but due to the imperative requirement for a wider channel, he recommended an appropriation of $210,000.[62] The next year he repeated his plea warning that the large steamers using the port "are very apt to run against the sides of the channel, cutting off large slices of the bank, thus endangering the vessels and at the same time seriously injuring the channel."[63] To Craighill, improvement of the Patapsco water highway should not be postponed. "It is of great importance," he wrote Chief

of Engineers Brigadier General Andrew A. Humphreys, "to the navigation and other interests connected with the business of the city of Baltimore . "[64]

In his efforts to obtain federal funds for Baltimore's harbor development, Craighill had the support of the city's business institutions, particularly those which depended on the export-import trade. The Vice President of the Baltimore and Ohio Railroad characterized the harbor as the "front door" of his company. He estimated that 87½ per cent of his company's business derived directly or indirectly from commerce flowing to and from Baltimore's shores. "The success of our Road, financially and otherwise," he admitted to Craighill, "depends so largely upon the success we may achieve in building up a large foreign business, that the question of Harbor facilities becomes one of prime importance."[65] The Chesapeake and Ohio Canal Company, desperate for business, saw the improvement of the Baltimore Harbor as a possible means to its own salvation whereby millions of tons of Cumberland coal arriving by the canal could be shipped to northern factories.[66]



Map showing two proposed routes for Delaware and Chesapeake Ship Canal. — National Archives

Working behind the scenes, Craighill wrote Mr. John Garrett, President of the Baltimore and Ohio Railroad in 1880 suggesting a plan to quickly wrench money out of Congress for the expansion of the Baltimore Harbor. There was no facade of neutrality. Craighill, a Corps District Engineer, instructed a private party how to attain increased appropriations from Congress. He told Garrett that the cost of dredging the channel to a twenty seven foot depth would be $1½ million. Congress had not requested Craighill to prepare such an estimate for Baltimore's harbor, but if Congress instructed him to do so, this is the figure he would provide. "I would suggest therefore," he wrote Garrett, "that one of the Maryland delegation, either in the Senate or House . . . be induced to introduce a resolution . . . requesting or directing the Secretary of War to call upon the Chief of Engineers of the Army for an estimate of the cost of giving an increased depth of water to the city of Baltimore " He concluded: "I can be ready to report at once when the resolution of Congress reaches me, and it would be possible to have action in Congress at the present session." Craighill instructed Garrett to keep the letter confidential.[67]

Later that same year Craighill wrote the *Baltimore Sun* proclaiming that the great grain elevators, wharves and the new dry dock all could be attributed to the excavation of the water approach channel to the city. "The diversion of grain of the west down the Mississippi river since the improvement at the mouth of that mighty stream," he observed, "is a thing Baltimore and other Atlantic cities should carefully and without delay consider."[68] Craighill was obviously emotionally attached to Baltimore and he wanted to see his city gain pre-eminence among all commercial rivals. Not only should the harbor be dredged, but the city should push for the construction of a ship canal to connect the Chesapeake and Delaware Bays. Such a canal, Craighill pointed out, would shorten travel miles for vessels from Baltimore to the Atlantic Ocean.[69] Three days later the *Baltimore Sun* ran an editorial echoing the ideas Craighill expressed in his letter. The paper stated that the railroads which come eastward "have a natural interest in seeing the improvements in the . . . harbor of Baltimore maintained and continued, and in promoting the construction of the proposed ship canal [between the Chesapeake and Delaware Bays] which should be completed and in use as speedily as possible."[70]

Construction of Chesapeake and Delaware ship canal would have to wait until after World War I. Congress did authorize a survey of proposed routes in 1878. Mr. N. H. Hutton, now serving as an assistant engineer to Craighill, made the study. He compared and contrasted three possible routes without formulating a final judgment as to which course would be the best. The city of Baltimore preferred the middle route passing through Queenstown, Maryland because of its relative

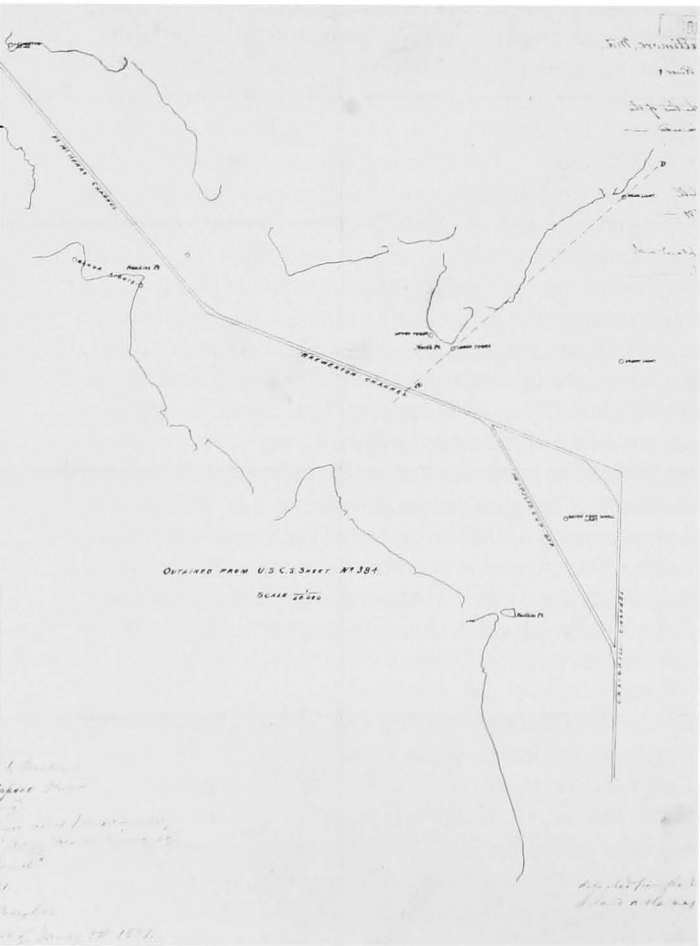
close proximity to its main harbor. Hutton estimated its cost would be $16 million. The southern route through Ferry Creek near Cambridge, Maryland would cost twice as much and therefore was given little consideration. Hutton calculated that a northern course running just ten miles south of the original Chesapeake and Delaware Canal would be the cheapest at $8 million.[71] Such a course, however, would favor Philadelphia. Craighill, noting the zealousness of the advocates of the respective canal paths, proclaimed that he did "not intend to become a lobbyist for either route . . . "[72]

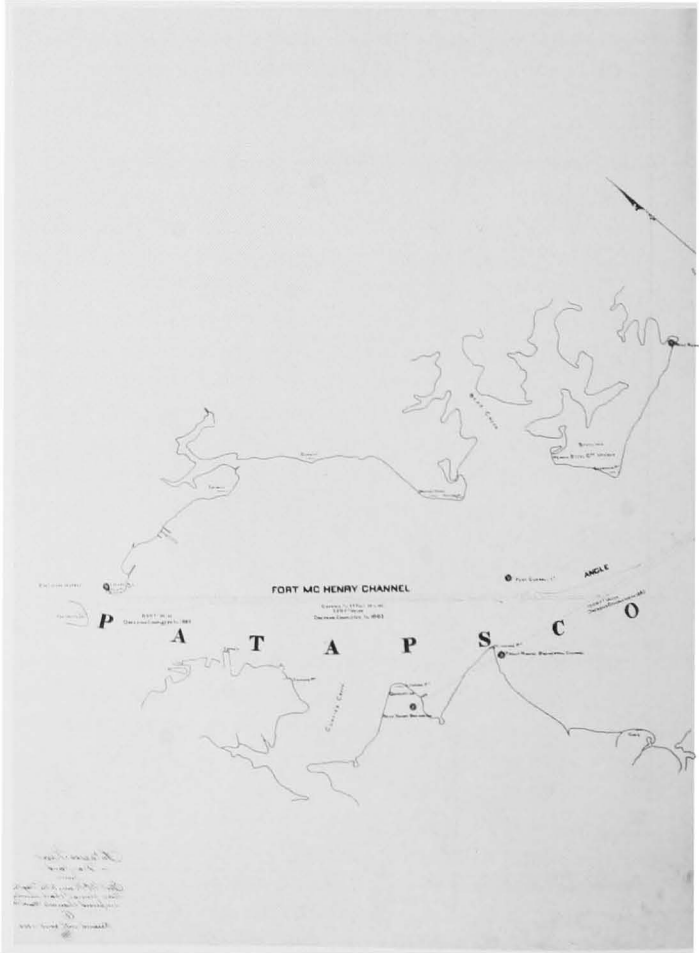
The proper location for the proposed canal continued to be debated during the next four decades. Craighill regretted the inaction. The canal, he felt, was vitally important to Baltimore. "Baltimore very naturally is extremely anxious to be brought nearer . . . to the ocean," Craighill wrote the Chief of Engineers in 1882. Although the city was closer to the West than Philadelphia, New York and Boston, her location at the head of the Chesapeake Bay required vessels to haul commerce the whole length of the Bay to the ocean. A canal connecting the Chesapeake and Delaware Bays would cut the mileage in half.[73]

Although authorization for the building of such a ship canal was not forthcoming, Craighill's efforts to achieve enlargement of the Baltimore Harbor channel was rewarded in 1881 when Congress approved a project to expand the depth of the channel to twenty seven feet. Even before the new dredging began, the *Baltimore Sun* applauded Craighill for "the great service he has rendered to Baltimore by opening and deepening the fine channel that bears his name."[74] The tonnage passing through the port of Baltimore was second only to the New York Harbor.[75]

IX

Because of an insufficient number of large dredges, excavation on the new project started slowly. But a substantial dredging force and a $450,000 appropriation in 1882 sent work into a furious pace. "We have contracts already with two of the largest dredging firms in the U.S.," Craighill informed the chairman of the Committee on River and Harbor Approaches of the Baltimore Board of Trade, "and are about to enter into a third. It is my belief that the dredging force to be engaged here this year will be the largest ever seen at one place in the U.S. "[76]



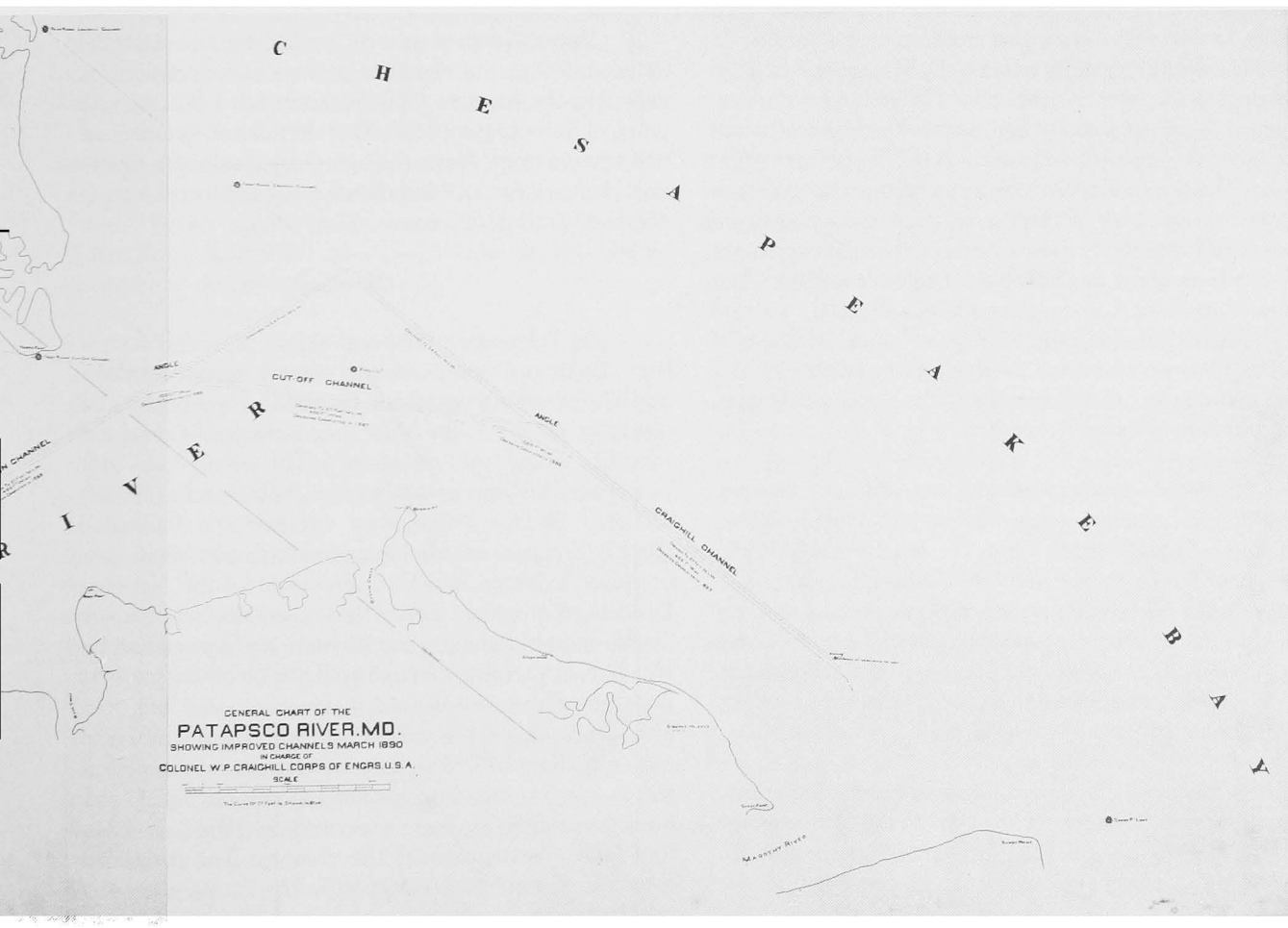


Patapsco River approach to Baltimore, 1887. — National Archives

The American Dredging Company of Philadelphia did cause Craighill some headaches. The company was slow in building dredges for the Patapsco because of an inability to obtain materials. After the necessary equipment arrived a fire destroyed the company's machine and blacksmith shops and parts of a partially constructed dredge. Once the dredges were finally in operation in the river, the company claimed that high winds causing rough seas had retarded the digging.[77] Isaac Albertson, president of the dredging company, also maintained that his firm had been "greatly deceived" into thinking that the material to be dredged would be soft; instead it turned out to be hard clay. The company wanted more than the 10¾ cents per cubic yard provided for in the current contract because of this alleged unexpected difficulty in dredging. Albertson called for "an additional ten (10¢) cents per cubic yard on all the *unreasonably hard* material that may be removed from the cuts yet to be made . . ."[78] While Craighill conceded that some of the river's bottom proved to be harder than originally anticipated, he felt Albertson's claim of a deception was an exaggeration. Ultimately, the Secretary of War Robert T. Lincoln denied the company's request for increased compensation for work already accomplished and for future excavations.[79]

Congress failed to pass a River and Harbor bill in 1883, but because of the large appropriation of the previous year the Baltimore Harbor dredging project moved forward without a slowdown. The importance of achieving a depth of twenty seven feet had not diminished in John W. Garrett's eyes and he felt assured that Craighill could continue dredging because of the large sum of money on hand. Many heavy steamships intended to use the port, Garrett wrote to Craighill, "but much depends upon securing the depth of channel . . . at an early day."[80] The *Baltimore Sun*, nevertheless, vented its anger on Congress by chastising that body for "making excessive appropriations for trout-streams and ponds" the previous year while now neglecting to provide funds "for the improvement of real highways of commerce."[81]

The harbor, however, did not suffer in 1883 from Congress's niggardliness. By the end of that year over three million cubic yards of material had been removed from the channel setting a yearly record for the Baltimore Harbor.[82] The achievement of the twenty seven foot depth took until the end of 1884.[83] Subsequently, appropriations again became irregular. Whatever funds became available Craighill put toward widening old cuts.



Patapsco River Channel, 1890. — National Archives

Because of a lack of funds, Craighill ordered the channel cleared of dredging machines in the spring of 1885. He used the opportunity to survey the dredged channel in order to verify progress. The examination showed considerable shoaling along the sides of the Craighill and Brewerton channels caused by large vessels striking against the banks and throwing masses of material into the dredged harbor approaches. The implication was clear; the channel needed to be wider.[84]

Insufficient funds caused operations to be suspended entirely during the fiscal year ending June 30, 1886. Only an appropriation of $150,000 granted in August prevented the year from being a total loss. Nevertheless, by the mid-1880's the Army Corps of Engineers had created an efficient water highway to Baltimore. Through June 30, 1886 the federal government had spent around $2 million on the harbor. The city of Baltimore and the state of Maryland had contributed $584,000.[85]

Meanwhile Craighill continued to campaign privately for more. Sometimes his concern that Baltimore become the principal commercial center in the country superseded his duties as a professional engineer. He was particularly anxious that the port receive no bad publicity which could be detrimental to business. In a letter to John W. Garrett he noted that it would be "a very unwise thing, in the interest of the goodname of the channel and of the commerce of Baltimore . . for any person to report a vessel aground *'in the channel'* when she is not so, as has to my certain knowledge been often done."[86] He praised the dredging of the channel to a depth of twenty seven feet in a letter to the Baltimore Board of Trade, but he lamented that the width could not be made as great as desirable for safe navigation. "The great importance of securing additional funds," he told the Board, "needs, therefore, no demonstration."[87] Garrett concurred that increasing the width of the channel was an "absolute necessity" in making Baltimore a more valuable port.[88]

Craighill always kept a close alliance between himself and Baltimore's business leaders. He, therefore, felt deep regret upon Garrett's death in 1884. He eulogized the Baltimore and Ohio railroad magnate in a letter to his son for the strong support he gave "to the effort to obtain a further improvement of the channel, by the attainment of a depth of 27 feet . . . This last advance gave to Baltimore a better water channel than either Philadelphia or New York has."[89]

Craighill thanked the entire business community of Baltimore in 1886 for cooperating in the campaign for channel improvement. But, he warned, there was no room for complacency. Further excavation of the Patapsco River was mandatory. "Greater width of channel is still required," he implored, "and for that we must continue to labor." With a trace of bitterness he concluded: "The whole depth and width might have been had in 2 or 3 years and at less cost if the money had been at once provided and not been doled out in driblets year by year with an occasional failure in the annual appropriation."[90] Charles D. Fisher, President of the Baltimore Board of Trade, responded by offering the Board's full support. He wrote Craighill that he was "fully determined that all the influence possible from here shall be brought to bear upon Congress to give us a proper appropriation at the next session so that the work on the channel can go on . "[91]

Craighill was also fortunate to have cordial relationships with members of Congress. He corresponded frequently with Maryland Senator Arthur Pue Gorman on the compelling need to wrench more money from Congress for the Baltimore Harbor. "I was very anxious indeed," Senator Gorman assured Craighill in 1887, "to have you begin at an early day the widening of the channel and complete that work, so that it will remain always as a monument to your skill as an Engineer . . . " According to the Senator, no officer in the Corps carried as much weight with the Senate Committee on Commerce as did the Baltimore District Engineer.[92]

When Gorman asked Craighill for a confidential letter outlining the need for a large appropriation for widening the harbor, Craighill responded by urging a grant of not less than $600,000.[93] In the end he received half that amount. Nevertheless, Congress, in its Rivers and Harbors Act of 1888 did officially authorize a main channel width of 600 feet.

X

By December 1892 and almost a million dollars later, Baltimore had a channel twenty seven feet deep and 600 feet wide throughout. Contractors carried on the dredging so efficiently that they actually finished six months ahead of schedule.[94] The work had not progressed without several hitches, however. In 1890 the National Dredging Company accused the Baltimore District Engineer of condoning an illegal combination in contract bidding. The Vice President of the National Dredging Company claimed that seven other companies "made their bid under a combination and agreement, by which it was arranged between them, that the American Dredging Company should make the lowest bid, and afterwards, share its business with the other members of the combination."[95] There is no evidence on the record to substantiate the charge and apparently Craighill took no action. Neither is there a record that there was ever a thorough investigation of the charges. The American Dredging Company, the largest in the country, got the contract.

Two years earlier that same company became embroiled in a bitter dispute with assistant engineer Major N. H. Hutton, the immediate superintendent of the harbor dredging. The company accused Hutton of consciously trying to drive its dredges from the harbor by placing unreasonable demands on employees and by using rude language resulting in daily persecutions having a demoralizing effect. Under such circumstances the President of the American Dredging Company decided to withdraw the dredge *Repubic* from the force digging in the Brewerton Channel "as she appears to be the target for most of your [Hutton's] attack, or spite work "[96] Further, the company criticized Hutton for placing dredges on both sides of the Brewerton Channel at the same time, obstructing navigation and jeopardizing the whole plant to greater risk of collision. Besides, Hutton forced the dredges to operate heading in a westward direction against the prevailing fall winds keeping the men and a portion of the dredges constantly wet. American Dredging Company President Albertson concluded a letter to Craighill by describing Hutton as arbitrary, unreasonable and a difficult burden to bear.[97]

Contractor Thomas Potter of New Jersey, whose company had toiled in the harbor during the humid summer of 1884, joined in the criticism of Major Hutton. He characterized Hutton as a tyrant who willfully and with malice ignored and repudiated written instructions from the District Engineer. Along with causing him to lose thousands of dollars, Potter charged Hutton with deliberately endeavoring to degrade and discredit him as a contractor. "Because of the treatment received at his hand," Potter emphatically declared, "I removed my plant from Baltimore, and would not *at any price* contract to do work under him."[98]

It came as no surprise when Hutton denied all the accusations leveled against him. Certainly the complaints were vociferous and bitter, but they also had a vague quality about them. Much of the dispute seemed to revolve around personality clashes rather than a genuine debate over engineering techniques. Perhaps Hutton had just been too diligent in his duties, supervising more closely than the companies liked. Besides, Hutton had been superintendent of the excavation of the Baltimore Harbor for many years and had done excellent work in the past. But it was also obvious that he and the American Dredging Company could not maintan a satisfactory working relationship. Therefore, Craighill decided to alleviate the complaints of his largest contractor by splitting Hutton's responsibilities and appointing a new supervisor to manage the American Dredging Company contract. The company happily received the new superintendent and promised to resume work with all of its dredges.[99]

Another irritating problem was the persistent violation of the harbor channels by oystermen dragging the bottom for the hard shell fish. As he had some years earlier, Craighill again warned in 1882 that oystermen could destroy the channel by constantly raking the river's floor. At that time Maryland law forbade oyster dredging within 500 yards of either edge of the Craighill Channel. Violators would lose their fishing licenses. The Baltimore District Engineer wanted this prohibition extended to include the cut-off between the Brewerton and Craighill channels. He suggested that the state erect a large sign board in a conspicuous place calling attention to the law and the penalty for its violation.[100] In 1894 the Maryland legislature did extend the oyster raking prohibition to include the Brewerton and Craighill Channel cut-off. Nevertheless, enforcement seemed to be spasmodic. Craighill noted numerous violations in 1886 and informed the Maryland Governor in 1894 "that the law is again being violated, and it seems my duty to appeal to you for such action as may seem expedient in order to prevent a worse condition than now exists." Craighill counseled that publication of a warning notice in the local newspapers and "an occasional appearance of one of the oyster police boats would probably be all that is needed."[101]

While oystermen, persuing their livelihood, disobeyed the law, small steamers passing through the channel often caused inconvenience and delay to Corps' dredging operations. There was no law which compelled small vessels drawing only eight to twelve feet of water to stay out of the Patapsco ship channel and all too frequently they ran too close to the dredges, sometimes necessitating a stoppage of work. The Baltimore District Engineer hoped that the vessels' owners would issue orders to their captains to avoid traveling on top of the dredges if possible.

With large steamers the trouble was different. Too often they passed by the dredges at full speed causing a terrific swell breaking anchor lines, stakes and tide gauges and forcing dredging delays of up to an entire day. The second lieutenant in immediate charge of the operations saw an easy solution to the problem; if the boats would simply slow down, the potential for damage would be significantly reduced. The Baltimore Board of Trade supported the idea and distributed a circular letter to various steamboat companies urging cooperation with those directing the dredging in order to minimize delays and damages. Secretary of War Elihu Root issued a series of regulations to take effect on March 20, 1901 governing the use of the main ship channel. Specifically they prohibited steamers passing dredges from traveling faster than six miles per hour.[102]

By the end of the 1870's the dumping of dredged material had become a hotly debated issue and the controversy has persisted until the present day. During 1879 Craighill had to force a city contractor to desist from

dumping sediment from the inner harbor into the Patapsco River where the current and changing tides could wash it down into the recently dredged water highway.[103] District Engineer Colonel Peter C. Hains manifest concern in 1899 about the vast amounts of dredged spoil that had been removed from the Patapsco River and dumped into the Chesapeake Bay over the years. Urgently he recommended that it was "now indispensable that precise data should be obtained of its effect upon the navigable portions of the Bay." He surmised that such a survey might show that future deposits would have to be placed behind bulkheads.[104]

XI

One of the major projects of the 1890's was the dredging of Curtis Bay, a tributary of the Patapsco River near Baltimore, to connect it with the main channel. The excavation to the main channel of about one mile seemed necessary because of the erection of a large sugar refinery in Curtis Bay. Of course the government paid for the improvement and not the company itself. Government promotion of business in the form of subsidies or technical assistance was nothing unusual. The Corps of Engineers helped to build the nation's transportation network from the early days of the Republic.

Congress approved the Curtis Bay project in 1892 providing for a channel 150 feet wide and twenty five feet deep. With $28,000 in 1892 and $12,000 more in 1894 the Corps executed the excavation. The enlargement of the channel stimulated the building of other manufacturing plants and wharves in Curtis Bay. The Baltimore and Ohio railroad constructed coal piers in the vicinity and the South Baltimore Car Works, the South Baltimore Foundry and the Ryan and McDonald Manufacturing Company makers of locomotives and machinery all settled in the area. The main harbor at Baltimore was becoming crowded and Curtis Bay provided an excellent additional outlet for these industries.[105]

In the main channel itself, Congress, in 1896, approved a project to increase the depth to thirty feet and to a width of 1,200 feet in the angles. Colonel Peter C. Hains, who became District Engineer in May 1895, believed that with liberal appropriations the entire enlargement could be finished in five years and the commercial expansion of Baltimore appeared to him to justify an effort to complete it within that time. The cost would be over $2 million.[106]

Unfortunately, the Spanish-American War interrupted prosecution of the digging, but with the $450,000 appropriated in 1896 dredging the thirty foot depth was well underway by the turn of the century.

XII

By the time of the Spanish-American War in 1898 the Corps of Engineers had transformed the port of Baltimore into one of the major harbors of the world. At a time when water transportation was the only means of travel across oceans the Baltimore Engineers constructed an artificial highway of water through which the largest cruisers of the day could pass. A shallow channel seventeen or eighteen feet deep was now thirty feet deep and 600 feet wide in some places. The effects on the city of Baltimore and Maryland as a whole cannot be overestimated. Without the excavation of the Patapsco channel Baltimore could not have remained an important port town. But the opening of the harbor allowed the city to become a prominent eastern commercial trading center. Manufacturing establishments producing grain, cloth and machinery settled in the city because of ready access to the sea. By 1898 the amount of the annual commerce passing through the port had increased $107,687,375 in value since the beginning of major improvements in 1852.[107]

Brigadier General William P. Craighill, who arrived in Baltimore as a major, left after thirty years in 1895 to become the Chief of Engineers in Washington, D. C. He departed after having profoundly influenced the shaping of the Baltimore Harbor. The Baltimore Harbor Commissioners recognized their debt to Craighill when in 1883 they praised him for his intelligent direction, advocacy and zeal.[108] Secretary of War Robert T.Lincoln marveled at Craighill's success in performing his duties and informed him in 1885 "that there is no officer in the army for whom my esteem is greater than it is for you."[109] The *Baltimore Sun* wished him well in his new position as Chief of Engineers and thanked him for "securing a splendid deep-water channel for the expanding commerce of this port Baltimore."[110] Certainly from the Civil War to 1895 he was the most influential personality behind the excavation of the Patapsco channel. The Baltimore Harbor was, as Senator Arthur Pue Gorman had hoped in 1887, a monument to Craighill's skill as an engineer.[111]

William P. Craighill served as Chief of Engineers until 1897 when he voluntarily retired after a distinguished career as a military engineer. But his reputation had never been confined to the precincts of the army as shown by his election to be President of the American Society of Civil Engineers in 1894. He was the first army officer to attain that distinction. He lived the last years of his life at his family home in Charlestown, West Virginia surrounded by his family and his books. He died on January 18, 1909. The *Baltimore American* placed Craighill's contribution in perspective by reminding its readers that before Craighill undertook the massive excavation of the Patapsco River most of the commerce coming into the port had to be unloaded on

lighters twenty miles from the inner harbor. "To the man who brought the world's commerce into the port of Baltimore and thereby did much to revive the pristine glory of the days of the clipper ships, under the new conditions of ocean liners," the *American* editorialized "this city will always be indebted."[112]

XIII

After Craighill left Baltimore, the Corps of Engineers continued to maintain and enlarge the approach channels leading to the wharves of the expanding port. Both the city and the federal government spent millions of dollars on new work and maintenance dredging. Up to 1945 the federal government alone removed more than 111 million cubic yards of material from the Baltimore Harbor at a cost of nearly $17 million.[113]

At the beginning of the twentieth century the Baltimore Harbor was one of the most crowded ports on the Atlantic seaboard. A large variety of craft jammed the piers from oyster boats to huge cargo ships. The approach channels leading to the inner harbor were thirty feet deep with a width of as much as 600 feet in some places. Dredges continued to labor in the Patapsco's waters preserving the channel and striving to attain a width of 600 feet throughout. But even as the dredges lifted mud from the river's bottom, the ambitions of the Baltimore city fathers for an even larger harbor brought pressure to bear for the adoption of a new Congressional harbor project to benefit the city.

For Baltimoreans, as well as for most Americans, 1900 was a time for optimism when the limitless resources of the world seemed to be at the country's feet. Spain had been defeated so easily that Americans felt there was no end to the influence of their power. At the same time there appeared to be no threat on the horizon that would challenge this "best of all possible worlds." Dreams of a worldwide commercial empire could now be transformed into reality. Of course, Baltimoreans wanted to share in this prosperity and keep their city near the top of the list of the major commercial and trade centers on the Atlantic coast. That a bigger harbor was necessary became a foregone conclusion.

The Baltimore Chamber of Commerce, Board of Trade and Merchants and Manufacturers Association were all exceedingly anxious to have the main channel enlarged to a depth of thirty five feet and a width of 1,000 feet from Baltimore to the sea. In January 1901 Baltimore District Engineer Lieutenant Colonel Oswald H. Ernst, who served in the Puerto Rican campaign during the Spanish-American War, urged the adoption of such a project. The growth of international trade, he observed in a letter to his supervisors in Washington, had been marked by an enlargement in the size of sea-going vessels. "Channels well adapted to the trade of a few years ago are no longer sufficient," he concluded. "Projects soon become obsolete. This is beginning to make itself felt in the harbor of Baltimore."[114]

Ernst's successor, Colonel Peter C. Hains, who had supervised the building of defenses for the Baltimore Harbor between 1896 and 1896, also supported an expansion of the main channel. He advised the city's business community to drop the idea of obtaining a channel 1,000 feet wide, however, and confine themselves to gaining a depth of thirty five feet within the current 600 foot width. Hains warned business organizations in the city "that if they were to try to get an appropriation of an amount sufficient to make a 1,000 ft. channel the probability was they would not get anything." Hains' advice was heeded.[115]

A fire ravaging the downtown business district on February 7, 1904 only temporarily slowed the campaign for deeper harbor channels.[116] Commercial interests persistently reminded government officials that some vessels trading in the port could not load their ships to their draft limits and navigate the existing channel to the sea. Other large cargo carriers, they claimed, avoided the port altogether because they would have to sacrifice too much of their carrying capacity to make entrance profitable. Finally the drive for harbor enlargement paid off when on March 3, 1905 Congress authorized dredging in the approach channels to the city to a depth of thirty five feet. It appropriated $250,000 for that year and approved work under continuing contracts to an additional $1 million. Previously in 1902 Congress had ratified small dredging projects in Curtis Bay and the Southwest Baltimore Harbor at Spring Garden. Only city authorized dredges had excavated in Spring Garden before that year.[117]

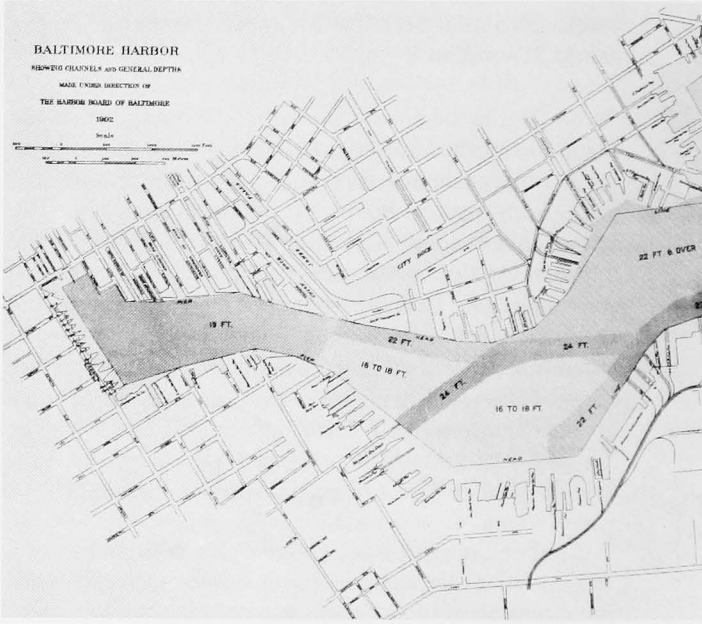
The digging of the thirty five foot channel was completed in 1915 for a total cost of almost $4 million. Unfortunately, cargo carriers of larger drafts still could not use the port's facilities because neither the city nor private terminal owners had provided a depth of thirty five feet to any of the wharves or docks in the inner harbor. During 1916, however, dredging contractors working for Baltimore dug the inner harbor to a depth of thirty five feet to conform to the deepening underwritten by the United States Congress.[118]

Throughout this period the dumping of dredged material caused controversy. Most of the excavated mud was deposited in the Chesapeake Bay. However, the potential damage to the Bay's oyster industry became of increasing concern. Colonel Hains warned in 1902 of the need of finding something to do with the dredged material besides carrying it farther out into the Bay and dumping it in deep water. He worried that this spoil material would be swept over the oyster beds and destroy them. "The

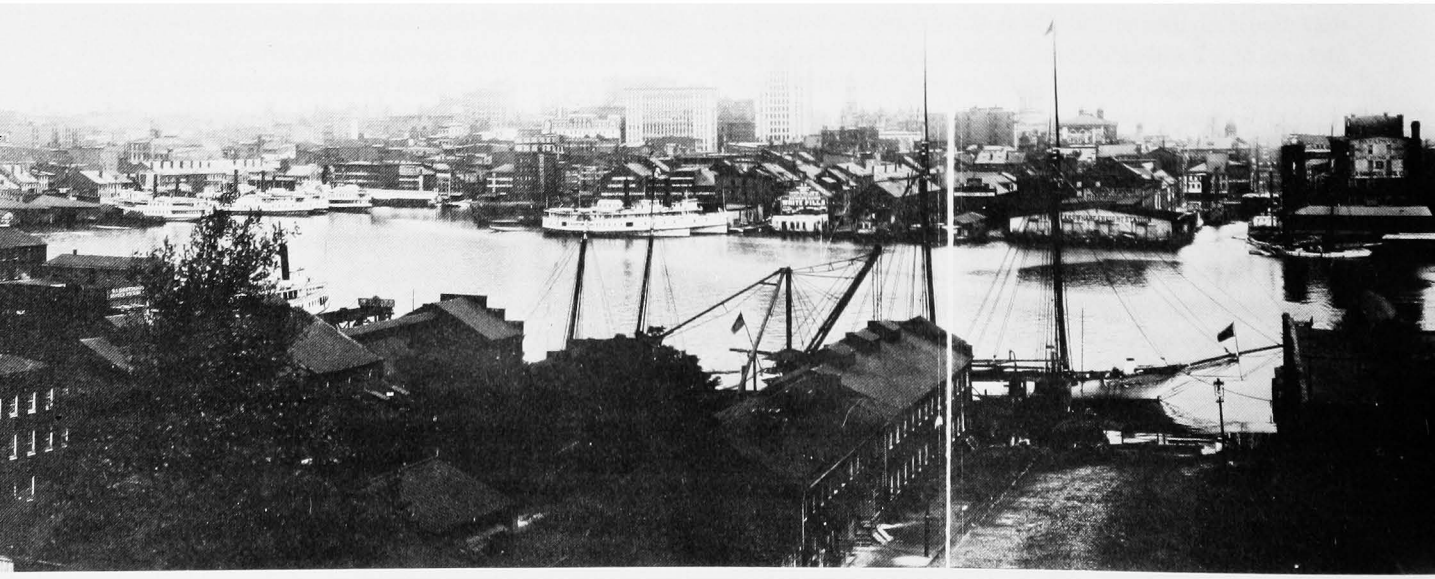
oyster business is an important one to Baltimore and anything tending to destroy any part of it," he cautioned, "will be violently opposed." As one alternative he proposed that the United States construct an artificial island in the channel out of the dredged waste.[119] Although no one took up his idea, many began to recognize the problem for the first time and the fishing industry continued to protest over the indiscriminate disposal of spoil in the Chesapeake Bay. For example, in 1906 oyster packers complained bitterly against the dumping of dredged mud on the natural oyster rock on the roads of Man-of-War shoals, which were the most prolific oyster beds in the Bay. Oyster interests estimated that between 1904 and 1906 approximately 1,000 acres of oyster beds had been destroyed in this manner.[0120]

Finally in 1917 Congress required that all new work in the Baltimore Harbor be made conditional upon the local community providing areas behind bulkheads for the deposit of dredged material. The city met the condition by building a bulkhead at McComas Street. The River and Harbor Act of 1930 authorizing expanded anchorage facilities also required the city to supply suitable disposal areas alongside bulkheads behind which local interests would agree to pump the dredged material. Again, the city complied with the terms for local cooperation.[121]

The federal government continued to contract dredges to widen and deepen the harbor in the years between the First and Second World Wars. At the same time, the state of Maryland authorized the city of Baltimore to incur indebtedness totalling $50 million for the development of port facilities.[122] During 1932 the Port Development Commission completed the construction of an $8½ million terminal pier under an agreement with the Western Maryland Railway Company while the army spent $1 million on new work and maintenance dredging.[123] By 1936 the main channel was thirty seven feet deep in some places. Although local shippers still sought to have the channel widened from 600 feet to reduce accidents, Baltimore District Engineer Colonel Elliot J. Dent writing in 1933 did not see a wider channel as mandatory. Most accidents, Dent wrote, were caused by carelessness. Certainly the 600 foot channel did not inhibit the flow of commerce. Steamship service at Baltimore extended to all major foreign countries and to all the principal domestic ports.[124] The amount of tonnage passing along the shores of the Patapsco River to and from Baltimore more than doubled from 8,894,570 tons in calendar year 1900 to 21,887,711 tons in 1936.[125]

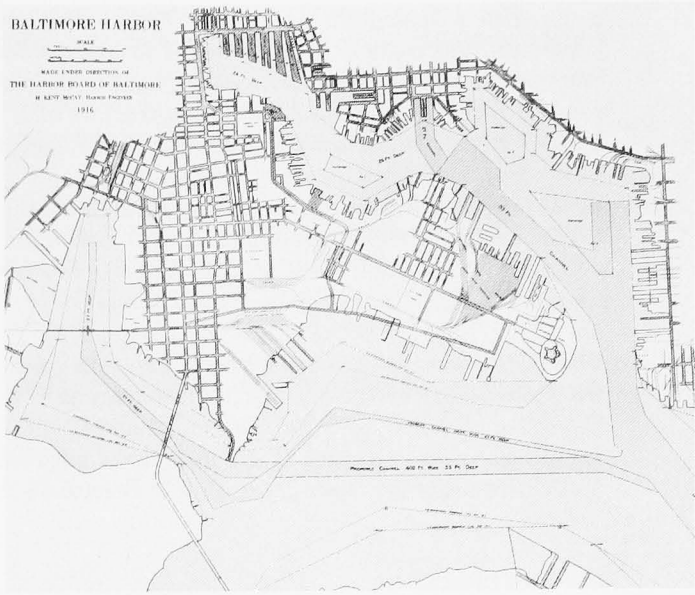


Map of Baltimore's inner port, 1902. — Library of Congress

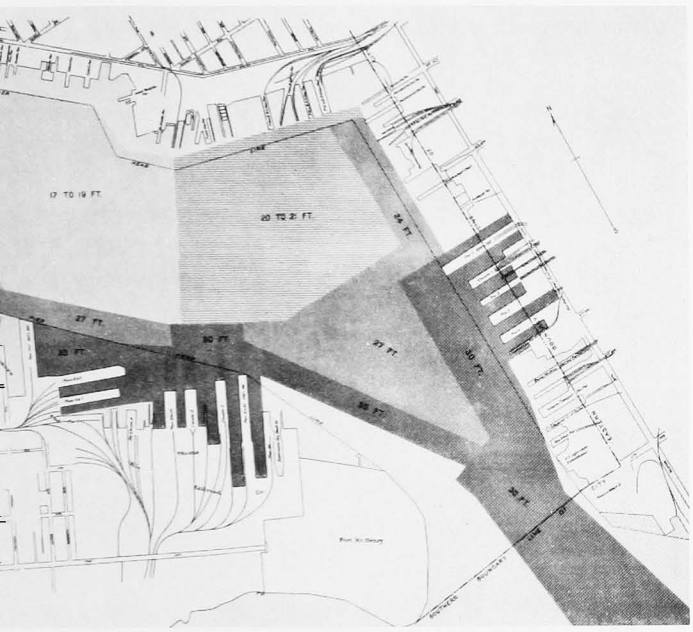


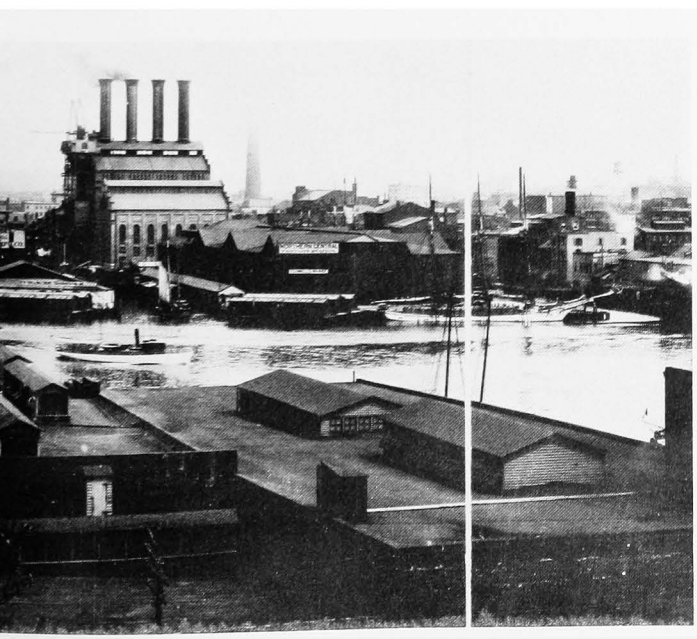
View of Baltimore Harbor from Federal Hill in 1903. — Library of Congress

A large contributing factor to the increased commerce of Baltimore's port was the federal government's decision to finally build the Chesapeake and Delaware Ship Canal which brought both Philadelphia and Baltimore closer to the Atlantic Ocean. Congress had been debating the feasibility of constructing the ship canal since 1871. Disputes over routes and the economic advisability of the scheme plagued promoters. A Presidential Commission appointed in 1906 to study the best course for a waterway to connect the Chesapeake and Delaware Bays recommended the purchase and improvement of the old canal originally built between 1824 and 1829. But it was not until 1919 that the government finally acquired the property.[126]



Baltimore's inner port, 1916.





Unloading iron ore at the Bethlehem Steel Mill, Sparrows Point, September 1940. — Farm Security Administration, Library of Congress

The Wilmington, Delaware District Engineer supervised the building of a lock free canal twelve feet deep and ninety feet wide between 1922 and 1929. This required deep excavation and the construction of new bridges to cross the improved waterway. Eventually, in 1935 Congress adopted a new enlargement plan for the canal providing for a depth of twenty seven feet and a width of 250 feet from the Delaware River to the Elk River and 400 feet in the Elk River and Chesapeake Bay. The blueprint added approximately twenty six miles in approach channels to the length of the project.[127] The War Department left the expansion of the canal itself to the Philadelphia Engineer District while it assigned the Baltimore District responsibility for excavating the twenty six miles of approach channels down Elk River and Chesapeake Bay from the mouth of Back Creek.

The United States Hopper dredge *Navesink* began excavating the approaches on July 21, 1936. In September United States hopper dredges *Absecon, Atlantic* and *Delaware* joined the force. By May 1938 the four dredges had removed over 24 million cubic yards of material from the waterway.[128]

The canal's conversion from a barge to a ship canal brought a substantial growth in the volume of commerce travelling up the Patapsco River to Baltimore. During March 1938 thirty two ships in both coastwise and overseas trade moved to and from Baltimore through the partially completed ship canal. By 1960 20,000 vessels passed through the canal each year. The Philadelphia Engineering District enlarged the canal during the 1960's

The Baltimore Harbor Industrial Piers, June 1938. — Farm Security Administration, Library of Congress

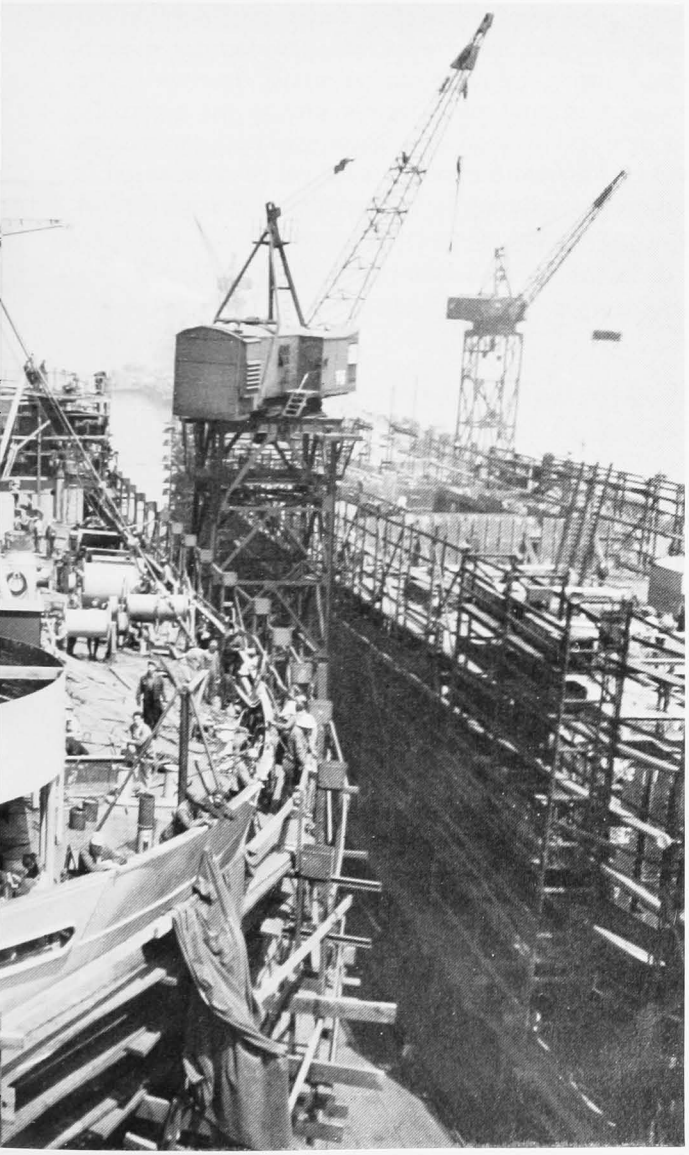
Baltimore Waterfront, June 1938. — Farm Security Administration, Library of Congress

Bethlehem-Fairfield Shipyards, May 1943. — U.S. Office of War Information, Library of Congress.

and is responsible for supervising the operation of this artificial water highway.[129]

XIV

By the 1930's the controlling depth in the Baltimore Harbor was thirty five feet. Operations consisted primarily of maintenance dredging by U.S. hopper dredges *Navesink* and *Manhattan* and contract dredging in Curtis Creek. Extensive new work during World War II was a luxury the nation could not afford. While the Chief of Engineers Major General Eugene Reybold recommended an appropriation for an improvement of the channel depth to thirty nine feet in June 1942, the Secretary of War Henry L. Stimson rejected any such request for funds. Because of "the absence of evidence showing that the proposed works are necessary to the prosecution of the war," he observed, "the submission during the present emergency of any estimate of appropriation for construction of the project [Baltimore Harbor] would not be in accord with the program of the President."[130] However, maintenance dredging to keep war materials, particularly iron ore and petroleum products, moving in and out of the harbor was continued. Baltimore District Engineer Lieutenant Colonel Oscar J. Pool viewed such maintenance operations as essential to the war effort. The shortages of iron and oil "make it imperative", Pool warned, "that their shipment be expedited and not be delayed by boats grounded in a channel."[131]



Bethlehem-Fairfield Shipyards, May 1943. — U.S. Office of War Information, Library of Congress.

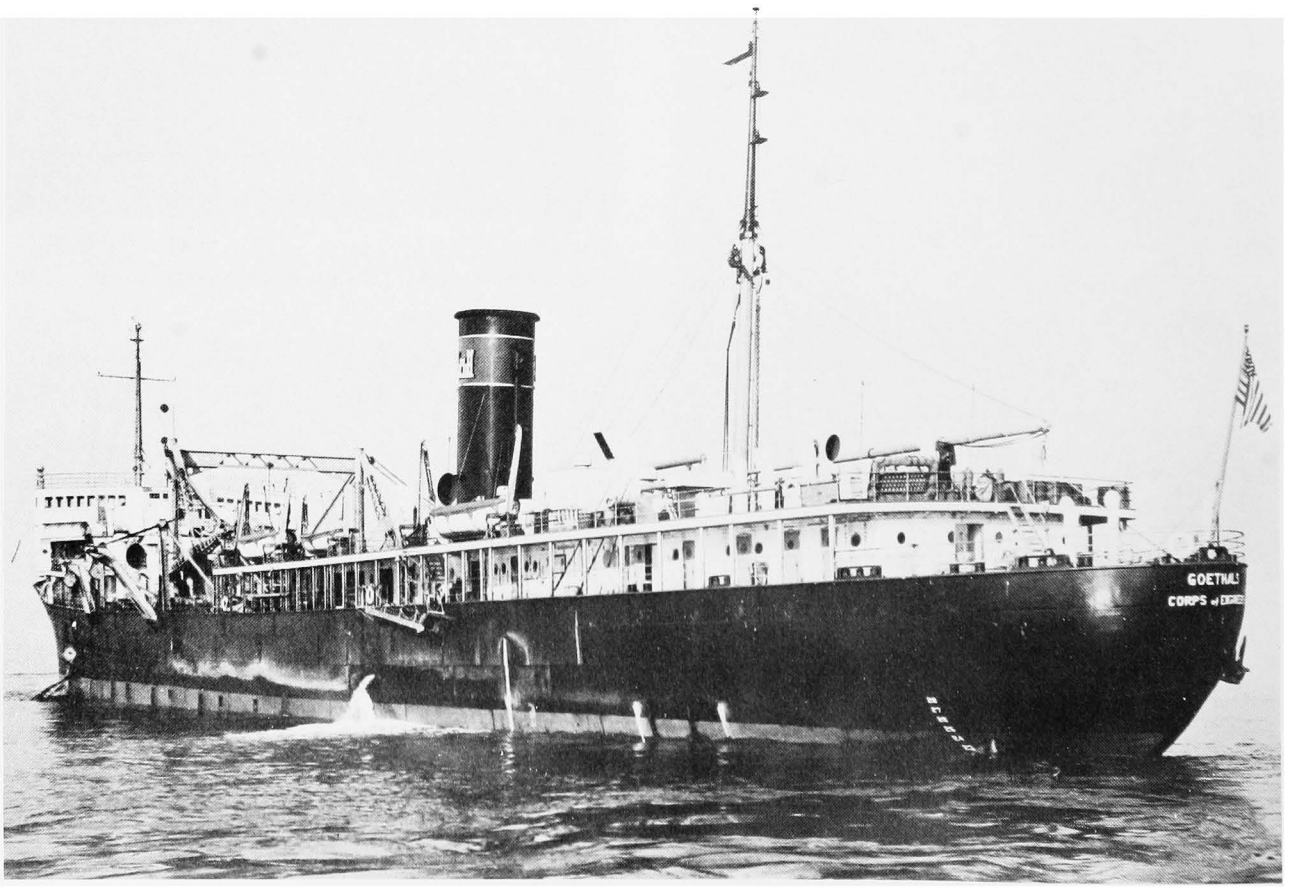
The WICOMICO Patrol Ship.

Following World War II Congress did revise the Baltimore Harbor project providing for a channel depth of thirty nine feet throughout. In addition, new work dredging by contract in 1946 and 1947 created a connecting channel twenty seven feet deep and 400 feet wide between Baltimore and the Chesapeake and Delaware Canal. The River and Harbor Act of June 30, 1948 authorized the collection and removal of drift from the Baltimore Harbor as a separate project with money coming from general maintenance funds for existing river and harbor works.

New excavations and maintenance dredging continued simultaneously until 1954 when the thirty nine foot depth was achieved at a cost of approximately $15 million.[132] In the meantime, the Corps of Engineers was already recommending further expansion of the harbor to a depth of forty two feet and a width of 800 feet with 1,000 feet in the angles. The width had not been significantly increased since the nineteenth century. Congress adopted the Corps' proposal in 1956, but it fell to a Presidential veto in an administration effort to cut the public works budget. A second veto the next year produced another setback for the promoters of harbor expansion. Finally, the project became law in 1958 and in 1960 Congress appropriated $1.9 million to start the excavation.

During the 1960's either the U. S. dredge *Essayons* or *Goethals* were seen frequently in the Patapsco River. Not only did they perform maintenance and new work tasks, but they dredged the connecting waterway to the Chesapeake and Delaware Canal to a width of 450 feet.[133]

Again as soon as one project was completed it became time to plan for the next. The River and Harbor Act of December 31, 1970 authorized a federal project to deepen the Baltimore Harbor channels from forty two to fifty feet.[134] But a dispute over the proper disposal area for the spoil material delayed the start of the digging until February 1975. The question of further harbor expansion is a hotly contested issue in the Baltimore area and its environs. Certainly the federal enlargement of the Baltimore Harbor channels executed by the Baltimore District of the Army Corps of Engineers, combined with the efforts put forth by the city and state, has made Baltimore one of the leading commercial ports in the world. The port has forty five miles of waterfront of which about twenty five miles are industrially developed. The question of how much further growth will eventually become counterproductive in terms of both commercial and environmental impact has not yet been answered. It has only been during the last few years that a definite limit on expansion has even been contemplated.



U.S. Dredge Goethals.

FOOTNOTES

[1]M. V. Brewington, *Chesapeake Bay: A Pictorial Maritime History,* (Cambridge, Maryland: Cornell Maritime Press, 1956), 118; U.S. Engineer Department, Baltimore Maryland, "Historical Summary of the Baltimore District Office" (January 1944), p. 2, Found in Historical Installation File, Records Management Branch, U.S. Army Corps of Engineers, Baltimore District, Baltimore, Maryland.

[2]Survey of the Harbor of Baltimore submitted by the Secretary of the Navy, H. Doc. 132, 19th Cong., 2nd Sess., Dec. 18, 1826, Found in *Roads and Canals,* Vol. 10, p. 6. All dimensions presented in the text are at mean low water.

[3]Annual Report of the Chief of Engineers, Gen. Charles Gratiot, Nov. 30, 1836, Part of the Annual Report of the Secretary of War, 24th Cong., 2nd Sess., Dec. 6, 1836, Found in *American State Papers,* Military Affairs, Vol. 6, Doc. 699, p. 852.

[4]*Index to the Reports of the Chief of Engineers, U.S. Army, 1866-1912, On Rivers and Harbors,* Vol. 1 (Washington: GPO, 1915), 366; Report from the Secretary of War on Internal Improvements, S. Doc. 115, 24th Cong., 2nd Sess., Jan. 24, 1837, Found in *Roads and Canals,* Vol. 38, p. 17; Forest G. Hill, *Roads, Rails and Waterways: The Army Engineers and Early Transportation* (Norman: Oklahoma Univ. Press, 1957), 181.

[5]Letter from Captain Henry Brewerton to Brig. Gen. Joseph G. Totten, Nov. 19, and Dec. 13, 1852, Records of the Chief of Engineers, National Archives, Washington, D.C., Record Group-77, Entry 968, Vol. 1.

[6]*Ibid.*, Oct. 28, 1853.

[7]*Ibid.*, Nov. 7, 1853.

[8]Annual Report of the Chief of Engineers, Appendix U, November 1874, p. 19.

[9]Letter from Brewerton to Totten, Feb. 8, 1854 and May 3, 1855, RG-77, Entry 968, Vol. 1.

[10]Annual Report of the Chief of Engineers, Nov. 22, 1858, p. 47.

[11]*Ibid.*

[12]Letter from Captain J. G. Foster, temporarily in charge of the Baltimore District to Lt. Col. R. E. DeRussy, Dec. 30, 1859, RG-77, Entry 968, Vol. 2.

[13]Through 1858 the federal government spent $120,000 on the Brewerton Channel while the city of Baltimore and the state of Maryland contributed $184,317. Annual Report of the Chief of Engineers, Nov. 1874, Appendix U, p. 20.

[14]Letter from Foster to DeRussy, Dec. 30, 1859.

[15]Annual Report of the Chief of Engineers, Oct. 30, 1865, p. 10.

[16]At the same time the Light House Board obtained an appropriation of $30,000 from Congress for the establishment of permanent beacon lights in the harbor. Letter from Major William P. Craighill to Maj. Gen. A. A. Humphreys, Sept. 4, 1866, RG-77, Entry 968, Vol. 3.

[17]*Baltimore Sun*, January 19, 1909, p. 8.

[18]Letter from Craighill to James B. McPherson, Oct. 20, 1861, James B. McPherson Papers, Manuscript Division, Library of Congress.

[19]Letter from Chief of Engineers Gen. Richard Delafield to Craighill, March 30, 1866, RG-77, Entry 22.

[20]Letter from Craighill to Humphreys, May 23, 1867, RG-77, Entry 968, Vol. 3.

FOOTNOTES (cont'd)

[21]*Ibid.*

[22]Annual Report of the Chief of Engineers, Nov. 1874, Appendix U, p. 21.

[23]Letter from Col. John H. Simpson to Mr. John Lloyd, Superintendent of the Dredges, Aug. 3, 1869, RG-77, Entry 968, Vol. 4.

[24]Annual Report of the Chief of Engineers, Oct. 25, 1869, Appendix O, p. 375.

[25]Letter from Simpson to Humphreys, Oct. 7, 1869, RG-77, Entry 968, Vol. 5.

[26]Open letter from Simpson to Mariners, Nov. 25, 1869, RG-77, Entry 968, Vol. 4.

[27]Letter from Simpson to Mr. George U. Porter, Secretary of the Baltimore Board of Trade, June 8, 1870, RG-77, Entry 968, Vol. 4.

[28]Letter from Simpson to Lloyd, Aug. 3, 1869.

[29]Letter from Simpson to Gen. W. Truman, Commander of the Army of the U.S., Sept. 29, 1869, RG-77, Entry 968, Vol. 4.

[30]Letter from Mr. N. H. Hutton, Ex-Assistant U.S. Engineer, to Simpson, Sept. 30, 1869, RG-77, Entry 968, Vol. 4.

[31]Letter from Simpson to Mr. John A. Creswell, Postmaster General of the U.S., July 21, 1870, RG-77, Entry 968, Vol. 4.

[32]Letter from Craighill to Humphreys, Dec. 16, 1870, RG-77, Entry 25, Box 9.

[33]Letter from Simpson to Humphreys, Sept. 3, 1870, RG-77, Entry 968, Vol. 5.

[34]Mr. John H. Baldwin replaced Dempsey on October 19, 1870. Although Simpson preferred the reappointment of Ronsaville, he registered no complaints about Baldwin's work. *Ibid.,* Oct. 17 and 19, 1870.

[35]Letter from Craighill to Humphreys, RG-77, Entry 968, Vol. 7.

[36]Annual Report of the Chief of Engineers, Nov. 1874, Appendix U, p. 21.

[37]*Ibid.,* Oct. 22, 1871, Appendix Q, p. 589.

[38]*Baltimore Sun,* April 10, 1871.

[39]*Ibid.,* Jan. 16, 1872.

[40]*Ibid.,* March 20, 1871.

[41]*Ibid.,* Dec. 13, 1871.

[42]Copy of letter from the Collector of the Port of Baltimore Mr. John L. Thomas to Craighill, Aug. 10, 1872, *Ibid.,* Oct. 9, 1872.

[43]Letter from Craighill to Humphreys, June 21, 1872, RG-77, Entry 969, Vol. 2.

[44]Letter from Craighill to Joshua Vansant, Chairman of the Patapsco River Improvement Board, Jan. 1, 1873, RG-77, Entry 969, Vol. 3.

[45]Letter from Curtis and Forbes and Company to Craighill, April 16, 1873, RG-77, Entry 997, Box 2.

[46]*Baltimore Sun,* Jan. 6, 1874, p. 4.

[47]Annual Report of the Chief of Engineers, Nov. 1874, Appendix U, p. 22.

[48]*Ibid.*

FOOTNOTES (cont'd)

[49]*Baltimore Sun,* July 3, 1874.

[50]Annual Report of the Chief of Engineers, Nov. 1874, Appendix U, p. 23.

[51]*Ibid.*

[52]Letter from Craighill to Humphreys, July 30, 1872, RG-77, Entry 968, Vol. 3.

[53]*Ibid.*, Oct. 4, 1876, RG-77, Entry 968, Vol. 8.

[54]Annual Report of the Chief of Engineers, Oct. 21, 1876, Appendix F, p. 287.

[55]Letter from Baltimore and Ohio Railroad Vice President William Keyser to Craighill, June 26, 1876, RG-77, Entry 997, Box 6.

[56]Annual Report of the Chief of Engineers, Oct. 12, 1877, Appendix F, p. 278, 280.

[57]*Ibid.*, 280.

[58]*Ibid.*, Oct. 20, 1879, Appendix F, p. 496.

[59]*Ibid.*, 497.

[60]*Ibid.*, Oct. 12, 1877, Appendix F, p. 273.

[61]*Ibid.*, Oct. 21, 1876, Appendix F, p. 285.

[62]*Ibid.*

[63]*Ibid.*, Oct. 12, 1877, Appendix F, p. 273-74.

[64]Letter from Craighill to Humphreys, Aug. 31, 1876, RG-77, Entry 968, Vol. 8.

[65]Letter from Keyser to Craighill, Dec. 23, 1876, RG-77, Entry 997, Box 6.

[66]Letter from the Engineer of the Chesapeake and Ohio Canal Company William R. Hutton to Craighill, Jan. 20, 1879, RG-77, Entry 997, Box 9.

[67]Letter from Craighill to the President of the Baltimore and Ohio Railroad Mr. John Garrett, May 3, 1880, RG-77, Entry 969, Vol 5.

[68]Letter from Craighill to Mr. A. S. Abell of the *Baltimore Sun,* Nov. 12, 1880, RG-77, Entry 969, Vol. 5. General G. A. Fillmore of the Mississippi River Commission warned Craighill in July 1880 that unless eastern ports improved their terminal facilities "the great bulk of our cereals and cotton sent abroad will go by way of the Gulf of Mexico." Letter from Gen. G. A. Filmore to Craighill, July 20, 1880, RG-77, Entry 997, Box 11.

[69]Letter from Craighill to Abell, Nov. 12, 1880.

[70]Copy of editorial in the *Baltimore Sun,* Nov. 15, 1880, RG-77, Entry 969, Vol. 5.

[71]Letter from Craighill to Humphreys, Feb. 7, 1879, RG-77, Entry 969, Vol. 5.

[72]Letter from Craighill to Chief of Engineers Brig. Gen. H. G. Wright, Dec. 20, 1880, RG-77, Entry 969, Vol. 5. In a letter written in 1885, Craighill sharply criticized the proposed northern route. Although he acknowledged that it would probably be cheaper, he declared it was *"not the best for Baltimore or the country generally."* He did not elaborate on his reasons for such a judgment, but he probably felt that by building the canal at such a location would place Baltimore at a disadvantage as compared to Philadelphia. Letter from Craighill to Mr. James L. Randolph, Oct. 22, 1885, RG-77, Entry 969, Vol. 7.

[73]Letter from Craighill to Wright, Dec. 6, 1882, RG-77, Entry 969, Vol. 6.

[74]*Baltimore Sun,* Feb. 24, 1881, p. 2.

FOOTNOTES (cont'd)

[75]Annual Report of the Chief of Engineers, Oct. 22, 1881, p. 134-35.

[76]Letter from Craighill to Mr. J. Carey Coale, Chairman of the Committee on River and Harbor Approaches of the Baltimore Board of Trade, March 21, 1883, RG-77, Entry 969, Vol. 6.

[77]Letter from the President of the American Dredging Company Isaac Albertson to Craighill, June 9, 1882, RG-77, Entry 997, Box 14.

[78]*Ibid.*, Jan. 19 and Aug. 21, 1882.

[79]Note from Chief of Engineers Gen. H. G. Wright to Secretary of War Robert T. Lincoln, Oct. 12, 1882, RG-77, Entry 77, Box 214; Letter from Lincoln to Wright, Dec. 20, 1882, RG-77, Entry 997, Box 15.

[80]Letter from Garrett to Craighill, March 14, 1883, RG-77, Entry 997, Box 15.

[81]*Baltimore Sun,* March 6, 1883, p. 2.

[82]Annual Report of the Chief of Engineers, Oct. 15, 1884, p. 142.

[83]*Ibid.*, Oct. 16, 1885, p. 138.

[84]*Ibid.*, Appendix I, p. 918.

[85]*Ibid.*, Oct. 26, 1886, p. 134; Oct. 22, 1887, p. 99.

[86]Letter from Craighill to Garrett, Feb. 15, 1883, RG-77, Entry 969, Vol. 6.

[87]Letter from Craighill to Coale, March 21, 1883.

[88]Letter from Garrett to Craighill, Nov. 3, 1883, RG-77, Entry 997, Box 15.

[89]Letter from Craighill to Mr. Robert Garrett, Sept. 30, 1884, RG-77, Entry 969, Vol. 7.

[90]Letter from Craighill to Mr. Charles D. Fisher, President of the Board of Trade of Baltimore, Sept. 17, 1886, RG-77, Entry 969, Vol. 7.

[91]Letter from Fisher to Craighill, Sept. 1, 1887, RG-77, Entry 994, Box 6.

[92]Letter from U.S. Senator Arthur Pue Gorman to Craighill, March 9, 1887, RG-77, Entry 994, Box 6.

[93]*Ibid.*, Feb. 15, 1888; Letter from Craighill to Gorman, May 11, 1888, RG-77, Entry 969, Vol. 7.

[94]Annual Report of the Chief of Engineers, Sept. 30, 1892, p. 133; Sept. 19, 1893, p. 144.

[95]Letter from the Vice President of the National Dredging Company George G. Barker to Craighill, Dec. 27, 1890, RG-77, Entry 994, Box 7.

[96]Letter from Albertson to Major N. H. Hutton, Nov. 7, 1888, RG-77, Entry 994, Box 7.

[97]Letter from Albertson to Craighill, Nov. 23, 1888, RG-77, Entry 994, Box 7.

[98]Letter from Thomas Potter to Craighill, Feb. 7, 1889, RG-77, Entry 994, Box 7.

[99]Letter from Hutton to Craighill, Nov. 17, 1888; Letter from Albertson to Craighill, Feb. 21, 1889. The President of the Atlantic Dredging Company also complained about Hutton's work. He wrote to Craighill that his company "decided several years ago that we would not do any work over which Maj. Hutton had control." He did not elaborate as to his reasons. Letter from Mr. R. G. Packhard, President of the Atlantic Dredging Company to Craighill, Feb. 22, 1889, RG-77, Entry 994, Box 7.

FOOTNOTES (cont'd)

[100]Letter from Craighill to Gen. O. E. Babcock, Lighthouse Engineer, 5th District, Jan. 9, 1882; Letter from Craighill to Maryland Governor William Hamilton, Jan. 12, 1882, RG-77, Entry 969, Vol. 6.

[101]Laws of the State of Maryland, Chapt. 30, Section 50, Passed Jan. 1894, RG-77, Entry 994, Box 8; Letter from Craighill to Maryland Governor Frank Brown, Jan. 2, 1894, RG-77, Entry 969, Vol. 8.

[102]Letter from Second Lt. Charles Kutz to Baltimore District Engineer Col. Peter C. Hains, April 29, 1897; Letter from Eugene Levering, President of the Baltimore Board of Trade to various steamboat companies, May 7, 1897, RG-77, Entry 994, Box 8; Letter from Hains to Chester River Steamboat Company, July 10, 1897, RG-77, Entry 969, Vol. 9; Regulations for the use of the main ship channel leading to Baltimore, Secretary of War, Elihu Root, March, 20, 1901, RG-77, Entry 994, Box 9.

[103]Letter from Justice of the Peace for the State of Maryland W. H. Richardson to the Collector for the Port of Baltimore John L. Thomas, Sept. 29, 1879; Letter from Thomas to Craighill, Oct. 3, 1879, RG-77, Entry 997, Box 10.

[104]Letter from Hains to the Baltimore Dredging Company, March 6, 1899, RG-77, Entry 985, Vol. 6.

[105]Letter from Craighill to Brig. Gen. Thomas L. Casey, Chief of Engineers, June 7, 1890, RG-77, Entry 969, Vol. 7; Letter from Craighill to Congressman Isidor Rayner of Maryland, May 8, 1894, RG-77, Entry 969, Vol. 8; Letter from First Lt. Kutz to Brig. Gen. John Wilson, Chief of Engineers, Dec. 21, 1899, RG-77, Entry 985, Vol. 7.

[106]Letter from Hains to Mr. H. C. Landis, Secretary of the Baltimore Board of Trade, Sept. 14, 1896, RG-77, Entry 984, Vol. 14.

[107]Annual Report of the Chief of Engineers, Sept. 29, 1898, p. 176.

[108]*Baltimore Sun,* Feb. 3, 1883, p. 2.

[109]Letter from Secretary of War Robert T. Lincoln to Craighill, March 2, 1885, RG-77, Entry 997, Box 16.

[110]*Baltimore Sun,* May 13, 1895, p. 4.

[111]Letter from U.S. Senator Arthur Pue Gorman to Craighill, March 9, 1887.

[112]*Baltimore American,* Jan. 19, 1909, p. 8; *Baltimore Sun,* Jan. 19, 1909, p. 4, 8; Association of the Graduates of the United States Military Academy, *Annual Reunion,* XXXX (June 10, 1909), 106-136.

[113]L. C. Gottschalk, "Effects of Soil Erosion on Navigation in Upper Chesapeake Bay," *Geographical Review,* XXXV (April 1945), 236.

[114]Letter from Lt. Col. O. H. Ernst to Chief of Engineers Brig. Gen. John M. Wilson, Jan. 19, 1901, RG-77, Entry 985, Vol. 8.

[115]Letter from Hains to Chief of Engineers Brig. Gen. George L. Gillespie, Dec. 8, 1902, RG-77, Entry 985, Vol. 9.

[116]The fire, which started on Sunday morning February 7, 1904, in forty hours destroyed over 140 acres of commercial property including 1,343 separate buildings. Francis F. Beirne, *The Amiable Baltimoreans* (New York: E. P. Dutton and Company, Inc., 1951), 338-39.

[117]Francis F. Beirne, *Baltimore A Picture History, 1859-1958* (New York: Hastings House, 1957), 97; Report on the History of the Project for a 35' Channel from Baltimore to the Sea, Albert Mott, Inspector, Dec.

FOOTNOTES (cont'd)

24, 1904; Letter from the Baltimore Merchants and Manufacturer Association to Col. Richard Hoxie, April 13, 1905; Letter from the Baltimore Board of Trade to Hoxie, April 17, 1905; Letter from the Baltimore Chamber of Commerce to Hoxie, April 19, 1905, RG-77, Entry 994, Box 9; Letters from Hains to Gillespie, July 10 and Aug. 5, 1902, RG-77, Entry 985, Vol. 9; Annual Report of the Chief of Engineers, Aug. 31, 1948, p. 444; Sept. 28, 1904, p. 180-81; Sept. 29, 1905, p. 187.

[118]*Ibid.*, Sept. 28, 1915, p. 387; Oct. 5, 1916, p. 421.

[119]Letter from Hains to Gillespie, Dec. 11, 1902, RG-77, Entry 985, Vol. 9.

[120]*Baltimore American*, September 25, 1906, RG-77, Entry 994, Box 9.

[121]Department of the Army, Baltimore District, Corps of Engineers, *Review Report: Baltimore Harbor and Channels* (June 1969), 21-22.

[122]Annual Report of the Chief of Engineers, Oct. 5, 1922, p. 523.

[123]*Ibid.*, Sept. 22, 1932, p. 394.

[124]Report of Col. Elliot J. Dent on the Baltimore Harbor, June 3, 1933, RG-77, ACC 71A939, Box 39.

[125]U.S. Army, Index to the Reports of the Chief of Engineers, Vol. 1, p. 366; U.S. Army, Corps of Engineers, *Baltimore Harbor and Channels*, H. Doc. 741, 79th Cong., 2nd Sess., 1947, p. 25. The tonnage passing through the port of Baltimore generally increased each year in the period from 1900 to 1936 with a drop off during the war years of 1917-1919 and during the depression years of 1922 and 1930-1934. See also U.S. Army Corps of Engineers, *Baltimore Harbor and Channels*, H. Doc. 29, 71st Cong., 1st Sess., 1929, p. 19.

[126]U.S. Chesapeake and Delaware Canal Commission, Waterway to Connect Waters of Chesapeake and Delaware Bays, S. Doc. 215, 59th Cong., 2nd Sess., 1907; U.S. Congress. House Committee on Railways and Canals, Hearings on the Chesapeake and Delaware Canal, 1908, 1909; U.S. Congress. Senate Subcommittee of the Committee on Coast and Insular Survey, March 21, 24, 28, and 31, 1914; U.S. Congress. House Committee on Rivers and Harbors, Hearings on the Purchase of the Chesapeake and Delaware Canal, Jan. 15, 1914; U.S. War Department,Proposed Acquisition of Chesapeake and Delaware Canal, S. Doc. 14, 64th Cong., 1st Sess., 1915; U.S. Congress. House Committee on Rivers and Harbors, Hearings on the Purchase and Improvement of the Chesapeake and Delaware Canal, Jan. 6, 1917; Dec. 16, 1918. For a detailed account of the debate to transform the Chesapeake and Delaware Canal into a modern ship canal see Ralph D. Gray, *The National Waterway; A History of the Chesapeake and Delaware Canal, 1769-1965* (University of Illinois Press, 1967), 216-239.

[127]U.S. Congress. House Committee on Rivers Harbors, Hearings on Continuing the Improvement of the Chesapeake and Delaware Canal, Jan. 31 and Feb. 1, 1934.

[128]U.S. Engineer Department, Philadelphia Office, *The Chesapeake and Delaware Canal* (May 1, 1941), 23-24.

[129]Gray, 251, 257.

[130]Letter from Chief of Engineers Maj. Gen. Eugene Reybold to Chairman of the House Committee on Rivers and Harbors, June 30, 1942; Letter from Sec. of War Henry L. Stimson to the Speaker of the House, March 11, 1943, RG-77, ACC 71A939, Box 39.

[131]Letter from Baltimore District Engineer Lt. Col.

FOOTNOTES (cont'd)

Oscar J. Pool to the Division Engineer, Aug. 9, 1943, RG-77, ACC 71A939, Box 39.

[132]Annual Report of the Chief of Engineers, 1955, Vol. 2, p. 187-88.

[133]*Ibid.*, 1963, Vol. 2, p. 278; 1964, Vol. 2, p. 249; 1965, Vol. 2, p. 239; 1966, Vol. 2. p. 239; 1967, Vol. 2, p. 253; 1968, Vol. 2, p. 189; 1969, Vol. 2, p. 171.

[134]*Ibid.*, 1972, Vol. 2, p. 4-2, 4-3.

View of Baltimore Harbor from Federal Hill ca. 1830. Photocopy of aquatint by W. J. Bennett. — Library of Congress

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