

COLONEL ALEXANDER SCAMMEL MEMORIAL BRIDGE
(Bellamy River Bridge)
(Bridge No. 174/034)
U.S. Route 4, spanning the Bellamy River
Dover
Strafford County
New Hampshire

HAER No. NH-26

HAER
NH
9-DOV,
2-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, P.A. 19106

HISTORIC AMERICAN ENGINEERING RECORD
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Location: U.S. Route 4, spanning the Bellamy River, Dover, Strafford County, New Hampshire.
USGS Dover East, NH Quadrangle, 1:24000
UTM Coordinates: 19.349560.4777610

Date of Construction: 1935

Engineer: Fay, Spofford & Thorndike, Boston, Massachusetts

Builder: Warren Brothers Road Company, Cambridge, Massachusetts

Present Owner: New Hampshire Department of Transportation
Concord, New Hampshire

Present Use: Vehicular bridge

Significance: The Scammell Memorial Bridge is a representative example of a single leaf bascule lift bridge with a vertical overhead counterweight. It is the oldest of the state's three remaining bascule bridges and is the only one in which the counterweight is visible. Construction of the bridge in 1935 was part of a larger Public Works Administration-funded project to restore a direct route from the seacoast to Concord through Durham.

Project Information: The Scammell Memorial Bridge was recorded in June, 1996 by Lisa Mausolf, Preservation Consultant, for the New Hampshire Department of Transportation (NHDOT). The recordation was undertaken pursuant to a Memorandum of Agreement between the Federal Highway Administration and the New Hampshire State Historic Preservation Officer executed in association with the planned replacement of the Scammell Memorial Bridge.

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DESCRIPTION

The Colonel Alexander Scammell Memorial Bridge (Bridge No. 174/034), built in 1935, is a two lane concrete trestle with a single leaf bascule draw span which carries U.S. Route 4 over the Bellamy River. The bridge is located within the City of Dover, in Strafford County, approximately 0.20 mile east of the Dover-Madbury town line. The bridge provides a physical connection between the town lines of Dover, Durham and Madbury, at the western end, and Dover Point, at the eastern terminus. Construction of the Scammell Bridge was one element in a multi-part highway improvement project which sought to restore a direct route from the seacoast of New Hampshire to Concord, the capital, via Durham. Other elements of the project included the construction of the General John Sullivan Bridge in 1934 across Little Bay from Dover Point to Portsmouth and construction of various short stretches of new road linking the new bridges with existing routes.

The Scammell Memorial Bridge is a bascule span with a vertical overhead counterweight. The steel span rests on what was originally a granite-faced (now concrete-faced) concrete pier supported by 112 timber piles on a base of silt and sand. The steel-girder bascule measures about 49 feet long from trunnion to end bearing and is located about mid length on the pile trestle. The 680 ft. long trestle spans two rip-rap covered embankments extending from the banks of the river. The bridge clears Bellamy River by 29' 9" at the draw span. The overall width is 30', and the roadway width is 24' between curbs, with an asphalt wearing surface. The bridge's support system consists of five continuous reinforced concrete tee beams measuring 1'6" wide and spaced 6'4 1/2" apart. Stirrups measuring 3/4" round are utilized throughout the caps and girders. The bronze bearing plates are 3/4" x 8" x 18". Concrete pile caps measuring 3'0" x 2'6" project from the outer faces of the teebeams, supporting a cantilevered walkway on the north side.

Flanking the central bascule draw span, which is 60'-0.5", are twenty concrete tee-beam deck spans varying in length between 28'-11" and 30'-11". The deck spans are supported by bents of five 20 inch square, reinforced concrete piles with chamfered corners. The piles range in length from 70 to 105 feet. The weight of the 105 foot piles is approximately 22 tons. The piles are driven vertically except for the bents under the two expansion joints and those supporting the bascule span. At these three points alternate piles have opposite batters. According to a contemporary report in an engineering journal, the Scammell Bridge was noteworthy for the exceptionally large precast concrete piles which featured slabs of asphalt-impregnated concrete cast into the piles to protect against disintegrating sea-water salts and frost actions (Engineering News-Record 1935: 122).

The bridge's two structural steel towers are joined by structural steel diagonal wind bracing. Set atop the towers is a concrete counterweight, decorated on the east side by recessed panels. The counterweight is carried by a pair of struts articulated to rearward extensions of the main trusses. The tower that supports the main trunnions, on which the span revolves, is extended up to the top of the counterweight. A link is pinned to the top of the tower and to the counterweight and is parallel to the plane through the main trunnion and the pin in the end of the main truss which supports the counterweight struts. The four joints are at the corners of a parallelogram. When the leaf opens, the counterweight is held parallel to its original position.

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The bridge currently has a sidewalk only on the south side. Originally the north walk measured three feet wide while a south walk was five feet wide. The north sidewalk was apparently eliminated to accommodate a wider roadway. At construction, a wearing surface of 1 1/2" of concrete was poured over the 7 1/2" thick slabs. The roadway is presently paved with asphalt. The original concrete open balustrade railings were 3'8" high and have been replaced with aluminum horizontal rails. The six original lamp standards on the north side have been replaced by standard aluminum light fixtures. The gates which marked the ends of the draw span have been removed. Designed to open to allow the passage of sea-going vessels, the Scammell Bridge's draw span has not been opened since 1958. In recent years, inspections have noted vertical cracking in the concrete pile supports, crumbling concrete and rusting of the rebar. The concrete pier caps are also crumbling in spots (Foster's Daily Democrat, June 6, 1994).

HISTORICAL INFORMATION

Background

The city of Dover comprises 28.2 square miles and is located in the southeastern part of the state, at a point where the Cocheco and Bellamy Rivers meet the tidewater. The two rivers run almost parallel to each other and are only one mile apart. Settlement has historically been concentrated at three centers of activity. The earliest settlement occurred at the eastern extent of the city, now known as Dover Point, at the junction of the Piscataqua and Cocheco Rivers. A mile above the point is Dover Neck, so called because it is a neck of land between three rivers. The village at Cocheco, now the business center of the city of Dover, is located at the lower falls of the Cocheco River (Dover 350th; Scales 1928; Whitehouse 1988).

Dover is the oldest community in New Hampshire and the second permanent settlement in New England. The first permanent settlement in the state occurred in 1623 at what is now Dover Point. The initial English settlers included Edward and William Hilton. Edward Hilton erected the first house in Dover on the east side of the point in the Spring of 1623. Hilton's settlement was initially called Northam, later renamed Dover. Other settlers from England arrived between 1631 and 1634 headed by Capt. John Mason. Early settlement was concentrated on the southernmost tip of Dover Neck bounded by the Piscataqua, Cocheco (or Fore) and Bellamy (or Back) Rivers. The area offered good fishing potential, the convenience of trading pelts with Indians at the falls, and clay banks for brickmaking, while the narrow neck of land provided an excellent means of escape in case of Indian attack. Settlement on the hill at Dover Neck began ten years after that at the point (Whitehouse 1988).

By 1630 the trading and fishing post had become an organized village. A meetinghouse was built by 1634, near the present location of the toll house on the Spaulding Turnpike. As the settlement grew a second meetinghouse was built at the top of the hill at Dover Point. Over the next fifty years the settlement at Hilton Point expanded to the north and west to reap the benefits of fertile soil, natural water power and virgin forests. The harmonious coexistence with the native Indian community began to deteriorate about 1675 and fortified houses known as garrisons were built in Dover and the surrounding area. An Indian raid in 1689 destroyed several garrisons and killed several residents (Dover 350th).

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From Dover's settlement in the early 1600s through the late 1700s the Cocheco River was the focus of the local economy. Early residents were primarily farmers and relied on the river and the gundalows that plied the river for trade and transportation. The coves of the river housed shipyards from an early time. As early as the 1640s a frigate was built for the British navy near Thomson's Cove. Later shipbuilding was encouraged by a desire to export lumber. At a very early period Dover became the largest ship-building locality in New England (Scales 1928:572; Whitehouse 1988).

As early as 1640, ferries were the only way of crossing the river. Early ferries included one operated between Dover Point and Bloody Point (Newington) by Thomas Trickey. This ferry did not cease operation until the railroad bridge was built in 1871. Other ferries linked Dover and Kittery (now Eliot) and Fresh Creek (now Rollinsford). Rights to operate a ferry business were controlled by the town. By 1766, traffic on the river prompted the town to vote to build a hotel at Dover Point. Dover became the seat of Strafford County in 1771 (Dover 350th: 87; Whitehouse 1988: 5).

As the town moved northward to its present center, a landing was established below the falls of the Cocheco River. In 1785 the town selectmen voted to sell or lease lots at the Landing to encourage and promote trade, spurring a new stage of development. Dover became a major lumber trade center for northern New England. The presence of falls for sawmills and a direct water access to the sea down the Cocheco River made Dover an important inland port and shipping center. Numerous stores and businesses opened along the waterfront during the 1820s. Gundalows and packets offered daily scheduled runs to Portsmouth and semiweekly trips to Boston and Portland (Whitehouse 1988: xii).

In June 1793, the General Court authorized the construction of the Piscataqua Bridge from Fox Point in Newington to Goat Island and thence to Meader's Neck in Durham. Work on the bridge began in April 1794 and was opened for traffic in November 1794. The bridge was 2,362 feet long and 38 feet wide and was considered a marvel in its day. Construction of an additional bridge over the Piscataqua between Portsmouth and Kittery in 1822 had a very different impact on Dover. The new bridge was a serious obstruction to the navigation of the river which previously had been navigable at all seasons from the ocean to Dover Point for all types of vessels. After the construction of the bridge boats had to start from Dover at about high tide, row down the Cocheco to the Piscataqua and then float with the tide to the bridge. In good weather, it took about four and a half hours to row a loaded gundalow from Dover Landing to Portsmouth Bridge. In inclement weather it could take several days to wait for safe passage under the Portsmouth Bridge. Accidents at the bridge increased dramatically and Dover attempted to sue for removal of the bridge although this was not successful (Stevens 1907: 51).

In 1821 cotton factories and print works were constructed at Dover. Known initially as the Dover Factory Co., it later merged into the Cocheco Manufacturing Company and was incorporated in 1836. Four mills and the print works manufactured the famous Cocheco prints, some of the country's first calicos. Sawyers Woolen Mills were established in 1824. Between 1820 and 1830, Dover's population almost doubled, rising from 2871 to 5449 due to the influence of the mills. The Dover Packet Co. and the coming of the railroad in 1841 were important in making Dover known as a distribution point, although for a time river trade was eclipsed by the railroad. The center of town moved from the wharves to the new railroad station. The last ship built in Dover was launched on the Cocheco River in 1838 (Whitehouse 1988: 17)

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Dover was incorporated as a city in 1855 and by the 1870s was one of the great industrial centers of New England. As railroad freight charges increased, businessmen returned to the river and its cheaper methods of transport, ushering in a renaissance in Dover shipping. During the last quarter of the 19th century, city officials concentrated on developing the Cochecho River. The shallow beds of the river were dredged and submerged ledges were blasted so that larger vessels could come directly into the Landing to unload. The 1880s marked the heyday of Dover shipping with as many as eight vessels docking each week. This prosperity came to an abrupt end in 1896 when a great storm and flood crippled many local waterfront businesses and redeposited much of the silt and sand which had been dredged out of the river over the past 25 years. A nationwide shift to railroads and modern trucking were the final deathblows to Dover's golden era of river shipping (Whitehouse 1988: xii-xiii).

In 1855 the Piscataqua River bridge was removed after 600 feet of the bridge on the Newington side was carried away by ice, thus ending the First New Hampshire Turnpike as a through way to Portsmouth. The Portsmouth and Dover Railroad, later the B & M Railroad, constructed a combination railroad and highway bridge further north in 1872. The demolition of the railroad bridge in 1935 and the restoration of a direct route from the seacoast to Concord made the highway the preferred transportation mode once again.

History of the Colonel Alexander Scammell Memorial Bridge

Prior to the construction of the companion Scammell and Sullivan Bridges, the only outlet from Portsmouth to the north was over the aged toll bridge owned by the Boston and Maine Railroad. Construction of the state-owned Scammell Memorial Bridge in 1935 (and the Sullivan Memorial Bridge in 1934) culminated eight years of legislative struggle regarding the location of the bridges and whether the improvements should be funded by tolls. From the beginning, the stated purposes of the project were to shorten the distance between Durham and Portsmouth and to provide a fitting entrance to the state for out of state tourists traveling over the east side route to the mountains. The successful legislation was introduced by Rep. Oren V. Henderson of Durham in 1933 and authorized the construction of a bridge over Little Bay and a companion bridge over the Bellamy River. The 1933 legislation repealed an earlier 1931 proposed layout which would have left Dover Point a dead end, requiring residents to travel six miles to Dover before starting south or west. The appropriation of \$1.1 million provided \$275,000 for the purchase of the Dover Point Toll Bridge from the Boston and Maine Railroad and \$825,000 to construct the two new bridges (Henderson, Bridges 1936).

Initial plans called for a level bridge over the Bellamy River, with a timber trestle and plank deck. A decision by the War Department in 1933 required that the Bellamy River bridge must have a draw span of forty feet in length and that the Dover Point bridge could be built without a draw span if a clearance of fifty feet above mean low tide over the Bellamy River was provided. Sealed proposals for the construction of a concrete trestle with bascule draw span were advertised in April 1934 and the contracts were awarded in June 1934. Fay, Spofford and Thorndike, Boston, Massachusetts, were the engineers, and the Warren Brothers Roads Co. of Cambridge, Massachusetts were the general contractors at a bid price of \$236,145. The Raymond Concrete Pile Co. of New York City, had the subcontract for driving the piles. The

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Lackawanna Steel Construction Company of Buffalo, New York furnished the steelwork and the Earle Gear and Machine Co. of Philadelphia provided the operating machinery for the draw span. The Bridge was undertaken under a PWA loan and grant (PWA Docket No. 752) to the New Hampshire Toll Bridge Commission (Henderson, Bridges 1936: 152-166).

During the Fall of 1933, work was started on the road leading from Coe's Corner in Durham to the Bellamy River and from the river to connect with N.H. Rt. 16 in Dover. The road was finished in November 1934 and tarred during the Spring of 1935. Although a large and formal dedication attended by over 10,000 marked the opening of the General John Sullivan Memorial Bridge in September 1934, the smaller Colonel Alexander Scammell Bridge was put into service on June 28, 1935, without formal ceremony. Rep. Oren V. Henderson of Durham, one of the sponsors of the bridge legislation, was present to open the gate at the drawspan. With the completion of the bridge, traffic for the first time in eighty years was resumed between Concord and Portsmouth via Durham over the First New Hampshire Turnpike, also known as U.S. Route 4 (Henderson, Bridges: 221; Henderson, Turnpike 1935: 35).

The bridge, known initially simply as the Bellamy River Bridge, was named after Col. Alexander Scammell (1747-1781) by the New Hampshire General Court in 1935. Scammell, a Revolutionary War hero, was born in Mendon, Massachusetts in 1747. After attending Harvard College, Scammell moved to the seacoast in 1772 and shortly thereafter began studying law with John Sullivan of Durham. Scammell joined General Sullivan and George Washington in the Revolutionary War in 1775 and was appointed brigadier major. He served at Bunker Hill, the siege of Boston, the Battle of Long Island, Trenton, Princeton and Bemis Heights, where he was wounded. In 1778 he was chosen by Congress to serve as adjutant general of the Continental Army. After a long campaign, he was praised by Washington who said, "The man who inspired us to do our full duty was Alexander Scammell." In 1781 Scammell resigned his administrative duties and rejoined the First New Hampshire as a colonel. Scammell was wounded at the Battle of Yorktown, captured and died six days later. He is believed to be buried in Williamsburg, Virginia. The naming of the Bellamy River Bridge after Scammell occurred after the bridge over Little Bay was named after General John Sullivan in 1934. In 1991, a state historic marker (No. 165) honoring Col. Scammell was erected at the west end of the bridge, on the south side of the highway (Henderson, Bridges 1936: 216; Clough 1892).

History of Bascule Bridges

Movable bridges, which may include bascule, swing, vertical lift and transporter bridges, are all designed to accommodate navigation traffic in the waterways crossed. A bascule bridge can be defined as a drawbridge working on a horizontal pivot. Although there are known examples of small bascule bridges built for military purposes as well as drawbridges for medieval castles, the real development of the modern bascule coincides with the invention of the steam locomotive in 1829 and the development of steel. In 1831, a single leaf, simple lever bascule was built in Devon, England. Measuring 32 feet long, the bridge was operated by an hydraulic pump. The Tower Bridge in London is among the earliest of modern, heavy bascule bridges and was completed in 1894. The hydraulic machinery for raising and lowering the double leaf bascule is housed in the large piers at the base of each tower. The pivots for the lifting spans of Tower

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Bridge are roller trunnion bearings. One of the earliest known bascules built in the United States was the 135th Street Bridge in New York City, completed in 1902. Many of the old swing bridges over the various branches of the Chicago River in Chicago were replaced by single-lever, trunnion, bascule bridges in the early 20th century. The earliest of the Chicago bascule bridges dates to 1903 (Mock 1949: 125; Hovey: 80-93; Hayden: 106).

The original inspiration for the design of the Scammell Memorial Bridge can be traced to designs patented by Joseph B. Strauss, later better known as the designer of the Arlington Memorial (Bascule) Bridge at Washington, D.C. and the Golden Gate (Suspension) Bridge in San Francisco. The first Strauss bascule bridge was completed in 1905, and a book on movable bridges published in 1926 notes that at that time there were more bascule bridges built from the various Strauss designs than from those of any other single type of bascule. The Strauss bascule designs included three general types - the vertical overhead counterweight type, the underneath counterweight type and the heel trunnion type. All of the Strauss designs are based on a parallelogram which is maintained as the bridge opens or closes. In the case of the overhead counterweight bridge, the struts between the top of the tower and the top of the counterweight remain parallel to the plane between the main trunnion and the pin in the end of the truss supporting the counterweight. The first Strauss bascule bridge was built for the Wheeling and Lake Erie Railroad over the Cuyahoga River in Cleveland in 1905. Measuring 150 feet long, the bridge was built with a single leaf and an overhead counterweight (Plowden 1974: 252; Hovey: 115-116).

The Scammell Memorial Bridge is the earliest of three bascule span bridges constructed in the State of New Hampshire. The other structures, the Hampton Bridge (Bridge No. 235/025) constructed in 1949 and the New Castle-Rye Bridge (Bridge No. 066/071) constructed in 1942, lack the visible counterweight. On March 28, 1994 a thematic review of the state's bascule bridges was completed by staff members from the New Hampshire Department of Transportation, State Historic Preservation Office and Federal Highways Administration. The Scammell Bridge was considered significant as the oldest of the three and because of its visible counterweight. Of the three bridges, the Scammell Bridge received the highest rating, followed by the Hampton Bridge and the Newcastle-Rye Bridge. All three bridges are potentially eligible for the National Register of Historic Places. In light of the planned replacement of the Scammell Bridge, the Department of Transportation has made a commitment to preserve and maintain the other bascule bridges as part of the statewide bridge preservation plan.

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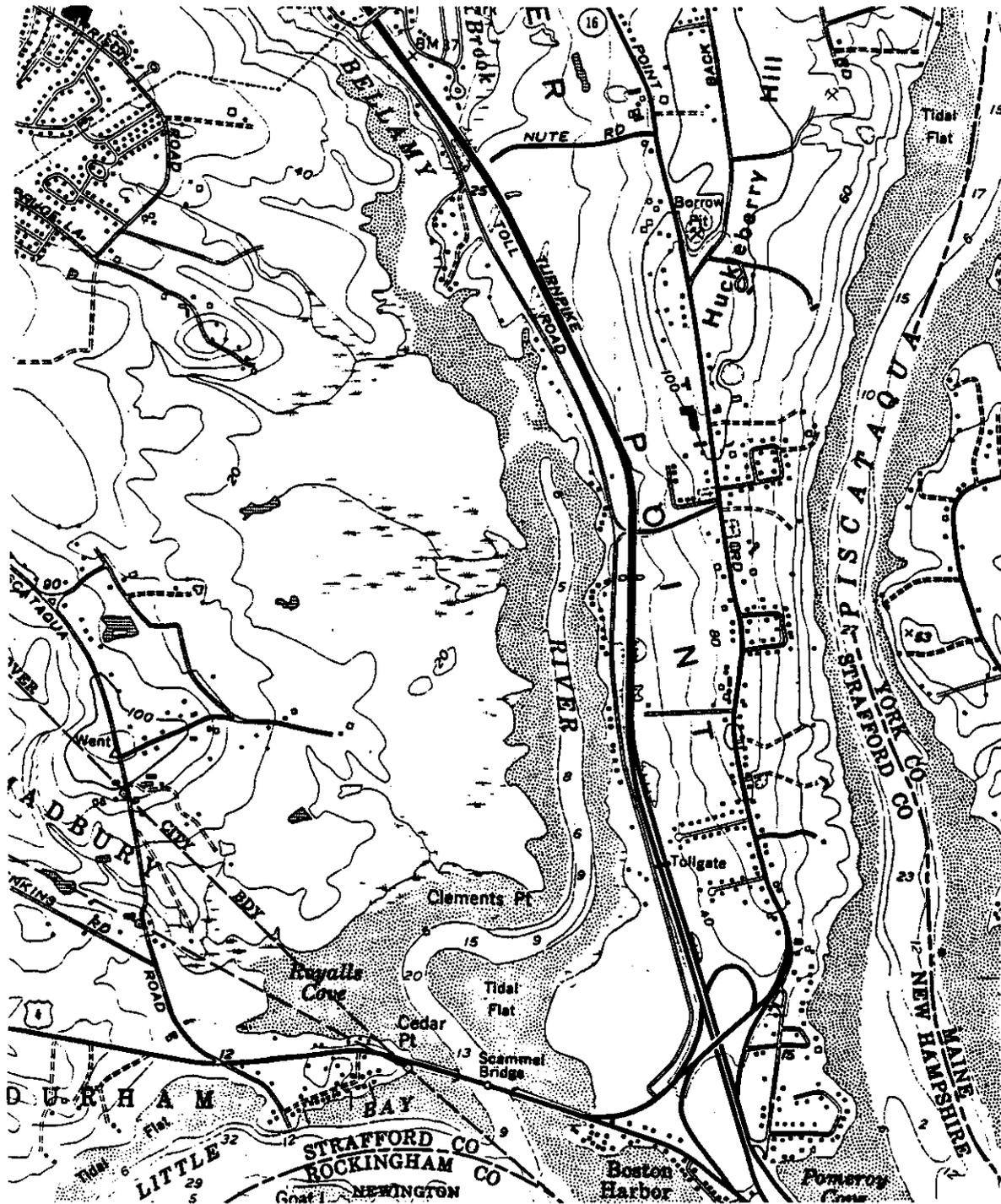
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Location Map
Source: USGS Dover East, NH Quadrangle, Scale = 1:24000

↑ North