

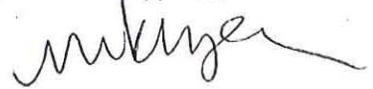
Determination of Eligibility (DOE)

Inventory #: CEN0008

Review Date: 5/11/2016

DOE Date: 2/12/2016

Final DOE Approved



Property Name: Bridge (080/040)

Area:

Address: Waukewan Road over Lake
Waukewan Inlet

Town: Center Harbor

County: Belknap

Reviewed For: R&C

DOE Program(s):
Federal Highway, NH Dept. of Transportatio

DETERMINATION OF ELIGIBILITY

Not eligible for either NR or SR

Integrity: Partial

Level: Local

Criteria:	A: No	B: No	C: No
	D: No	E: N	

STATEMENT OF SIGNIFICANCE:

The DOE Committee agrees that the 1-span concrete slab bridge in Center Harbor built in 1928 does not meet Criterion C, nor does it retain integrity under that criterion. However, more information is needed on the bridge and its 20th century history, particularly associated with automobile travel and tourism in the Lakes Region, and the potential for associations with summer cottage development on Lake Waukewan before eligibility under Criterion A can be determined.

Updated 5/11/16: As requested, more information including 20th century maps of the area were provide on continuations sheets. The DOE Committee agrees that the bridge, which replaced an earlier crossing, is not associated with events important to the broad patterns of development of the area and is not eligible for the National Register under Criterion A.

Period of Significance:
to

Period not applicable

Boundary: bridge including abutments and approaches.

Follow Up:
notify appropriate parties

Comments:

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Name, Location, Ownership

- 1. Historic name no
- 2. District or area n/a
- 3. Street & number Waukewan Road over Lake Waukewan Inlet
- 4. City or town Center Harbor
- 5. County Belknap
- 6. Current owner NHDOT

Function or Use

- 7. Current use(s) Highway bridge, Center Harbor 080/040
- 8. Historic use(s) same

Architectural Information

- 9. Style 1-span reinforced concrete slab bridge
- 10. Architect/builder NH Highway Department.
- 11. Source NHDOT records
- 12. Construction date 1928
- 13. Source NHDOT records
- 14. Alterations, with dates Original wood railings and guardrails replaced c. 1980
- 15. Moved? no yes date: _____

Exterior Features

- 16. Foundation Stone abutments
- 17. Cladding n/a
- 18. Roof material n/a
- 19. Chimney material n/a
- 20. Type of roof n/a
- 21. Chimney location n/a
- 22. Number of stories n/a
- 23. Entry location n/a
- 24. Windows n/a
- Replacement? no yes date: _____

Site Features

- 25. Setting Developing mixed-use road
- 26. Outbuildings n/a
- 27. Landscape features Stream, lake
- 28. Acreage less than 1



- 35. Photo # 1 Direction NE
- 36. Date 09/16/2015
- 37. Reference (file name or frame #): CEN0008-001

- 29. Tax map/parcel # N/A
- 30. State Plane Feet (NAD83): x: 1,016,378.42 y: 424,526.72

- 31. USGS quadrangle and scale Holderness 1983 7.5 min. 1:24000

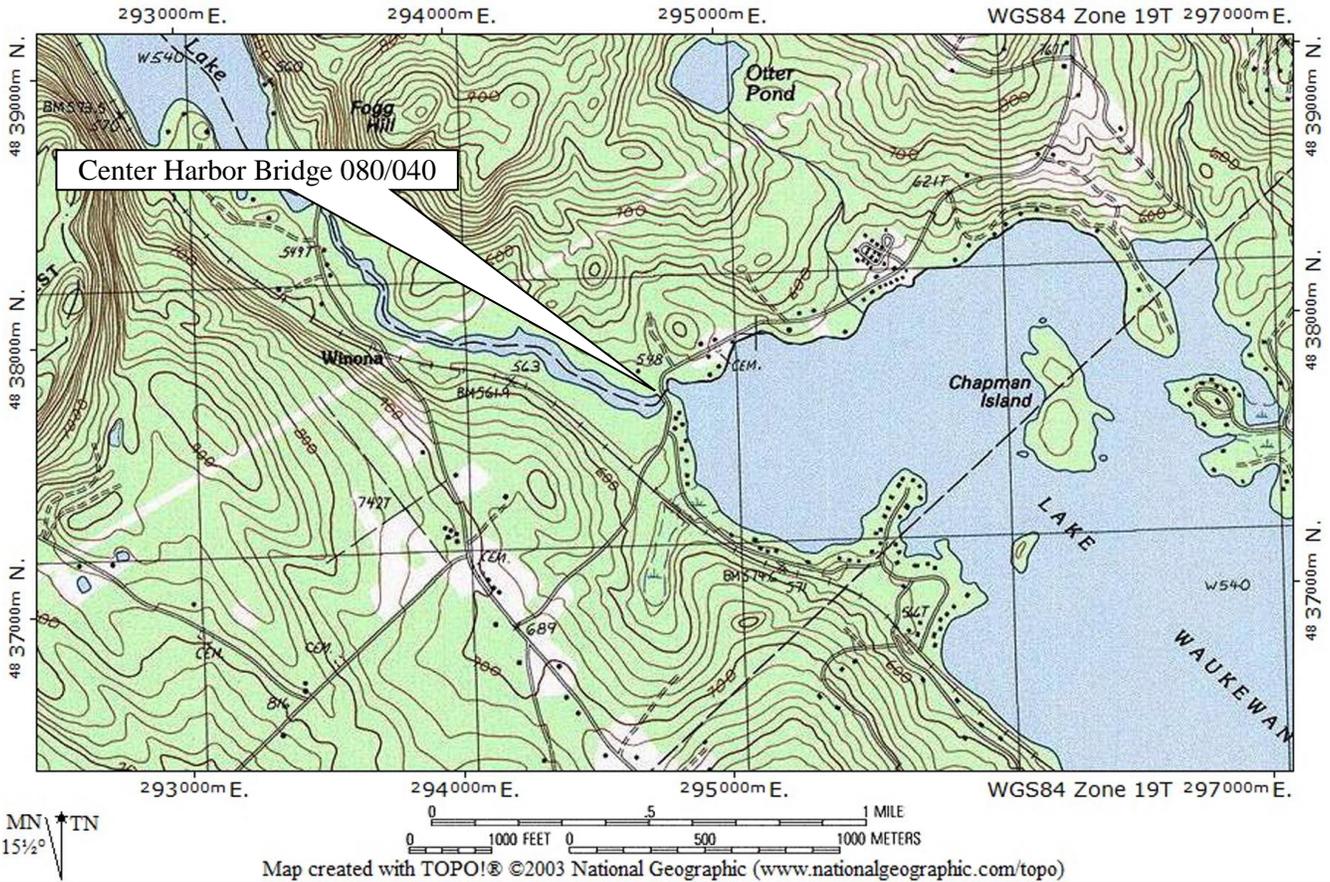
Form prepared by

- 32. Name Richard M. Casella
- 33. Organization Historic Documentation Company, Inc.
- 34. Date of Survey 16 September 2015

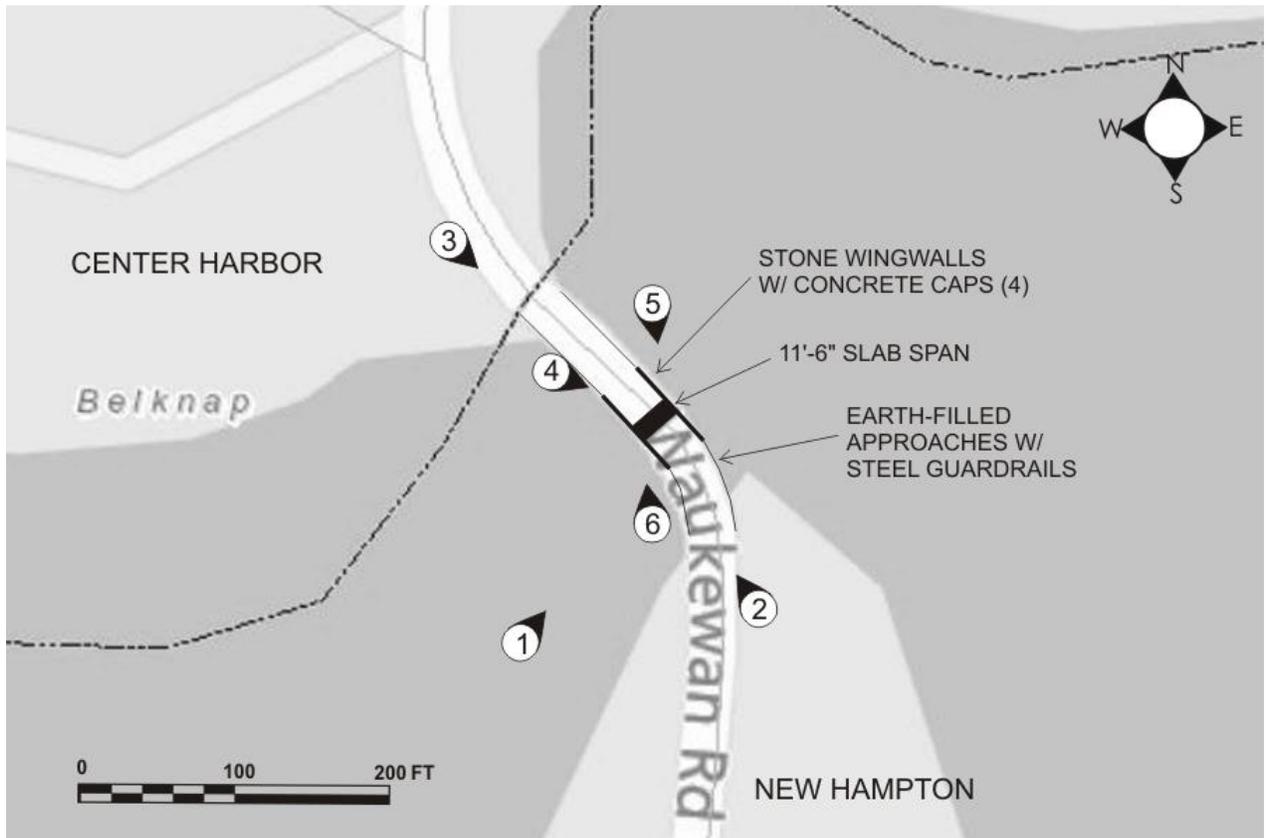
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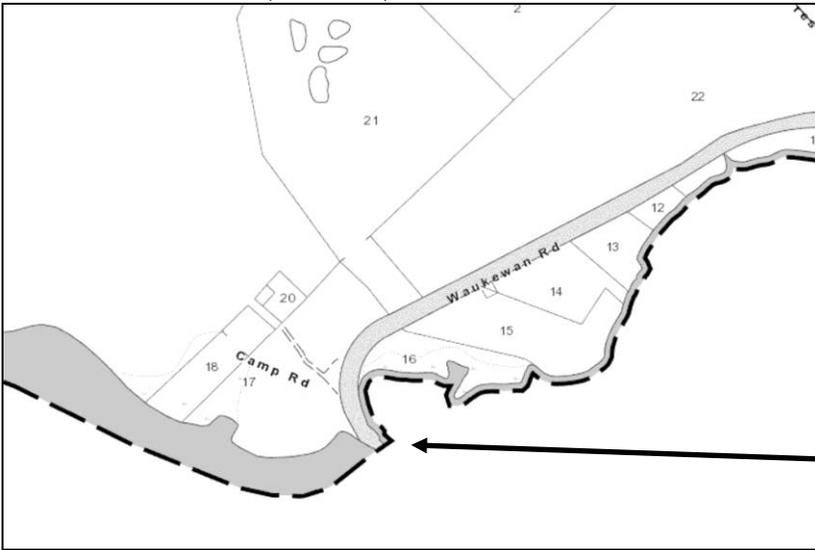
39. LOCATION MAP: USGS Quad: Holderness 1983 7.5 min. 1:24000



40. PROPERTY MAP AND KEY TO PHOTOS:

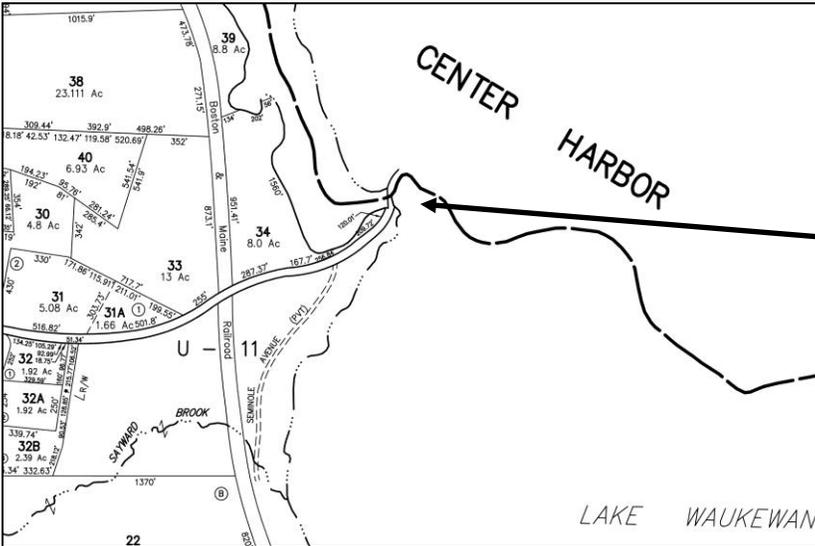


39. LOCATION MAP (continued): TAX MAPS



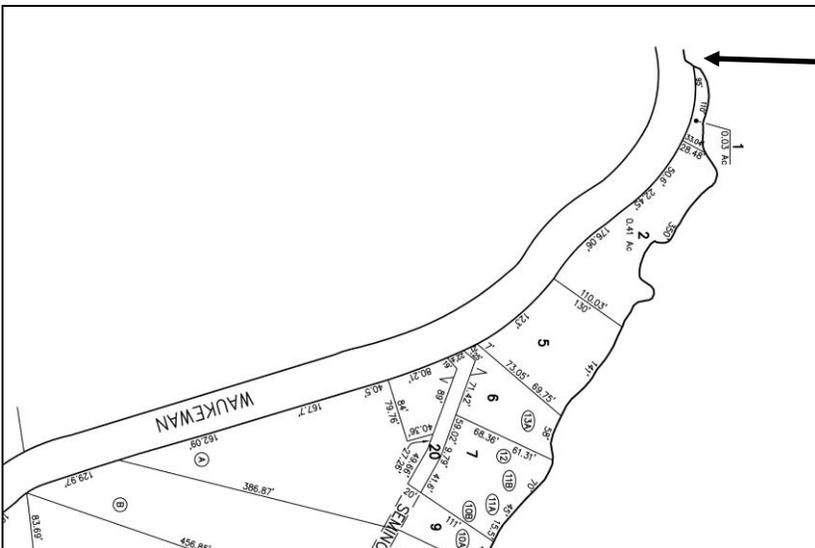
**BRIDGE
LOCATION**

TAX PARCEL MAP: Center Harbor Map # 105



**BRIDGE
LOCATION**

TAX PARCEL MAP: New Hampton Map # R-7



**BRIDGE
LOCATION**

TAX PARCEL MAP: New Hampton Map # U-11

41. Historical Background and Role in the Town or City's Development:

Center Harbor Bridge 080/040 was built by the New Hampshire Highway Department (NHHD) in 1928. The total cost of the bridge, \$578.13, was split evenly between the Town and the state according to the NHHD bridge project card. The town undertook improvements to Waukewan Road at the same time, which included filling, grading and installing several steel culverts.¹

A detailed history of the establishment of Waukewan Road could not be obtained through research. A Cider Mill of split-stone construction was established c.1800 on the north shore of Lake Waukewan, about a half-mile east of the bridge crossing. The extent of Waukewan Road, if present at that time, was not determined. The building of the Boston, Concord & Montreal Railroad in the 1840s, through New Hampton less than a quarter mile from the bridge crossing, may have been associated with establishment of portions of the the road and the original bridge. The railroad line, Waukewan Road, the road crossing over Lake Waukewan Inlet, the Cider Mill, and other developments along the road in both Center Harbor and New Hampton, are shown on the 1860 and 1892 maps (see Figures 1 & 2). The road crossing over the inlet implies a bridge or culvert of some type was present at those times. A search of the Center Harbor Annual Reports did not locate any mention of the bridge that preceded the concrete slab bridge. Another Center Harbor bridge of similar size with split stone abutments that was replaced in 1933 (Winona Road over Long Pond Outlet) was investigated; the preceding bridge was of log stringer construction with a plank floor.² Based on that information, it may be presumed that the preceding Waukewan Road bridge was also a log stringer span, a very common type found throughout the state in the 19th and early 20th century. The Annual Report for the year ending January 31, 1929, lists expenditures for "State Aid Bridge" totaling \$498.90.³ This "State Aid Bridge" is assumed to be the subject bridge over Lake Waukewan Inlet; the difference between the amount listed on the bridge project card as the Towns 50% share of the bridge cost (\$289.07) and the cost listed in the Annual Report cannot be explained.

42. Applicable NHDHR Historic Contexts: 84. Automobile highways and culture, 1900-present.

43. Architectural Description and Comparative Evaluation:

Center Harbor Bridge 080/040 carries Waukewan Road over Lake Waukewan Inlet, a small channel that runs about a mile between Winona Lake and Waukewan Lake that also forms the boundary between the towns of Center Harbor and New Hampton. The bridge is located about 3400 feet north of the intersection of Winona Road and Waukewan Road, and about 1000 feet north of the former Boston & Maine Railroad tracks. The area around the bridge is developed with a mix or seasonal and year-round homes, the nearest property being an extensively altered home of undetermined age, located on the New Hampton side about 250 feet southeast of the bridge.

No individual plans were prepared for the bridge. The bridge card indicates that the "slab standard" was used for its design and the bridge was built by New Hampshire Highway Department (NHHD) forces (see Figures 3 & 4). The bridge is a one-span concrete slab on split-stone abutments with extended U-type wingwalls along the approaches, also of concrete-capped split-stone construction. Dimensions of the bridge according to the NHDOT records are: 11.5' clear span, 13.0' overall length, 21.2' width overall. The original wood guardrails (see Figures 5 & 6) were replaced at some time with standard steel W-type guardrail on steel posts bolted to the edge of the bridge slab and along the approaches. The granite abutments and wingwalls consist of random split granite of varying sizes. The stone is presumed to date from the preceding bridge but portions of the stonework were evidently reconstructed and pointed using cement mortar. This work was probably done with the construction of the present bridge and concrete cap wall.

Concrete slab bridge technology:

The concrete slab bridge type is the simplest form of concrete bridge. The superstructure consist of a solid mass of concrete of uniform thickness generally in the range of 8" to 20" thick, reinforced with steel rods running the full length (longitudinally) of the slab. Slab bridges are "cast-in-place" by pouring the wet concrete into forms erected at the bridge site into which the steel reinforcement has been placed according to plans. Concrete slab bridges date from the beginning of the 20th century and were quickly adopted by state highway departments for their low cost and ease of construction

¹ Annual Report of the Officers of the Town of Center Harbor, Year Ending January 31, 1929, pp. 45-47.

² NHHD bridge project card, Center Harbor bridge 064/047.

³ Ibid.

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with local labor and materials. Iowa for example, adopted a standard design for concrete slab highway bridges in 1913. New Hampshire adopted standard designs for spans up to 10 feet in 1917, and up to 20 feet in 1924.⁴

The simple-span cast-in-place concrete slab bridge has not changed significantly in terms of general design since the 1920s due to the fact that the type is suited economically and structurally only to very short spans less than about 40 feet. Efficient use of materials drops off rapidly beyond that length, as the ratio of bridge dead load to live load increases to impractical proportions. In other words, increasingly larger amounts of expensive steel reinforcing must be added to longer span slabs just to carry the weight of the concrete itself with an ever smaller proportion of the steel working to carry the live load. The advances that have occurred have been in concrete chemistry, mixing, placement and curing; in reinforcement strength, design and placement; and in formwork materials and methods. Most technical advances came after WWII, primarily in the mid-1950s and led to somewhat longer economical span lengths.

According to the 2015 NHDOT Bridge Summary database, New Hampshire has 423 slab bridges, representing roughly 11% of the state's 3,846 bridges. Of those, 364 were built before 1966, and are 50 years or older. Twenty-seven were built prior to 1917 when the NHD adopted a standard slab design. The Bridge Summary lists one bridge built before 1917 that has not been rebuilt. The Center Harbor bridge is one of 23 built in 1928 and one of 239 dating between 1924 and 1940, a period during which slab technology remained essentially constant. There are 236 concrete slab bridges 20 feet in length or less, of which 22 are 13 feet in overall length like the subject bridge.

Examples of other concrete slab bridges that compare to the subject bridge are listed in Table 1 below and are located in NHDHR files.

TABLE 1: CONCRETE SLAB BRIDGE EXAMPLES						
BRG. NO.	LOCATION	YEAR	SPANS	DHR SURVEY #	DOEC DATE	ELIGIBLE/ CRITERIA
<u>SUBJECT BRIDGE</u> Center Harbor 080/040	Waukewan Rd over Lake Waukewan Inlet	1928	1 @ 13'	CEN0008	TBD	TBD
Roxbury 088/125	NH 9 over Hubbard Brook	1928	1 @ 14'	ROX0004	07/23/14	NO
Epsom 160/110	NH 107 over Griffin Brook	1933	1 @ 16'	EPS0098	12/10/08	NO
Salem 083/062	S. Policy Rd. over Porcupine Brook	1935	1 @ 17'	SAL0057	01/26/11	NO
Gilford 147/138	Area Rd. over Poor Farm Brook	1936	1 @ 22'	GLF0007	07/08/09	YES / A & C
Sharon 071/099	Cross Rd over Town Line Brook	1938	1 @ 12'	SHA0002	02/27/13	NO
Ashland 101/073	River St. over Squam River	1941	1 @ 21'	ASH0033	05/27/09	More Info Needed

44. National or State Register Criteria Statement of Significance:

Center Harbor Bridge 080/040 is not associated with events important to the broad patterns of our history nor has it played any important or significant role in the development of the towns of Center Harbor and New Hampton. The bridge was built in 1928 to replace an earlier bridge or culvert of unknown origin and type. A bridge was established at the site by 1860 according to historic mapping. The bridge is therefore not eligible for the National Register under Criteria A.

Center Harbor Bridge 080/040 is of short-span design following standardized plans of the New Hampshire Highway Department. The bridge does not possess important architectural or engineering characteristics that would distinguish it from the roughly 250 similar concrete slab bridges built in NH prior to World War II. The stone abutments and wingwalls

⁴ See "State of New Hampshire Highway Department Standard Structures, Concrete Slab Bridge, December 1917" and "State of New Hampshire Highway Department Standard Structures, Reinforced Concrete Slabs, October 31, 1924. Unbound design sheets on file in Bureau of Bridge Design, New Hampshire Department of Transportation, Concord.

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are of rudimentary construction that lack exceptional characteristics of type or workmanship. As a very small concrete slab, retrofit onto an atypical substructure, it is not a good representative example of its type. The bridge is therefore not eligible for the National Register under Criteria C.

45. Period of Significance: N/A

46. Statement of Integrity: The property retains integrity of location. The removal of the original wood railings and guardrails the addition of a concrete abutment caps has diminished the integrity of the original association, feeling, workmanship, design and materials of the bridge.

47. Boundary Discussion: The boundary of the property is defined by the physical limits of the bridge and its stone and concrete abutments and wing walls.

48. Bibliography and/or References: Also see footnote citations.

Casella, Richard and Camilla Deiber. *Highway Bridges in Iowa, 1942-1970*. National Register of Historic Places Multiple Property Documentation Form. Prepared for Iowa Department of Transportation, March 2004.

Center Harbor Historical Society. "Center Harbor Village School, Built 1886, Home of Center Harbor Historical Society." Published by author, no date. Pamphlet located at New Hampshire State Library.

New Hampshire Highway Department. "State of New Hampshire Highway Department Standard Structures, Concrete Slab Bridge, December 1917" and "State of New Hampshire Highway Department Standard Structures, Reinforced Concrete Slabs, October 31, 1924." Unbound design sheets on file in Bureau of Bridge Design, New Hampshire Department of Transportation, Concord.

Parsons-Brinkerhoff and Engineering and Industrial Heritage. *A Context for Common Historic Bridge Types. NCHRP Project 25-25, Task 15*. Prepared for the National Cooperative Highway research Program, Transportation Research Council and National Research Council, October 2005.

Woodford, E. M. *Map of Belknap County, New Hampshire*. Philadelphia: Smith & Peavey, Publishers, 1860

Surveyor's Evaluation:

NR listed: individual _____
within district _____

Integrity: yes _____
no _____X_____

NR eligible: individual _____
within district _____
not eligible _____X_____
more info needed _____

NR Criteria: A _____
B _____
C _____
D _____
E _____

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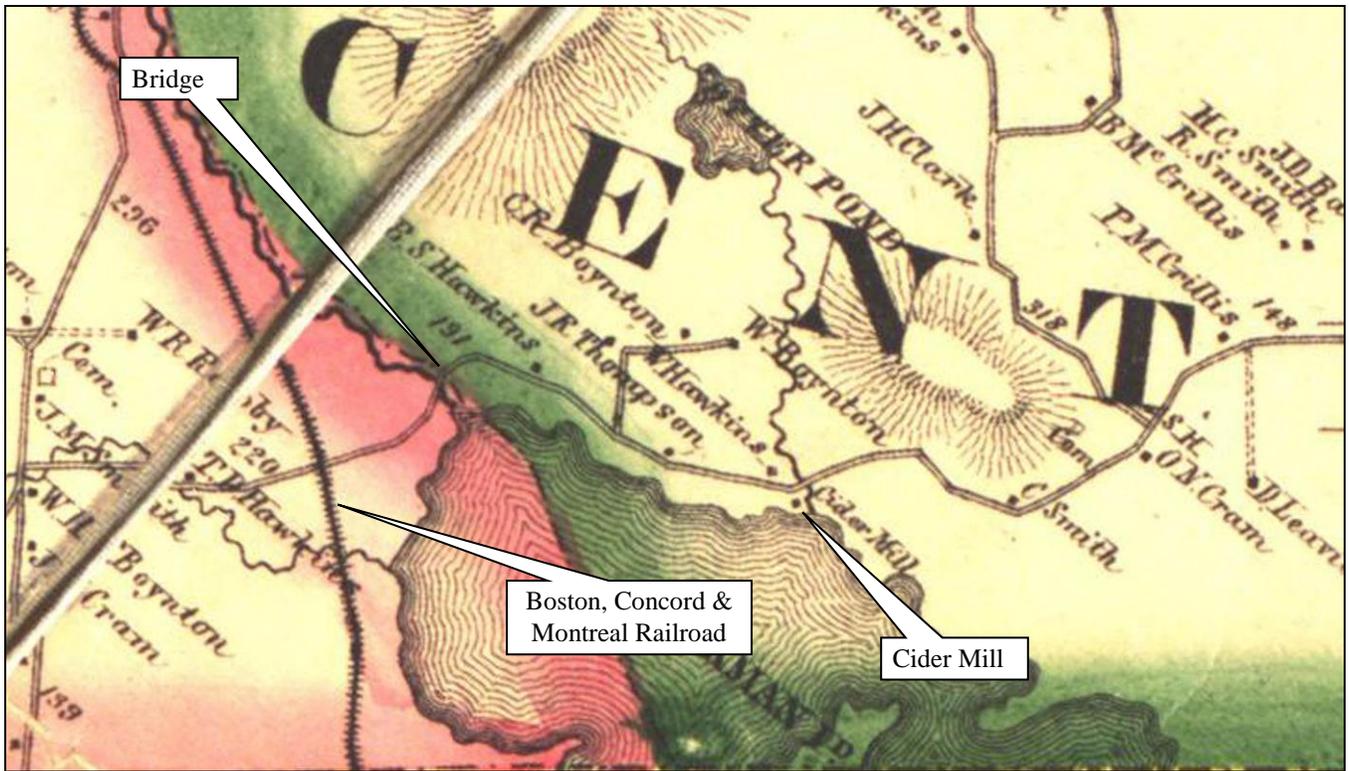


FIGURE 1: 1860 Map of Belknap County (Woodford 1860).

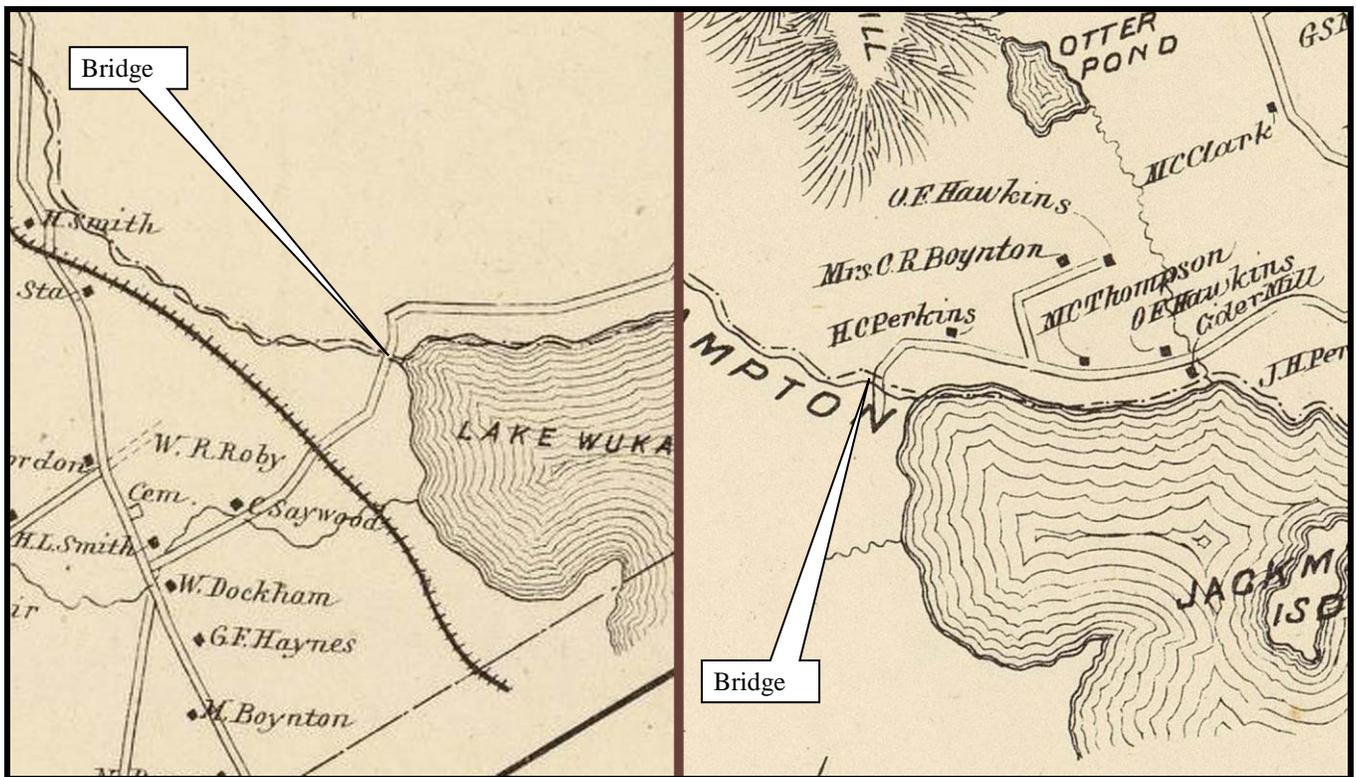


FIGURE 2: Hurd 1892 map: New Hampton map on left; Center Harbor map on right.

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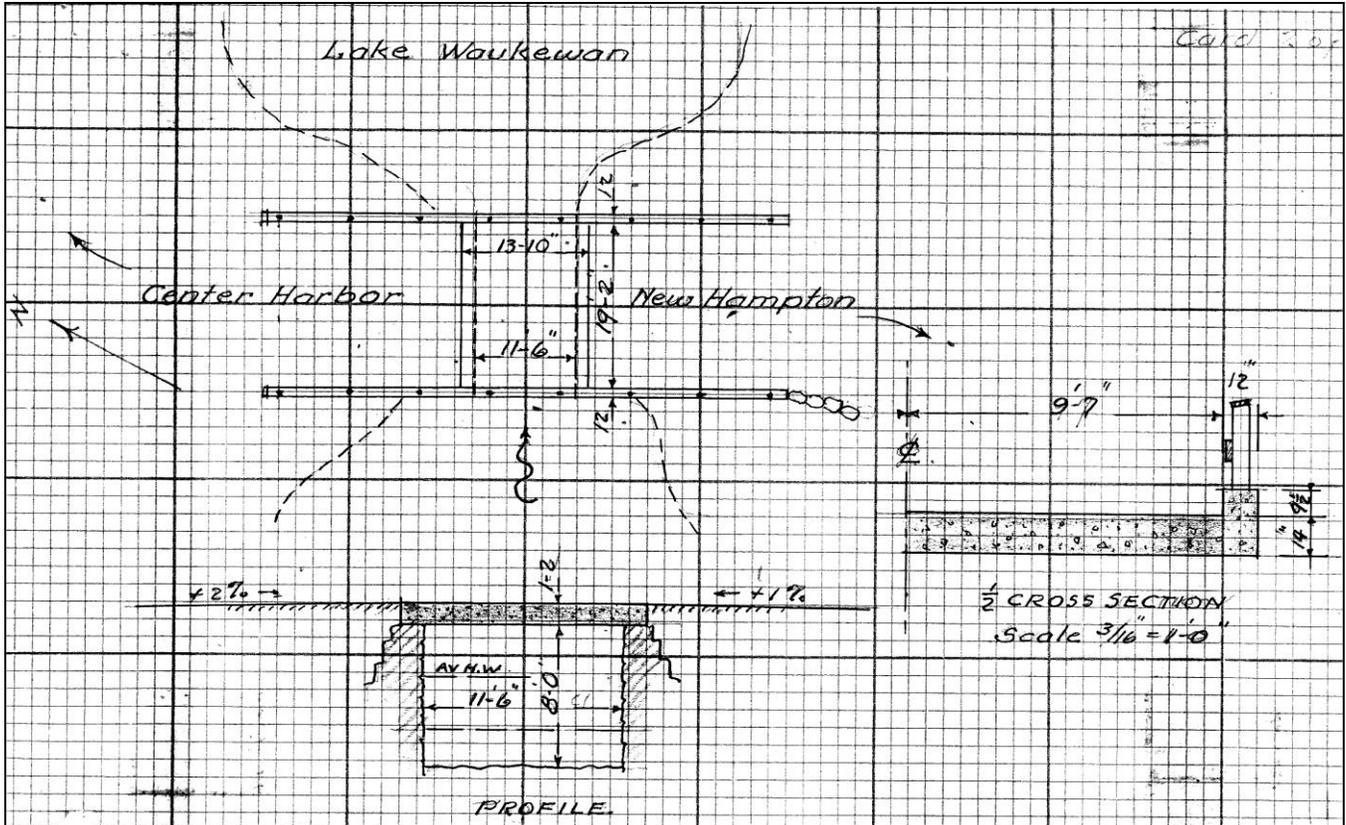


FIGURE 3: Plan, elevation and section sketches from Bridge Card (NHHD Bridge Card 1941).

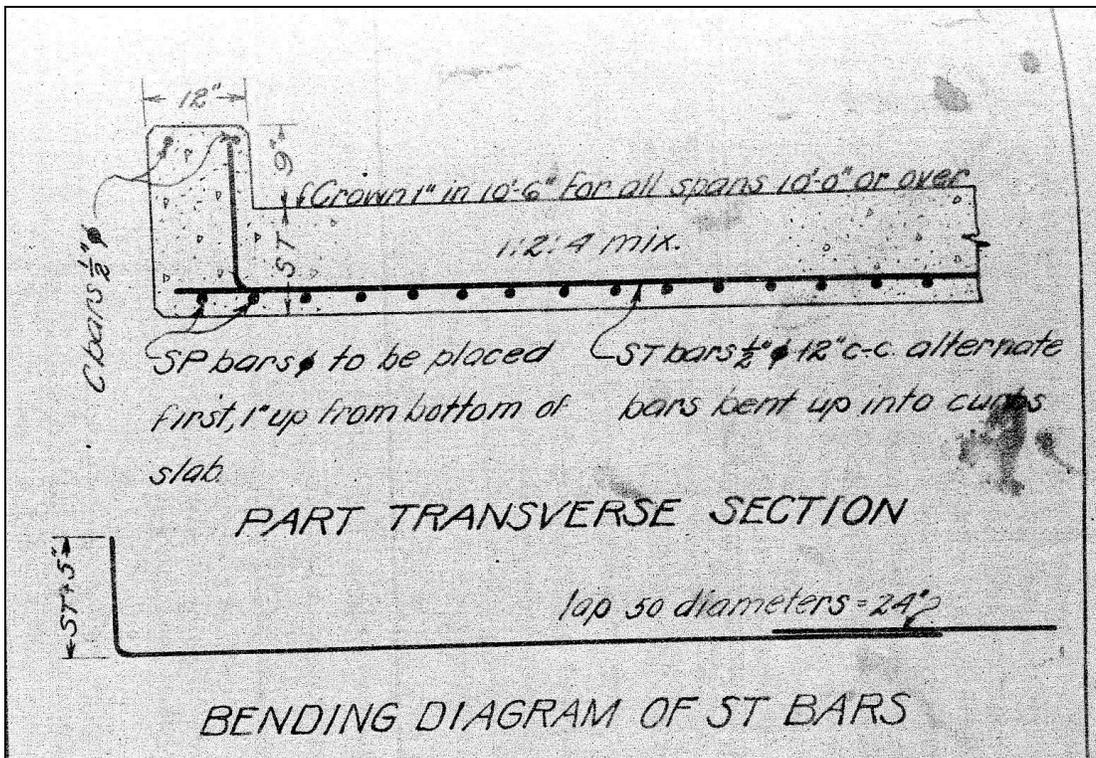


FIGURE 4: New Hampshire Highway Department standard design for reinforced concrete slab spans, October 31, 1924. When the standard was design was used and a separate set of plans were not prepared, the term "slab standard" was typically noted on bridge project and inventory cards in the place of a plan number (NHHD, 1924).

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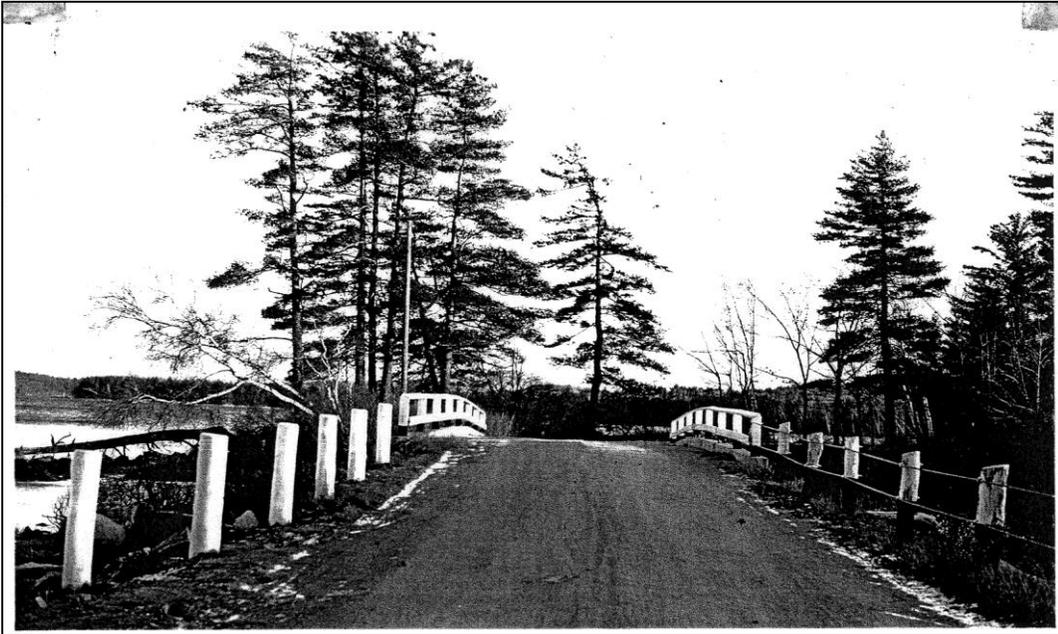


FIGURE 5: Photo of Center Harbor Bridge 080/040, December 11, 1941, showing Center Harbor (north) approach looking south toward New Hampton. Note original wood railings and post and cable guardrails along approaches (NHHD Bridge Card 1941).

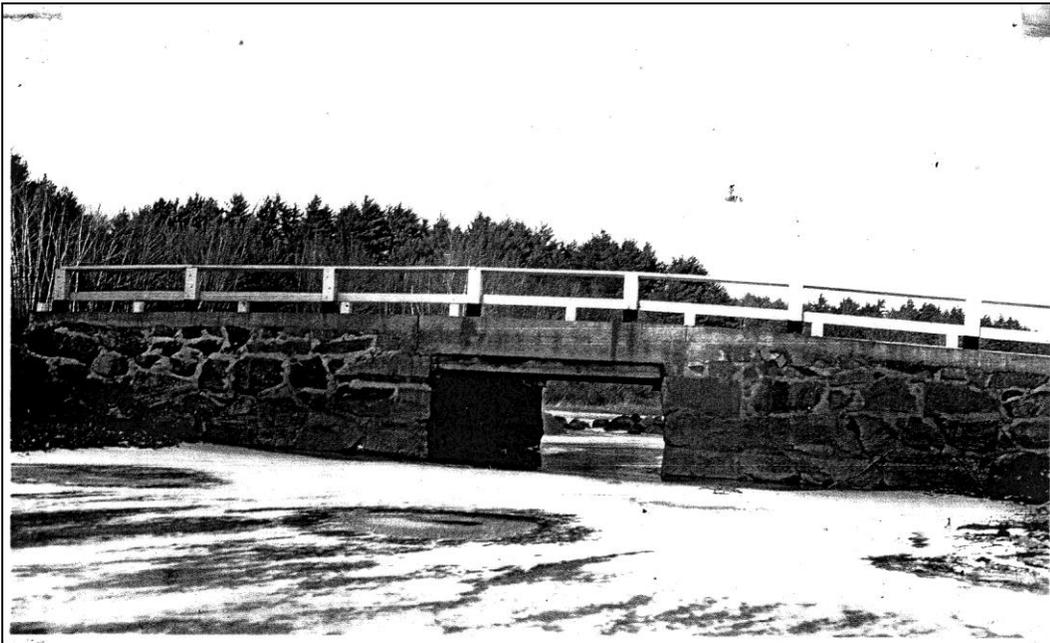


FIGURE 6: Photo of Center Harbor Bridge 080/040, December 11, 1941, showing west (upstream) side of bridge (NHHD Bridge Card 1941).

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Date photos taken: 09/16/2015



Photo :#	2	Description: Context view and south (New Hampton) approach.
Reference (file name or frame #):	CEN0008_002	Direction: NW

Date photos taken: 09/16/2015



Photo :#	3	Description: Context view and north (Center Harbor) approach.
Reference (file name or frame #):	CEN0008_003	Direction: SE

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NHDHR INVENTORY # CEN0008

Date photos taken: 09/16/2015



Photo :#	4	Description: Roadway view of bridge showing modern guardrail and steel posts carried on concrete cap added to stone abutments. Lake Waukehan on left.
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Reference (file name or frame #):	CEN0008_004	Direction:	SE
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Date photos taken: 09/16/2015



Photo :#	5	Description: East side (downstream or lake side) of bridge showing concrete slab on stone abutments and concrete cap added to abutment wing walls.
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Reference (file name or frame #):	CEN0008_005	Direction:	S
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NHDHR INVENTORY # CEN0008

Date photos taken: 09/16/2015



Photo :#	6	Description: West (upstream) side of bridge showing concrete slab on stone abutments and concrete cap added to abutment wing walls
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Reference (file name or frame #):	CEN0008_006	Direction:	N
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PHOTO KEY IS LOCATED ON PAGE_2__

I, the undersigned, confirm that the photos in this inventory form have not been digitally manipulated and that they conform to the standards set forth in the NHDHR Photo Policy. These photos were printed at the following commercial printer OR were printed using the following printer, ink, and paper: Walgreen Pharmacy, Middletown, RI. (Color photos must be professionally printed.)
The negatives or digital files are housed at/with: Historic Documentation Company, Inc., 490 Water St., Portsmouth, RI 02871

SIGNED:

FOR STATE REGISTER LISTING ONLY!

If this inventory form is being submitted for consideration of New Hampshire State Register listing, have you included:

___ a photo CD with digital images included in the nomination (does not apply if film photography was used)

___ the State Register Contact Information sheet

CONTINUATION SHEET

The following information is provided in response to DOEC request for additional information to support the Criterion A evaluation.

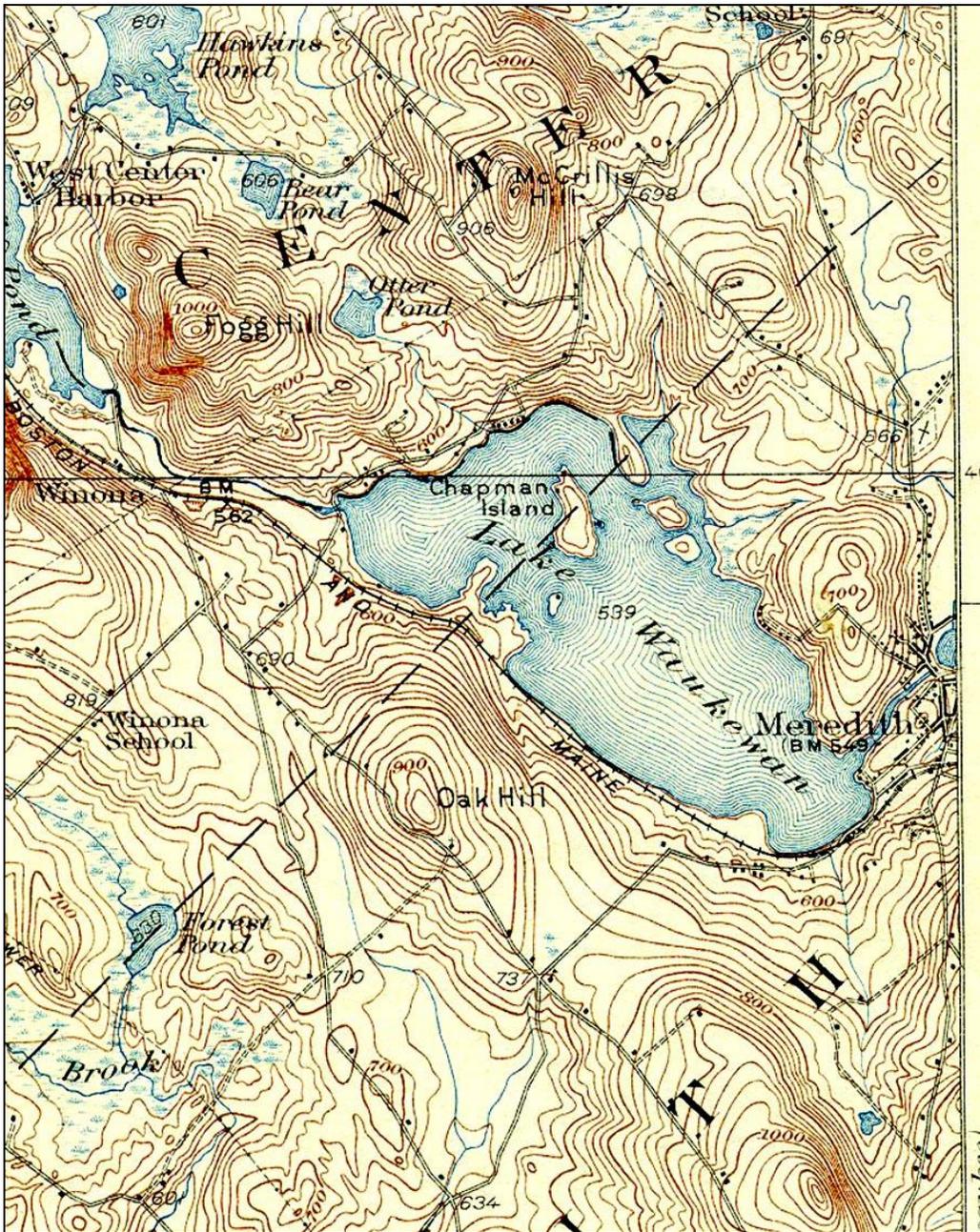


Figure C-1: Holderness NH Quadrangle topo map, 1927 (surveyed 1925).

[Please note that the 1940 Holderness topo map is a reissue of 1927 map and contains the same topo and building/structure information from 1925 USGS survey. It is therefore not included herein.]

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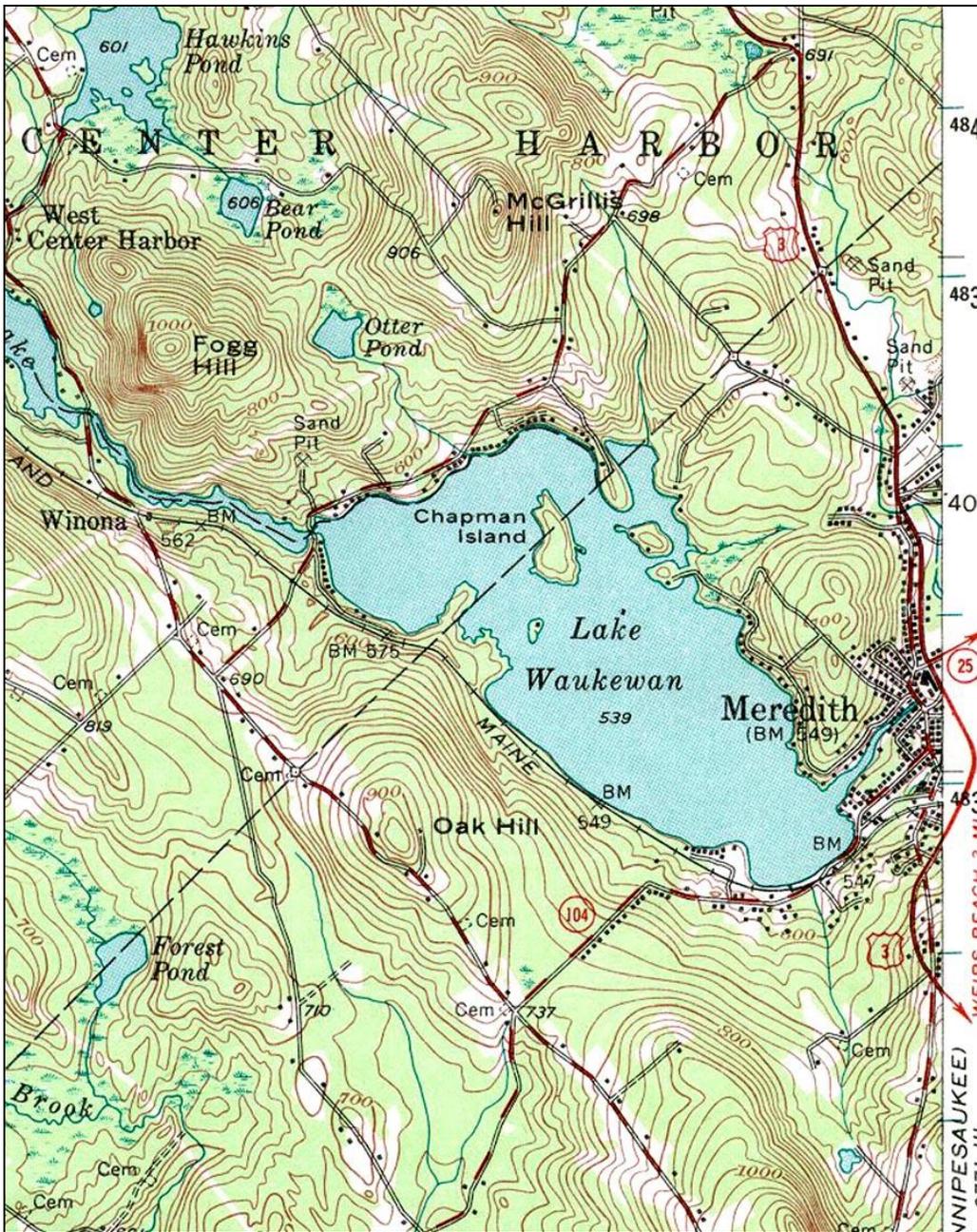


Figure C-2: Holderness NH Quadrangle topo map, 1956 (revised 1956).

Conclusions:

- 1) The construction of the 1928 subject replacement bridge of the same size (12-foot span) as the preceding bridge did not fundamentally improve or alter existing transportation characteristics of the crossing and roads it served and therefore does not constitute an event of historic importance.
- 2) The topographic maps indicate that the area grew as the population in Meredith grew and was not a result of the rehabilitation of the subject bridge crossing. The crossing remained a low-use, local-access road around the lake, the same as it functions today.
- 3) How the reconstructed deck-span crossing might have influenced local property development cannot be determined. If a preexisting bridge was so dangerous that it discouraged use of the crossing and it was replaced by a new safe bridge that encouraged use of the crossing, it might constitute an event that had a measureable and documentable impact on the development of the area. Unfortunately there is no documentary evidence to support that conclusion.
- 4) Since the bridge crossing was pre-existing and did not fundamentally improve or alter existing transportation characteristics of the crossing and roads it served, there is no way to correlate any specific types of subsequent

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development within the immediate area or areas farther afield, to its reconstruction. Since the areas north and south of the bridge could be accessed from other preexisting nearby roads north and south of the bridge, the direction from which subsequent development originated and flowed cannot be determined.

5). The collective impact of the establishment of commercial or recreational developments such as a grocery store, filling station, motel, restaurant, theater, boat yard, swimming beach, etc., in the Meredith or overall Lakes area may be able to be interpreted over a period of time, but singling out the effect of individual developments, especially small capital improvements including the rehabilitation of the subject crossing, is generally impossible. Examples of exceptions to that rule might be the establishment of a large resort hotel or major bridge crossing where previously there was none and for which supporting documentary evidence regarding its socio-economic after-effects would likely exist.

Therefore Center Harbor Bridge 080/040 cannot be associated with events important to the broad patterns of state or local history nor can its role in the development of the towns of Center Harbor and New Hampton be determined. The bridge is therefore not eligible for the National Register under Criteria A.