

INDIVIDUAL INVENTORY FORM

NHDHR INVENTORY # TEM0004

Name, Location, Ownership

- 1. Historic name Converse Road Bridge
- 2. District or area n/a
- 3. Street & number Converse Road over Whiting Brook
- 4. City or town Temple
- 5. County Hillsborough
- 6. Current owner Town of Temple

Function or Use

- 7. Current use(s) Highway bridge
- 8. Historic use(s) same

Architectural Information

- 9. Style Metal plate arch culvert
- 10. Architect/builder unknown.
- 11. Source _____
- 12. Construction date 1950
- 13. Source NHDOT records
- 14. Alterations, with dates _____

Visual evidence _____

- 15. Moved? no yes date: _____

Exterior Features

- 16. Foundation n/a
- 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 Rural residential
- 26. Outbuildings n/a
- 27. Landscape features none



- 35. Photo # 1 Direction N
- 36. Date April 25, 2013
- 37. Reference (file name or frame #): TEM0004-01

- 28. Acreage less than 1 ac.
- 29. Tax map/parcel # _____
- 30. Map reference _____
- 31. USGS quad and scale Greenville Quadrangle, 7.5 minute, 1997

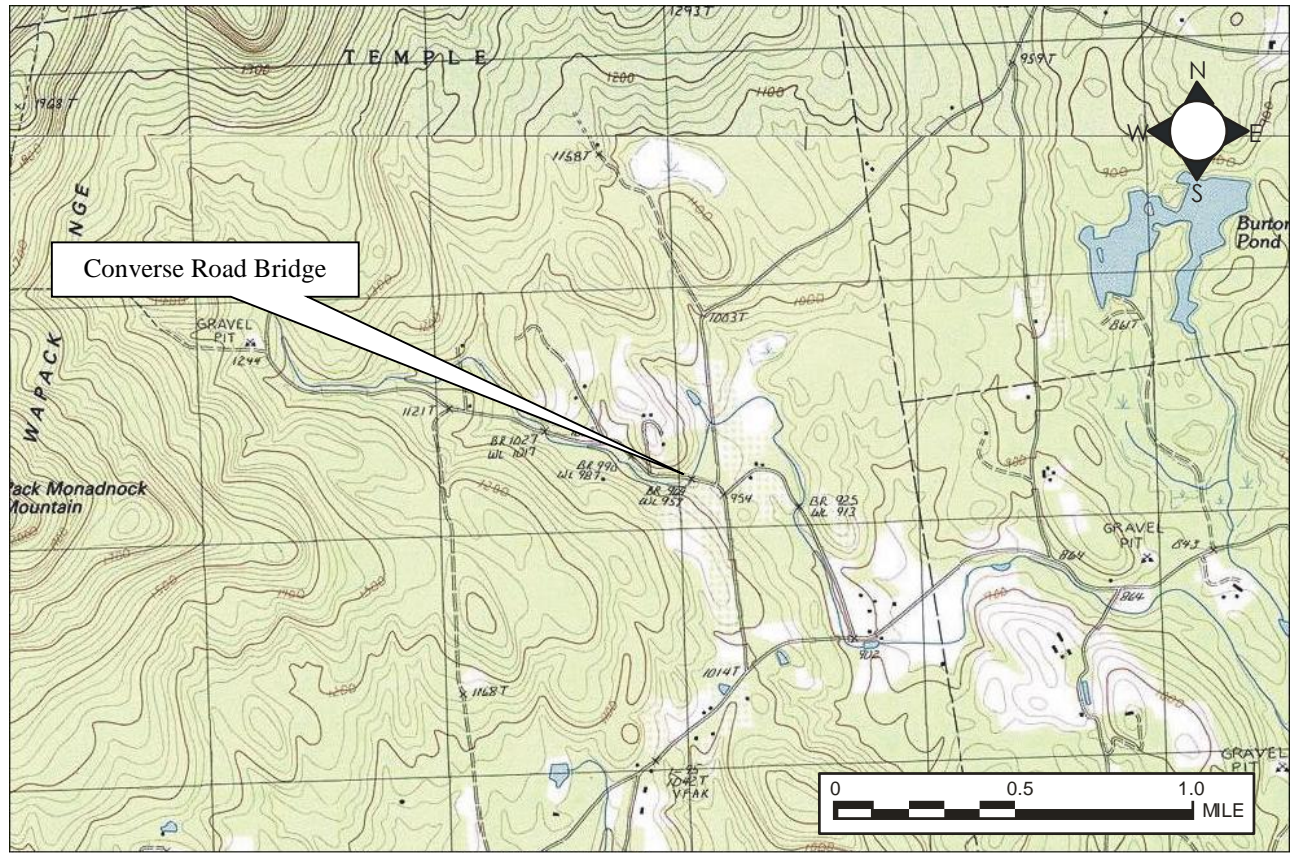
Form prepared by

- 32. Name Richard M. Casella
- 33. Organization Historic Documentation Company, Inc.
- 34. Date of Survey April 2013

INDIVIDUAL INVENTORY FORM

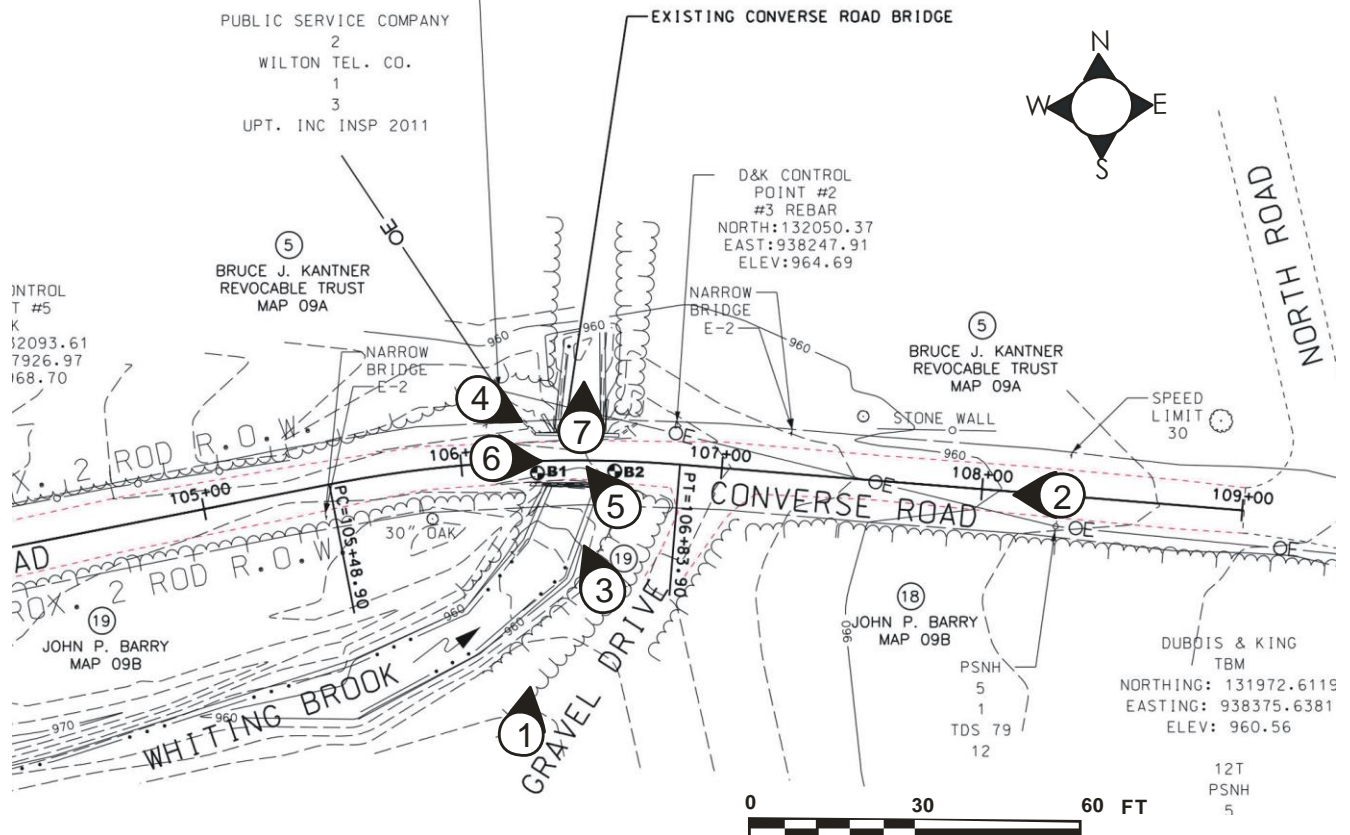
NHDHR INVENTORY # TEM0004

39. LOCATION MAP: USGS Quad: Greenville, NH 1997



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

40. PROPERTY MAP AND KEY TO PHOTOS:



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

No information on the history of Converse Road, previous bridges at the site, or records of the construction of the existing metal arch culvert were obtained. Historical topographical mapping shows the road present in 1900 serving three houses or structures just beyond the bridge to the west where the road ends. No mention of the construction of the culvert was found in the Annual Reports of the Town of Temple, 1935 to 1955; this outcome was expected since culverts were and are typically purchased and installed by towns within their general highway budget and not itemized in the Reports. The Temple Historical Society was queried for information regarding the site and responded that there is no known historical significance to the site and that the "old bridge and surrounding area were completely destroyed in the 1938 hurricane" (Lauriat, 2013). No information regarding the presence or type of temporary culvert or bridge structure that may have served the crossing in the period between 1938 and 1950 was obtained. Again, the lack of records or information on culverts and very short span bridges is typical as they were often built with town highway force labor and materials on hand or purchased directly from drainage supply companies. There is therefore no evidence to suggest that the crossing or culvert played any significant role in the development of the Town.

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

43. Architectural Description and Comparative Evaluation:

Converse Road Bridge, (NH Bridge No. Temple 110/114) consists of a manufactured galvanized steel multiple plate arch culvert. NHDOT does not have drawings or a bridge inventory card for the culvert which is typical for manufactured culverts purchased and installed by municipalities such as this. This description is based on field observations and information provided by DuBois & King, Inc., the project consulting engineers for the Town of Temple. The arch is of the half-semicircle type with a radius of 9 feet, giving it a span of 18' at the toe or spring point of the arch. The bridge is approximately 14' wide overall. The arch culvert is constructed of prefabricated sections of curved and corrugated steel plates. The corrugations are 1-1/2" deep by 6" wide (between crests). The plate sections overlap 4" and are bolted together with closely spaced bolts around the perimeter through predrilled holes. The plates are approximately 3/16" thick and vary in length and width dimensions to accommodate staggered joints and desired width of the arch. The plates are approximately 4' wide by 5' or 10' feet long.

The toe of the arch sits on a concrete footing that is exposed in the streambed but of unknown overall dimensions. The inlet and outlet facewalls and the flanking wing walls are constructed of stone, a mixture of large quarry split granite, split granite rubble, and field stone. The large split stones are roughly 6' long by 1' square, typical of granite lintels supplied by quarries for the construction of stone box culverts. Since the culvert was installed in 1950, it is possible that the stone was salvaged from a box culvert at this location or another as previously discussed.

The culvert facewalls are capped with granite lintels that extend up about 4" above the roadway to serve as curbs. There are no guardrails or railings on the bridge or approaches.

Comparative Evaluation: There are 93 metal plate-arch (MP-A) culverts in the NHDOT Bridge Summary. Culverts are considered bridges in NH if over 10 feet in span. The oldest MP-A culverts in NH date from 1934. In that year four were installed along Mt. Clinton Road in Crawford's Purchase. The prefabricated corrugated steel plate culvert and arch, developed by the Armco Drainage Products Association (ARMCO) had just come onto the market in 1931-1932. Based on the Bridge Summary, the Crawford's Purchase culverts were apparently the first application of the "off the shelf" product in New Hampshire by Highway Department engineers. Fifteen MP-A culverts in NH date from 1934 to 1941. There is a lapse in their use during WWII due to the ban on the use steel for non war-critical construction, and also immediately after the war until 1950 due to the worldwide shortfall of steel production. The remaining 78 MP-A culverts were built 1950 or later and continue to be built today by both the state and local highway departments. An examination was made of the Bridge Inventory Cards for 1934-1935 MP-A bridges and several from the 1950s and 1960s. The characteristics are all the same, since the design by the primary manufacturer, ARMCO, remained constant. The only differences in the bridges other than their length and width, are the materials of the face and wing walls which are either stone or concrete.

History of the Metal Plate Arch Culvert

Smooth metal pipe culverts of up to 36" in diameter were in widespread use by the railways by the late 19th century. The corrugated metal pipe was invented by James H. Watson in 1896 (Patent No. 559,642). By 1900 the Watson Culvert, was being manufactured by the American Rolling Mill Company in Middleton, Ohio. It was made with a longitudinal overlapping joint, factory riveted and shipped in one piece from the manufacturer. The metal was coated with "spelter" a rough grade of molten zinc, for corrosion protection, a process that was further developed by American Rolling Mill Company research engineers and perfected in 1909 as the hot-dipped galvanization process. The company became known as ARMCO.

In the first years of the 20th century, the Acme Culvert Company of Canton, Ohio, began competing with the Watson culvert, introducing a corrugated zinc-coated steel culvert in sizes up to 6 feet in diameter. The larger culverts came in half-sections, with a top and bottom and a bolt-up flange running longitudinally for ease in shipping, handling and assembly in the field. By 1910, the Acme Culvert was "used extensively in this country and other countries." The validity of the Watson patent was struck down in 1910.

In 1931 ARMCO introduced a corrugate galvanized steel culvert constructed of separate plates that could be bolted together in the field to form culverts of various sizes. The first installation was on the Illinois Central Railroad that year. In 1932 the arch design was introduced, essentially a half-pipe section that needed to be anchored to a concrete or timber footing to contain the thrust of the arch at the spring point. The advantages of the arch were readily apparent in that the natural stream bed was left undisturbed.

By 1945 roughly 500 ARMCO multi-plate arches were installed in the US. The company became Contech Construction Products in 1986. Today the Multi-Plate arch continues to be manufactured, with over 35,000 installations since 1931, according to the company website (www.conteches.com).

44. National or State Register Criteria Statement of Significance:

Converse Road Bridge (Temple 110/114) was built in 1950 on a minor secondary road and has not played any important or significant role in the development of the Town. It is therefore not eligible for the National Register under Criteria A. The bridge is not associated with individuals important to history and is therefore not eligible for the National Register under Criteria B. The engineering principles involved in the design and manufacture of the corrugated metal plate arch culvert date to approximately 1900. The Converse Road Bridge is an example of the type that entered the market in 1932 and has remained essentially unchanged since that time. The features that have made the product widely adopted for thousands of installations are low material cost, simplicity of assembly and installation and the lack of need for specialized design or construction support. The bridge is an example of a common manufactured structure and therefore not eligible for the National Register under Criteria C.

Converse Road Bridge (Temple 110/114) therefore does not possess the necessary significance for listing on the National Register under Criteria A, B and C.

45. Period of Significance: N/A

46. Statement of Integrity: The property retains integrity of location and setting, association, feeling, design, materials and workmanship.

47. Boundary Discussion: The boundary of the property is defined by the physical limits of the culvert, facewalls, and attached stone retaining walls.

48. Bibliography and/or References:

Engineering News. "Experience with pipe culverts of corrugated iron." *Engineering News*, January 20, 1910, pp. 80-81.

Engineering News. "Iron culverts used for arch construction in Arizona." *Engineering News*, August 17, 1916, p. 330.

INDIVIDUAL INVENTORY FORM**NHDHR INVENTORY # TEM0004**

Engineering and Contract Record. "Place and merits of corrugated metal culverts." *Engineering and Contract Record*, July 5, 1933, pp. 656-657.

Engineering News-Record. "Corrugated-iron pipe of multi-plate design introduced on Illinois Central railroad." *Engineering News-Record*, November 19, 1931, pp. 805-806.

Engineering News-Record. "Metal arch culvert carried by timber mat floating on muck." *Engineering News-Record*, April 26, 1934, p 540.

Fowler, George L. "An investigation of corrugated culverts." *Railway Age Gazette*, May 19, 1916.

Kenny, H.B. "Solving the small bridge problem with large-diameter corrugated iron pipe." *Good Roads*, September 1924, pp. 83-84.

Lauriat, Philip. Letter from Lauriat, President of Temple Historical Society, to Peter Bero, DuBois & King, Inc., dated 18 March 2013. Located in NHDHR Request for project Review File.

NHDOT Bridge Inspection Records. Located in NHDOT Bridge Design, Concord, NH.

Pabst, H.A. "Concrete culverts lengthened with corrugated-iron pipe." *Engineering News-Record*, June 16, 1932, p. 859.

Railway Age. "Roads use corrugated culverts under fills." *Railway Age*, June 7, 1924, pp. 1359-1363.

Railway Age Gazette. Service secured from corrugated iron culverts." *Railway Age Gazette*, February 19, 1915.

Shafer, G.E. and Kroff, W.J. "Probable life of corrugated culverts." *Engineering News-Record*, October 18, 1945, pp. 504-506.

Temple New Hampshire Annual Reports. 1935 to 1955. Printed by Maxfield Press, Nashua, NH.

Surveyor's Evaluation:

NR listed:	individual _____	NR eligible:	individual _____	NR Criteria:	A _____
	within district _____		within district _____		B _____
Integrity:	yes _____		not eligible <u>X</u> _____		C _____
	no _____		more info needed _____		D _____
					E _____

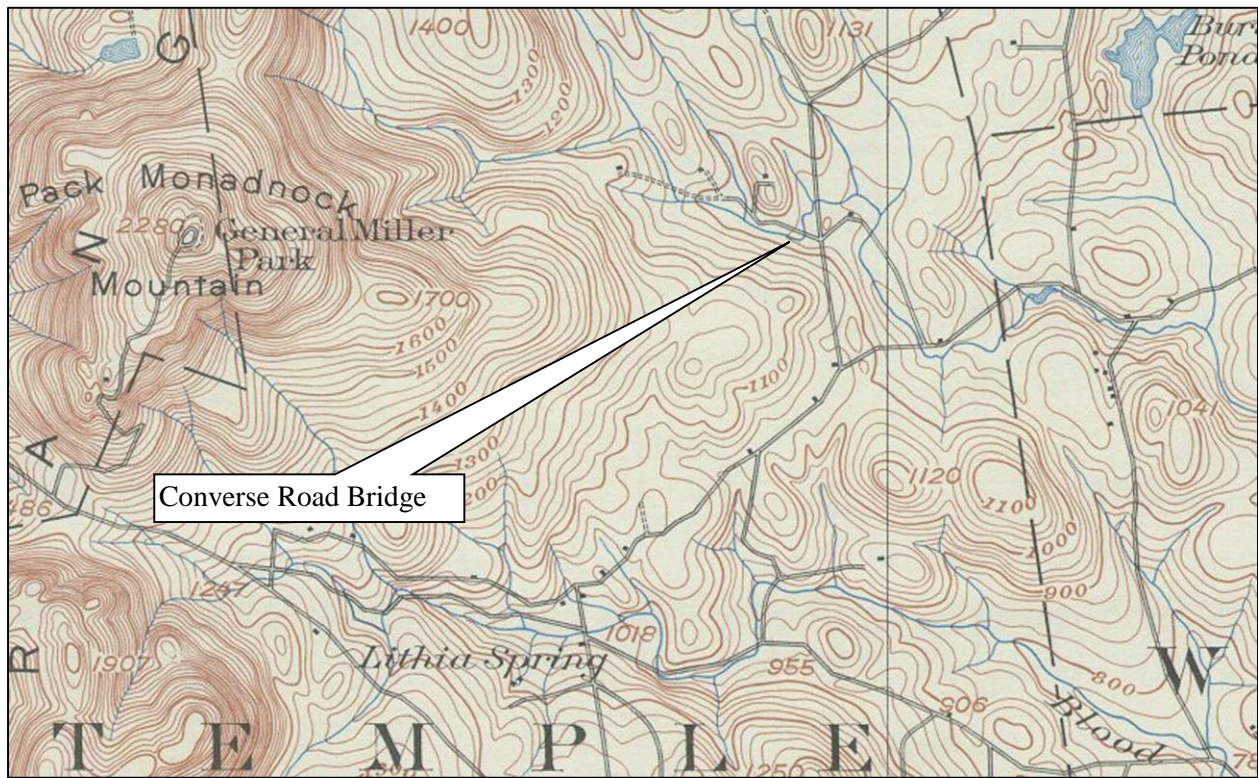


FIGURE 1: Historic Topo, Peterboro 15 minute Quadrangle 1900.

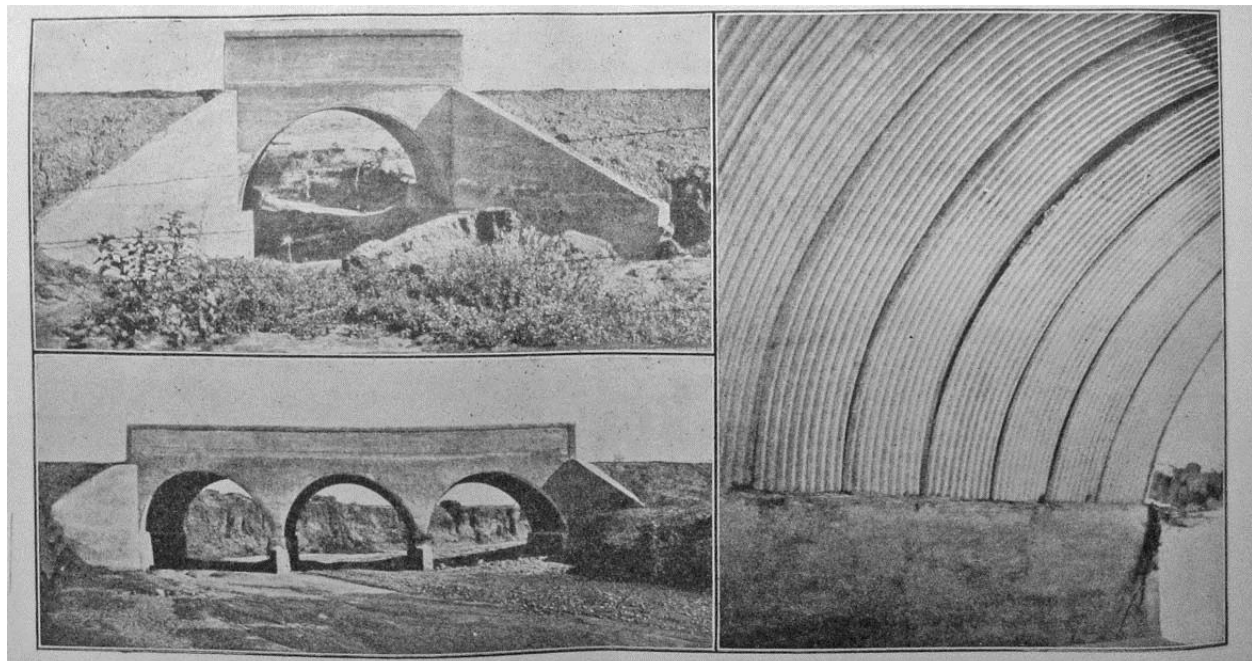


FIGURE 2: Corrugated steel culvert used for arch bridge construction of up to 12 feet span on Arizona roads in 1916. (*Engineering News*, August 17, 1916, p. 330).

INDIVIDUAL INVENTORY FORM

NHDHR INVENTORY # TEM0004

Date photos taken: April 25, 2013



Photo :# 2 Description: Roadway view of culvert, looking west from east approach.

Reference (file name or frame #): TEM0004_002

Direction: W

Date photos taken: April 25, 2013



Photo :# 3 Description: Upstream elevation showing split stone facewall and wingwalls.

Reference (file name or frame #): TEM0004_003

Direction: NW

INDIVIDUAL INVENTORY FORM

NHDHR INVENTORY # TEM0004

Date photos taken: April 25, 2013



Photo :# 4 Description: Downstream side and view to east showing outlet facewall of split stone.

Reference (file name or frame #): TEM0004_004

Direction: SE

Date photos taken: April 25, 2013



Photo :# 5 Description: Inside of culvert showing corrugated and curved galvanized steel plate arch section overlapped and bolted together.

Reference (file name or frame #): TEM0004_005

Direction: NW

INDIVIDUAL INVENTORY FORM

NHDHR INVENTORY # TEM0004

Date photos taken: April 25, 2013



Photo :#	6	Description: Inside of culvert showing steel plate arch resting on exposed concrete footing.
Reference (file name or frame #):	TEM0004_006	Direction: E

Date photos taken: April 25, 2013



Photo :#	7	Description: View downstream from bridge showing granite curbs formed by granite lintel capping the culvert facewalls.
Reference (file name or frame #):	TEM0004_007	Direction: N

INDIVIDUAL INVENTORY FORM

NHDHR INVENTORY # TEM0004

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: HP Photosmart 7850 Printer, HP Vivera 100 Gray Photo Ink, HP Premium-Plus Photopaper.

(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