February 3, 2020

CONFIDENTIAL

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Environmental Section
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Subject: Participation in the Program Comment Regarding Post-1945 Concrete and Steel Bridges in Vermont: Common Concrete Culverts
(EA Number: PDWP020 - 090; Authorization Number: PS0711-WA00005);
via electronic mail to Judith.Ehrlich@vermont.gov

Dear Ms. Ehrlich:

WSP USA Inc. (WSP) completed a review of concrete and steel culverts for the Program Comment Regarding Post-1945 Concrete and Steel Bridges in Vermont. The purpose of this review was to provide VTrans with a list of pre-1945 concrete and steel culverts that can follow an expedited/streamlined process under the current PA between VTrans and VDHP. The review presented in this letter is accompanied by a spreadsheet of culverts that may be considered to have some exceptional quality and will potentially need to continue to be considered pursuant to Section 106 of the NRHP.

METHODOLOGY

WSP reviewed several documents relating to post-1945 common bridge types to understand which bridges may be exempt under the FHWA Program Comment. Sources of data for developing the list of exceptional bridges included a number of key surveys, NRHP Multiple Property Documentation forms, and bridge datasets:

- *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978*
- *Stone Highway Culverts in Vermont, 1750 to 1930*
- *Crossings: A History of Vermont Bridges* by Robert McCullough
- *A Context for Common Historic Bridge Types, NCHRP Project 25-25, Task 15*
- VTransparency Bridge Data
- Historic highways and scenic byway corridors
- Structure, Inventory and Appraisal Database
    - VT Short Structures datasets

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Much of the information regarding significance of culverts in the MPDF, *Stone Highway Culverts in Vermont, 1750 to 1930,* applied only to structures built before 1930 and was very similar to the significance and registration requirements presented in the 2018 MPDF, *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978.* Most of the data in *Crossings: A History of Vermont Bridges* by Robert McCullough had been incorporated into the aforementioned MPDF and thus no new data was gleaned from this source.

The two most pertinent sources used to determine what culverts may have exceptional quality are the *Metal Truss, Masonry and Concrete Bridges of Vermont MPDF* and the National Cooperative Highway Research Program (NCHRP) report, *A Context for Common Historic Bridge Types.* The pertinent information used to determine the potential significance of concrete and steel culverts is outlined below.

A. Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978

The multiple property documentation form, *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978,* outlines the significance and eligibility of steel and concrete culverts in the state. In Vermont, a culvert is defined as a structure with a bottom, similar to Bateman's definition, regardless of its length.

Significance

Culverts in Vermont are of concrete [Types 119 and 219], steel [Type 319], timber [Type 719], masonry [Type 819], and aluminum [Type 919] construction. Culverts built in the 1940-1978 period in Vermont number 1,198, or roughly 30 percent of the total 4,005 short and long structures. No examples of masonry or timber culverts were constructed in Vermont after 1932. From a historical standpoint culverts with spans of less than 20', and therefore too small to qualify as bridges, lack historical importance except in certain cases. One exception would be the earliest application of concrete and steel culverts, which date to the 1920s or earlier.

Registration Requirements

The period of significance for culverts includes the period in which culverts were constructed, from 1900 to 1978. Culverts less than 50 years of age that meet Registration Requirements must also possess characteristics of exceptional importance to be considered NRHP eligible. Culverts that meet Registration Requirements must also retain integrity of location, design, setting, materials, workmanship, feeling, and association.

Specific considerations for eligibility under Criterion A

1. A culvert that can be shown to be a contributing element of major bridge, road, or highway construction project, including association with the Good Roads movement, that is eligible for the NRHP for reasons that include the construction of the subject culvert.

2. An early culvert established as part of Vermont's range roads or turnpikes.

Specific considerations for eligibility under Criterion C

1. Innovative, specialized, or patented designs of recognized importance.

Certain types of precast and prestressed concrete culverts built in Vermont may possess innovative or significantly specialized characteristics to warrant this consideration. Patented culvert designs or features introduced in Vermont are not known to exist from current research.

B. A Context for Common Historic Bridge Types

This report, produced under the National Cooperative Highway Research Program (NCHRP), was completed to provide "assistance to practitioners with assessing the historic significance of bridge types within the context of the United States" (Parsons Brinckerhoff 2005). While the focus of the study was bridges, the history and significance of common types such as reinforced concrete cast-in-place slabs, T beams, box beams, pre-cast slabs and rigid frames are applicable to culverts.

Cast-in-Place Flat Slab

According to the common bridge type context, these structures began to appear around 1905 and continued to be built well into the twentieth century. The type was very popular on small highways in the 1930s and 1940s (Parsons Brinckerhoff 2005:3-82 to 3-84). In VTrans' short-structures database, concrete slab culverts [Type 101] generally follow this trend with the earliest structure constructed in 1900. In Vermont, concrete slabs continued to be utilized as late as 2005, though only six structures have been constructed after 1968.

Character-defining features of slab bridges include the slab, parapet or railing, and abutments, wingwalls and, occasionally piers. These structures can possess significance if they were constructed before 1955 and are intact, having many of the aforementioned character-defining features. Many structures have not retained their original parapet or railing, having been replaced with guardrails or removed altogether. Only 21 slab structures were constructed between 1945 and 1955. Of the 142 concrete slab structures [Type 101] built prior to 1955, 68 have been reconstructed or rehabilitated as early as 1940 and as recently as 2011. These rehabilitated structures may not have the requisite character-defining features to be significant examples of this type, especially those that have been rehabilitated within the past 50 years.

Reinforced Concrete T Beam

T beam structures [Type 104] were used around the same time as the flat slab with the most prolific period being in the 1920s and 1930s. Only two T beam culverts exist in the state: VT110-0018 built in 1916 and US7-0168 built in 1930 and rehabilitated in 1955. Character defining features of this type include slab integrated with longitudinal beams, parapet or railing when integrated, and abutments, wingwalls or, occasionally piers.VT110-0018 appears to be an intact example of the type with original railing on both sides of the road.

Concrete Rigid Frame

Rigid frame structures were built from the early 1920s to 1950. In Vermont, rigid frame culverts began being constructed in 1919 through the 1950s with three bridges built after 1980. Character-defining features include a monolithic substructure and superstructure of one continuous fabric, and a parapet railing. The common bridge historic context states, "The more highly-significant rigid frames are those that possess integrity and date early in the period of the structure's development in the United States (1920s) and those that can be documented as a representative example of a department of transportation's standard bridge design." (Parson Brinckerhoff 2005:3-97). Of the 19 rigid frame culverts built in the state, six have been rehabilitated and consequently have diminished integrity.

LIST OF EXCEPTIONAL CULVERTS

Prior to including a bridge on the exceptional list, WSP confirmed the bridge's type through review of the appraisal inventories and photographs on VTransparency. Interstate bridges were not included on either the exceptional list or the exempted list because they have already been addressed in the Section 106 Exemption Regarding Effects to the Interstate Highway System, adopted by the Advisory Council on Historic Preservation on March 10, 2005.

There was no specific guidance in any of the literature for concrete box culverts or steel culverts. Inspection photographs of the earliest examples of these types (pre-1920) were reviewed for any significant character-defining features. The bridge type field, which briefly states the bridge type, was also checked for significant features. Many concrete box culverts mentioned stone or arch in the bridge type field. These structures were assumed to be potentially exceptional. All of the bridges constructed of stone [Types 800, 801, 811 and 819] were assumed to be exceptional. The one timber culvert [Type 719-CABOT- US2-00084] was also assumed to be exceptional under Criterion C as it was built in 1923 and could be an early, exceptional example of its type. None of the aluminum pipe culverts were reviewed for exceptional qualities as the earliest one was constructed in 1960.

Review of the registration requirements for culverts in the MPDF, *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978*, indicates that very few post-1945 culverts are eligible for listing in the NRHP. The design and materials used to construct culverts was well established as standard by the postwar period and thus very few culverts from this period used innovative, specialized, or patented designs of recognized importance required for eligibility under Criterion C. Culverts constructed after 1945 were not generally associated with major road construction projects other than the interstate system, which as stated above have been exempted.

However, culverts constructed prior to 1945, particularly in the 1910s and early 1920s, may be associated with the Good Roads movement and be potentially eligible under Criterion A. No concrete or steel culverts were constructed early enough to be associated with Vermont's range roads or turnpikes and therefore do not meet that specific registration requirement in the MPDF under Criterion A.

SUMMARY
WSP has concluded that 72 culverts (65 concrete culverts, one steel culvert, one timber culvert, and five masonry culverts) are recommended as eligible for listing in the NRHP under Criterion A or Criterion C and thus may have exceptional qualities and would potentially need to continue to be considered pursuant to Section 106 of the NRHP (Table 1). The remaining 1,193 culverts are common examples of their type that lack distinction and/or are not associated with any significant road construction project. Many of the culverts have diminished integrity due to loss of character defining features or modern rehabilitation.

Please let me know if you have any questions. Once we finalize the exceptional list, I can provide a list of both exceptional and exempt culverts.

Kind regards,

Camilla R. McDonald

Camilla McDonald
Manager-Historic Preservation

CM
Encl.
cc: file

Reference
Parson Brinckerhoff and Engineering and Industrial Heritage
2005 NCHRP Project 25-25, Task 15: A Context For Common Historic Bridge Types. Document accessed online at http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(15)_FR.pdf.

TABLE 1. List of Exceptional Culverts

Route Name	Bridge Number	Year Built	Year Reconstructed	Town Name	Bridge Type	Bridge Type Code	NRHP Criteria	Notes	Location
VT4A	5	1924	____	Castleton	R.C. Box Wd with Slab	100	A or C	Appears to be rigid frame rather than concrete box, railing still mostly intact.	1.2 MI E VT 30
VT133	5	1900	____	Tinmouth	Concrete Slab	101	A or C	Earliest example, moderate integrity	6.0 MI N. JCT. VT 30
VT140	5	1918	____	Wallingford	Concrete Slab	101	A or C		3.6 MI E JCT US 7
VT12	56	1918	____	Northfield	Concrete Slab	101	A or C		2.5 MI S VT 12A
VT7A	17	1919	____	Arlington	Concrete Slab	101	A or C		2.5 MI N JCT VT 313
VT110	16	1919	____	Washington	Concrete Slab	101	A or C		8.3 MI S JCT US302
VT133	12	1919	____	Ira	Concrete Slab	101	A or C		5.8 MI S. JCT. VT 4A
VT100	098G	1919	____	Ludlow	Concrete Slab	101	A or C		1.4 MI S JCT VT 103
VT7B	6	1919	____	Clarendon	Concrete Slab	101	A or C		1.7 MI N VT 103
VT110	15	1921	1940	Washington	Concrete Slab	101	A or C		8.7 MI S JCT US302
US7	82	1921	____	Wallingford	Concrete Encased Steel Beam	101	A or C		0.1 MI S JCT VT 140
VT118	24	1921	____	Enosburg	Concrete Slab	101	A or C		1.8 MI S JCT VT 105
US302	20	1922	____	Orange	Concrete Slab	101	A or C		0.6 MI W JCT VT 25
VT14	64	1923	____	Barre	Concrete Slab	101	A or C		2.8 MI S JCT US 302 S
VT4A	14	1924	____	Ira	Concrete Slab	101	A or C		1.4 MI W US 4 OVERPASS
US7	159	1924	____	Colchester	Concrete Slab	101	A or C		2.0 MI N JCT VT 2A
VT09	10	1925	1941	Woodford	Concrete Slab	101	A		3.5 MI E US 7
VT105	73	1927	____	Derby	Concrete Slab	101	A		4.2 MI E JCT US 5
VT140	3	1927	____	Wallingford	Concrete Slab	101	A		2.0 MI E JCT US 7
VT12	58	1928	0	Northfield	Concrete Slab	101	A		1.6 MI S JCT. VT.12A S
VT100B	3	1928	____	Moretown	Concrete Slab	101	A		1.1 MI E JCT VT 100
VT105	74	1928	____	Charleston	Concrete Slab	101	A		1.2 MI W JCT VT 5A
VT12	57	1928	0	Northfield	Concrete Slab	101	A		1.7 MI S JCT. VT.12A S
VT114	10	1928	____	Lyndon	Concrete Slab	101	A		3.0 MI N JCT US 5
VT113	11	1928	____	Vershire	Concrete Slab	101	A		7.5 MI E JCT VT 110
VT133	20	1928	____	West Rutland	Concrete Slab	101	A		0.3 MI S. JCT. VT 4A
VT140	4	1929	____	Wallingford	Concrete Slab	101	A		2.5 MI E JCT US 7
VT15	001A	1929	____	Essex	Concrete Slab	101	A		0.3 MI E VT 2A
VT09	7	1930	____	Bennington	Concrete Slab	101	A		1.0 MI E US 7
VT09	8	1930	____	Bennington	Concrete Slab	101	A		1.3 MI E US 7
VT110	18	1916	____	Washington	Concrete T-Beam	104	A	Early intact example of a T-beam culvert	4.0 MI S JCT US 302
VT64	8	1919	____	Williamstown	Concrete Rigid Frame	107	A or C	If rigid frame, could be eligible under Criterion C	0.9 MI W JCT VT 14

Route Name	Bridge Number	Year Built	Year Reconstructed	Town Name	Bridge Type	Bridge Type Code	NRHP Criteria	Notes	Location
VT2B	5	1919	____	St. Johnsbury	Concrete Frame	107	A or C	Earliest concrete rigid frame with moderate integrity.	2.3 MI E JCT US2
VT104	17	1927	____	St. Albans	Concrete Rigid Frame	107	A or C		1.2 MI S JCT VT 36
VT14	52	1931	____	Williamstown	Concrete Rigid Frame	107	A or C	Very poor condition but good example	4.1 MI N VT65
US5	124	1931	1970	Barnet	Concrete Arch	111	A or C		5.0 MI S JCT US 2
VT11	063A	1949	____	Springfield	Concrete Arch	111	A or C		JCT VT 143
VT09	53	1914	____	Brattleboro	Concrete Arch Wd with Slab	119	A or C	Not Exempt, Nice example of an early concrete culvert with concrete rail.	1.1 MI W I91
VT15	39	1917	____	Hyde Park	R.C. Box	119	A	Earliest box culvert with railing but in very poor condition	1.7 MI W VT 100 N
VT15	76	1918	1937	Walden	R.C. Box	119	A	Potential rehabbed but early example	2.2 MI E JCT VT 16
US5	43	1919	____	Springfield	R.C. Box	119	A		1.0 MI S JCT VT 11 WEST
US5	45	1919	____	Springfield	R.C. Box	119	A		0.1 MI N JCT VT 11 EAST
US5	126	1919	____	St. Johnsbury	R.C. Box	119	A		1.6 MI S JCT US 2
VT4A	10	1919	____	Castleton	R.C. Box	119	A		3.4 MI E VT 30
VT4A	9	1919	____	Castleton	R.C. Box	119	A		3.2 MI E VT 30
VT7A	28	1919	____	Manchester	R.C. Box	119	A		0.5 MI S JCT VT 11
VT112	4	1919	____	Halifax	R.C. Box	119	A		4.8 MI E JCT VT 100
VT142	1	1919	____	Vernon	R.C. Box	119	A		0.6 MI N VT MASS ST LINE
VT128	7	1919	____	Westford	Concrete Box	119	A		2.1 MI S JCT VT 104
VT128	4	1919	____	Essex	Concrete Box	119	A		2.1 MI N JCT VT 15
VT128	2	1919	____	Essex	R.C. Box	119	A		0.8 MI N JCT VT 15
VT112	6	1919	1940	Halifax	R.C. Box	119	A		3.2 MI E JCT VT 100
VT11	16	1919	____	Winhall	R.C. Box	119	A		0.5 MI E JCT VT 30
VT112	2	1919	____	Halifax	R.C. Box	119	A		6.2 MI E JCT VT 100
VT108	4	1919	1953	Stowe	R.C. Box Wid with Slab	119	A		4.0 MI N JCT VT 100
VT14	125A	1919	____	Irasburg	R.C. Pipe	119	A		0.7 MI N JCT VT 58 W
VT15	77	1919	1938	Walden	R.C. Box	119	A		2.3 MI E JCT VT 16
VT15	2	1919	____	Essex	R.C. Box	119	A	Good intact example	1.4 MI E VT 2A
VT14	125B	1919	____	Irasburg	R.C. Pipe	119	A		1.2 MI N JCT VT 58 W
VT346	5	1919	1933	Pownal	R.C. Box	119	A		2.0 MI N JCT US 7
VT100	74	1919	____	Wardsboro	R.C. Box	119	A		4.0 MI S JCT VT 30
VT125	013A	1919	____	Ripton	Precast R.C. Box	119	A		3.4 MI. E US7
US302	004A	1919	____	Barre City	Conc Slab/Gran Slab	119	A		3.5 M EAST JCT US2
VT11	21	1919	____	Peru	R.C. Box	119	A		4.6 MI E JCT VT 30
VT14	62	1921	____	Williamstown	R.C. / Stone Box	119	A		3.9 MI S JCT US 302 S
US302	5	1918	1975	Barre City	Jack Arch	302	A	Not Exempt, Series of corrugated pipe arches between steel beams, stone abutments	0.1 M W JCT VT 14
US2	84	1923	____	Cabot	Timber Penstock	719	A		7.6 MI W JCT VT 15
US5	169	1931	____	Barton	Granite Slab/ R.C. Box	800	A or C		3.2 MI N JCT VT 16 WEST
US5	162	1905	____	Barton	2 Span Masonry Slab	801	A or C		0.4 MI S JCT VT 16 SOUTH
US2	123	1917	____	Lunenburg	Stone Arch	811	A or C		5.7 MI W JCT VT 102

Route Name	Bridge Number	Year Built	Year Reconstructed	Town Name	Bridge Type	Bridge Type Code	NRHP Criteria	Notes	Location
VT09	5	1919	____	Bennington	Masonry Stone Arch	819	A or C		0.2 MI W US 7
US4	57	1932	____	Hartland	Masonry Arch Culvert	819	A or C		0.1 MI E JCT VT 12 SOUTH

FIGURE 1a: Known Cultural Resources in the Arnold Hogan-Kenmore Project Area (ESRI World Imagery 2018)

FIGURE 1a: Known Cultural Resources in the Arnold Hogan-Kenmore Project Area (ESRI World Imagery 2018)