Minnesota Department of Transportation (MnDOT)
Local Historic Bridge Report

Executive Summary — Bridge Number: L4013

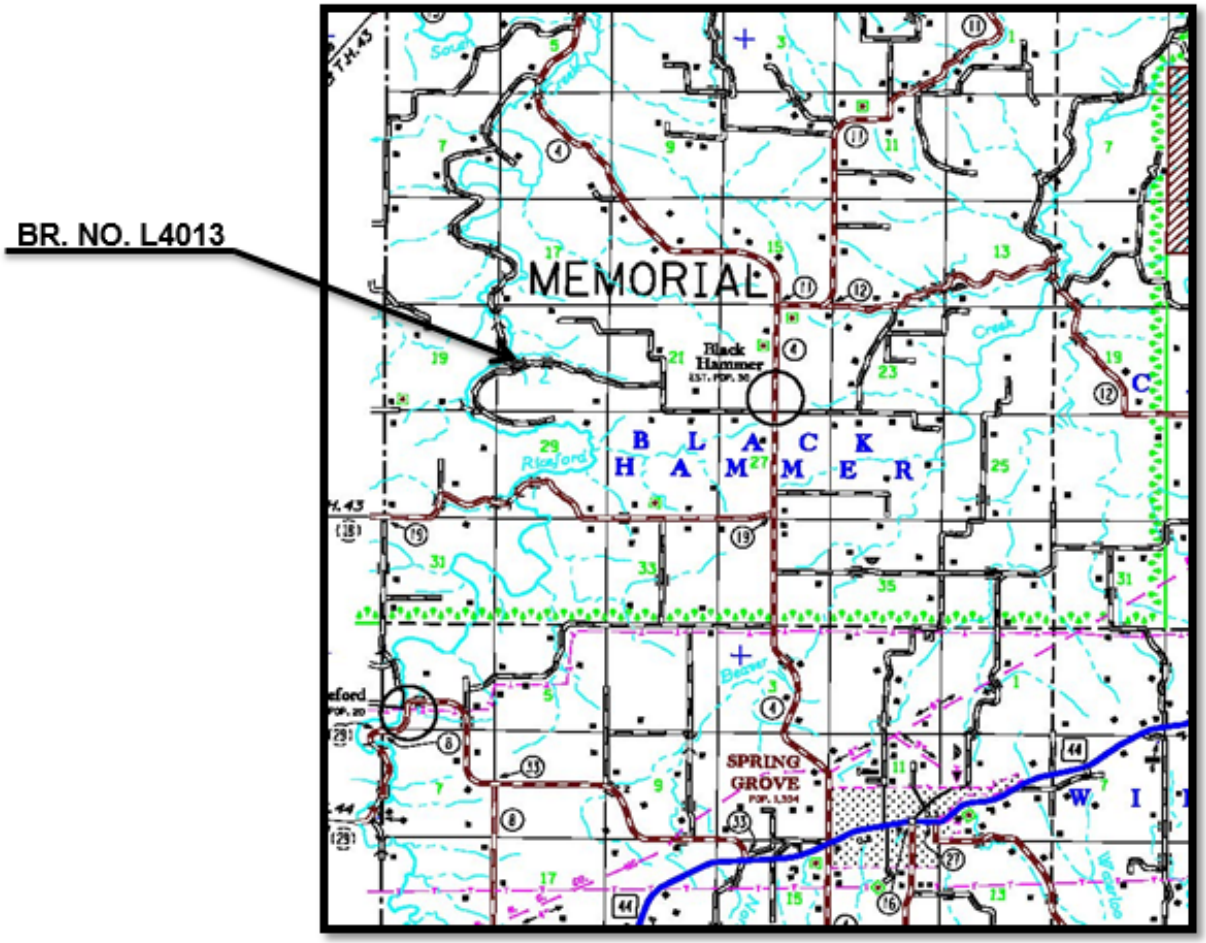
Bridge L4013 was constructed in 1915 to carry a single lane of vehicular traffic on Rooster Valley Road over a Dry Run in Houston County. The bridge is owned by Black Hammer Township. It is significant as the only surviving, authenticated example of an early-twentieth-century, state-designed, stone-arch bridge.

Bridge L4013 is a single-span, stone-arch bridge spanning approximately 12 feet 6 inches. The structural arch and its headwalls/wingwalls are comprised of stone masonry. The underside arch reaches a height ranging from approximately 9 feet to 10 feet above the dry run grade.

The bridge is currently open to vehicle traffic and it is load-posted to 5 tons based on a physical inspection rating completed in 2009. The stone arch is in fair to poor overall condition overall and presents a concern due the inability to assess its load capacity and concern for overall stability under load. Also contributing to the bridges low capacity rating is the lack of earth cover over the arch for load distribution. The bridge has no railings, resulting in a sharp drop off at each edge of the arch.

Preservation activities that could allow for the bridges continued use for vehicular traffic are detailed within. While a detailing of these activities is provided, consideration to removing vehicular traffic from the bridge should also be considered.

Any work on Bridge L4013 should proceed according to the Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards) [36 CFR part 67] and *The Secretary's Standards with Regard to Repair, Rehabilitation, and Replacement Situations,* as adapted by the Virginia Transportation Research Council (Guidelines).



Bridge L4013 – ROOSTER VALLEY ROAD over DRY RUN

PROJECT LOCATION
HOUSTON COUNTY
SEC. 20, TO 102NN, R 07W
UTM ZONE: 15 NAD: 27
USGS QUAD NAME: SPRING GROVE
EASTING: 1982923 ft.
NORTHING: 15848870 ft.

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Minnesota Department of Transportation (MnDOT)
Local Historic Bridge Report

I – Project Introduction Bridge Number: L4013

This Bridge Report is a product of a comprehensive study performed for approximately 140 historic bridges owned by county, city, township, private and other state agencies besides MnDOT. The study is the second phase of a multi-phased process developed and executed in partnership with representatives from the Federal Highway Administration (FHWA); State Historic Preservation Office (SHPO); MnDOT State Aid; MnDOT Cultural Resources Unit (CRU); the US Army Corps of Engineers (USACE); local public works and county highway departments; county and township boards and city councils; the preservation community and the general public. To perform the study, MnDOT retained the consultant team of LHB Inc., Mead & Hunt Inc., and The 106 Group.

The general goals of the study include:

- Gathering and compiling the existing historic and bridge condition data and other relevant information on the bridges in the study group into bridge reports.
- National Register nominations for a select number of bridges within the study group which the bridge owner may request a nomination to be prepared.
- Updating MnDOT's *Management Plan for Historic Bridges in Minnesota* based on the study's findings.
- Producing a narrative for the MnDOT Historic Bridge Website to disseminate information regarding locally owned historic bridges in Minnesota.
- Investigating and preparing a summary regarding how other states have funded historic bridge programs and structured Programmatic Agreements when multiple non-state entities are the owners of historic bridges.

The Bridge Reports compile and summarize the historic and engineering information concerning the structures. The reports also document the existing use and condition of the bridges along with assessments of the maintenance, stabilization and preservation needs of each structure, including cost estimates. The maintenance activities, along with regular structural inspections and anticipated bridge component replacement activities are routine practices directed toward continued structure serviceability. Stabilization activities address immediate needs identified as necessary to maintain a bridge's structural and historic integrity and serviceability. Preservation activities are near term or long term steps that need to be taken to preserve and in some cases restore a bridge's structural and historic integrity and serviceability. In assessing preservation activities, a design life of 20 years or longer is typically considered. In addition to general restoration activities and dependent on the severity of deterioration, preservation activities may include spot repair, disassembly and reassembly or replacement of specific bridge components.

Recommendations within the Bridge Reports are consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards). The Standards are basic principles created to help preserve the distinct character of a historic property and its site, while allowing for reasonable change to meet new engineering standards and codes. The Standards recommend repairing, rather than replacing deteriorated features whenever possible. The Standards apply to historic properties of all periods, styles, types, materials and sizes and encompass the property's location and surrounding environment.

The Standards were developed with historic buildings in mind and cannot be easily applied to historic bridges. The Virginia Transportation Research Council (Council) adapted the Standards to address the special requirements of historic bridges. They were published in the Council's 2001 Final Report: A Management Plan for Historic Bridges in Virginia, *The Secretary's Standards with Regard to Repair, Rehabilitation, and Replacement Situations,* provide useful direction for undertaking maintenance, repair, rehabilitation, and replacement of historic bridges and are included in the Appendix to this plan.

Existing bridge data sources typically available for Minnesota bridges were gathered for the study. These sources include:

- PONTIS, a bridge management system formerly used by MnDOT to manage its inventory of bridges statewide, and its replacement system, SIMS (Structure Information Management System)
- The current MnDOT Structure Inventory Report and MnDOT Bridge Inspection Report. Reports are available for the majority of the bridges (not available for bridges in private ownership)
- Database and inventory forms resulting from the 2012 Minnesota Local Historic Bridge Study and other prior historic bridge studies as incorporated into the database
- Existing Minnesota historic contexts studies for bridges in Minnesota, including *Reinforced-Concrete Highway Bridges in Minnesota, 1900-1945, Minnesota Masonry-Arch Highway Bridges, 1870-1945, Iron and Steel Bridges in Minnesota, 1873-1945 and Minnesota Bridges 1955-1970*
- Field investigations documenting the general structural condition and determining character-defining features

Additional data sources researched and gathered for some of the bridges as available also included:

- Files and records at MnDOT offices
- Original bridge construction plans, rehabilitation plans, and maintenance records of local owners
- Files and documents available at the SHPO office, including previous inventory forms, determinations of eligibility, studies, and compliance documents
- Existing historic and documentary material related to the National Register-eligible bridges

The Appendix contains the following: a Glossary explaining structural and historic preservation terms used in the report, the Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior's Standards, a list of engineering and historic documents available for this bridge, and copies of the MnDOT Structure Inventory and Bridge Inspection Reports current at the time of the report preparation.

The Bridge Report will provide the bridge owner and other interested parties with a comprehensive summary of the bridge condition and detailed information related to the historic nature of the bridge. This information will enable historic bridge owners to make informed decisions when planning for their historic properties.

This narrative is drawn from previous documents, as available for the subject bridge, which may include determination of eligibility (also known as Phase II evaluation), Minnesota Architecture/History Inventory Form, National Register nomination, Multiple Property Documentation Form, and/or applicable historic contexts. See Sources for details on which documents were used in compiling this Historic Data section.

Contractor Unknown

Designer/Engineer Alfred J. Rasmussen

Description

Bridge L4013 is a single-span, stone-arch bridge that carries an unpaved east-west road over a dry run. It is located in a wooded rural area of Houston County about 8 miles west of Caledonia.

The bridge is built of coursed-ashlar, buff-colored limestone. It has a semicircular arch with a 12-foot-6-inch span. The limestone matches farmstead foundations in the general vicinity, strongly suggesting a local origin for the stone. The quarry has not been identified. The voussoirs are well-blocked and uniform, measuring 8 inches in width and 12 inches in height. Joints are about 1 inch thick. Except for a few crude patches of repointing, the mortar has almost completely disintegrated from the intrados joints.

The arch springs about 4 feet above grade from sharply defined impost ledges that extend outward from the intrados about 6 inches. Constructed on a slight skew, the bridge has an overall width of approximately 18 feet. Spandrel walls are continuous with slightly flared wingwalls. To protect the foundations from the scour, the stream bed under the bridge has been paved in concrete. Photographs from the 1950s and 1960s show stone parapet walls with pipe-metal railings on both sides of the roadway. These features have been removed, leaving a ragged masonry line flush with the roadway.

Significance

The Minnesota State Highway Commission was officially organized in 1905 to improve the quality of roads and bridges in the state. To fulfill its responsibilities, the commission assigned field engineers to assist county governments with highway projects and prepared a series of standard bridge plans. Standardized bridge plans are known for beam spans, plate girders, pony and through trusses, reinforced-concrete slab and girder bridges. Although commission reports do not mention a stone-arch plan, the commission's field engineers apparently had at their disposal a standard short-span design appropriate for the limestone region of southeastern Minnesota. In January 1915, for example, Houston County requested Alfred J. Rasmussen, the commission's engineer for that county to make a survey and draw plans for a bridge in Section 20 (southwest quarter of northwest quarter) of Black Hammer Township. The county approved the plans a month later. Although county records provide no further information on the project, the bridge presumably was built by the end of the summer.

Bridge L4013 retains a high degree of integrity. It continues to carry vehicular traffic over the dry stream bed in rural southeastern Minnesota. As such it retains integrity of location, setting, feeling, and association. The bridge has experienced minor alterations including the removal of the original rail and addition of concrete in the stream bed. Despite these alterations, the bridge continues to retain integrity of workmanship, design, and materials. The period of significance is 1915 to correspond with the date of construction.

Bridge L4013 is significant under *Criterion C* in the area of Engineering for its design and construction. Constructed in 1915, the structure is important as the only surviving, authenticated example of an early-twentieth-century, state-designed, stone-arch bridge. Since its design was replicated in other counties, the bridge provides strong evidence that the Minnesota State Highway Commission attempted to standardize stone-arch bridge construction in much the same way that it sought to create uniformity in the design of steel and concrete bridges.

Historic Context	Minnesota Masonry-Arch Highway Bridges, 1870-1945
National Register Status	Listed (Individually)
Criterion A Significance	N/A
Criterion C Significance	Engineering: Important type
Historic District	N/A
SHPO Inventory Number	HU-BLH-008

Sources Used to Compile Section II – Historic Data

Hess, Jeffrey A. "Bridge L4013," National Register of Historic Places Nomination for Bridge, 1990, in State Historic Preservation Office, Minnesota Historical Society, St. Paul, MN.

Field investigation by LHB, Inc. and Mead & Hunt, 24 May 2013.

Character-Defining Features

Character-defining features are prominent or distinctive aspects, qualities, or characteristics of a historic property that contribute significantly to its physical character. Features may include materials, engineering design, and structural and decorative details. Often, the character-defining features include important historic fabric. However, historic fabric can also be found on other elements of a bridge that have not been noted as character-defining. For this reason, it is important to consider both character-defining features and the bridge's historic fabric when planning any work.

Feature 1: Design and construction of the masonry stone arch with stone wingwalls and impost ledges. This feature includes the coursed-ashlar, buff-colored limestone construction as well as the round-arch configuration of the arch ring.

Minnesota Department of Transportation (MnDOT)
Local Historic Bridge Report

III – Bridge Data — Bridge Number: L4013

Date of Construction (remodel)	**1915**
Common Name (if any)	

Location

Feature Carried:	ROOSTER VALLEY RD
Feature Crossed:	Dry Run
County:	Houston
Ownership:	Black Hammer Township

MnDOT Structure Data

*Data Current (as of):	Sep 2013
Main Span Type:	812 MASONRY ARCH
Main Span detail:	SPANDREL FILLED ARCH
Substructure Type - Foundation Type:	
Abutment:	4-Masonry - 0-Unknown
Piers:	N-Not Applicable - N-Not Applicable
Total Length:	15 ft
Main Span Length:	11.5 ft
Total Number of Span(s):	1
Skew (degrees):	15
Structure Flared:	No Flare
Roadway Function:	Rural, Local
Custodian/Maintenance Type:	Township

Reported Owner Inspection Date	6/4/2012
Sufficiency Rating	39.9
Operating Rating	HS 5
Inventory Rating	HS 3
Structure Status	P – Load Posted
Posting	VEH: 5 SEMI: DBL:
Design Load	UNKN

Current Condition Code

Deck:	N
Superstructure:	N
Substructure:	N
Channel and Protection:	7
Culvert:	4

Roadway Clearances

Roadway Width:	14.5 ft
Vert. Clearance Over Rdwy:	N/A
Vert. Clearance Under Rdwy:	N/A
Lat. Clearance Right:	0 ft
Lat. Clearance Left:	0 ft

Current Appraisal Rating

Structural Evaluation:	2
Deck Geometry:	N
Underclearances:	N
Waterway Adequacy:	8
Approach Alignment:	5

Roadway Data

ADT Total:	40 (1986)
Truck ADT Percentage:	Not given
Bypass Detour length:	6 miles
Number of Lanes:	1

Fracture Critical	No
Deficient Status	S.D.

Waterway Data

Scour Code: E-CULVERT

Non-MnDOT Data

Approach Roadway Characteristics

Lane Widths:	13 ft
Shoulder Width:	N/A
Shoulders Paved or Unpaved:	N/A
Roadway Surfacing:	Aggregate

****Number of Crashes reported in MnMCAT within 500 feet of Bridge Site** 0

Location of Plans	N/A
Plans Available	No Plans Available

* Non-MnDOT data collected during field survey. All other fields of data collected from MnDOT September of 2013. See Appendix C for MnDOT inventory and inspection report data.

** Unless a significant number of crashes are noted on or near a bridge, the accident data is not detailed in this report.

Existing Conditions
Available information, as detailed in the Project Introduction section, concerning Bridge L4013 was reviewed prior to visiting the bridge site. The site visit was conducted to establish the following:

1. General condition of structure
2. Conformation to available extant plans
3. Current use of structure
4. Roadway/pedestrian trail geometry and alignment (as applicable)
5. Bridge geometry, clearances and notable site issues

General Bridge Description
Bridge L4013 is a single-span stone-arch bridge spanning approximately 12 feet, 6 inches. Both the structural arch and its stone headwalls/wingwalls are comprised of stone which appears to be coursed-ashlar buff colored limestone. The semicircular stone arch rises from stone abutment walls, which project approximately 2 feet to 4 feet from the dry run grade which the bridge spans. The underside arch reaches a height ranging from approximately 9 feet to 10 feet above the dry run grade. The bridge is built on an approximate 15-degree skew.

Serviceability Observations
The bridge is currently open to vehicle traffic and it is load-posted to 5 tons based on a rating completed in 2009. The rating was based on a physical inspection and the low capacity rating is attributed to the stone arch, namely the loss of mortar and initiation of displacement between the stones comprising the stone arch. Also contributing to the low rating is the lack of earth cover over the arch for load distribution. Approximately 3 to 6 inches of gravel cover over the top of the arch stones was observed at the time of the field assessment. The bridge has no railings resulting in a sharp drop off at each edge of the arch.

Condition Observations

Arch
The stone arch is in fair to poor condition. With the exception of what appears to be the isolated loss of a few small stones, the original arch stones appear intact, reasonably sound, and fairly uniform in alignment. However the joint mortar, presumed originally placed between stones, appears with limited exception to be completely deteriorated and void. This loss of mortar has led to movement and loosening of the arch stones and increases the potential for further stone movement and loss of arch structural capacity. This potential for stone movement is further increased by the noted limited cover over the stone arch (3 inches to 6 inches gravel) and thus attributes to the bridges low load capacity posting.

Abutments
The arch springs from stone abutment ledges which project from just over two feet to just under four feet above the dry run. The stone comprising the abutment ledges appears reasonably sound and shows signs of previous repointing and smearing of joint mortar. The abutment ledges are in fair condition with most notable distress being a vertical crack extending from the base of the abutment stone ledge at the northwest corner, reaching a width of 1-3/4 inch in the stone arch above the ledge and extending to nearly the crown of the stone arch.

Stone Headwalls and Wingwalls
The arch voussoirs stones appear in fair to good condition overall. The majority of the headwall stones are also in fair condition. The accessible wingwall stones also appear in fair condition, although portions of the wingwall stones appear missing and there is a greater quantity of cracked/spalling wingwall stone. Mortar condition is quite variable for the headwalls/wingwalls with failed regions, poorly repointed/ smeared regions, and regions where the entire wall has been back-plastered with mortar, thereby eliminating the ability to make an assessment on stone condition.

Railings
There are no railings or curbing present on the structure.

Approach/Waterway Observations
A concrete slab, presumably placed to control scour, is in place paving the dry run stream bed beneath the bridge. A large area of scour is present directly off the downstream (east) end of the concrete slab resulting in an approximately 2-foot drop.

The roadway leading to and from the bridge is gravel surfaced and can be characterized as curving and hilly.

Date of Engineering Site Visit by LHB
May 24, 2013

Condition 1: West elevation, (note lack of earth fill over top of concrete arch for distribution of wheel loading and lack of railings/headwall over arch)

Condition 2: East elevation, also showing concrete flume paved between abutments

Condition 3: Roadway elevation, looking south
(note vehicle is parked south of bridge in southwest corner)

Condition 4: Southeast wingwall corner (note displacement of end wingwall stones and lack of mortar between wingwall and arch stones)

Condition 5: Northeast wingwall (note deteriorated stones and missing mortar)

Condition 6: Underside arch, looking west
(note deteriorated mortar/mortar voids and signs of stone spalling)

Condition 7: Underside arch, looking west (closer view)
(note lack of joint mortar and signs of stone spalling evident)

Condition 8: Cracking in south abutment foundation, southwest corner (note crack extends up and into arch stone)

Condition 9: Cracking from south abutment foundation projecting up through stone arch

Condition 10: Southwest wingwall (note back-plastering over stone masonry and large vertical cracks)

Condition 11: Washout and undermining beneath flume slab at west outlet end

Condition 12: Undermining appears to continue beneath the southwest wingwall, potentially contributing to the observed vertical cracking (settlement)

Overall Recommendations
Due to the condition of the arch stones/ arch stone tuckpointing, the load carrying capacity and service life for the bridge to continue to carry vehicle traffic is likely limited to less than two years unless rehabilitative repairs are made. Furthermore, due the unpredictable nature of the stone arch condition, plans for discontinued vehicular use or rehabilitative repairs should be made for the bridge in the near term.

Preservation activities that could allow for the bridges continued use for vehicular traffic are detailed below. While a detailing of these activities is provided, an alternate method for preservation of the historic bridge to be considered and assessed would be to discontinue vehicular traffic and construct an adjacent bridge for ongoing vehicular traffic. As an added note, should an adjacent bridge be built in an upstream location it will be important to construct it in such a location so as to ensure water which runs in the dry run is properly directed through Bridge L4013 in a manner that does not surcharge or threaten to undermine the structure.

Recommended Stabilization Activities

1. Due to the deteriorated condition of the arch stone mortar and inability to replace it once stones have moved or dislodged, activities to stabilize the individual arch stones, short of full scale cribbing beneath them, are not apparent.

2. Safety implications of using the bridge with no railings present should be further considered.

Recommended Preservation Activities
The below listed preservation activities are provided as a basis to show the substantial work which would be required to complete preservation work which would allow for continued vehicular use.

Arch
To maintain vehicular traffic and restore the bridge's structural integrity, and due the loss of mortar from the arch stone joints and their subsequent displacement, it will likely be necessary to completely disassemble, clean, and reassemble the arch stones. This process would allow for the arch stones to be cleaned, any missing or failing stones to be replaced, and for the stones to be re-laid with mortar between stones replaced, resulting in full restoration of the original bridge's structural strength. Performing this work would most likely require a careful numbering of the stones prior to disassembly to simplify the reassembly process and assure restoration of original geometry. The work would also require the construction of underside arch falsework forming matching original underside arch geometry to enable the stone re-setting. While it is not believed a very large quantity of arch stones would require replacement, for those that do, it is felt that local quarried stone of the type, color range, shape and crafted texture to the original is still available for use. Also, since it is unlikely any of the original stone mortar is present or competent enough for testing, the mortar selection and finished tooling will need to be based on the properties of the stone and historic information regarding this and similar structures. To maintain historic integrity it will also be necessary for the project construction details to fully define the tuckpointing requirements including but not limited to such items as joint preparation, mortar finish and tooling, mortar curing, and preparation of repointing test panels. For purposes of the preservation estimate, disassembly and reassembly of the arch stones has been assumed.

Stone Abutment Walls
Conduct further study of the stone abutment walls to determine if they can be repaired in place through repointing and replacement of select deteriorated stones or if they will require complete disassembly and reassembly similar to the abutments. At a minimum, the stones in the vicinity of the northeast crack will require disassembly to affect the crack repair. The foundation condition for the abutment walls should also be investigated. It is likely they are built on underlying bedrock which should be verified as if no further work to reinforce their foundation may be necessary. For purposes of the preservation estimate in place repair (selective stone replacement selective disassembly and repointing) without reassembly of the abutment walls has been assumed.

Stone Headwalls and Wingwalls
With much of the headwall, voussoir, and wingwall stones integral to the arch stones it is anticipated disassembly and reassembly of most of these stones will be required to affect the arch stone work. In addition it is likely due to condition and loss of original stone that on the order of 50 percent of the wingwall stones will require replacement. A study should also be made in regard to the original stone parapet/railing features which were present on the bridge. Reconstruction of the headwall should include provisions to restore what is believed to have been a higher height headwall/parapet which projected above the arch crown. Restoring a higher height headwall/ parapet will allow for additional earth fill over the arch, which ideally would be increased to reach a minimum fill depth of 2 feet. Note that a shallower depth on the order of 1.5 feet could be accommodated through use of a 10-inch-thick reinforced distribution slab placed beneath 8 inches of aggregate roadway surfacing should a depth of 2 feet be determined to be too inconsistent with original structure geometry. For purposes of the preservation estimate disassembly, selective replacement and reassembly of the headwalls and wingwalls is assumed.

Railings
Further research should be performed in an effort to determine what the original railing features were. Research into the railing must also consider the narrow/single lane width of the roadway over the bridge, the horizontal curves through the bridge and the need for farm equipment to utilize the roadway. It is believed the loss of the original parapets and rails may be attributed to the need to haul wider equipment over the bridge. This research combined with the determined future use, code safety requirements for the future use and potential variances and exceptions from current safety code requirements should be assessed. It is likely a rail type which is responsive to the historic structure and which also reaches an acceptable safety level while not fully meeting current code safety requirements will be the solution. In addition slight realignment to the roadway and railing placement which maximizes the available bridge width may prove very beneficial to the future rail/parapet not receiving vehicular damage. This is based on solutions reached on other similar structures where a balance between the historic needs and current code requirements was achieved. For purposes of the preservation estimate, an allowance for stone parapet/railing construction has been included.

Approach/Waterway
As discussed in the Railing section, possible adjustments to the alignment that would decrease the probability for damage to any newly constructed parapets/railings from farm equipment accessing the bridge should be considered. In general, a realignment from historic alignment would not normally be

considered it should be studied to determine if minor revisions which improve approach alignment to the bridge and which do not adversely affect the historic character can be achieved.

The existing concrete flume forming the streambed beneath the bridge may require removal to affect the arch and abutment wall rehabilitation work. The washed out section of streambed just downstream of the poured concrete flume will also require repair. Should removal of the concrete flume be necessary a hydraulic study should be performed to determine if a more historically correct material can be used for streambed infill. For purposes of the preservation estimate minor approach realignment/re-grading and construction of a grouted riprap flume has been assumed.

Recommended Annual Maintenance Activities

1. For motorist safety and to minimize further damage to the structure the load posting should remain in place and be enforced. The bridge should also be inspected on a more frequent interval than yearly to allow for closure prior to failure or further damage to the structure should additional arch stone displacement occur.

2. The fill depth over the arch should be monitored. Further loss of fill over the structure would result in direct vehicular loading to the arch stones with the potential for significant damage or failure of the arch.

3. Monitor bridge closely during flood periods to assure no further damage to cracked northeast abutment wall/arch segment and arch.

Summarized Maintenance, Stabilization and Preservation Construction Cost Estimates
It is important to recognize that the work scope and cost estimates presented herein are based on a limited level assessment of the existing structure. In moving forward with future project planning, it will be essential to undertake a detailed structure assessment addressing the proposed work for the structure. It is also important that any future preservation work follow applicable preservation standards with emphasis to rehabilitate and repair in-place structure elements in lieu of replacement. This includes elements which are preliminarily estimated for replacement within the work scope of this report. Only through a thorough review of rehabilitation and repair options and comprehensive structural and historic assessment can a definitive conclusion for replacement of historic fabric be formed.

The opinions of probable construction and administrative costs provided below are presented in 2013 dollars. These costs were developed without benefit of a detailed, thorough bridge inspection, bridge survey or completion of preliminary design for the estimated improvements. The estimated costs represent an opinion based on background knowledge of historic unit prices and comparable work performed on other structures. The opinions of cost are intended to provide a programming level of estimated cost. These costs will require refinement and may require significant adjustments as further analysis is completed in determining the course of action for future structure improvements. A 20 percent contingency and 7 percent mobilization allowance has been included in the construction cost estimates.

Administrative and engineering costs are also presented below. Engineering and administrative costs are also to be interpreted as programming level only. Costs can be highly variable and are dependent on structure condition, intended work scope, project size and level of investigative, testing and documentation work necessary. Additional studies, evaluation, and historic consultation costs not exclusively called out may also be incurred on a case-by-case basis.

Maintenance, Stabilization and Preservation Costs (refer to the work item breakdown on the next page)

Opinion of Annual Cost- Maintenance Activities:	$	0
Opinion of Construction Cost- Stabilization Activities:	$	0
Opinion of Construction Cost- Preservation Activities:	$	502,100

Estimated Preliminary Design, Final Design, Construction Administration Costs

Preliminary Design and Assessment	$	8,000
Final Design and Plans	$	60,000
Construction Administration	$	70,000

MAINTENANCE, STABILIZATION & PRESERVATION COST ESTIMATE (2013 DOLLARS)
Bridge No. L4013
June 27, 2013

ITEM NO.	ITEM	UNIT	ESTIMATED QUANTITIES AND COST QUANTITY	UNIT COST	TOTAL ESTIMATE
MAINTENANCE COSTS					
1	MAINTENANCE ACTIVITIES LIMITED TO INSPECTION/ ASSESSMENTS ONLY- no costs programed				$0.00 $0.00
	20% CONTINGENCY				$0.00
				ESTIMATED MAINTENANCE COSTS	**$0.00**
STABILIZATION COSTS					
1	NO STABILIZATION ACTIVITIES PROGRAMMED				$0.00
	20% CONTINGENCY				$0.00
				ESTIMATED STABILIZATION COSTS	**$0.00**
PRESERVATION COSTS					
	(Assuming bridge reconstruction to allow for continued vehicular use, which is not recommended)				
	MOBILIZATION @ 7%	LUMP SUM	1	$35,000.00	$35,000.00
1	DIS-ASSEMBLE ARCH, HEADWALLS AND WINGWALLS	LUMP SUM	1	$30,000.00	$30,000.00
2	STONE ARCH RECONSTRUCTION	SQ FT	400	$250.00	$100,000.00
3	HEADWALL RECONSTRUCTION	SQ FT	110	$350.00	$38,500.00
4	WINGWALL RECONSTRUCTION	SQ FT	750	$225.00	$168,750.00
5	ABUTMENT PARTIAL RECONSTRUCTION	SQ FT	90	$350.00	$31,500.00
6	ABUTMENT MASONRY REPOINTING	SQ FT	150	$30.00	$4,500.00
7	CONCRETE FLUME REPLACEMENT	LUMP SUM	1	$8,500.00	$8,500.00
8	FLUME REGRADING	LUMP SUM	1	$2,500.00	$2,500.00
9	SITE GRADING/ EROSION CONTROL	LUMP SUM	1	$5,000.00	$5,000.00
	20% CONTINGENCY	LUMP SUM	1	$77,850.00	$77,850.00
				ESTIMATED PRESERVATION COSTS	**$502,100.00**

Appendix A. Glossary

Glossary

Abutment – Component of bridge substructure at either end of bridge that transfers load from superstructure to foundation and provides lateral support for the approach roadway embankment.

Appraisal ratings – Five National Bridge Inventory (NBI) appraisal ratings (structural evaluation, deck geometry, under-clearances, waterway adequacy, and approach alignment, as defined below), collectively called appraisal ratings, are used to evaluate a bridge's overall structural condition and load-carrying capacity. The evaluated bridge is compared with a new bridge built to current design standards. Ratings range from a low of 0 (closed bridge) to a high of 9 (superior). Any appraisal item not applicable to a specific bridge is coded N.

Approach alignment – One of five NBI inspection ratings. This rating appraises a bridge's functionality based on the alignment of its approaches. It incorporates a typical motorist's speed reduction because of the horizontal or vertical alignment of the approach.

Character-defining features – Prominent or distinctive aspects, qualities, or characteristics of a historic property that contribute significantly to its physical character. Features may include structural or decorative details and materials.

Condition, fair – A bridge or bridge component of which all primary structural elements are sound, but may have minor deterioration, section loss, cracking, spalling, or scour.

Condition, good – A bridge or bridge component which may have some minor deficiencies, but all primary structural elements are sound.

Condition, poor – A bridge or bridge component that displays advanced section loss, deterioration, cracking, spalling, or scour.

Condition rating – Level of deterioration of bridge components and elements expressed on a numerical scale according to the NBI system. Components include the substructure, superstructure, deck, channel, and culvert. Elements are subsets of components, e.g., piers and abutments are elements of the component substructure. The evaluated bridge is compared with a new bridge built to current design standards. Component ratings range from 0 (failure) to 9 (new) or N for (not applicable); elements are rated on a scale of 1-3, 1-4 or 1-5 (depending on the element type and material). In all cases condition state 1 is the best condition with condition state 3, 4 or 5 being the worst condition. In rating a bridge's condition, MnDOT pairs the NBI system with the newer and more sophisticated Pontis element inspection information, which quantifies bridge elements in different condition states and is the basis for subsequent economic analysis.

Corrosion – The general disentegration of metal through oxidation.

Cutwater – The wedge-shaped end of a bridge pier, designed to divide the current and break up ice.

Decay – Deterioration of wood as a result of fungi feeding on its cell walls.

Delamination – Surface separation of concrete, steel, glue laminated timber plies etc. into layers.

Deck geometry – One of five NBI appraisal ratings. This rating appraises the functionality of a bridge's roadway width and vertical clearance, taking into account the type of roadway, number of lanes, and ADT.

Deficiency – The inadequacy of a bridge in terms of structure, serviceability, and/or function. Structural deficiency is determined through periodic inspections and is reflected in the ratings that are assigned to a bridge. Service deficiency is determined by comparing the facilities a bridge provides for vehicular, bicycle, and pedestrian traffic with those that are desired. Functional deficiency is another term for functionally obsolete (see below). Remedial activities may be needed to address any or all of these deficiencies.

Deficiency rating – A nonnumeric code indicating a bridge's status as structurally deficient (SD) or functionally obsolete (FO). See below for the definitions of SD and FO. The deficiency rating status may be used as a basis for establishing a bridge's eligibility and priority for replacement or rehabilitation.

Design exception – A deviation from federal design and geometric standards that takes into account environmental, scenic, aesthetic, historic, and community factors that may have bearing upon a transportation project. A design exception is used for federally funded projects where federal standards are not met. Approval requires appropriate justification and documentation that concerns for safety, durability, and economy of maintenance have been met.

Design load – The usable live-load capacity that a bridge was designed to carry, expressed in tons according to the AASHTO allowable stress, load factor, or load resistance factor rating methods. An additional code was recently added to assess design load by a rating factor instead of tons. This code is used to determine if a bridge has sufficient strength to accommodate traffic load demands. A bridge that is posted for load restrictions is not adequate to accommodate present or expected legal truck traffic.

Deterioration – Decline in condition of surfaces or structure over a period of time due to chemical or physical degradation.

Efflorescence – A deposit on concrete or brick caused by crystallization of carbonates brought to the surface by moisture in the masonry or concrete.

Extant – Currently or actually existing.

Extrados – The upper or outer surfaces of the voussoirs which compose the arch ring. Often contrasted with intrados.

Footing – The enlarged, lower portion of a substructure which distributes the structure load either to the earth or to supporting piles.

Fracture Critical Members – Tension members or tension components of bending members (including those subject to reversal of stress) whose failure would be expected to result in collapse of the bridge.

Functionally obsolete – The Federal Highway Administration (FHWA) classification of a bridge that does not meet current or projected traffic needs because of inadequate horizontal or vertical clearance, inadequate load-carrying capacity, and/or insufficient opening to accommodate water flow under the bridge. An appraisal rating of 3 or less for deck geometry, underclearance, approach alignment, structural evaluation or waterway adequacy will designate a bridge as functionally obsolete.

Gusset plate – A plate that connects the horizontal and vertical members of a truss structure and holds them in correct position at a joint.

Helicoidal – Arranged in or having the approximate shape of a flattened coil or spiral.

Historic fabric – The material in a bridge that was part of original construction or a subsequent alteration within the historic period of the bridge (i.e., more than 50 years old). Historic fabric is an important part of the character of the historic bridge and the removal, concealment, or alteration of any historic material or distinctive engineering or architectural feature should be avoided if possible. Often, the character-defining features include important historic fabric. However, historic fabric can also be found on other elements of a bridge that have not been noted as character-defining.

Historic bridge – A bridge that is listed in, or eligible for listing in, the National Register of Historic Places.

Historic integrity – The authenticity of a bridge's historic identity, evidenced by the survival and/or restoration of physical characteristics that existed during the bridge's historic period. A bridge may have integrity of location, design, setting, materials, workmanship, feeling, and association.

Inspections – Periodic field assessments and subsequent consideration of the fitness of a structure and the associated approaches and amenities to continue to function safely.

Intrados – The innner or lower surface of an arch. Often contrasted with extrados.

Inventory rating – The load level a bridge can safely carry for an indefinite amount of time expressed in tons or by the rating factor described in design load (see above). Inventory rating values typically correspond to the original design load for a bridge without deterioration.

Keystone – Wedge-shaped stone, or voussoir, at the crown of an arch.

Load Rating – The determination of the live load carrying capacity of a bridge using bridge plans and supplemented by field inspection.

Maintenance – Work of a routine nature to prevent or control the process of deterioration of a bridge.

Minnesota Historical Property Record – A documentary record of an important architectural, engineering, or industrial site, maintained by the Minnesota Historical Socitety as part of the state's commitment to historic preservation. MHPR typically includes large-format photographs and written history, and may also include historic photographs, drawings, and/or plans. This state-level documentation program is modeled after a federal program known as the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER).

National Bridge Inventory – Bridge inventory and appraisal data collected by the FHWA to fulfill the requirements of the National Bridge Inspection Standards (NBIS). Each state maintains an inventory of its bridges subject to NBIS and sends an annual update to the FHWA.

National Bridge Inspection Standards – Federal requirements for procedures and frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of state bridge inventories. NBIS applies to bridges located on public roads.

National Register of Historic Places – The official inventory of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, which is maintained by the Secretary of the Interior under the authority of the National Historic Preservation Act of 1966 (as amended).

Non-vehicular traffic – Pedestrians, non-motorized recreational vehicles, and small motorized recreational vehicles moving along a transportation route that does not serve automobiles and trucks. Includes bicycles and snowmobiles.

Operating rating – Maximum permissible load level to which a bridge may be subjected based on a specific truck type, expressed in tons or by the rating factor described in design load (see above).

Pack rust – Rust forming between adjacent steel surfaces in contact which tends to force the surfaces apart due to the increase in steel volume.

Pier – A substructure unit that supports the spans of a multi-span superstructure at an intermediate location between its abutments.

Pointing – The compaction of mortar into the outermost portion of a joint and the troweling of its exposed surface to secure water tightness and/ or desired architectural effect (when replacing deteriorated mortar).

Pony truss – A through bridge with parallel chords and having no top lateral bracing over the deck between the top chords.

Posted load – Legal live-load capacity for a bridge which is associated with the operating rating. A bridge posted for load restrictions is inadequate for legal truck traffic.

Pontis – Computer-based bridge management system to store inventory and inspection data and assist in other bridge data management tasks.

Preservation – Preservation, as used in this report, refers to historic preservation that is consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. Historic preservation means saving from destruction or deterioration old and historic buildings, sites, structures, and objects, and providing for their continued use by means of restoration, rehabilitation, or adaptive reuse. It is the act or process of applying measures to sustain the existing form, integrity, and material of a historic building or structure, and its site and setting. MnDOT's *Bridge Preservation, Improvement and Replacement Guidelines* describe preservation differently, focusing on repairing or delaying the deterioration of a bridge without significantly improving its function and without considerations for its historic integrity.

Preventive maintenance – The planned strategy of cost-effective treatments that preserve a bridge, slow future deterioration, and maintain or improve its functional condition without increasing structural capacity.

Reconstruction – The act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location. Activities should be consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties.*

Rehabilitation – The act or process of returning a historic property to a state of utility through repair or alteration which makes possible an efficient contemporary use, while preserving those portions or features of the property that are significant to its historical, architectural, and cultural values. Historic rehabilitation, as used in this report, refers to implementing activities that are consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. As such, rehabilitation retains historic fabric and is different from replacement. MnDOT's *Bridge Preservation, Improvement and Replacement Guidelines* describe rehabilitation and replacement in similar terms.

Restoration – The act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time. Activities should be consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties.*

Ring stone – One of the separate stones of an arch that shows on the face of the headwall, or end of the arch. Also known as a voussoir.

Scaling – The gradual distentegration of a concrete surface due to the failure of the cement surface caused by chemical attack or freeze-thaw cycles or rebar too close to the surface and oxidizing from exposure to chlorides.

Scour – Removal of material from a river's bed or bank by flowing water, compromising the strength, stability, and serviceability of a bridge.

Scour critical rating – A measure of a bridge's vulnerability to scour (see above). MnDOT utilizes letter designations to represent specific descriptions of a bridges susceptibility and/ or present condition in regards to scour. Range in condition and scour susceptibility does not necessarily correlate alpha numerically to the MnDOT scour code letters so it is important to understand the specifc scour description for each MnDOT scour code. The scour codes and descriptions can be found in the "MNDOT Bridge Inspection Field Manual".

Section loss – Loss of a member's cross sectional area and resulting strength usually by corrosion or decay.

Serviceability – Level of facilities a bridge provides for vehicular, bicycle, and pedestrian traffic, compared with current design standards.

Smart flag – Special Pontis inspection element used to report the condition assessment of a deficiency that cannot be modeled, such as cracks, section loss, and steel fatigue.

Spall – Depression in concrete caused by a separation of a portion of the surface concrete, revealing a fracture parallel with or slighty inclined to the surface.

Spring line – The imaginary horizontal line at which an arch or vault begins to curve. As example, the point of transition from the vertical face of an abutment to the start of arch curvature extending from abutment face.

Stabilization – The act or process of stopping or slowing further deterioration of a bridge by means of making minor repairs until a more permanent repair or rehabilitation can be completed.

Stringcourse – A horizontal band of masonry, generally narrower than other courses and sometimes projecting, that extends across the structure's horizontal face as an architectural accent. Also known as belt course.

Structural evaluation – Condition rating of a bridge designed to carry vehicular loads, expressed as a numeric value and based on the condition of the superstructure and substructure, the inventory load rating, and the ADT.

Structurally deficient – Classification indicating NBI condition rating of 4 or less for any of the following: deck condition, superstructure condition, substructure condition, or culvert condition. A bridge is also classified as structurally deficient if it has an appraisal rating of 2 or less for its structural evaluation or waterway adequacy.. A structurally deficient bridge is restricted to lightweight vehicles; requires immediate rehabilitation to remain open to traffic; or requires maintenance, rehabilitation, or replacement.

Sufficiency rating – Rating of a bridge's structural adequacy and safety for public use, and its serviceability and function, expressed on a numeric scale ranging from a low of 0 to a high of 100. It is a relative measure of a bridge's deterioration, load capacity deficiency, or functional obsolescence. MnDOT may use the rating as a basis for establishing eligibility and priority for replacement or rehabilitation. Typically, bridges which are structurally deficient and have sufficiency ratings between 50 and 80 are eligible for federal rehabilitation funds and those which are structurally deficient with sufficientcy ratings of 50 and below are eligible for replacement.

Through truss – A bridge with parallel top and bottom chords and top lateral bracing with the deck generally near the bottom chord.

Under-clearances – One of five NBI appraisal ratings. This rating appraises the suitability of the horizontal and vertical clearances of a grade-separation structure, taking into account whether traffic beneath the structure is one- or two-way.

Variance – A deviation from State Aid Operations Statute Rules that takes into account environmental, scenic, aesthetic, historic, and community factors that may have bearing upon a transportation project. A design variance is used for projects using state aid funds. Approval requires appropriate justification and documentation that concerns for safety, durability and economy of maintenance have been met.

Vehicular traffic – The passage of automobiles and trucks along a transportation route.

Voussoir – One of the separate stones forming an arch ring; also known as a ring stone.

Waterway adequacy – One of five NBI appraisal ratings. This rating appraises a bridge's waterway opening and passage of flow under or through the bridge, frequency of roadway overtopping, and typical duration of an overtopping event.

Appendix B. Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior's Standards

The Secretary's Standards with Regard to Repair, Rehabilitation, and Replacement Situations

Adapted from:

Clark, Kenneth M., Grimes, Mathew C., and Ann B. Miller, *Final Report, A Management Plan for Historic Bridges in Virginia*, Virginia Transportation Research Council, 2001.

The Secretary of the Interior's Standards for the Treatment of Historic Properties, first codified in 1979 and revised in 1992, have been interpreted and applied largely to buildings rather than engineering structures. In this document, the differences between buildings and structures are recognized and the language of the Standards has been adapted to the special requirements of historic bridges.

1. Every reasonable effort shall be made to continue an historic bridge in useful transportation service. Primary consideration shall be given to rehabilitation of the bridge on site. Only when this option has been fully exhausted shall other alternatives be explored.

2. The original character-defining qualities or elements of a bridge, its site, and its environment should be respected. The removal, concealment, or alteration of any historic material or distinctive engineering or architectural feature should be avoided.

3. All bridges shall be recognized as products of their own time. Alterations that have no historical basis and that seek to create a false historical appearance shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive engineering and stylistic features, finishes, and construction techniques or examples of craftsmanship that characterize an historic property shall be preserved.

6. Deteriorated structural members and architectural features shall be retained and repaired, rather than replaced. Where the severity of deterioration requires replacement of a distinctive element, the new element should match the old in design, texture, and other visual qualities and where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical and physical treatments that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the most environmentally sensitive means possible.

8. Significant archaeological and cultural resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, structural reinforcements, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Appendix C. Documents

Additional Electronic Data
Bridge L4013

Historic Data

- Research

Local Data

- L4013 historic inspection information
- Local Historic Bridge Repor_L4013

MnDOT Reports

- 2011 Condition Sheet_L4013
- L4013 Inspection 6-14-12
- L4013 Inventory 4-19-13
- 2009 Field Inspection
- 2009 Rating Report

Photos

- L4013 LHB Photos 5-24-13
- L4013 M&H Photos 5-23-13
- MHS Photos – Old Photos
- Report Photos

Plans

- No data

Mn/DOT BRIDGE INSPECTION REPORT

Inspected by: HOUSTON COUNTY

BRIDGE L4013 ROOSTER VALLEY RD OVER DRY RUN INSP. DATE: 06-04-2012

County: HOUSTON
City:
Township: BLACK HAMMER
Section: 20 Township: 102NN Range: 07W
Span Type: MASONRY ARCH

Location: 2.5 MI W OF JCT CSAH 4
Route: TWNS 126 Ref. Pt.: 000+00.190
Control Section: Maint. Area:
Local Agency Bridge Nbr:

Length: 15.0 ft
Deck Width:
Rdwy. Area / Pct. Unsnd:
Paint Area/ Pct. Unsnd:
Culvert 11.5'ARCH / 16 ft

NBI Deck: N Super: N Sub: N Chan: 7 Culv: 4

Open, Posted, Closed: LOAD POSTED Postings: 5 - -

Appraisal Ratings - Approach: 5 Waterway: 8 MN Scour Code: E-CULVERT Def. Stat: S.D. Suff. Rate: 39.9

Required Bridge Signs - Load Posting: VEHICLE ONLY Traffic: NOT REQUIRED
Horizontal: OBJECT MARKERS & WIDTH Vertical: NOT APPLICABLE

STRUCTURE UNIT: 0

ELEM NBR	ELEMENT NAME	ENV	INSP. DATE	QUANTITY	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4	QTY CS 5
243	CULVERT - OTHER	2	06-04-2012	16 LF	0	0	16	0	N/A
			01-04-2012	16 LF	0	0	16	0	N/A
	Notes: |Some cracking and deterioration of the masonry joints. 2008 - There is a crack approximately 1.5" wide near the outlet end of the arch running from footing to footing. 2011 - There is a crack approximately 1.5" - 1.75" wide near the outlet end of the arch, running from footing to footing, with the widest point being 1.75", which is appx. 6' up from the concrete floor. 2012 - No change|								
388	CULVERT HEADWALL	2	06-04-2012	2 EA	0	0	2	0	N/A
			01-04-2012	2 EA	0	0	2	0	N/A
	Notes: |2011-[2012] - Cracking and deterioration of the masonry joints, loose and missing stones.|								
964	CRITICAL FINDING	2	06-04-2012	1 EA	1	0	N/A	N/A	N/A
			01-04-2012	1 EA	1	0	N/A	N/A	N/A
	Notes: |2011-[2012] - None found|								
981	SIGNING	2	06-04-2012	1 EA	1	0	0	0	0
			01-04-2012	1 EA	1	0	0	0	0
	Notes: | 2010 - The delineator at the S.E. corner is bent over and the delineator at the S.W. corner is missing. Load posting signs of 5 Ton have been placed, as reccomended by LHB in 2009. Advance one lane bridge signs are also inplace. 2011 - All 4 delineators are inplace. Load posting signs of 5 Ton are also inplace, along with advance load posting signs, and one lane bridge ahead signs. 2012 - The delineators at the S.E. & S.W. corners are bent and out of plumb. All other signs are still inplace.|								
984	DRAINAGE	2	06-04-2012	1 EA	1	0	0	N/A	N/A
			01-04-2012	1 EA	1	0	0	N/A	N/A
	Notes: |2011-[2012] - No drainage problems noted.|								
985	SLOPES	2	06-04-2012	1 EA	0	1	0	N/A	N/A
			01-04-2012	1 EA	0	1	0	N/A	N/A
	Notes: |2011-[2012] - There is some erosion of the embankment slopes over the structure.|								
987	ROADWAY OVER CULVERT	2	06-04-2012	1 EA	1	0	0	N/A	N/A
			01-04-2012	1 EA	1	0	0	N/A	N/A
	Notes: |2010-[2012] - No settlement in the aggregate surfaced roadway over the culvert.|								

General Notes: The structure has a concrete floor. 2010 - The structure was evaluated by LHB in 2009. 2011 - All elements were visible at the time of inspection.

Inspector's Signature

Reviewer's Signature / Date

Mn/DOT Structure Inventory Report

Bridge ID: L4013 **ROOSTER VALLEY RD over DRY RUN**

Date: 04/19/2013

+ GENERAL +

Agency Br. No.	
District	6
Maint. Area	
County	28 - HOUSTON
City	
Township	BLACK HAMMER
Desc. Loc.	2.5 MI W OF JCT CSAH 4
Sect., Twp., Range	20 - 102NN - 07W
Latitude	43d 37m 20.54s
Longitude	91d 42m 21.83s
Custodian	TOWNSHIP
Owner	TOWNSHIP
Inspection By	HOUSTON COUNTY
BMU Agreement	
Year Built	1903
Year Fed Rehab	
Year Remodeled	
Temp	
Plan Avail.	NO PLAN

+ STRUCTURE +

Service On	HIGHWAY
Service Under	STREAM
Main Span Type	MASONRY ARCH
Main Span Detail	
Appr. Span Type	
Appr. Span Detail	
Skew	15L
Culvert Type	11.5'ARCH
Barrel Length	16 ft

Number of Spans

MAIN: 1 APPR: 0 TOTAL: 1

Main Span Length	11.5 ft
Structure Length	15.0 ft
Deck Width	
Deck Material	N/A
Wear Surf Type	GRAVEL
Wear Surf Install Year	
Wear Course/Fill Depth	0.50 ft
Deck Membrane	NONE
Deck Protect.	N/A
Deck Install Year	
Structure Area	240 sq ft
Roadway Area	
Sidewalk Width - L/R	
Curb Height - L/R	
Rail Codes - L/R	00 00

+ ROADWAY +

Bridge Match ID (TIS)	1
Roadway O/U Key	1-ON
Route Sys/Nbr	TWNS 126

Roadway Name or Description

TWNS 126

Roadway Function	MAINLINE
Roadway Type	1 LN;2 WAY
Control Section (TH Only)	
Ref. Point (TH Only)	
Date Opened to Traffic	01-01-1903
Detour Length	6 mi.
Lanes	1 Lane ON Bridge
ADT (YEAR)	40 (1986)
HCADT	
Functional Class.	RURAL LOCAL

+ RDWY DIMENSIONS +

If Divided	NB-EB	SB-WB
Roadway Width	14.5 ft	
Vertical Clearance		
Max. Vert. Clear.		
Horizontal Clear.		
Lateral Clr. - Lt/Rt		
Appr. Surface Width		20.0 ft
Roadway Width		
Median Width		

+ MISC. BRIDGE DATA +

Structure Flared	NO
Parallel Structure	NONE
Field Conn. ID	
Cantilever ID	

Foundations

Abut.	MASONRY - UNKN
Pier	N/A
Historic Status	ON REGISTER
On - Off System	OFF

+ PAINT +

Year Painted	Pct. Unsound
Painted Area	
Primer Type	
Finish Type	

+ BRIDGE SIGNS +

Posted Load	VEHICLE ONLY
Traffic	NOT REQUIRED
Horizontal	OBJECT MARKERS & WIDTH
Vertical	NOT APPLICABLE

+ INSPECTION +

Deficient Status	S.D.
Sufficiency Rating	39.9
Last Inspection Date	06-04-2012
Inspection Frequency	12
Inspector Name	HOUSTON
Structure	P-LOAD POSTED

+ NBI CONDITION RATINGS +

Deck	N
Superstructure	N
Substructure	N
Channel	7
Culvert	4

+ NBI APPRAISAL RATINGS +

Structure Evaluation	2
Deck Geometry	N
Underclearances	N
Waterway Adequacy	8
Approach Alignment	5

+ SAFETY FEATURES +

Bridge Railing	0-SUBSTANDARD
GR Transition	0-SUBSTANDARD
Appr. Guardrail	0-SUBSTANDARD
GR Termini	0-SUBSTANDARD

+ IN DEPTH INSP. +

Frac. Critical	
Underwater	
Pinned Asbly.	
Spec. Feat.	

+ WATERWAY +

Drainage Area	
Waterway Opening	99 sq ft
Navigation Control	NO PRMT REQD
Pier Protection	NOT APPL
Nav. Vert./Horz. Clr.	
Nav. Vert. Lift Bridge Clear.	
MN Scour Code	E-CULVERT
Scour Evaluation Year	1991

+ CAPACITY RATINGS +

Design Load	UNKN
Operating Rating	HS 5.00
Inventory Rating	HS 3.00
Posting	VEH: 05 SEMI: DBL:
Rating Date	12-23-2009

Mn/DOT Permit Codes

A: N B: N C: N

V2006