Executive Summary

Bridge L4646, also known as the Spring Brook Bridge, is located in the city of Beaver Creek, Rock County, Minnesota. The bridge carries Sixth Street (Municipal Route 11) over Spring Brook and is owned by the city of Beaver Creek. It was constructed in 1911. Bridge L4646 is significant for its association with Perley N. Gillham, an early Minnesota bridge builder who designed and constructed reinforced-concrete arch bridges.

Bridge L4646 is a single-span, concrete arch bridge with a span of approximately 32 feet over Spring Brook. The structural arch, railings, headwalls and wingwalls are comprised of cast-in-place reinforced concrete. The arch rises from cast-in-place concrete abutment walls, presumably on spread footings. The top of the arch is earth filled and the driving surface consists of aggregate surfacing.

Bridge L4646 is in fair condition overall and appears to adequately serve its purpose of carrying vehicular and pedestrian traffic. The most significant defects include cracking and spalling of the wingwalls and headwalls, deterioration and undermining of the abutments, as well as erosion and exposure of the east bridge slopes. With proper maintenance, stabilization and preservation activities it is believed Bridge L4646 could continue to serve in its present capacity for 20 years or longer.

Any work on Bridge L4646 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 L4646 – MUN 11 over SPRING BROOK

PROJECT LOCATION
ROCK COUNTY
SEC. 28, TO 102NN, R 46W
UTM ZONE: 14 NAD: 27
USGS QUAD NAME: HILLS
EASTING: 751306 ft.
NORTHING: 15860893 ft.
Executive Summary

Bridge Location

I. Project Introduction
II. Historic Data
III. Bridge Data
IV. Existing Conditions/Recommendations
V. Projected Costs

Appendices

A. Glossary
B. Guidelines for Bridge Maintenance and Rehabilitation based on the Secretary of the Interior’s Standards
C. Documents
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. It is important to note that this report indicates if a bridge is located within a known historic district, but it does not identify all known or potential historic properties. Potential impacts to adjacent or surrounding historic properties, such as archaeological sites or other structures must be considered. Contact MnDOT CRU early in the project planning process in order to identify other potential historic properties. 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 report.

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: Perley N. Gillham

Designer/Engineer: Perley N. Gillham

Description
Bridge L4646, or the Spring Brook Bridge, is located at the northeast corner of the city of Beaver Creek, Beaver Creek Township, Rock County, Minnesota. Rock County marks the southwestern corner of the state, bordering on South Dakota along the west and Iowa along the south. The bridge carries gravel-surfaced Sixth Street (Municipal Route 11) over Spring Brook. Although the bridge is located within the city limits, the environment is essentially rural pasture land.

Aligned on a northeast-southwest axis, Bridge L4646 is a single-span, reinforced-concrete, filled-spandrel, barrel-vaulted, low-rise, arch bridge, with slightly flared wing-wall abutments. The span length is 32 feet. The out-out deck width is 18 feet 8 inches, carrying a 15-foot-7-inch roadway and no sidewalks. A straight and level concrete coping is continuous across the roadway elevation and the tops of the wingwalls. The railings are straight and are located across the span only; there is no railing on the wingwalls. Each railing terminates in a cylindrical concrete post, and railing and post carry a continuous, flat coping. A cast molding follows the underside of each coping.

On the top center of the east railing, scribed in the concrete, are the name of the contractor and the date (P.N. Gillham, 1911), the names of the Beaver Creek Township Board members, and the names of the two county commissioners appointed to the joint township-county committee established to oversee this particular bridge project. The printing of letters is irregular, with the letter “S” reversed, and “CONTRACTER,” and “TOWNSHIP BORD” are misspelled. Stylistically, the bridge exhibits Classical Revival elements, including the coping, molding, and end posts. These particular features are found on all bridges identified as being constructed by P.N. Gillham.

Significance
Bridge L4646 was one of a number of bridges designed and built by Perley Nye Gillham. Despite several studies on Gillham bridges over the years, very little is actually known about him. According to the Multiple Property Document (MPDF) “Reinforced-Concrete Bridges in Minnesota, 1900-1945,” he was “an obscure mason and general contractor” who designed and built “small but elegant reinforced-concrete bridges in Rock County.” As a bridge builder, Perley N. Gillham had a long career that spanned 45 years. He began his career as a bridge contractor in 1883, at the age of 29, when he was awarded a contract to repair the Ash Creek Bridge in Rock County, and continued until he constructed his last bridge in 1928, at the age of 74. The greatest concentration of his work is in Rock County, where he is estimated to have constructed about 90 percent of the concrete bridges in the county.
This bridge is one of at least 12 strikingly similar bridges in Rock County and one in neighboring Nobles County that have the identification "P.N. Gillham" scribed in the concrete. There are at least 16 additional bridges in the county that do not bear Gillham's name and have design elements so similar to the confirmed Gillham bridges as to allow attribution to him. Confirmed dates of Gillham bridges range from 1908 to 1913; attributed bridges have unconfirmed dates ranging from 1901 to 1920. Bridge L4646 is one of four extant reinforced-concrete arch bridges by Gillham. Other examples include:

- Bridge L2194 (1928; RK-MGT-002)
- Bridge L2257 (1910; RK-LVC-032)
- Bridge L2340 (1906; RK-BCT-005)

Gillham is noteworthy for his early use of reinforced-concrete for bridge construction. The bridges Gillham designed and built in Rock County are easily identifiable by their shared common characteristics. Gillham bridges are almost exclusively single span, reinforced-concrete, arch bridges with closed spandrels, found in remote locations throughout the county. These small, simple structures display some decorative elements, suggestive of the classicism of the City Beautiful Movement that flourished around the turn of the century. Moldings are often used to delineate the deck and the railings, while the railings, which are usually solid, often have cylindrical rail posts. Bridge L4646 displays many of Gillham’s trademark stylistic elements in its design, such as the low-rise, single-span, filled-spandrel, elliptical arch with a scribed line in the arch-ring edge; wing-wall abutments with continuous coping; a distinctive slab railing, over arch only, with cylindrical end posts and continuous coping; distinctive, decorative, concrete molding found along the lower edge of all coping; and names and dates related to construction scribed or pressed into the top surface of the railing coping.

Research revealed little about the construction history for Bridge L4646, aside from the fact that it was constructed by Gillham in 1911. Additionally, research did not identify any major modifications or alterations to the bridge. At an unknown time, one of the end posts was damaged by a vehicular collision. The original post was recovered and re-set, and the repairs utilize sympathetic materials and do not detract from the overall integrity of the bridge. Bridge L4646 is an excellent, intact, and documented example of Gillham’s bridges and retains integrity of workmanship, materials, design, feeling, association, location, and setting. The period of significance coincides with the 1911 date of construction.

Bridge L4646 was listed in the National Register in 1989 under Criterion C in the area of Engineering. The bridge is an excellent, unaltered, example of a regional, vernacular variation on the small, rural, early reinforced-concrete vehicular bridge, particularly that variety of reinforced-concrete arch bridge built by, or attributed to, Perley N. Gillham, of Luverne, Rock County, Minnesota. This is a very large collection of similarly designed, aesthetically outstanding, early reinforced-concrete bridges, located almost entirely within a single county.

**Historic Context**
Minnesota Reinforced-Concrete Highway Bridges, 1900-1945

**National Register Status**
Listed (Individually)

**Criterion A Significance**
N/A
**II – Historic Data**

**Bridge Number:** L4646

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<th><strong>Criterion C Significance</strong></th>
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**Sources Used to Compile Section II – Historic Data**


Field inspection by LHB, Inc. and Mead & Hunt, Inc., 1 October, 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 reinforced-concrete elliptical arch span, exemplifying the style and construction method of Perley N. Gillham, including the scribed line in the arch-ring edge, distinctive slab railing and the distinctive, decorative concrete molding found along the lower edge of all coping.
**Minnesota Department of Transportation (MnDOT)**  
*Local Historic Bridge Report*

### Bridge Data

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<th>Date of Construction (remodel)</th>
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<td>Common Name (if any)</td>
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### Location

- Feature Carried: MUN 11  
- Feature Crossed: Spring Brook  
- County: Rock  
- Ownership: City of Beaver Creek

### MnDOT Structure Data

- Main Span Type: 112 CONC ARCH  
- Main Span detail: SPANDREL FILLED ARCH  
- Substructure Type - Foundation Type: 1-Concrete - 1-Spread/Soil  
- Total Length: 38 ft  
- Main Span Length: 32.1 ft  
- Total Number of Span(s): 1  
- Skew (degrees): 0  
- Structure Flared: No Flare  
- Roadway Function: Rural, Local  
- Custodian/Maintenance Type: City

**Data Current (as of):** Sep 2013

### Reported Owner Inspection Date

- 11/16/2012

### Sufficiency Rating

- 56.3

### Operating Rating

- HS 18

### Inventory Rating

- HS 12

### Structure Status

- A - Open

### Posting

- VEH: SEMI: DBL:

### Design Load

- UNKN

### Current Condition Code

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<td>Channel and Protection:</td>
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<td>Culvert:</td>
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### Current Appraisal Rating

- Structural Evaluation: 5  
- Deck Geometry: 7  
- Underclearances: N  
- Waterway Adequacy: 6  
- Approach Alignment: 3

### Fracture Critical

- No

### Deficient Status

- F.O.

### Roadway Clearances

| Roadway Width: | 15.6 ft |
| Vert. Clearance Over Rdwy: | N/A |
| Vert. Clearance Under Rdwy: | N/A |
| Lat. Clearance Right: | 0 ft |
| Lat. Clearance Left: | 0 ft |

### Roadway Data

- ADT Total: 56 (1990)  
- Truck ADT Percentage: Not given  
- Bypass Detour length: 1 mile  
- Number of Lanes: 1 (On Bridge)

### Waterway Data

- Scour Code: L-STBL; LOW RISK

### Non-MnDOT Data

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

- 0

**Approach Roadway Characteristics**

| Lane Widths: | 11 ft |
| Shoulder Width: | No Shoulder |
| Shoulders Paved or Unpaved: | N/A |
| Roadway Surfacing: | Aggregate |

**Location of Plans**

- N/A

**Plans Available**

- No Plan 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 L4646 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 L4646 is a single span, concrete arch bridge spanning approximately 32 feet over Spring Brook on Municipal Road 11 (6th Street) in the city of Beaver Creek. The structural arch, railings, headwalls and wingwalls are comprised of cast-in-place reinforced concrete. The arch rises from cast-in-place concrete abutment walls, presumably on a spread footing. There are no plans available for this bridge. The top of the arch is earth filled and the 17-foot-wide driving surface is aggregate. The concrete railing is monolithic with the headwalls with a height of approximately 2 feet 6 inches above the driving surface.

The bridge lies on a northeast southwest alignment. For purposes of directional description in the “Existing Conditions/Recommendations” section of this report, the northeast approach/abutment will be considered north.

Bridge L4646 is in fair condition overall. The most significant defects include cracking and spalling of the wingwalls and headwalls, deterioration and undermining of the abutments, and erosion/exposure of the east bridge slopes.

Serviceability Observations
The bridge is currently open to vehicular and pedestrian traffic with no apparent load posting restrictions from legal loads.

Condition Observations

Railings
Both railings are in fair condition. On each rail there is minor spalling and cracking throughout. The west railing was damaged by a collision on the south end. According to the city, the railing was completely knocked off of the bridge but re-set in its original position. The color of the repair concrete matches the original concrete color. However, the coping detail was not replicated. As part of the repair, a mass of concrete at the base of the rail was placed to stabilize the headwall and wingwall. Located on the top of the railing is an inscription naming P. N. Gillham the contractor, the construction date (1911), as well as the names of other township and city board members.

Headwalls and Wingwalls
At each corner of the bridge there are cracks originating from the end of the railing and extending to the arch at varying angles and widths. The east cracks have been previously patched. All surfaces of the
wingwalls and headwalls have minor to moderate cracks, spalls, and pop-outs. At the ends of each headwall (in all 4 corners of the bridge), where the arch curvature changes, there is a 10 square foot area of deteriorated concrete on the headwall face which also wraps around to the arch underside.

Arch
The arch appears to be in fair condition except above the north abutment where the concrete has begun to deteriorate with spalling and pitting present.

Road Surface
The aggregate roadway surfacing was found to be in good condition overall except at the top of the arch where the concrete of the arch is exposed due to insufficient cover from the aggregate roadway surfacing.

Abutments
The abutments are in overall poor condition. North abutment face is eroded for the full length of the bridge and a height of 4 feet 6 inches. The south abutment concrete is sound, but it is undermined 8 inches on average (13 inches maximum) along the waterline. It appears that the south abutment face has been repaired in the past because the concrete color and forming does not match the arch concrete above. The date of this repair is unknown.

Bridge Slopes
The bridge slopes are in varying condition. The east slopes are steep and lacking vegetation. The northwest slope is in stable condition. And, the southwest slope has been previously stabilized with grouted riprap which is in good condition.

Approach/Waterway Observations
The approach roadway curves at both ends of the bridge. The roadway surfacing appears to be in good condition except for its lacking depth over the arch.

No deficiencies were noted in the waterway.

Date of Engineering Site Visit by LHB
October 1, 2013
IV – Existing Conditions/Recommendations

Bridge Number: L4646

Condition 1: East elevation

Condition 2: Roadway, looking north
Condition 3: Roadway, looking south

Condition 4: West railing
Condition 5: West railing repair, south end

Condition 6: Southwest rail repair, outside face
Condition 7: East railing

Condition 8: Rail inscription (P.N. Gillham)
Condition 9: Northwest headwall and wingwall (note diagonal crack from rail to arch)

Condition 10: Southwest slope paving, south abutment & arch underside
Condition 11: Southeast wingwall, slope, and headwall

Condition 12: Northeast wingwall and slope, northwest similar condition (note cracks in wall, deterioration at arch and pop-outs in walls)
Condition 13: North abutment and arch underside

Condition 14: North abutment
Condition 15: South abutment and arch underside

Condition 16: South abutment, east end
Overall Recommendations
The bridge is currently open to vehicular and pedestrian traffic. The recommendations which follow assume the structure’s use will remain the same.

Recommended Stabilization Activities
There are no stabilization activities recommended for Bridge L4646.

Recommended Preservation Activities

Railings
The railings are in fair condition, there is no repair required to east or west railing.

The current railings do not meet the current height standards (without a reinforcing plan it is unknown if they meet the current crash standards). Due to the railings being a character-defining feature of this structure, altering the rails would diminish the historic integrity significantly. The current and future use of the roadway, code safety requirements, and potential variances from current safety code requirements should be assessed. It is likely that a variance could be granted for the existing railings to remain unaltered during any future structure rehabilitation because of their significance to the structure’s history and the low ADT of the roadway. This is based on solutions reached on other similar structures where a balance between the historic needs and current code requirements was achieved.

Headwalls and Wingwalls
There are miscellaneous areas where the concrete is missing or deteriorated throughout the headwalls and wingwalls as well as at the arch/headwall interface in each corner of the bridge. These areas should receive a concrete surface repair. Depending on the depth of the deteriorated concrete, this repair will likely require removal of 2 to 4 inches of deteriorated concrete to reach sound concrete, blasting clean and epoxy coating of any rusting reinforcing steel, and then replacement with repair concrete of matching color and forming (including the texture from forming) to match the existing finished surface.

In areas where there are significant cracks through the wingwalls that have not been successfully patched (northwest and southeast), it is recommended that the cracks be epoxy injected to seal out moisture that may cause the cracks to propagate. The color of the injected epoxy should be chosen to match the existing concrete surface and the injection work should be carefully performed to avoid staining or smearing of epoxy on finished exposed surfaces.

Arch
The concrete above the north abutment should be repaired in the same manner as the concrete surface repair recommended for the headwalls and wingwalls. Since there is no evidence on the outer faces of the bridge of an internal drainage system, it is likely that lack of drainage is contributing to the accelerated deterioration of the north abutment and arch. Another likely cause for this deterioration is the frequency of flooding and/or high water that allows water carrying rocks and other material to run against the abutment walls.
It is recommended that the arch fill be excavated in order to complete repairs on the interior of the bridge. The concrete on the interior arch and wall faces should be assessed at that time for need of concrete surface repair. An estimated amount of repair is assumed in the preservation estimate. Once any surface repairs are complete, a drainage system should be installed and a waterproof membrane should be applied to the interior arch and wall surfaces. All of this work would be buried after the roadway and arch fill is replaced, therefore a color and finish match is not critical for the membrane work.

Road Surface
Due to the substandard rail height (2 foot 6 inches) and need to add fill to the roadway in order to protect the exposed surface of the top of the arch, an assessment should be conducted to find a balance between the minimum required earth cover over the arch and a safe/acceptable rail height. For protection of the arch and distribution of vehicular loading to the arch, it would be ideal to place a minimum of 2 feet of aggregate above the top of the arch. However, placing this amount of aggregate would essentially bury the railings which are a character defining feature of the bridge. For purposes of cost estimation, a minimum fill height of 6 inches is assumed.

Abutments
The north abutment should receive a concrete surface repair that continues from the north arch repair and is conducted in the same manner. Both abutments should be protected by placing concrete underpin walls in front of them. This will arrest the scouring on the north and south abutments. All loose and deteriorated concrete should be removed until sound concrete is found. The new underpin walls should extend below the streambed to protect the abutment footing and its bearing surface. The underpin walls should be constructed to blend in with the existing structure by minimizing their projection and utilizing concrete of like color, composition and finish to the existing concrete. Following placement of the underpin walls, it is further recommended that riprap be placed directly in front of them to reduce the scouring of the streambed in this location.

Bridge Slopes
The east slopes should be stabilized to prevent future erosion. It is recommended that the eroded bridge slopes be protected with riprap. Due to the steepness of the slopes, the most effective way to stabilize the slopes would be to use grouted riprap. The grout in the riprap should be held down below the top third of the riprap stone surface in order to maintain an appearance of natural stone.

Recommended Annual Maintenance Activities

1. Maintain required fill over the top of the arch through routine grading.

2. If salts are used on the roadway during the winter months, the bridge should be flushed with water each spring to remove dirt, debris and de-icing salts. Low pressure spray, less than 400 psi, should be used to ensure there is no damage to surface finishes. Test flushing method and water pressure to ensure it does not damage or abrade the bridge surfaces.
Minneapolis Department of Transportation (MnDOT)
Local Historic Bridge Report

V – Projected Costs

Bridge Number: L4646

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: $ 2,400
Opinion of Construction Cost- Stabilization Activities: $ 0
Opinion of Construction Cost- Preservation Activities: $ 179,800

Estimated Preliminary Design, Final Design, Construction Administration Costs

Preliminary Design and Assessment $ 4,000
Final Design and Plans $ 18,000
Construction Administration $ 22,000
## MAINTENANCE, STABILIZATION & PRESERVATION COST ESTIMATE (2013 DOLLARS)

**Bridge No. L4646**  
*July 18, 2014*

### MAINTENANCE COSTS

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**ESTIMATED MAINTENANCE COSTS:** $2,400.00

### STABILIZATION COSTS

**NO STABILIZATION ACTIVITIES ARE PROGRAMMED**

**ESTIMATED STABILIZATION COSTS:** $0.00

### PRESERVATION COSTS

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<tr>
<th>ITEM NO.</th>
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<tr>
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**ESTIMATED PRESERVATION COSTS:** $179,800.00
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 disintegration 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 inner 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 Society 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 historic, 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 specific 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 slightly 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 sufficiency 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:

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 historic basis and that seek to create a false historic 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 L4646

Historic Data
- Research

Local Data
- No data

MnDOT Reports
- Accident Report
- L4646 2010 Condition Sheet
- L4646 Inspection 11-16-12
- L4646 Inventory 05-30-13
- L4646 Rating Report 1973

Photos
- L4646 LHB 10-01-13
- L4646 M&H Photos 10-01-13
- Report Photos

Plans
- No data
# Mn/DOT Bridge Inspection Report

**BRIDGE L4646**  
MUN 11 OVER SPRING BROOK  
**INSPI. DATE: 11-16-2012**

**County:** ROCK  
**Location:** 0.2 Mi E of JCT CSAH 25  
**Length:** 36.6 ft

**City:** BEAVER CREEK  
**Route:** MUN 11  
**Ref. Pt.:** 000+00.000  
**Width:** 18.7 ft

**Township:** Control Section:  
**Maint. Area:** Rdwy. Area / Pct. Unstd.:  
**Length:** 592 sq ft

**Section:** 28 Township: 102N Range: 46W  
**Local Agency Bridge Nbr:** Paint Area / Pat. Unstd.:  
**Culvert:** N/A

**Open, Posted, Closed:** OPEN  
**Appraisal Ratings - Approach:** 3  
**Waterway:** 6  
**MN Scour Code:** L-STBL/LOW RISK  
**Def. Stat:** F.O.  
**Suff. Rate:** 56.3

**Required Bridge Signs - Load Posting:** NOT REQUIRED  
**Traffic:** NOT REQUIRED  
**Horizontal OBJECT MARKERS:** Vertical: NOT APPLICABLE

## Structure Unit: 0

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<td>0</td>
<td>N/A</td>
<td>N/A</td>
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</tbody>
</table>

**General Notes:**  
- (106) Scour at SW corner should have riprap installed.  
- (180) Riprap is needed at S.W. corner and along both abutments.  
- (2006) Same as previous inspections.

---

**Inspector’s Signature**  
**Reviewer’s Signature / Date**
<table>
<thead>
<tr>
<th><strong>GENERAL</strong></th>
<th><strong>ROADWAY</strong></th>
<th><strong>INSPECTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency Br. No.</td>
<td>Bridge Match ID (TIS) 1</td>
<td>Deficient Status F.O.</td>
</tr>
<tr>
<td>District 7</td>
<td>Roadway O/U Key 1-ON</td>
<td>Sufficiency Rating 56.3</td>
</tr>
<tr>
<td>County 67 - ROCK</td>
<td>Route Sys/Nbr MUN 11</td>
<td>Last Inspection Date 11-16-2012</td>
</tr>
<tr>
<td>City BEAVER CREEK</td>
<td>Roadway Name or Description MUN 11</td>
<td>Inspection Frequency 24</td>
</tr>
<tr>
<td>Township</td>
<td>Roadway Function MAINLINE</td>
<td>Inspector Name ROCK</td>
</tr>
<tr>
<td>Desc. Loc. 0.2 MI E OF JCT CSAH 25</td>
<td>Roadway Type 1 LNR:2 WAY</td>
<td>Structure A-OPEN</td>
</tr>
<tr>
<td>Sect., Twp., Range 28 - 102NN - 48W</td>
<td>Control Section (TH Only)</td>
<td><strong>+ NEI CONDITION RATINGs</strong></td>
</tr>
<tr>
<td>Latitude 43d 36m 48.60s</td>
<td>Ref. Point (TH Only)</td>
<td>Deck N</td>
</tr>
<tr>
<td>Longitude 96d 21m 30.00s</td>
<td>Date Opened to Traffic 01-01-1911</td>
<td>Superstructure 6</td>
</tr>
<tr>
<td>Custodian CITY</td>
<td>Detour Length 1 mi.</td>
<td>Substructure 5</td>
</tr>
<tr>
<td>Owner CITY</td>
<td>Lanes 1 Lane ON Bridge</td>
<td>Channel 6</td>
</tr>
<tr>
<td>Inspection By ROCK COUNTY</td>
<td>ADT (YEAR) 55 (1990)</td>
<td>Culvert N</td>
</tr>
<tr>
<td>BMU Agreement</td>
<td>HCADT</td>
<td><strong>+ NEI APPRAISAL RATINGs</strong></td>
</tr>
<tr>
<td>Year Built 1911</td>
<td>Functional Class RURAL LOCAL</td>
<td>Structure Evaluation 5</td>
</tr>
<tr>
<td>Year Fed Rehab</td>
<td>If Divided NB-EB SB-WB</td>
<td>Deck Geometry 8</td>
</tr>
<tr>
<td>Year Remodeled</td>
<td>Roadway Width 15.6 ft</td>
<td>Underclearances N</td>
</tr>
<tr>
<td>Temp</td>
<td>Vertical Clearance</td>
<td>Waterway Adequacy 6</td>
</tr>
<tr>
<td><strong>+ STRUCTURE +</strong></td>
<td>Horizontal Clear.</td>
<td><strong>+ IN DEPTH INSPE +</strong></td>
</tr>
<tr>
<td>Service On HIGHWAY</td>
<td>Lateral Clear.</td>
<td>Frac., Critical</td>
</tr>
<tr>
<td>Service Under STREAM</td>
<td>On - Off System OFF</td>
<td>Underwater</td>
</tr>
<tr>
<td>Main Span Type CONC ARCH</td>
<td></td>
<td>Pinned Astyl.</td>
</tr>
<tr>
<td>Main Span Detail SPANDREL FILLED ARC</td>
<td></td>
<td>Spec. Feat.</td>
</tr>
<tr>
<td>Appr. Span Type</td>
<td></td>
<td><strong>+ WATERWAY +</strong></td>
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<tr>
<td>Appr. Span Detail</td>
<td></td>
<td>Drainage Area</td>
</tr>
<tr>
<td>Skew</td>
<td></td>
<td>Waterway Opening 192 sq ft</td>
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<tr>
<td>Culvert Type</td>
<td></td>
<td>Navigation Control NO PRMT REQ</td>
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<tr>
<td>Barrel Length Number of Spans</td>
<td></td>
<td>Pier Protection</td>
</tr>
<tr>
<td>MAIN 1  APPR 0  TOTAL 1</td>
<td></td>
<td>Nav. Vert./Horz. Cir.</td>
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<tr>
<td>Main Span Length 32.1 ft</td>
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<td>Nav. Vert. Lift Bridge Clear.</td>
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<tr>
<td>Structure Length 38.0 ft</td>
<td></td>
<td>MN Scour Code L-STBL;LOW RISK</td>
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<tr>
<td>Deck Width 18.7 ft</td>
<td></td>
<td>Scour Evaluation Year 2002</td>
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<tr>
<td>Deck Material N/A</td>
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<td><strong>+ CAPACITY RATINGs</strong></td>
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<tr>
<td>Wear Surf Type GRAVEL</td>
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<td>Design Load UNKN</td>
</tr>
<tr>
<td>Wear Surf Install Year</td>
<td></td>
<td>Operating Rating HS 18.00</td>
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<tr>
<td>Wear Course/Fill Depth 0.08 ft</td>
<td></td>
<td>Inventory Rating HS 12.00</td>
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<tr>
<td>Deck Membrane NONE</td>
<td></td>
<td>Posting</td>
</tr>
<tr>
<td>Deck Protect. N/A</td>
<td></td>
<td>Rating Date 10-16-2012</td>
</tr>
<tr>
<td>Deck Install Year</td>
<td></td>
<td><strong>+ BRIDGE SIGNS +</strong></td>
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<tr>
<td>Structure Area 711 sq ft</td>
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<td>Post Load NOT REQUIRED</td>
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<tr>
<td>Roadway Area 592 sq ft</td>
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<td>Traffic NOT REQUIRED</td>
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<tr>
<td>Sidewalk Width - L/R</td>
<td></td>
<td>Horizontal OBJECT MARKERS</td>
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<tr>
<td>Curb Height - L/R</td>
<td></td>
<td>Vertical NOT APPLICABLE</td>
</tr>
<tr>
<td>Rail Codes - L/R</td>
<td></td>
<td><strong>Mn/DOT Permit Codes</strong></td>
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</tbody>
</table>