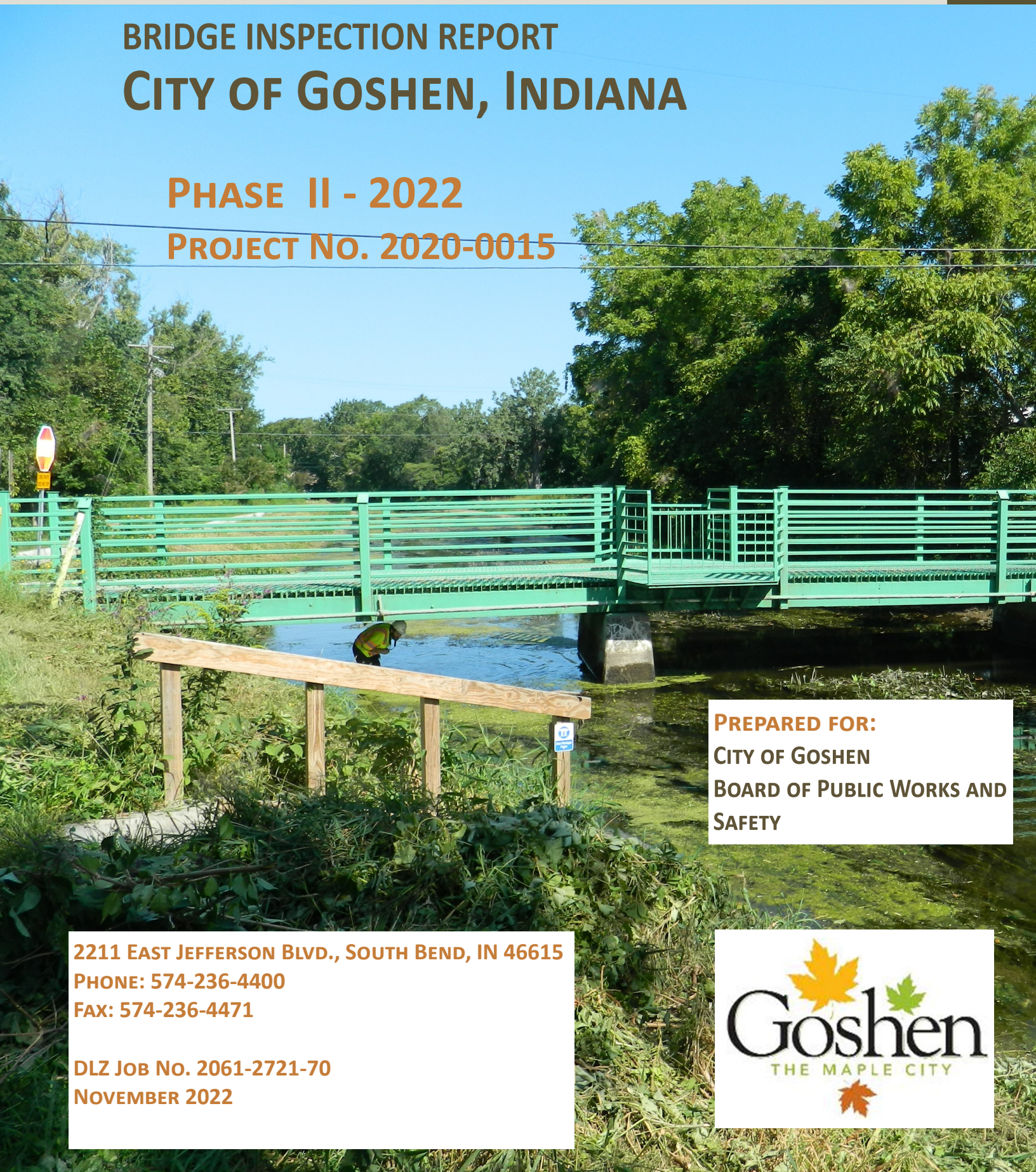
BRIDGE INSPECTION REPORT
CITY OF GOSHEN, INDIANA

PHASE II - 2022
PROJECT NO. 2020-0015



PREPARED FOR:
CITY OF GOSHEN
BOARD OF PUBLIC WORKS AND SAFETY

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DLZ JOB NO. 2061-2721-70
NOVEMBER 2022

Goshen
THE MAPLE CITY

BRIDGE INSPECTION REPORT
CITY OF GOSHEN
ELKHART COUNTY
INDIANA

November 2022

Board of Public Works and Safety

Mayor Jeremy Stutsman

Michael Landis

Mary Nichols

Certified By:

Michael A. Kummeth, P.E.
Registered Professional Engineer
State of Indiana No. 910382

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Registered Professional Engineer
State of Indiana No. 1091097

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CITY OF GOSHEN

BOARD OF PUBLIC WORKS AND SAFETY

JEREMY STUTSMAN, Mayor

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PREFACE

This Bridge Inspection Report continues the City of Goshen's Bridge Inspection Program, which is administered by the City of Goshen Engineering Department. This report was prepared in accordance with the National Bridge Inspection Standards developed under the 1968 Federal Aid Highway Act.

DLZ Indiana, LLC was authorized to conduct this inspection and prepare this report in accordance with an Agreement with the City of Goshen, Indiana, dated July 24, 2020. Authorization to proceed with Phase II was issued by the City of Goshen on August 4, 2022. The field inspections were performed on August 24, 2022. As required per the agreement, and in compliance with FHWA requirements, a listing of the personnel involved in the inspections and their qualifications can be found on page 7.

This inspection report should prove to be helpful to City Officials in determining problem areas, in posting safe bridge load limits, in establishing a plan for bridge improvements, and in the selection of safe school bus routes. This report should also further demonstrate the need for preventative maintenance and reemphasize the benefits of a well coordinated bridge improvement program.

We wish to acknowledge the assistance and cooperation of all governmental offices involved in this study, including, but not necessarily limited to, the City of Goshen Engineer, the City of Goshen Board of Public Works and Safety, and the City of Goshen Parks Department.

BRIDGE INSPECTION REPORT

CITY OF GOSHEN

INDIANA

TABLE OF CONTENTS

INTRODUCTION AND SCOPE REPORT

The purpose of this Phase II inspection was to provide a current condition analysis and report of vehicular bridges under the jurisdiction of the City of Goshen. The inspection and report exclude the bridges that carry pedestrian traffic only, since these bridges are on a 48-moth inspection cycle. Please refer to the 2020 Phase I report for the latest inspection on the pedestrian bridges. Since 2012, the Jefferson Street Bridge over Millrace Hydraulic Canal (Bridge No. 301) has been restricted to permit only pedestrian traffic by placing a bollard at the east approach. However, due to its age and condition, it is recommended that Bridge No. 301 remains on a 24-month cycle like the rest of the vehicular bridges. The Phase II (2022) inspection report includes a total of 7 structures: Bridges 300, 301, 302, 305, 306, 401, and 402.

The inspections were limited to monitoring the problem areas identified in the previous reports and checking for relatively evident deficiencies, which have occurred since the last inspection. Although the inspections and the report have been completed under the direction of a Registered Professional Engineer and every effort has been made to maintain a high level of professional judgment, no guarantees can be made that all deficiencies were noted.

The Structure Inventory and Appraisal (SI&A) Reports have been prepared with respect to the Federal Highway Administration's (FHWA) guidelines established in December of 1995 and Indiana Department of Transportation's (INDOT) direction and interpretation.

In accordance with the FHWA's *Recording and Coding Guide for the Structural Inventory and Appraisal of the Nations Bridges*, hereafter referred to as the coding guide, the SI&A sheets shall include and keep updated (within 5 years) the ADT and the percentage of trucks at the structure for those carrying vehicular traffic. For any proposed design work at the vehicular structures, the City should obtain traffic counts prior to proceeding with any design. The traffic counts for all vehicular bridges are up to date.

All field notes, computations, reference data and other materials used in the preparation of this report are on file at the office of DLZ Indiana, LLC. Copies of relevant data for individual bridges will be furnished upon request.

NARRATIVE

BRIDGE REPLACEMENT AND MAINTENANCE

At this time there are two (2) bridges out of the seven (7) included in this report that are recommended for rehabilitation and/or repairs. One bridge, Bridge 302, is recommended for replacement.

The estimated total cost for all the improvements is $1,417,350. A priority schedule for these improvements is included on Table 2. This cost is based on a narrow scope of work focused on repairing structures with noted major deficiencies and does not include structures requiring only routine maintenance tasks or safety feature upgrades.

Routine maintenance costs are not included in the Coding Guide of FHWA and have therefore been separated out. Routine maintenance will be required on three (3) bridges to prevent future problems from occurring. This includes, but is not limited to, clearing vegetation overgrowth, installing load posting signs, installing gates, repairing holes in decks, removing debris, and placement of riprap to help prevent scour and erosion. The estimated total cost for all these maintenance needs is $28,000. These estimates were based on the inspecting engineer's visual evaluation at the time of inspection. It should be realized that this type of cost is very hard to estimate on a general basis, and the costs shown should be considered as a guide to the magnitude and assumed complexity of maintenance needs rather than a firm dollar estimate. It is recommended that all maintenance work be done in a timely fashion, either to improve safety or to prevent further deterioration. Some routine maintenance may need to be performed annually or semi-annually, such as clearing vegetation from the bridge. The minor repairs made now will reduce later maintenance and repair costs and will extend the useful life of these bridges. See Table 3 for a summary of maintenance costs per bridge.

In addition to these comments, the following general conditions are worthy of noting:

1. A couple of the steel bridges were found to have dirt and debris accumulating around their bearings. This condition leads to severe corrosion problems, which could be greatly reduced by periodically cleaning the bearing areas and painting the steel portions of the structure in these areas. Bridges 302 and 305 were found to have debris accumulating at the bearings.

2. One of the steel bridges has paint that is in poor to very poor condition. This condition leaves the steel unprotected and susceptible to rust and can drastically reduce the structural integrity of the bridge, depending upon its extent. A plan to sandblast and paint steel bridges could slow down the rate of deterioration of older structures and prevent the premature deterioration of newer structures. A properly performed painting will last approximately twenty years. Bridge 302 was found to have the paint in poor to fair condition.

3. Many bridges have problems with erosion, undermining, or scour to varying degrees at the substructure elements. Although these problems may not appear to be very

serious initially, if they are not corrected, they can lead to serious problems. When these problems are detected, they should be repaired. A variety of means exist to repair and prevent future problems such as placing riprap around the substructure. Bridges 301, 305, and 306 were found to have erosion, undermining, or scour depressions.

4. Many bridges have a heavy amount of vegetation growing on, around and under them. This vegetation reduces the visibility of the bridge and can shorten the life expectancy of the structure. The vegetation tends to hold water around the bridge and reduces air circulation. These two factors will cause the bridge to deteriorate at a faster rate. A plan to keep the vegetation away from the bridge will reduce the hazard of obscuring the bridge and at the same time allow more air circulation to keep the bridge dry. Bridge 305 was found to have vegetation encroaching on the bridge.

It should be noted that continuous maintenance costs beyond these immediate requirements will be needed. However, estimating costs of such future maintenance is not within the scope of this report. In using the cost estimating sections of this report, readers are cautioned that preliminary estimates are very general and that substantial refinements can be obtained when an in-depth scope of work and detailed plans are prepared for a project.

BRIDGE SIGNING AND MARKING

The field inspection showed that a few signs and markers are being used by the City. Local Agencies traditionally have been reluctant to engage in extensive signing, probably due to the assumption that most persons traveling local roads are familiar with these roads. Signs are also subject to vandalism and can be a major expense for highly limited budgets. However, recent changes in legal decisions governing liability in accidents and increases in traffic are forcing Local Agencies to be conscious of signing and marking problems. As a minimum, signs warning of one lane or narrow bridges and low load limits are essential. In addition to these signs, reflectorized delineators warning of narrow shoulders or reflectorized warning signs at the ends of narrow bridges provide a highly visible means of warning the traveling public of hazardous situations. Weed and brush control should be exercised to maintain the visibility of such warning devices.

The location of load limit signs deserves attention. Load limit signs should be located within a few feet of the structure. However, it would be advantageous to both the motorists and the City to also locate these signs at intersections nearest the bridge, thereby warning the motorists at a point where they can change their route, if necessary. It would also be to the City's benefit to keep updated and well documented records of the posting of all load limit signs. For a summary of bridge load postings, see Table 4. In accordance with the INDOT Bridge Inspection Manual, a notice should be sent by the City to the school districts advising them of the location of all bridges with a 12 Ton or less capacity. This notice should be sent annually or when a bridge's posting status changes.

The criteria for posting bridge end markers for vehicular bridges is called out in the

Federal Manual on *Uniform Traffic Control Devices;* and the Indiana Manual on *Uniform Traffic Control Devices*. These manuals only require bridge end markers for *"One Lane Bridge"* and *"Narrow Bridge"* structures or where *"objects not actually in the roadway may be so close to the edge of the road that they need a marker"*. It is this latter criterion that governs our judgment when recommending posting of markers for certain structures wider than a *"Narrow Bridge"*. However, the final use of the markers at locations other than at a *"One Lane Bridge"* or a *"Narrow Bridge"* will remain at the discretion of the City.

Table 5 and Table 6 list those safety items that are currently on the bridge and those that are recommended for use at the bridge designated, respectively. The recommended signing set out in these tables is intended as a minimum and should be evaluated in the field for possible expansion, especially if features such as intersections, curves, or other hazards are near the bridge.

BRIDGE INVENTORY AND APPRAISAL CRITERIA

The condition of each bridge has been assessed by the inspecting engineer and ratings have been assigned to the features as listed in accordance with the guidelines referenced herein. In general, a rating "6" or "7" indicates a potential for minor maintenance. A rating of "5" indicates a potential for major maintenance and ratings of "4" or less indicate a potential for major rehabilitation or replacement.

The appraisal of each structure with the deficiencies as noted, was based on the judgment of the inspecting engineer. Ratings were then assigned based again on the referenced guidelines. Ratings "6" and above indicate that conditions are equal to or better than present minimum criteria. Ratings "4" and "5" indicate conditions meeting minimum tolerable limits to be left in place as is. Ratings "3" and lower indicate intolerable conditions requiring repair or replacement with high priority.

The capacity of each structure was determined by calculations where possible. Where enough data is unavailable, assumptions were made to arrive at a rating. The calculations were based on field dimensions, on the condition of the superstructure and on the judgment of the engineer. They are by no means intended to completely analyze the entire structure or to guarantee the capacity ratings. This is clearly beyond the scope of this project and would be impossible without complete plans and a more detailed inspection and investigation. They are intended to be a "best estimate" for these ratings and serve as the basis for determining the safe live load capacity. The summary of the load ratings can be found in Table 4.

Certain criteria were established as a practical method for arriving at a rating for each of the structure types. The procedures used, in accordance with guidelines of this study, were as follows:

General: The supporting bridge floor members in all cases were assumed to be the limiting component and subject of analysis. Members were assumed to be less than fully effective where portions of members were lost due to corrosion or spalling.

Steel: Member sized and spacings were measured. Superstructure dead loads were approximated based on field measurements. Distribution of wheel loads was determined in accordance with current AASHTO requirements. ASTM A36 steel (36 ksi yield stress) was assumed for bridges built since 1963 and A7 steel (33 ksi yield stress) was assumed for construction between 1936 and 1963. Steel with 30 ksi yield stress was assumed for steel construction between 1905 and 1936. For construction prior to 1905 steel with 26 ksi yield stress was assumed. Inventory ratings were based on 55 percent of yield stress; while the operating rating was based on 75 percent of yield stress.

Cast-in-Place Concrete Flat Slabs, Arches & Girders: Member sizes and spacing were measured. Where plans were available the specified concrete compressive strength, reinforcement yield strength and size and location of reinforcement was used in the strength calculations. Where this data was not available the guidelines outlined in the AASHTO Manual for Condition Evaluation of Bridges were followed. For structures built prior to 1954 the inventory rating was based on an allowable steel stress of 18 ksi, the operating rating was based on an allowable steel stress of 25 ksi and a yield strength of 33 ksi. For structures built after 1954 the inventory rating was based on an allowable steel stress of 20 ksi, the operating rating was based on an allowable steel stress of 28 ksi and a yield strength of 40 ksi. The concrete compressive strength for structures built prior to 1959 was assumed to be 2500 psi and 3000 psi after 1959. For a concrete compressive strength of 2500 psi, the allowable stress for the inventory rating was 1000 psi and 1500 psi for the operating rating. For a concrete compressive strength of 3000 psi, the allowable stress for the inventory rating was 1200 psi and 1900 psi for the operating rating.

Prestressed Concrete Box Beams and I-Beams: Member capacities were determined with the aid of load tables and the 1960's Prestressed Beam Standard Drawings published by the Indiana Department of Transportation. When the number of prestressing strands was not known, a conservative estimate was made. When plans were not available, an initial concrete strength of 4,000 psi and a final concrete strength of 5,000 psi were assumed. In addition, strands were eliminated at crack locations or where spalls were evident.

Timber Slabs: Member sizes and spacings were measured. Superstructure dead loads were approximated based on the field measurements. The distribution of wheel loads was determined in accordance with current AASHTO requirements. In accordance with INDOT specifications, timber slabs were assumed to be Douglas Fir–Larch, No. 1 or better with a bending strength of 1150 psi. The actual allowable stress for the operating and inventory ratings was based on the bending strength multiplied by various adjustment factors. For both the inventory and operating rating, a repetitive member factor of 1.15 and a size factor (which depends on thickness and depth) of 1.0 to 1.2 were used. For the inventory rating a load duration factor of 1.15 was used while 1.33 was used for the operating rating duration factor. In addition to the adjustment factors, the allowable operating rating stress was increased by 33%, in accordance with AASHTO.

A listing of all personnel involved with the project and their qualifications is listed in Table 1. A summary of bridges historic significance can be found in Table 7. In order to further

facilitate and clarify interpretation of the various items contained on the Structure Inventory and Appraisal Sheets, a brief explanation of each item is listed in Appendix B.

It is hoped that the format of this report will provide a convenient means of reference for anyone using it and assist in achieving an improved, adequate and safe bridge system within the City of Goshen.

TABLE 1

LISTING OF PERSONNEL AND QUALIFICATIONS AND SIGNATURE OF ALL TEAM LEADERS

Inspection	Load Rating	Name	Qualifications	Duties
X	X	Michael A. Kummeth, P.E.	BSCE, NHI 1990, 33 years insp. & design, INDOT Bridge Inspector Number IN000149-2020	QC-QM
X	X	Pedro A. Trana, P.E.	MSCE, BSCE, NHI 2005, 18 years insp. & design, INDOT Bridge Inspector Number IN000255-2021	Project Manager
X		Ethan A. Flook	BSCE, 4years inspection & design experience INDOT Bridge Inspector Number IN000668-2031-ATL	Team Leader
X		Christian Dennis	M.Eng., BSCE, 1 Summer of Bridge Inspection Experience	Team Member

At least one Team Leader was present and actively involved at each of the individual inspections listed above for each of the bridges in the City of Goshen, Indiana for the 2022 Inspections.

_____

Pedro A. Trana, P.E.

TABLE 2

PRIORITY SCHEDULE FOR BRIDGE IMPROVEMENTS

Priority No.	Bridge No.	Year Needed	Work Description	*Estimated Project Cost
1	402	2025	REPLACE CRACKED SIDEWALK AT WEST STAIRS APPROACH.	$10,000
2	302	2026	REPLACE STRUCTURE WITH NEW VEHICULAR BRIDGE.	$1,062,350
3	306	2030	REMOVE AND REPAIR UNSOUND CONCRETE. EPOXY INJECT CRACKS. MILL AND OVERLAY CONCRETE DECK.	$345,000
			Total Cost =	**$1,417,350**

* Estimated Project Cost does not include maintenance costs.

TABLE 3

SCHEDULE FOR BRIDGE MAINTENANCE

Priority No.	Bridge No.	Description	Year Needed	*Estimated Cost
1	302	INSTALL GATE AT EAST APPROACH. INSTALL LOAD POSTING SIGNS.	2023	$6,000
2	305	CLEAR VEGETATION. PLACE RIPRAP AT PIERS.	2023	$11,000
3	401	SEAL CRACKS IN TOP SURFACE OF SLAB.	2025	$11,000
			Total Cost:	**$28,000**

TABLE 4

LOAD RATING SUMMARY AND LOAD POSTING

Bridge No.	Design Load	Load Rating (H inventory for Veh. Bridges)	Open, Posted, or Closed	*Year Rated
300	H-20/HS-20	20 TON	OPEN	2012
301	UNKNOWN	1 TON	POSTED – PEDESTRIANS ONLY	2008
302	H-20/HS-20	12 TON	B – OPEN, POSTING REQUIRED	2020
305	H-20/HS-20	20 TON	OPEN	2012
306	UNKNOWN	16 TON	OPEN	2020
401	HS-25	20 TON	OPEN	2009
402	E-80 COOPER TRAIN	40 TON	OPEN	2020

* All previous load ratings have been verified in 2022.

TABLE 5

SAFETY IMPROVEMENTS CURRENTLY AT BRIDGE

Bridge No.	One Lane	Narrow Bridge	Bridge Railing	Approach Railing	Bridge End Markers	Speed Limit	Curve Signs	Other
300			X	X				
301			X	X				1
302			S					2
305	X		S		X	X		3
306			X					3
401			X	X				4
402			X					

X = In Place and Adequate

S = In Place and Substandard

Other:

1 – Bollard in place to prevent vehicular traffic.

2 – Additional signs in place: “Pedestrian Crossing (Symbol)” and City of Goshen Trail signs. In addition, gates restricting bridge are placed at the west approach.

3 – Additional signs in place: STOP Sign and/or City of Goshen Trail sign.

4 – Additional signs in place: “SR 119”, City of Goshen Trail, and “Bikeway Narrows” signs.

TABLE 6

SAFETY IMPROVEMENTS NEEDED AT BRIDGE

Bridge No.	One Lane	Narrow Bridge	Bridge Railing	Approach Railing	Bridge End Markers	Speed Limit	Curve Signs	Other
300								
301								
302			X	X				1
305			X	X				
306								
401								
402								

Other:

1 – Install Load Posting signs. Install gate at east approach. Lock gate at west approach.

TABLE 7

LISTING OF HISTORICAL STRUCTURES

Category: (1) On National Register of Historic Places
(2) Eligible for National Register of Historic Places
(3) Possibly eligible for National Register of Historic Places

Category	Bridge No.	Structure Type	Location
2 - ELIGIBLE	301	EARTH FILLED MASONRY ARCH	350' W. OF 3RD STREET

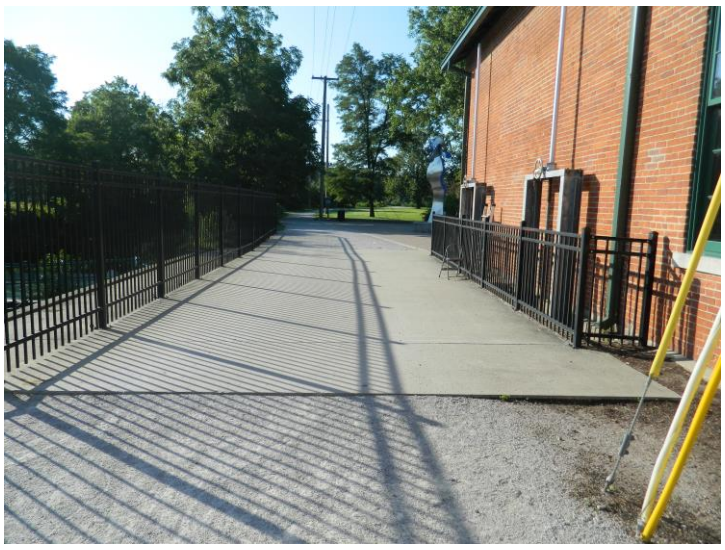
STRUCTURE INVENTORY AND APPRAISALS

CITY OF GOSHEN BRIDGE NO. 300

MILLRACE CANAL TRAIL
OVER
MILLRACE HYDRAULIC CANAL

EAST ELEVATION

SECTION LOOKING NORTH



SECTION LOOKING SOUTH

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 300

Facility Carried: MILLRACE CANAL TRAIL
Feature(s) Intersected: MILLRACE HYDRAULIC CANAL

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**MILLRACE HYDRAULIC CANAL**
Facility Carried:	**MILLRACE CANAL TRAIL**
Location:	**175' W. OF 2ND ST./WASH. ST. INTER.**
Latitude:	**41° 35' 5.38"**
Longitude:	**85° 50' 17.81"**

GEOMETRIC DATA

Structure Length:	**34'-0"**
Max. Span Length:	**16'-0"**
Deck Width (O-O):	**21'-9"**
Br. Rdwy Width:	**17'-0"**
Approach Width:	**10'-0"**
Total Hor. Clearance – Over:	**17'-0"**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**30** Years
Deck:	**30** Years
Joints:	**NA** Years
Superstructure:	**50** Years
Substructure:	**20** Years
Approach:	**10** Years
Channel:	**20** Years
Culvert:	**NA** Years

STRUCTURE DATA

Str. Type-Main:	**PRES. CONC. H.C. SLAB**
Str. Type-Appr:	**NA**
Deck Str. Type:	**CONCRETE**
Wearing Surface:	**MONOLITHIC CONCRETE**
Thickness of Asphalt:	**0** Inches
No. of Spans – Main:	**2**
No. of Spans – Approach:	**0**

AGE OF SERVICE

Year Built:	**1898**
Reconstructed:	**2010**
Repaired:	**NA**
Type of Service:	**PED./BIKE** over **WATERWAY**
Lanes on Structure:	**TRAIL**
ADT – Over:	**NA** VPD
ADT Year Over:	**NA**
Paint Date:	**NA**
Paint Rating:	**NA**
Detour:	**NA**

CLASSIFICATION

Historical Significance:	**NOT ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**H-20/HS-20**
Operating Rating:	**45 TON**
Inventory Rating:	**36 TON**
Gross Tons or H Rating:	**20 TON**
Posting:	**5 - EQUAL OR ABOVE LEGAL LOADS**
Date Posted/Closed:	
Open, Posted, or Closed:	**OPEN**
Tons Posted:	
Year of Rating:	**2012**

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**7/30/2020**

PROPOSED IMPROVEMENTS

Year Needed:	
Type Work:	
	NO MAJOR WORK NEEDED AT THIS TIME
Bridge Imp. Costs:	**$0,000**
Roadway Imp. Costs:	**$0,000**
Total Project Costs:	**$0,000**
Yr. of Cost Estimate:	

MAINTENANCE NEEDS

Year Needed:	
Describe Work:	
	NO MAJOR MAINTENANCE NEEDED

Total Maintenance Costs:

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**VERY GOOD**	**CONCRETE**	**8**
Wearing Surface:	**VERY GOOD**	**MONOLITHIC CONCRETE**	**8**
Superstr:	**VERY GOOD**	**PRESTRESSED CONC.E HOLLOW CORE SLABS**	**8**
Substr:	**FAIR - ABRASION/ SCALING/ WORN**	**CONCRETE**	**5**
Channel:	**GOOD**	**CONCRETE**	**7**
Culvert:	**NA**	**NA**	**NA**
Approach Roadway:	**GOOD - TRAIL - MINOR CRACKS IN RCBA**	**GRAVEL**	**7**

APPRAISAL

		RATING
Structural:	**FAIR - CONCRETE ABUTMENTS AND CENTER PIER ARE WORN WITH SCALING AND ABRASION**	**5**
Geometry:	**GOOD - TRAIL**	**7**
Bridge Railing:	**VERY GOOD - STEEL PEDESTRIAN RAIL**	**8**
Waterway Adequacy:	**OVER HYDRAULIC CANAL WITH FLOW CONTROL**	**9**
Roadway Alignment:	**STRAIGHT AND LEVEL - TRAIL**	**8**
Scour:	**STABLE**	**8**
Foundation:	**UNKNOWN (LIKELY SPREAD FOOTING)**	

REMARKS

ACCESS TO SUBSTRUCTURE IS OBTAINED BETWEEN WEST COPING AND POWERHOUSE. A 20' EXTENSION LADDER, 3' STEP LADDER, AND CANAL MUST BE LOWERED AT A MINIMUM FOR ACCESS. MINOR CRACKING IN REINFORCED CONCRETE APPROACH SLABS. HONEYCOMBING IN BEAM 4 FROM WEST IN SOUTH SPAN. BEARING PAD AT N END OF BEAM 2 FROM WEST IN SOUTH SPAN IS WALKING OUT.

DLZ
2211 EAST JEFFERSON BLVD.
SOUTH BEND, IN 46615
PHONE: (574) 236-4400 FAX: (574) 236-4471

CITY OF GOSHEN BRIDGE NO. 301

JEFFERSON STREET
OVER
MILLRACE HYDRAULIC CANAL

NORTH ELEVATION

SOUTH ELEVATION

SECTION LOOKING WEST

SECTION LOOKING EAST

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 301

Facility Carried: JEFFERSON STREET
Feature(s) Intersected: MILLRACE HYDRAULIC CANAL

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**MILLRACE HYDRAULIC CANAL**
Facility Carried:	**JEFFERSON STREET**
Location:	**350' W. OF 3RD STREET**
Latitude:	**41° 35' 1.27"**
Longitude:	**85° 50' 14.64"**

GEOMETRIC DATA

Structure Length:	**48'-0"**
Max. Span Length:	**21'-3"**
Deck Width (O-O):	**11'-0"**
Br. Rdwy Width:	**9'-1"**
Approach Width:	**10'-0"**
Total Hor. Clearance – Over:	**9'-1"**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**6** Years
Deck:	**NA** Years
Joints:	**NA** Years
Superstructure:	**15** Years
Substructure:	**15** Years
Approach:	**10** Years
Channel:	**15** Years
Culvert:	**NA** Years

STRUCTURE DATA

Str. Type-Main:	**EARTH FILLED MASONRY ARCH**
Str. Type-Appr:	**NA**
Deck Str. Type:	**NA**
Wearing Surface:	**BITUMINOUS**
Thickness of Asphalt:	**5** Inches
No. of Spans – Main:	**2**
No. of Spans – Approach:	**0**

AGE OF SERVICE

Year Built:	**1880**
Reconstructed:	**UNKNOWN**
Repaired:	**2022**
Type of Service:	**PED./BIKE** over **WATERWAY**
Lanes on Structure:	**01**
ADT – Over:	**0** VPD
ADT Year Over:	**2008**
Paint Date:	**NA**
Paint Rating:	**NA**
Detour:	**< 1 MILE**

CLASSIFICATION

Historical Significance:	**ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**UNKNOWN**
Operating Rating:	**NA**
Inventory Rating:	**1 TON**
Gross Tons or H Rating:	**1 TON**
Posting:	**1 - 30.0-30.9% BELOW LEGAL LOADS**
Date Posted/Closed:	**40969**
Open, Posted, or Closed:	**POSTED**
Tons Posted:	**PEDESTRIAN ONLY**
Year of Rating:	**2008**

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**7/30/2020**

PROPOSED IMPROVEMENTS

Year Needed:	
Type Work:	
	NO MAJOR WORK NEEDED AT THIS TIME
Bridge Imp. Costs:	**$0,000**
Roadway Imp. Costs:	**$0,000**
Total Project Costs:	**$0,000**
Yr. of Cost Estimate:	

MAINTENANCE NEEDS

Year Needed:	
Describe Work:	
	NO MAJOR MAINTENANCE NEEDED
Total Maintenance Costs:	**$0,000**

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**NA**	**NA**	**NA**
Wearing Surface:	**FAIR - TRANSVERSE CRACKS / SETTLEMENT AND EROSION**	**BITUMINOUS**	**5**
Superstr:	**SATISFACTORY - CRACKS AND EFFLORESCENCE**	**STONE MASONRY**	**6**
Substr:	**SATISFACTORY - ABRASION**	**STONE MASONRY**	**6**
Channel:	**GOOD**	**EARTH AND RIPRAP**	**7**
Culvert:	**NA**	**NA**	**NA**
Approach Roadway:	**GOOD - RECENTLY REPAVED**	**CONCRETE**	**7**

APPRAISAL

		RATING
Structural:	**SATISFACTORY- CRACKING AND LEACHING OF ARCHES**	**6**
Geometry:	**GOOD - TRAIL**	**7**
Bridge Railing:	**GOOD - STEEL PEDESTRIAN HANDRAIL**	**7**
Waterway Adequacy:	**OVER HYDRAULIC CANAL WITH FLOW CONTROL**	**9**
Roadway Alignment:	**STRAIGHT AND LEVEL- TRAIL**	**8**
Scour:	**STABLE - RIPRAP ADDED AT ABUTMENTS AND PIER**	**5**
Foundation:	**SPREAD FOOTING**	

REMARKS

EAST APPROACH HAS RECENTLY BEEN REDONE AS PART OF THE CONSTRUCTION OF THE ADJACENT BUILDING. WEST APPROACH REPAIRED IN SEPTEMBER 2022. NEW CONCRETE SIDEWALK APPROACHES. BRIDGE ADEQUATE FOR PEDESTRIAN TRAFFIC ONLY. THE MASONRY IS SOLID WITH NO LOOSE STONES FOUND. THE BRIDGE SHOULD BE KEPT CLEAR OF VEGETATIVE GROWTH. PATCHES ON EAST SPAN IN GOOD CONDITION. RIPRAP AROUND ABUTMENTS AND PIER. RIPRAP IN NORTHEAST AND SOUTHEAST CORNERS. RIPRAP AT SOUTHEAST CORNER IS ERODING. RIPRAP AT NORTHWEST AND SOUTHWEST BANKS WERE RECENTLY ADDED IN SEPTEMBER 2022. MASONRY REPOINTING IN GOOD CONDITION. ABRASION AT WEST ABUTMENT AT ORDINARY HIGH WATER MARK. ABRASION AT WEST SIDE OF PIER. CRACKING WITH LEACHING IN WEST SPAN NEAR PIER. SPALLING AND DETERIORATION AT SOUTHWEST WINGWALL.

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CITY OF GOSHEN BRIDGE NO. 302

MADISON STREET
OVER
MILLRACE HYDRAULIC CANAL

NORTH ELEVATION

SOUTH ELEVATION

SECTION LOOKING WEST

SECTION LOOKING EAST

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 302

Facility Carried: MADISON STREET
Feature(s) Intersected: MILLRACE HYDRAULIC CANAL

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**MILLRACE HYDRAULIC CANAL**
Facility Carried:	**MADISON STREET**
Location:	**375' W. OF 3RD STREET**
Latitude:	**41° 34' 56.33"**
Longitude:	**85° 50' 15.10"**

GEOMETRIC DATA

Structure Length:	**62'-6"**
Max. Span Length:	**15'-5"**
Deck Width (O-O):	**22'-0"**
Br. Rdwy Width:	**21'-6"**
Approach Width:	**21'-6"**
Total Hor. Clearance – Over:	**21'-6"**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**7** Years
Deck:	**7** Years
Joints:	**NA** Years
Superstructure:	**10** Years
Substructure:	**5** Years
Approach:	**5** Years
Channel:	**15** Years
Culvert:	**NA** Years

STRUCTURE DATA

Str. Type-Main:	**ENCASED STEEL BEAM**
Str. Type-Appr:	**NA**
Deck Str. Type:	**CONCRETE**
Wearing Surface:	**MONOLITHIC CONCRETE**
Thickness of Asphalt:	**0** Inches
No. of Spans – Main:	**4**
No. of Spans – Approach:	**0**

AGE OF SERVICE

Year Built:	**UNKNOWN**
Reconstructed:	**2008**
Repaired:	**2012**
Type of Service:	**VEHICULAR** over **WATERWAY**
Lanes on Structure:	**02**
ADT – Over:	**10** VPD
ADT Year Over:	**2014**
Paint Date:	**UNKNOWN**
Paint Rating:	**4 - POOR**
Detour:	**SINGLE ACCESS POINT - NO DETOUR**

CLASSIFICATION

Historical Significance:	**NOT ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**H-20/HS-20**
Operating Rating:	**51**
Inventory Rating:	**23**
Gross Tons or H Rating:	**12 TON**
Posting:	**4 - 0.1-9.9% BELOW LEGAL LOADS**
Date Posted/Closed:	
Open, Posted, or Closed:	**B - OPEN, POSTING REQUIRED**
Tons Posted:	
Year of Rating:	**2020**

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**2/7/2020**

PROPOSED IMPROVEMENTS

Year Needed:	**2026**
Type Work:	**REPLACEMENT - CONTRACT**

REPLACE STRUCTURE WITH NEW VEHICULAR BRIDGE.

Bridge Imp. Costs:	**$632,000**
Roadway Imp. Costs:	**$430,350**
Total Project Costs:	**$1,062,350**
Yr. of Cost Estimate:	**2021**

MAINTENANCE NEEDS

Year Needed:	**2023**
Describe Work:	**INSTALL GATE AT EAST APPROACH. INSTALL LOAD POSTING SIGNS**
Total Maintenance Costs:	**$6,000**

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**FAIR - TRANSVERSE CRACKING, EFFLORESCENCE, SPALLING**	**CONCRETE**	**5**
Wearing Surface:	**FAIR - POTHOLES, DELAMINATION IN SW CORNER**	**MONOLITHIC CONCRETE**	**5**
Superstr:	**FAIR - EXPOSED BOTTOM FLANGES HAVE DETERIORATION/SECTION LOSS**	**CONCRETE ENCASED STEEL BEAM**	**5**
Substr:	**POOR - BENT CAPS WITH HEAVY SURFACE RUST AND HEAVY SECTION LOSS**	**STEEL PILE BENTS AND CONC. ABUTMENTS**	**4**
Channel:	**SATISFACTORY - FLOWS AGAINST EAST ABUTMENT**	**EARTH**	**6**
Culvert:	**NA**	**NA**	**NA**
Approach Roadway:	**GOOD**	**BITUMINOUS AT WEST APPROACH. CONCRETE AND BRICK PAVERS AT EAST APPROACH**	**7**

APPRAISAL

		RATING
Structural:	**POOR - HEAVY CORROSION OF H-PILES/ SECTION LOSS AT STEEL CAP BEAMS**	**4**
Geometry:	**SOMEWHAT BETTER THAN MINIMUM ADEQUACY TO LEAVE IN PLACE**	**5**
Bridge Railing:	**FAIR - STEEL W-BEAM - SUBSTANDARD**	**5**
Waterway Adequacy:	**OVER HYDRAULIC CANAL WITH FLOW CONTROL**	**9**
Roadway Alignment:	**STRAIGHT AND LEVEL / NO SPEED REDUCTION REQUIRED**	**8**
Scour:	**STABLE**	**5**
Foundation:	**PILES AND SPREAD FOOTINGS**	

REMARKS

SURFACE SPALL AT CENTER OF DECK. DELAMINATED AREA IN SOUTHWEST CORNER OF DECK. EROSION BEHIND SOUTHWEST, SOUTHEAST, AND NORTHEAST WINGWALLS. HEAVY RUST ON H-PILES WITH MODERATE SECTION LOSS. CROSS BEAMS IMMEDIATELY ADJACENT TO ABUTMENTS (BENTS 2 & 6) HAVE SEVERE SECTION LOSS/DETERIORATION OF FLANGES AND 100% SECTION LOSS OF WEB, NO LONGER SUPPORTING SUPERSTRUCTURE. OLD BENT CAPS AT BENTS 3, 4 & 5 WITH AREAS OF 100% SECTION LOSS OF WEBS AND HEAVY RUST THROUGHOUT. NEW BENT CAPS INSTALLED AT BENTS 3, 4 & 5 IN 2008. MINOR TO MODERATE SECTION LOSS OF EXPOSED BOTTOM FLANGES OF SUPERSTRUCTURE BEAMS. DECK UNDERSIDE HAS SPALLING AND EXPOSED, CORRODED REINFORCING. 1" CRACK IN EAST ABUTMENT. WATER FLOWS AGAINST EAST ABUTMENT. SHIMS INSTALLED IN 2012 TO PROVIDE POSITIVE BEARING OF SUPERSTRUCTURE BEAMS TO ORIGINAL BENT CAP BEAMS AT BENTS 3, 4 & 5. GATES AT WEST APPROACH ARE LIFTED. NO GATE AT EAST APPROACH. NO LOAD POSTING SIGNS. CRACKING AND DETERIORATION OF WEST ABUTMENT AT BEARING SEATS. CONCRETE APPROACH SLAB AND BRICK PAVERS AT EAST APPROACH.

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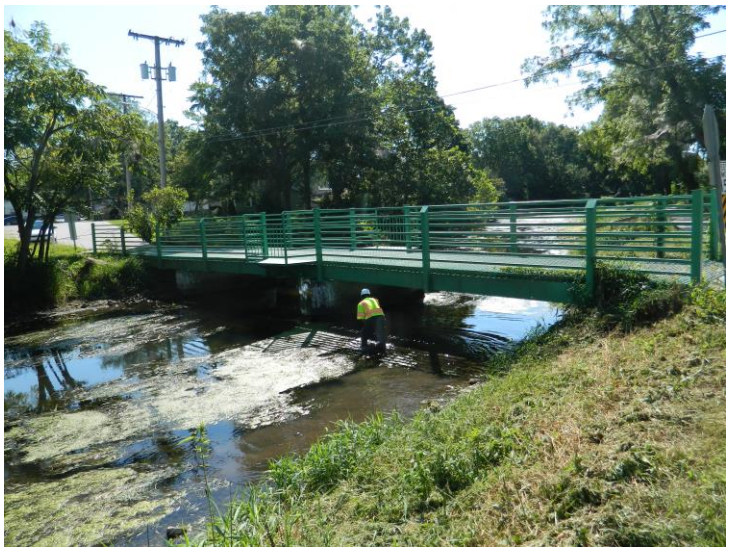
CITY OF GOSHEN BRIDGE NO. 305

WAVERLY AVENUE
OVER
MILLRACE HYDRAULIC CANAL



NORTH ELEVATION

SOUTH ELEVATION

SECTION LOOKING WEST

SECTION LOOKING EAST

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 305

Facility Carried: WAVERLY AVENUE
Feature(s) Intersected: MILLRACE HYDRAULIC CANAL

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**MILLRACE HYDRAULIC CANAL**
Facility Carried:	**WAVERLY AVENUE**
Location:	**525' W. OF SR 15 (MAIN ST.)**
Latitude:	**41° 34' 5.74"**
Longitude:	**85° 49' 50.34"**

GEOMETRIC DATA

Structure Length:	**87'-2"**
Max. Span Length:	**30'-0"**
Deck Width (O-O):	**12'-0"**
Br. Rdwy Width:	**12'-0"**
Approach Width:	**12'-0"**
Total Hor. Clearance – Over:	**10'-0"**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**10** Years
Deck:	**10** Years
Joints:	**NA** Years
Superstructure:	**10** Years
Substructure:	**10** Years
Approach:	**10** Years
Channel:	**15** Years
Culvert:	**NA** Years

STRUCTURE DATA

Str. Type-Main:	**SIMPLE STEEL BEAM**
Str. Type-Appr:	**NA**
Deck Str. Type:	**BOLTED STEEL GRATE**
Wearing Surface:	**STEEL**
Thickness of Asphalt:	**0** Inches
No. of Spans – Main:	**3**
No. of Spans – Approach:	**0**

AGE OF SERVICE

Year Built:	**UNKNOWN**
Reconstructed:	**UNKNOWN**
Repaired:	**2015**
Type of Service:	**VEHICULAR** over **WATERWAY**
Lanes on Structure:	**01**
ADT – Over:	**10** VPD
ADT Year Over:	**2014**
Paint Date:	**2015**
Paint Rating:	**8 - VERY GOOD**
Detour:	**SINGLE ACCESS POINT - NO DETOUR**

CLASSIFICATION

Historical Significance:	**NOT ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**H-20/HS-20**
Operating Rating:	**45 TON**
Inventory Rating:	**31 TON**
Gross Tons or H Rating:	**20 TON**
Posting:	**5 - EQUAL OR ABOVE LEGAL LOADS**
Date Posted/Closed:	
Open, Posted, or Closed:	**OPEN**
Tons Posted:	
Year of Rating:	**2012**

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**7/30/2020**

PROPOSED IMPROVEMENTS

Year Needed:	
Type Work:	
	NO MAJOR WORK NEEDED AT THIS TIME
Bridge Imp. Costs:	**$0,000**
Roadway Imp. Costs:	**$0,000**
Total Project Costs:	**$0,000**
Yr. of Cost Estimate:	

MAINTENANCE NEEDS

Year Needed:	**2023**
Describe Work:	
	CLEAR VEGETATION. PLACE RIPRAP AT PIERS
Total Maintenance Costs:	**$11,000**

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**GOOD**	**BOLTED STEEL GRATE**	**7**
Wearing Surface:	**GOOD**	**STEEL**	**7**
Superstr:	**FAIR - HEAVY PITTING, MODERATE SECTION LOSS AT FLANGES**	**STEEL**	**5**
Substr:	**FAIR - CRACKING/ EFFLOR. AT PIER ENDS, MINOR UNDERMINING AT W. PIER**	**CONCRETE**	**5**
Channel:	**SATISFACTORY - SCOUR AT SOUTH END OF PIERS**	**EARTH AND RIPRAP**	**6**
Culvert:	**NA**	**NA**	**NA**
Approach Roadway:	**CRACKED AT EAST APPROACH**	**BITUMINOUS**	**6**

APPRAISAL

		RATING
Structural:	**FAIR - SCOUR AT SOUTH END OF PIERS. MINOR UNDERMINING AT WEST PIER. BEAM SECTION LOSS WITH HEAVY PITTING**	**5**
Geometry:	**MEETS MINIMUM TOLERABLE LIMITS TO LEAVE IN PLACE**	**4**
Bridge Railing:	**GOOD - STEEL TUBE - DOES NOT MEET STANDARDS**	**7**
Waterway Adequacy:	**OVER HYDRAULIC CANAL WITH FLOW CONTROL**	**8**
Roadway Alignment:	**STRAIGHT AND LEVEL, MINOR SPEED REDUCTION REQUIRED. TRAIL INTERSECTION AT WEST END.**	**6**
Scour:	**STABLE - PREVENTIVE ACTION REQUIRED**	**4**
Foundation:	**UNKNOWN (LIKELY SPREAD FOOTING)**	

REMARKS

BRIDGE CLEANED AND PAINTED IN 2015. NEW STEEL TUBE RAIL INSTALLED. NEW RAILING WELDED TO FASCIA CHANNEL BEAMS AND BOTTOM FLANGE OF 1ST AND 2ND INTERIOR W-BEAMS(FATIGUE PRONE DETAIL). 15 MPH SIGNS POSTED. ONE LANE BRIDGE SIGNS POSTED. HEAVY PITTING ON ALL BEAMS, WORST IN BEAMS SPACED CLOSELY TOGETHER. SCOUR HOLE AND UNDERMINING AT WEST PIER, SOUTH SIDE. TOP OF FOOTING EXPOSED AT WEST SIDE OF WEST PIER. EAST PIER HAS SCOUR DEPRESSION AT SOUTH END. LOW CLEARANCE AT BEAMS TOWARDS ABUTMENTS. HEAVY VEGETATION AT EAST END OF BRIDGE. SEWER LINES ON NORTH SIDE. POWER LINES AT SOUTH SIDE. GAS LINE ON SOUTH SIDE. TRAIL INTERSECTION AT WEST END OF BRIDGE. THINNING OF TOP FLANGE OF EAST INTERIOR CENTER BEAM (INTERIOR BEAM 3).

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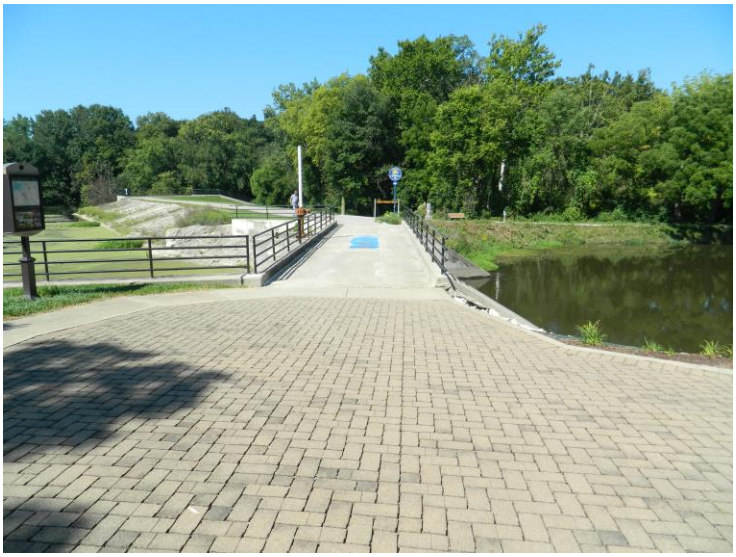
CITY OF GOSHEN BRIDGE NO. 306

MILLRACE CANAL TRAIL
OVER
MILLRACE HYDRAULIC CANAL

NORTH ELEVATION

SOUTH ELEVATION



SECTION LOOKING WEST

SECTION LOOKING EAST

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 306

Facility Carried: MILLRACE CANAL TRAIL
Feature(s) Intersected: MILLRACE HYDRAULIC CANAL

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**MILLRACE HYDRAULIC CANAL**
Facility Carried:	**MILLRACE CANAL TRAIL**
Location:	**220' W. OF RIVER VISTA DR.**
Latitude:	**41° 33' 41.53"**
Longitude:	**85° 50' 7.44"**

GEOMETRIC DATA

Structure Length:	**64'-3"**
Max. Span Length:	**20'-9"**
Deck Width (O-O):	**13'-11"**
Br. Rdwy Width:	**11'-8"**
Approach Width:	**12'-6"**
Total Hor. Clearance – Over:	**11'-8"**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**10** Years
Deck:	**10** Years
Joints:	**NA** Years
Superstructure:	**10** Years
Substructure:	**10** Years
Approach:	**10** Years
Channel:	**NA** Years
Culvert:	**NA** Years

STRUCTURE DATA

Str. Type-Main:	**ENCASED STEEL BEAM**
Str. Type-Appr:	**NA**
Deck Str. Type:	**REINFORCED CONCRETE**
Wearing Surface:	**REINFORCED CONCRETE**
Thickness of Asphalt:	**0** Inches
No. of Spans – Main:	**3**
No. of Spans – Approach:	**0**

AGE OF SERVICE

Year Built:	**1868**
Reconstructed:	**UNKNOWN**
Repaired:	**2021**
Type of Service:	**PED./BIKE** over **WATERWAY**
Lanes on Structure:	**TRAIL**
ADT – Over:	**NA** VPD
ADT Year Over:	**NA**
Paint Date:	**NA**
Paint Rating:	**NA**
Detour:	**NA**

CLASSIFICATION

Historical Significance:	**NOT ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**UNKNOWN**
Operating Rating:	**35**
Inventory Rating:	**28**
Gross Tons or H Rating:	**16 TON**
Posting:	**5 - EQUAL OR ABOVE LEGAL LOADS**
Date Posted/Closed:	
Open, Posted, or Closed:	**OPEN**
Tons Posted:	
Year of Rating:	

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**7/30/2020**

PROPOSED IMPROVEMENTS

Year Needed:	**2030**
Type Work:	**REHABILITATION - CONTRACT**

REMOVE AND REPAIR UNSOUND CONCRETE. EPOXY INJECT CRACKS. MILL AND OVERLAY CONCRETE DECK.

Bridge Imp. Costs:	**$310,000**
Roadway Imp. Costs:	**$35,000**
Total Project Costs:	**$345,000**
Yr. of Cost Estimate:	**2022**

MAINTENANCE NEEDS

Year Needed:	
Describe Work:	**NO MAJOR MAINTENANCE NEEDED**

Total Maintenance Costs: **$0,000**

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**SATISFACTORY - ROUGH/ SCALING & CRACKING**	**REINFORCED CONCRETE**	**6**
Wearing Surface:	**SATISFACTORY - ROUGH/UNEVEN**	**REINFORCED CONCRETE**	**6**
Superstr:	**CRACKING AND LEACHING / EXPOSED BOTTOM FLANGE**	**CONCRETE ENCASED STEEL BEAM**	**5**
Substr:	**HEAVY CRACKING AND LEACHING / ABRASION BELOW WATERLINE**	**REINFORCED CONCRETE**	**5**
Channel:	**GOOD - AT GOSHEN DAM**	**NATURAL/CONCRETE**	**7**
Culvert:	**NA**	**NA**	**NA**
Approach Roadway:	**GOOD**	**BITUMINOUS AT WEST APPROACH. CONCRETE AND BRICK PAVERS AT EAST APPROACH**	**7**

APPRAISAL

		RATING
Structural:	**FAIR - HEAVY CRACKING AND LEACHING**	**5**
Geometry:	**GOOD - TRAIL**	**7**
Bridge Railing:	**GOOD - STEEL TUBE - DOES NOT MEET STANDARDS**	**7**
Waterway Adequacy:	**OVER HYDRAULIC CANAL WITH FLOW CONTROL**	**9**
Roadway Alignment:	**STRAIGHT AND LEVEL - TRAIL**	**8**
Scour:	**STABLE**	**5**
Foundation:	**UNKNOWN (LIKELY SPREAD FOOTING)**	

REMARKS

DECK SURFACE IS ROUGH AND UNEVEN, EXHIBITING ABRASION AND CRACKING. HEAVY CRACKING WITH LEACHING AT UNDERSIDE OF STRUCTURE AND PIER WALLS. 8" THICK REINFORCED CONCRETE SLAB SUPPORTED ON ENCASED STEEL BEAMS. THE BOTTOM FLANGE OF THE BEAMS ARE EXPOSED, EXHIBITING SURFACE RUST. GROUTED RIPRAP AT POND SIDE. VOIDS IN THE GROUTED RIPRAP WERE FIXED IN 2021. MINOR EROSION BEHIND THE NORTHWEST AND NORTHEAST WINGWALLS.

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CITY OF GOSHEN BRIDGE NO. 401

PLYMOUTH AVENUE
OVER
MAPLE CITY GREENWAY

NORTH ELEVATION

SOUTH ELEVATION

SECTION LOOKING WEST

SECTION LOOKING EAST

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 401

Facility Carried: PLYMOUTH AVENUE
Feature(s) Intersected: MAPLE CITY GREENWAY

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**MAPLE CITY GREENWAY**
Facility Carried:	**PLYMOUTH AVENUE**
Location:	**200' W. OF SOUTH 3RD ST.**
Latitude:	**41° 34' 31.80"**
Longitude:	**85° 50' 9.80"**

GEOMETRIC DATA

Structure Length:	**17'-0"**
Max. Span Length:	**14'-0"**
Deck Width (O-O):	**80'-0"**
Br. Rdwy Width:	**41'-6"**
Approach Width:	**41'-6"**
Total Hor. Clearance – Over:	**41'-6"**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**15** Years
Deck:	**15** Years
Joints:	**NA** Years
Superstructure:	**NA** Years
Substructure:	**NA** Years
Approach:	**15** Years
Channel:	**NA** Years
Culvert:	**45** Years

STRUCTURE DATA

Str. Type-Main:	**REINFORCED CONCRETE CULVERT**
Str. Type-Appr:	**NA**
Deck Str. Type:	**REINFORCED CONCRETE**
Wearing Surface:	**REINFORCED CONCRETE**
Thickness of Asphalt:	**0** Inches
No. of Spans – Main:	**3**
No. of Spans – Approach:	**0**

AGE OF SERVICE

Year Built:	**2009**
Reconstructed:	
Repaired:	
Type of Service:	**VEHICULAR** over **PED./ BIKE**
Lanes on Structure:	**02**
ADT – Over:	**12224** VPD
ADT Year Over:	**2019**
Paint Date:	**NA**
Paint Rating:	**NA**
Detour:	**5 MILES**

CLASSIFICATION

Historical Significance:	**NOT ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**HS-25**
Operating Rating:	**45 TON**
Inventory Rating:	**36 TON**
Gross Tons or H Rating:	**20 TON**
Posting:	**5 - EQUAL OR ABOVE LEGAL LOADS**
Date Posted/Closed:	
Open, Posted, or Closed:	**OPEN**
Tons Posted:	
Year of Rating:	**2009**

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**7/29/2020**

PROPOSED IMPROVEMENTS

Year Needed:	
Type Work:	
	NO MAJOR WORK NEEDED AT THIS TIME
Bridge Imp. Costs:	**$0,000**
Roadway Imp. Costs:	**$0,000**
Total Project Costs:	**$0,000**
Yr. of Cost Estimate:	

MAINTENANCE NEEDS

Year Needed:	**2025**
Describe Work:	
	SEAL CRACKS IN TOP SURFACE OF SLAB

Total Maintenance Costs: **$11,000**

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**SATISFACTORY - LONGITUDINAL CRACKING**	**REINFORCED CONCRETE**	**6**
Wearing Surface:	**SATISFACTORY - LONGITUDINAL CRACKING**	**REINFORCED CONCRETE**	**6**
Superstr:	**NA**	**NA**	**NA**
Substr:	**NA**	**NA**	**NA**
Channel:	**NA - NOT OVER WATERWAY**	**NA**	**NA**
Culvert:	**GOOD**	**REINFORCED CONCRETE**	**7**
Approach Roadway:	**GOOD**	**BITUMINOUS**	**7**

APPRAISAL

		RATING
Structural:	**SATISFACTORY- CRACKING OF TOP SLAB**	**6**
Geometry:	**SOMEWHAT BETTER THAN MINIMUM ADEQUACY**	**5**
Bridge Railing:	**GOOD - NESTED GUARDRAIL ON SOUTH SIDE**	**7**
Waterway Adequacy:	**NA - NOT OVER WATERWAY**	**NA**
Roadway Alignment:	**STRAIGHT AND LEVEL, NO SPEED REDUCTION REQUIRED**	**8**
Scour:	**NA - NOT OVER WATERWAY**	**NA**
Foundation:	**BOX CULVERT**	

REMARKS

LONGITUDINAL SHRINKAGE CRACKING OF TOP OF REINFORCED CONCRETE BOX. LONGITUDINAL SHRINKAGE CRACKING WITH LIGHT LEACHING AT UNDERSIDE OF TOP OF SLAB. LONGITUDINAL CRACKS ARE SPACED ANYWHERE FROM 2'-6" TO 5'-6" APART. MINOR MAP SURFACE CRACKING OF BOTTOM SLAB OF CULVERT. EROSION BEHIND SOUTHWEST CORNER OF TUNNEL.

DLZ
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SOUTH BEND, IN 46615
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CITY OF GOSHEN BRIDGE NO. 402

NORFOLK SOUTHERN RAILROAD
OVER
WINONA TRAIL BIKE

EAST ELEVATION

WEST ELEVATION

SECTION LOOKING NORTH

SECTION LOOKING SOUTH

STRUCTURE INVENTORY AND APPRAISAL FORM

Bridge Number: 402

Facility Carried: NS RAILROAD
Feature(s) Intersected: WINONA TRAIL BIKE

IDENTIFICATION

State:	**INDIANA**
District:	**FORT WAYNE**
County:	**ELKHART**
City/Town:	**GOSHEN**
Feature Int'd:	**WINONA TRAIL BIKE**
Facility Carried:	**NS RAILROAD**
Location:	**780' S. OF COLLEGE AVE.**
Latitude:	**41° 33' 49.80"**
Longitude:	**85° 49' 33.96"**

GEOMETRIC DATA

Structure Length:	**14'-0"**
Max. Span Length:	**12'-0"**
Deck Width (O-O):	**54'-0"**
Br. Rdwy Width:	**NA**
Approach Width:	**NA**
Total Hor. Clearance – Over:	**NA**
Bridge Skew:	**0** Degree(s)
Stream Skew:	**0** Degree(s)

REMAINING LIFE

Estimated Remaining Life:	
Wearing Surface:	**25** Years
Deck:	**NA** Years
Joints:	**NA** Years
Superstructure:	**NA** Years
Substructure:	**NA** Years
Approach:	**15** Years
Channel:	**NA** Years
Culvert:	**75** Years

STRUCTURE DATA

Str. Type-Main:	**REINFORCED CONCRETE CULVERT**
Str. Type-Appr:	**NA**
Deck Str. Type:	**NA**
Wearing Surface:	**RAILROAD BALLAST**
Thickness of Asphalt:	**0** Inches
No. of Spans – Main:	**1**
No. of Spans – Approach:	**0**

CLASSIFICATION

Historical Significance:	**NOT ELIGIBLE**
Maintenance Responsibility:	**City**
Owner:	**City**

LOAD RATING AND POSTING

Design Load:	**E-80 COOPER TRAIN**
Operating Rating:	**NA**
Inventory Rating:	**40 TON**
Gross Tons or H Rating:	**40 TON**
Posting:	**NA**
Date Posted/Closed:	**NA**
Open, Posted, or Closed:	**OPEN**
Tons Posted:	
Year of Rating:	**2020**

PROPOSED IMPROVEMENTS

Year Needed:	**2025**
Type Work:	**REPAIR - LOCAL FORCES**

REPLACE CRACKED SIDEWALK AT WEST STAIRS APPROACH

Bridge Imp. Costs:	**$0,000**
Roadway Imp. Costs:	**$10,000**
Total Project Costs:	**$10,000**
Yr. of Cost Estimate:	**2022**

AGE OF SERVICE

Year Built:	**2011**
Reconstructed:	
Repaired:	
Type of Service:	**RAILROAD** over **PED./ BIKE**
Lanes on Structure:	**00**
ADT – Over:	**NA** VPD
ADT Year Over:	**NA**
Paint Date:	**NA**
Paint Rating:	**NA**
Detour:	**NA**

INSPECTIONS

Inspection Date:	**8/24/2022**
Des. Inspection Frequency:	**24** Months
Prev. Inspection Date:	**7/29/2020**

MAINTENANCE NEEDS

Year Needed:

Describe Work:

NO MAJOR MAINTENANCE NEEDED

Total Maintenance Costs:

CONDITION

	CONDITION	MATERIAL	RATING
Deck:	**NA - UNDER RAILROAD FILL**	**NA**	**NA**
Wearing Surface:	**GOOD**	**RAILROAD BALLAST**	**7**
Superstr:	**NA**	**NA**	**NA**
Substr:	**NA**	**NA**	**NA**
Channel:	**NA - NOT OVER WATERWAY**	**NA**	**NA**
Culvert:	**GOOD - MINOR SURFACE SPALLS/ SHRINKAGE CRACKS**	**REINFORCED CONCRETE**	**7**
Approach Roadway:	**CRACKING IN WEST APPROACH STAIRS**	**CONCRETE SIDEWALKS**	**7**

APPRAISAL

		RATING
Structural:	**GOOD CONDITION**	**7**
Geometry:	**GOOD - CONCRETE STAIRWELL**	**7**
Bridge Railing:	**GOOD - STEEL HANDRAIL**	**7**
Waterway Adequacy:	**NA - NOT OVER WATERWAY**	**NA**
Roadway Alignment:	**TRAIL UNDER RAILROAD**	**8**
Scour:	**NA - NOT OVER WATERWAY**	**NA**
Foundation:	**BOX CULVERT**	

REMARKS

CRACKING IN WEST APPROACH SIDEWALK. MINOR SHRINKAGE CRACKS IN CONCRETE RETAINING WALLS, WEST STAIRS. MINOR MAP SURFACE CRACKING IN BOTTOM SLAB OF CULVERT. MINOR SURFACE SPALLS IN UNDERSIDE OF TOP SLAB OF UNIT 2 FROM WEST.

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APPENDIX B

DESCRIPTION OF ITEMS

APPENDIX B – NBI ITEM DESCRIPTIONS & GLOSSARY OF TERMS

1. State: "Indiana" (185) for all bridges.

2. Hwy District: INDOT highway district number in which the bridge is located.

3. County: County code and name.

4. City/Town: City and town code and name are listed. Bridges are listed as being in an urban area rather than within actual corporation limits. This item is coded all "zeros" for bridges in rural locations.

5. Features Intersected: This is the stream, road, railroad and/or other features under the bridge.

6. Facility Carried: This is the name of the local road as named by the county.

7. Bridge Number: This is the bridge number which, in general, follows the LTAP bridge numbering system.

8. Location: The location of the bridge using local road designations, county lines, other locally recognized features, or map boundary location codes.

16. Latitude: The latitude found on USGS maps.

17. Longitude: The longitude found on USGS maps.

26. Year Built: Year (or approximate year) the bridge was built.

27. Lanes on Str.: Lanes of highway traffic carried on the structure and lanes of highway traffic under the bridge.

28. ADT: Current average daily traffic count on bridge to the nearest ten vehicles. These were estimated where recent counts were not available.

29. Year of ADT: Year traffic count was taken or estimated.

30. Design Load: The live load which the bridge was evaluated for load rating purposes.

31. Approach Roadway Width/Shldr.: Shoulder-to-shoulder width of the approach roadway.

32. Skew: The angle of bridge skew to the nearest degree.

36B. Bridge Railing Type: Identifies the type of railing on the bridge.

APPENDIX B – NBI ITEM DESCRIPTIONS & GLOSSARY OF TERMS

37. Historical Significance: This item indicates that a bridge may be a particularly unique example of the history of engineering; the crossing itself might be significant; the bridge may be associated with a historical property or area; or the bridge may be associated with significant events or circumstances. One of the following 1-digit codes are used as applicable:

    1. Bridge is on the National Register of Historic Places.
    2. Bridge is eligible for the National Register of Historic Places.
    3. Bridge is possibly eligible for the National Register of Historic Places or bridge is on a State or Local historic register. (Requires further investigation before determination can be made.)
    4. Historical significance is not determinable at this time.
    5. Bridge is not eligible for the National Register of Historic Places.

38. Open, Posted or Closed: This item indicates the operational status of the bridge; "K" = closed to all traffic, "P" = open to traffic with load posted; "A" = open to traffic without load posted, "B" = open; posting required, "G" = new bridge; not yet open; "R" = posted for other than load.

39. Type Service: Describes the function of the bridge. This is usually highway or highway-pedestrian.

43A. Structure Type-Main: The structural type of bridge for the main spans of the bridge.

43C. Main Widening Type: The structural type of material used for widening, if that has occurred.

44. Structure Type-Approach: The structural type for the approach spans, if they are a different material or construction type than the main spans.

45. Number of Spans-Main: The number of spans in the main units of the bridge.

46. Number of Spans-Approach: The number of spans in the approach units of the bridge.

47. Total Horizontal Clearance: The distance to the nearest tenth of a foot between the most restrictive features limiting the roadway. Where no such features existed, the deck width was used. When two clearances are recorded after this item, the second clearance is the distance between the most restrictive features limiting the use of the highway or railroad under the bridge. This is recorded only when the bridge is over a highway or railroad.

48. Maximum Span Length: The length to the nearest tenth of a foot of the longest span.

49. Structure Length: The total length of bridge from backwall to backwall to the nearest foot.

APPENDIX B – NBI ITEM DESCRIPTIONS & GLOSSARY OF TERMS

50. Bridge Roadway Width (Curb-Curb): The distance between curbs on the bridge to the nearest tenth of a foot. Where curbs do not exist, the distance between parapets, railings or guardrails is used.

51. Deck Width (Out-Out): The total width of the bridge roadway to the nearest tenth of a foot.

58. Deck: Describes the material and condition of the bridge floor, wearing surface, expansion joints, curbs, railings, deck drains and other associated items.

59. Superstructure: Describes the material and condition of the deck supporting members, their connections and bearings.

60. Substructure: Describes the material and condition of the superstructure supporting elements such as abutments, piers, bents, piles and others.

61. Channel & Channel Protection: Describes the channel, its protections and any problems associated with the channel.

62. Estimated Remaining Life: The estimated remaining life of the bridge with repairs but without major reconstruction. This estimate on each of the major components takes into account the material condition, the load rating, the traffic counts and other factors.

63. Operating Rating: Operating rating is the maximum live load that can be occasionally carried by a bridge. See Item 66, Inventory Rating.

64. Inventory Rating: Inventory rating is the maximum live load that can safely utilize an existing structure for an indefinite period of time. The range of loading above the inventory rating up to the operating rating should be allowed only by written permit from the County.

65. Structural Condition: Describes major structural deficiencies.

66. Deck Geometry: Describes deficiencies in deck width.

67. Bridge Posting: Describes the load capacity, relative to the legal load allowed, to show when posting is required.

68. Waterway Adequacy: Describes deficiencies in the waterway, the bridge opening and slope protection at the bridge. The waterway opening under the bridge was judged to be adequate or inadequate from drift and other signs and without a hydraulic analysis.

APPENDIX B – NBI ITEM DESCRIPTIONS & GLOSSARY OF TERMS

69. Year Needed: The year that improvements, repairs or replacement is recommended by the inspecting engineer.

75. Type of Work: This describes the type of work recommended as repair, widening, replacement or construction of a new bridge at the same or another location or for a new type of service.

90. Inspection Date: The date the structure was inspected.

91. Designated Inspection Frequency: The designated inspection interval, in months, for each bridge in the inventory.

Bridges will require special non-scheduled inspections after unusual physical traumas.

92. Bridge Improvement Cost: Only bridge construction costs are included. No bridge maintenance costs are included.

93. Roadway Improvement Cost: Only roadway construction costs are included. No roadway maintenance costs are included.

94. Total Project Cost: All costs normally associated with the proposed bridge improvement project, including right-of-way, detour, preliminary engineering, construction inspection and other incidental costs are included. No maintenance costs are included.

95. Year of Improvement Cost Estimate: The base year of the improvement costs provided in Items 94 through 96, with cost data provided to be no more than 8 years old.

106. Year Reconstructed: Indicates the year of reconstruction or rehabilitation of the structure, where applicable.

For a bridge to be defined as reconstructed, the type of work performed, whether or not it meets current minimum standards, must have been eligible for funding under any of the Federal-aid funding categories. The eligibility criteria would apply to the work performed regardless of whether all State or local funds or Federal-aid funds were used.

107. Deck Structure Type: Describes the type of deck system on the bridge. If more than one type of deck system is on the bridge, the most predominant is indicated.

108. Wearing Surface/Protective System: Indicates information on the wearing surface and protective system of the bridge deck.

APPENDIX B – NBI ITEM DESCRIPTIONS & GLOSSARY OF TERMS

113A. Scour: Identifies the current status of the bridge regarding its vulnerability to scour, as follows:

Code	Description
U	Unknown Foundation
N	Bridge not over waterway.
8	Bridge foundations (including piles) well above flood water elevations.
8	Bridge foundations determined to be stable for calculated scour conditions; calculated scour is above top of footings.
7	Countermeasures have been installed to correct a previously existing problem with scour. Bridge is no longer scour critical.
6	Scour calculation/evaluation has not been made (Use only to describe case where bridge has not yet been evaluated for scour potential).
1	Bridge foundations determined to be stable for calculated scour conditions; scour within limits of footing or piles.
4	Bridge foundations determined to be stable for calculated scour conditions; field review indicates action is required to protect exposed foundations from effects of additional erosion and corrosion.
3	Bridge is scour critical; bridge foundations determined to be unstable for calculated scour conditions: Scour within limits of footing or piles. Scour below spread-footing base or pile tips.
2	Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations. Immediate action is required to provide scour countermeasures.
1	Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic.
0	Bridge is scour critical. Bridge has failed and is closed to traffic.

113B. Foundation Type: Identifies the type of foundation if known.

Items 58 through 62 and Item 65 are given a numerical "CONDITION" rating as follows:

Rating	Description
N	Not Applicable.
9	New Condition.
8	Very Good Condition: No repairs needed.
7	Good Condition: Some minor problems.

APPENDIX B – NBI ITEM DESCRIPTIONS & GLOSSARY OF TERMS

6	Satisfactory Condition: Potential exists for "major maintenance" with major items in need of repair by maintenance forces.
5	Fair Condition: Potential exists for "minor rehabilitation" with major repair by contract needed.
4	Poor Condition: Potential exists for "major rehabilitation" with minimum adequacy to tolerate present traffic; immediate rehabilitation necessary to keep open.
3	Serious Condition: Repair or rehabilitation required immediately with inadequacy to tolerate present heavy load; "warrants closing bridge to trucks".
2	Critical Condition: The need for repair or rehabilitation is urgent. The facility should be closed until the indicated repair is complete with inadequacy to tolerate any live load; "warrants closing bridge to all traffic".
1	Imminent Failure Condition: The "facility is closed". Study should determine the feasibility of the bridge being repairable, if desirable to reopen to traffic.
0	Failed Condition: The "facility is closed" and the bridge conditions are beyond repair; "danger of immediate collapse".

Items 67 through 72 are given a numerical "APPRAISAL" rating as follows:

Rating	Description
N	Not Applicable.
9	Superior to present desirable criteria.
8	Equal to present desirable criteria.
7	Better than present minimum criteria.
6	Equal to present minimum criteria.
5	Somewhat better than minimum adequacy to tolerate being left in place as is.
4	Meets minimum tolerable limits to be left in place as is.
3	Basically intolerable condition requiring high priority of repair.
2	Basically intolerable condition requiring high priority of replacement.
0	Closed, immediate replacement necessary to put back in service.