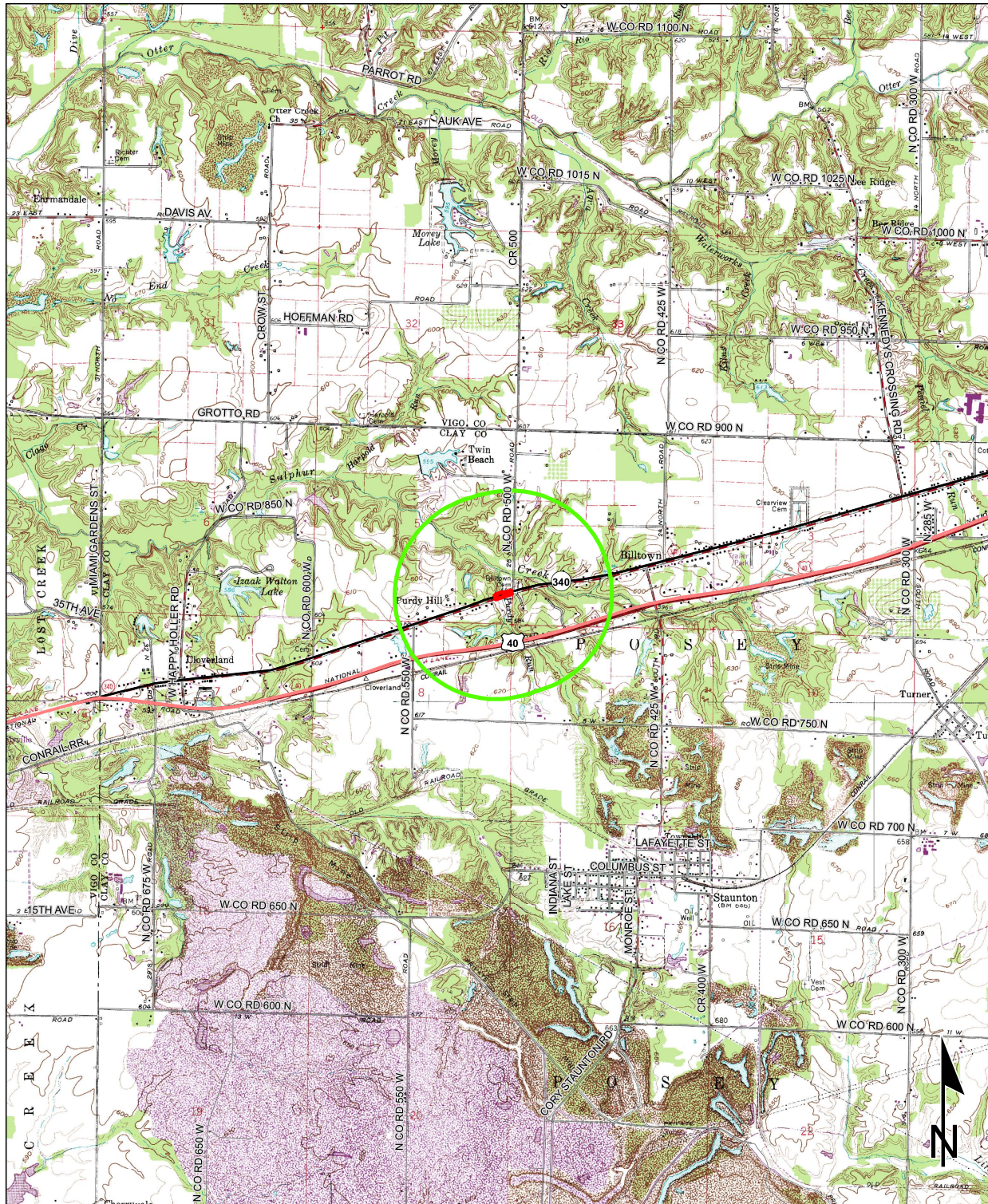


Red Flag Investigation - Site Location
 SR 340 Over Purdy Run, 2.09 Miles East of West U.S. 40 Junction
 Des. No. 1900176, Bridge Replacement Over Purdy Run
 Clay County, Indiana

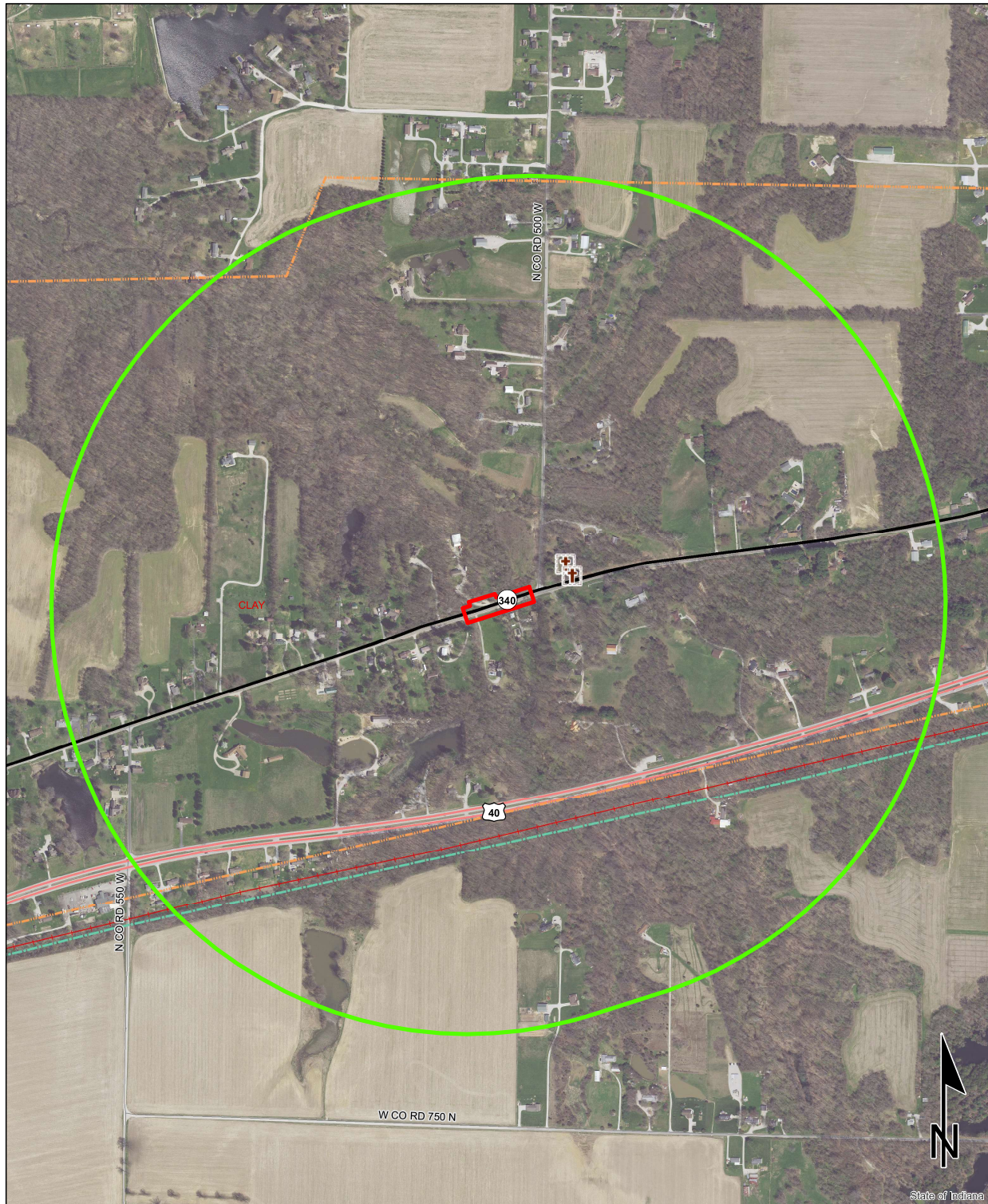


Sources: 0.6 0.3 0 0.6 Miles
Non Orthophotography
Data - Obtained from the State of Indiana Geographical Information Office Library
Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

BRAZIL WEST QUADRANGLE
INDIANA
7.5 MINUTE SERIES
(TOPOGRAPHIC)

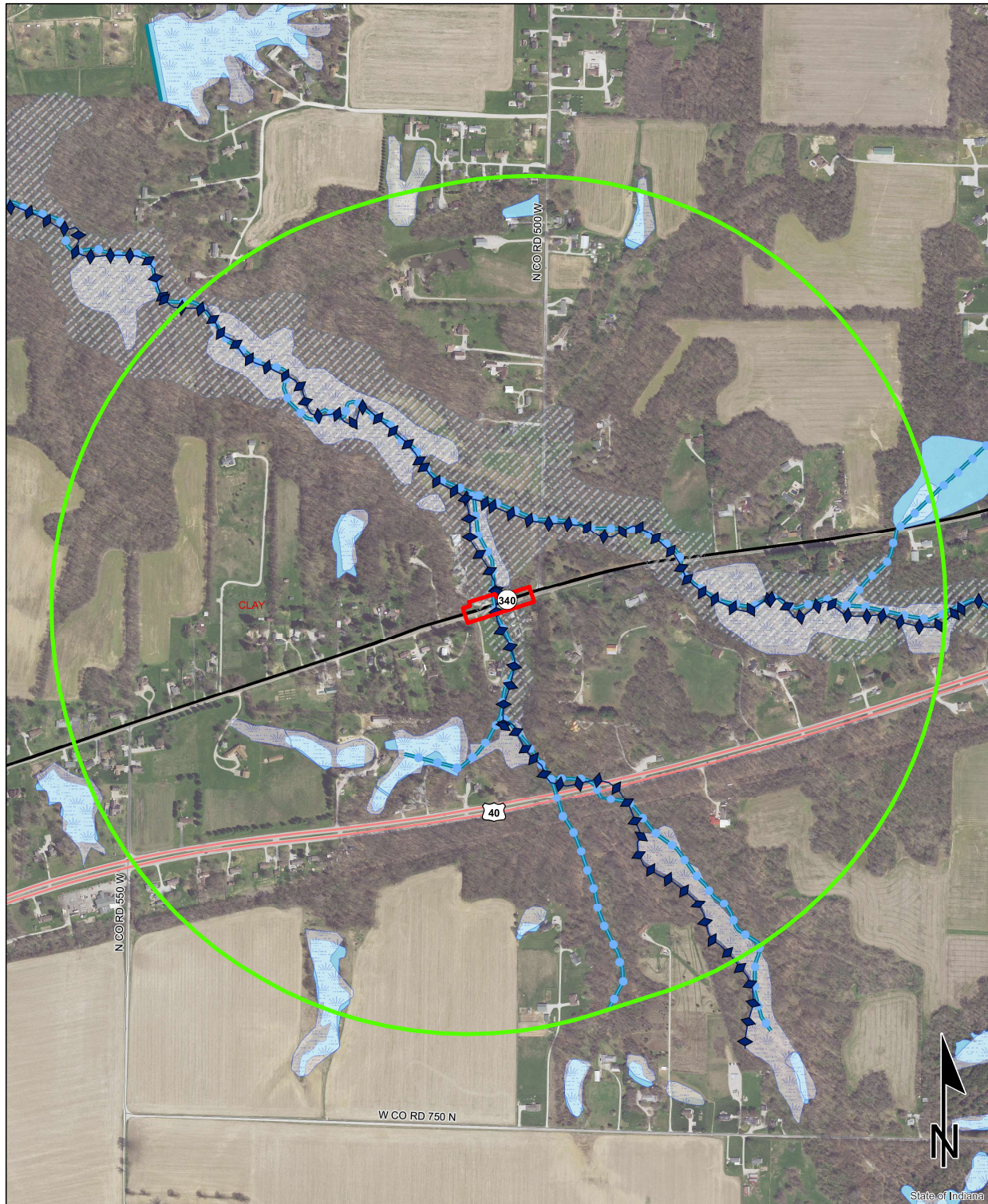
Red Flag Investigation - Infrastructure
 SR 340 Over Purdy Run, 2.09 Miles East of West U.S. 40
 Junction Des. No. 1900176, Bridge Replacement Over Purdy Run
 Clay County, Indiana



Sources: 0, 0.075, 0.15 Miles
Non Orthophotography
Data - Obtained from the State of Indiana Geographical Information Office Library
Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83
 This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

	Religious Facility		Recreation Facility		Project Area
	Airport		Pipeline		Half Mile Radius
	Cemeteries		Railroad		Toll
	Hospital		Trails		Interstate
	School		Managed Lands		State Route
			County Boundary		US Route
					Local Road

Red Flag Investigation - Water Resources
 SR 340 Over Purdy Run, 2.09 Miles East of West U.S. 40
 Junction Des. No. 1900176, Bridge Replacement Over Purdy Run
 Clay County, Indiana



Sources:
Non Orthophotography
Data - Obtained from the State of Indiana Geographical Information Office Library
Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

NWI - Point	Wetlands	Project Area
Karst Spring	Lake	Half Mile Radius
NWI - Line	Floodplain - DFIRM	Toll
Impaired_Stream_Lake	Cave Entrance Density	Interstate
NPS NRI listed	Sinkhole Area	State Route
River	Sinking-Stream Basin	US Route
Canal Structure - Historic	County Boundary	Local Road
Canal Route - Historic		

Appendix F

Water Resources

Item	Appendix Page
Wetland Delineation and Waters of the US Report	F-1 to F-10

APPROVED

Justus McGill

9/20/21

Waters of the US Report
SR 340 Bridge Replacement over Purdy Run
Structure #340-11-01639B
Posey Township, Clay County, Indiana
Des. No. 1900176

Report Completed: June 1, 2021



Prepared for:



Indiana Department of Transportation
41 W 300 N
Crawfordsville, IN 47933
Phone: 765-361-5621

Submitted by:



CHA Consulting, Inc.
Union Station / 300 South Meridian Street
Indianapolis, IN 46225
Phone: 317-780-7182

**Waters of the US Report
SR 340 Bridge Replacement over Purdy Run
Structure #340-11-01639B
Posey Township, Clay County, Indiana
Des. No. 1900176**

Report Completed: June 1, 2021

I. Introduction

The Indiana Department of Transportation (INDOT) is proposing to proceed with the replacement of the Structure #340-11-01639B in Posey Township, Clay County, Indiana. The purpose of this investigation was to identify wetlands and waterways within and adjacent to the project area. A routine wetland determination, per the *1987 Corps of Engineers Wetland Delineation Manual (Y-87-1)* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* was conducted. This report details the findings of the investigation.

The project is located along State Road (SR) 340 over Purdy Run located approximately 2.09 miles east of West US 40 junction, west of Brazil, Indiana (Attachment A, State Location Map). The study area is centered on 39.507822° North and -87.201419° West. Specifically, the project is located in Section 5, Township 12 North, Range 7 West as shown on the Brazil West, Indiana United States Geological Survey (USGS) 7.5 Minute Quadrangle (Attachment A, USGS Project Location Map).

II. Existing Data

7.5 Minute USGS Quadrangle Maps and Watershed

The USGS map was reviewed to determine the topography and drainage patterns within the project area. The map indicates that the project area and surrounding terrain is characterized by stream valleys with the elevation ranging from approximately 580 to 610 feet. One blue line perennial stream, Purdy Run is mapped within the project area.

Drainage basins are divided into hydrologic units by the USGS based on major river systems. The entire project area is within the 8-digit Hydrologic Unit Code (HUC); 05120111, Middle Wabash-Busseron Watershed and within the 12-digit HUC; 051201110404 Sulfur Creek Watershed.

National Wetland Inventory (NWI) Map

The U.S. Fish and Wildlife Service (USFWS) NWI maps identify potential wetlands based on high-level imagery interpretation. The wetlands are then classified by type utilizing the Cowardin classification system. The classification system provides information on wetland vegetation type, water regime, and any relevant alterations. This level of mapping does not determine regulatory boundaries. The NWI map was evaluated for the presence of potential jurisdictional wetlands within the project area (Attachment A, NWI Wetlands Map). One NWI wetland is mapped north of the study area identified as palustrine, broad-leaved deciduous, forested wetland that temporarily floods (PFO1A).

County Soil Survey Map

The Natural Resources Conservation Service (NRCS) Web Soil Survey was reviewed to determine soil classification within the project area (Attachment A, NRCS Soils Map). Five soil types were identified within the project area (Table 1, on the following page). One soil type was identified as partially hydric, Shoals silt loam, 0 to 2 percent slopes, frequently flooded, very brief duration (Sh).

Table 1. Soil Summary

Soil Type	Symbol	Drainage Rating	Hydrology	Hydric Rating	Hydric
Chetwynd loam, 25 to 70 percent slopes	ChF	Well drained	None	0%	No
Lobdell loam, occasionally flooded	Lo	Moderately well drained	Occasional flooding	0%	No
Parke silt loam, 12 to 18 percent slopes, eroded	PaD2	Well drained	None	0%	No
Pike silt loam, 2 to 6 percent slopes, eroded	PkB2	Well drained	None	0%	No
Shoals silt loam, 0 to 2 percent slopes, frequently flooded, very brief duration	Sh	Somewhat poorly drained	Frequent flooding	6%	Partially

Flood Map

The Flood Insurance Rate Maps (FIRM) and Indiana Department of Natural Resources (IDNR) Best Available Floodzone Mapping for the project area were reviewed for the presence of Special Flood Hazard Areas (Attachment A, IDNR Floodzones Map). As described by the Federal Emergency Management Agency (FEMA) and IDNR, the project is located within floodplain along Purdy Run identified as Zone A. Zone A is defined as areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.

III. Methodology

Waters of the U.S.

Streams that may be considered Waters of the U.S. are documented with supporting evidence of potential jurisdiction. If a stream contains an ordinary high water mark (OHWM), typically defined as a defined bed and bank, then additional characterization is completed. Identified streams are listed by the name provided on the USGS map, or if not named, is listed as an unnamed tributary (UNT). Connections to the nearest Traditional Navigable Waterway (TNW) are then identified. Jurisdiction will be determined using the current procedures outlined by the USACE.

Wetland Delineation

The project area was analyzed using methods outlined in the *1987 Corps of Engineers Wetland Delineation Manual (Y-81-1)* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)*. These manuals require wetland boundaries to be delineated using a 3-parameter approach: hydrophytic vegetation, hydric soils, and wetland hydrology. Hydrophytic vegetation is met by the dominance of wetland species; plants identified with an indicator status of OBL, FACW, and FAC. Hydric soil is caused by anaerobic conditions and is observed by the presence of field indicators including gray or dark brown color, mottling, gleying, muck and/or peat, hydrogen sulfide odor, or iron-manganese masses. Lastly, wetland hydrology is met by the presence of water for more than 5 percent of the growing season; one primary indicator or two secondary indicators must be observed.

IV. Field Reconnaissance

CHA staff conducted a field investigation on October 22, 2020 to determine the presence of wetlands, Waters of the U.S., and Waters of the State within the project area. Locations of data points and streams are provided in Attachment A on the Photo Orientation Map. Photographs of the project area, and Wetland Delineation Data Forms are included in Attachments B and C, respectively. The following provides a brief description of the findings of the field investigation.

Streams

One stream and two roadside ditches were identified within the project area.

Purdy Run

Purdy Run is perennial stream that flows north under the SR 340 bridge that is 38 feet long by 35 feet wide by 32 feet tall. No signs of bats or bird nests were observed under the structure. Purdy Run has an OHWM 18 feet wide by 1.5 feet deep, with substrate consisting mostly of gravel and silt. The OHWM measurement was taken at 39.507893, -87.201400. The stream is mapped as a USGS blue line perennial stream within the study area. The stream has aquatic habitat except during dry periods and has a drainage area of 1.6 square miles. Purdy Run has a narrow to wide forested buffer with the surrounding areas in residential and agriculture land use. Due to all these attributes, the quality of the stream is average. Purdy Run flows north through the project area and drains into Sulphur Creek. Sulphur Creek flows west connecting with Otter Creek that drains into the Wabash River, a TNW and Waters of the U.S. Due to these connections, the Purdy Run is considered a Waters of the U.S. Purdy Run totals 128 linear feet within the study area.

Non-Jurisdictional Roadside Ditches (RSDs)

Three RSDs were identified within the project area. These features were designed along with the roadway to convey storm water, were excavated within an upland area, drain upland waters, and did not display a continuous defined bed and bank or OHWM. Due to these reasons, these features are likely not considered Waters of the U.S.

Wetlands

No wetlands were identified within the project area. Within the project area, steep slopes are present along Purdy Run and the dominant tree species included *Maclura pomifera* (Osage-orange, FACU), *Celtis occidentalis* (hackberry, FAC), and *Ulmus americana* (American elm, FACW). The understory was comprised of *Lonicera maackii* (Amur honeysuckle, UPL), *Rosa multiflora* (multiflora rose, FACU), *Euonymus alatus* (burningbush, UPL), and *Vinca minor* (periwinkle, UPL). DP-1 was taken north of SR 340 within the floodplain along Purdy Run where vegetation included *Ulmus americana*, *Lonicera maackii*, and *Vinca minor*; not meeting the hydrophytic vegetation criteria. Within the project area and DP-1, no hydric soil indicators were observed and only one secondary hydrology indicator, geomorphic position, was observed. Therefore, no wetland indicators were met. Table 2 provides a summary of the data point.

Table 2. Summary of Data Point

Data Point	Photos	Latitude/ Longitude	Wetland Indicators Met			Wetland/Upland
			Hydrophytic Vegetation	Hydric Soils	Hydrology	
DP-1	PP-9 & DP-1	39.507936 -87.201357	No	No	No	Upland

V. Conclusion

One perennial stream was identified within the project area (Table 3). The stream was identified as a Waters of the U.S. and will likely be under the jurisdiction of the USACE. Three roadside ditches were observed within the project area that are not likely considered Waters of the U.S.

Table 3. Summary of Stream Resources

Stream Name	Photos	Latitude/ Longitude*	OHWM Width/ Depth	USGS Blue Line? Type?	Pools/ Riffles	Substrate	Stream Quality	Waters of the U.S.	Stream Type
Purdy Run	PPs 1, 2, 5, 6	39.507893 -87.201400	18'/1.5'	Yes, Perennial	No	Gravel and silt	Average	Yes	Perennial

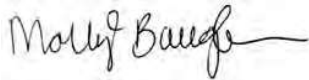
*Location of OHWM measurement.

A preliminary jurisdictional determination form is included in Attachment D outlining the water resources described in this report. Every effort should be taken to avoid and minimize impacts to these water resources. If impacts are necessary, then mitigation may be required. The final determination of jurisdictional waters is ultimately made by the USACE. This report is our best judgment based on the guidelines set forth by the USACE.

VI. Acknowledgement

This waters determination has been prepared based on the best available information, interpreted in the light of the investigator's training, experience, and professional judgement in conformance with the 1987 Corps of Engineers Wetland Delineation Manual, the appropriate regional supplement, and other appropriate agency guidelines.

Report Prepared By:



6/1/2021

Molly Baughman
Environmental Scientist
CHA Consulting, Inc.

Date

Report Reviewed By:



6/1/2021

Summer Elmore, PWS
Senior Scientist
CHA Consulting, Inc.

Date

VII. References

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Newcomb, Lawrence. 1977. *Newcomb's Wildflower guide: an ingenious new key system for quick, positive field identification of the wildflowers, flowering shrubs and vines of Northeastern and North Central North America*. Boston: Little, Brown and Company.

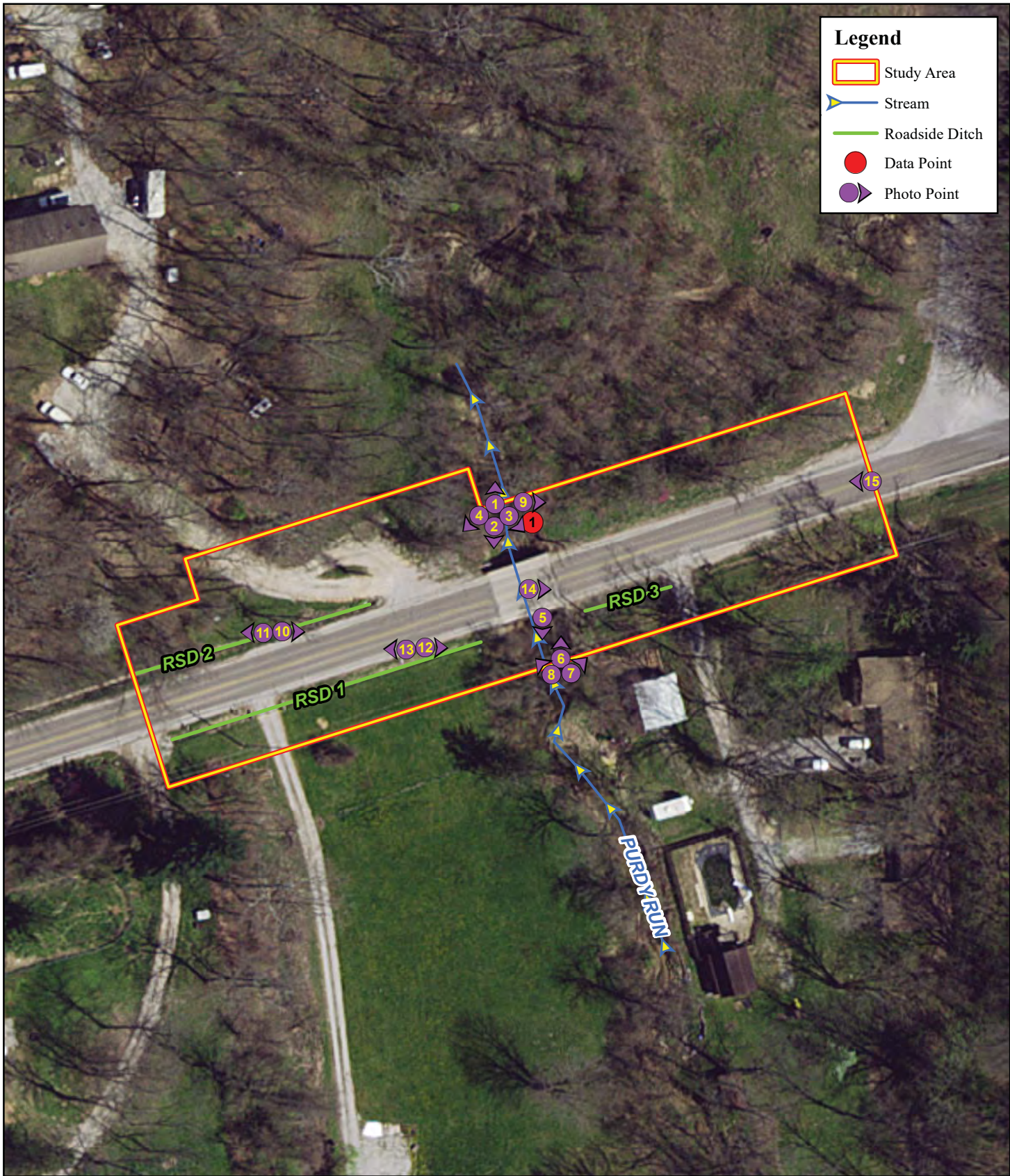
U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)*, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

VIII. List of Attachments






- Attachment A: Project Location and Water Resource Maps
- Attachment B: Water Resource Photographs
- Attachment C: Wetland Determination Data Forms
- Attachment D: Preliminary Jurisdictional Determination Form



Please Note - Attachments have been removed from this document to conserve space. Project maps can be found in Appendix B of this document. Attached forms can be found in the project file.




Legend

-  Study Area
-  Stream
-  Roadside Ditch
-  Data Point
-  Photo Point

Date Saved: 5/24/2021 • Author: E. Butterfield



Indiana Department of Transportation 		Photo Orientation Map SR 340 Bridge Project Over Purdy Run Brazil, Clay County, Indiana	
Scale 1" = 75'	DES No. 1900176	<i>Image Courtesy of the IndianaMap</i> <i>Photo Date: 2018</i>	



PP-1; Looking north, downstream at Purdy Run, a perennial stream.



PP-2; Looking south, upstream at Purdy Run and the SR 340 bridge. [OHWM at 39.507893, -87.201400](#)



PP-3; Looking southeast along Purdy Run.



PP-4; Looking southwest along Purdy Run.



PP-5; Looking south, upstream at Purdy Run from the south side of the SR 340 bridge.



PP-6; Looking north, downstream at Purdy Run from the south project boundary.



PP-7; Looking northeast along Purdy Run.



PP-8; Looking northwest along Purdy Run.



PP-9; Looking east at upland area from DP-1.



DP-1; Looking down at the upland soil profile.



PP-10; Looking east at RSD 2 along the north side of SR 340.



PP-11; Looking west at RSD 2 along the north side of SR 340.



PP-12; Looking east at RSD 1 along the south side of SR 340.

PP-13; Looking west at RSD 1 along the south side of SR 340.



PP-14; Looking east along SR 340 and RSD 3 that is south of the road and west of the driveway.

PP-15; Looking west along SR 340 from the east project boundary.

Appendix G

Public Involvement

Item	Appendix Page
Notice of Survey	G-1

Notice of Survey

Date: June 2, 2020

SUBJECT: SR 340 Over Purdy Run / Bridge Replacement Project, DES No. 1900176

Dear Property Owner:

Our information indicates that you own or occupy property near the above referenced project. Our employees will be performing a survey of the project area in the near future. It may be necessary for them to come onto your property to complete this work. This is permitted by law per Indiana Code IC 8-23-7-26. They will show you their identification, if you are available, before coming onto your property. If you have sold this property, or it is occupied by someone else, please let us know the name and address of the new owner or current occupant so we can contact them about the survey.

At this stage, we generally do not know what effect, if any, our project may eventually have on your property. If we determine later that your property is involved, you will be contacted with additional information.

The survey work will include mapping the location of features such as trees, buildings, fences and drives, and obtaining ground elevations. The survey is needed for the proper planning and design of this project. Please be assured of our sincere desire to cause you as little inconvenience as possible during this survey. If any problems do occur, please contact our field crew or contact me at the telephone number or address shown above for our office. Ali Hekmatfar Ph.D., P.E. the Project Manager for CHA, is also available for questions concerning this project.

Sincerely,

Civil Engineering Consultants, Inc. (CECon)



Grant R. Niemeyer, P.S.
Project Manager

Cc: File 20-016 A, Ali Hekmatfar (317) 780-7134

Appendix H

Air Quality

Item	Appendix Page
Statewide Transportation Improvement Program (STIP)	H-1
West Central Indiana Metropolitan Planning Area TIP	H-2

Indiana Department of Transportation (INDOT)
 State Preservation and Local Initiated Projects FY 2020 - 2024

SPONSOR	CONTR ACT # / LEAD DES	STIP NAME	ROUTE	WORK TYPE	LOCATION	DISTRICT	MILES	FEDERAL CATEGORY	Total Cost of Project*	PROGRAM	PHASE	FEDERAL	MATCH	2020	2021	2022	2023	2024
Indiana Department of Transportation	42240 / 1900176	A 10	SR 340	Bridge Replacement	over Purdy Run, 2.09 E W of US 40 jct	Crawfordsville	0	STBG	\$2,056,635.00	Bridge Construction	CN	\$1,381,308.00	\$345,327.00					\$1,726,635.00
										Bridge Consulting	PE	\$264,000.00	\$66,000.00	\$330,000.00				
Performance Measure Impacted: Bridge Condition																		
Comments:PE phase for \$330,000 FY20 and CN phase for \$1,726,635 FY24 via WCIEDD dated 10/1/2019 including DES 1900176																		
Indiana Department of Transportation	42240 / 2000877	A 31	US 40	Small Structure Maint and Repair	0.63 mi W of SR 340 E jct	Crawfordsville	0	STBG	\$83,584.00	Bridge ROW	RW	\$8,000.00	\$2,000.00			\$10,000.00		
Performance Measure Impacted: Safety																		
Comments:Add ROW for \$10,000 FY22, THEDC Resolution 7/21/2020, AQC NA																		
Indiana Department of Transportation	42648 / 1902742	A 13	VA VARI	ADA Sidewalk Ramp Construction	Various Locations in Clay City	Crawfordsville	0	Safety	\$998,000.00	Safety Consulting	PE	\$132,800.00	\$33,200.00	\$166,000.00				
										Safety Construction	CN	\$665,600.00	\$166,400.00			\$832,000.00		
Performance Measure Impacted: Safety																		
Comments:PE phase \$166,000 FY20 and CN phase \$832,000 FY22, No MPO																		
Indiana Department of Transportation	42915 / 2001077	A 31	SR 59	Bridge Maintenance And Repair	0.92 mi S of SR 42, over Prairie Creek	Crawfordsville	0	STBG	\$86,170.00	Bridge Construction	CN	\$62,536.00	\$15,634.00			\$78,170.00		
										Bridge Consulting	PE	\$6,400.00	\$1,600.00	\$8,000.00				
Performance Measure Impacted: Bridge Condition																		
Comments:Add New Project; Add PE for \$8,000 FY21, CN for \$78,170 FY22, THEDC Resolution 7/21/2020, AQC NA																		
Indiana Department of Transportation	42924 / 2000123	A 31	SR 59	Bridge Thin Deck Overlay	5.06 mi N of US 40, over CSX RR	Crawfordsville	0	STBG	\$192,211.00	Bridge Construction	CN	\$137,768.80	\$34,442.20				\$172,211.00	
										Bridge Consulting	PE	\$16,000.00	\$4,000.00	\$20,000.00				
Performance Measure Impacted: Bridge Condition																		
Comments:Add New Project; Add PE for \$20,000 FY21, CN for \$172,211 FY23, THEDC Resolution 3/27/2020, AQC NA																		
Indiana Department of Transportation	42924 / 2000375	M 23	SR 59	Bridge Thin Deck Overlay	4.65 mi S of SR 246, over Eel River	Crawfordsville	0	STBG	\$1,281,655.00	Bridge Construction	CN	\$0.00	\$0.00		\$30,000.00			(\$30,000.00)
Performance Measure Impacted: Bridge Condition																		
Comments:move CN \$30,000 to FY21																		
Indiana Department of Transportation	42924 / 2000375	A 54	SR 59	Bridge Thin Deck Overlay	4.65 mi S of SR 246, over Eel River	Crawfordsville	0	STBG	\$1,161,655.00	Bridge ROW	RW	\$28,000.00	\$7,000.00			\$35,000.00		
Performance Measure Impacted: Bridge Condition																		
Comments:Add FY22 ROW phase \$35,000. No MPO, AQC NA																		
Indiana Department of Transportation	42936 / 2000838	M 33	SR 59	HMA Overlay, Preventive Maintenance	From SR 48 to 0.14 mi S of SR 157	Crawfordsville	11.42	STBG	\$5,053,702.00	Road Consulting	PE	\$0.00	\$0.00	(\$55,000.00)		\$55,000.00		\$0.00
Performance Measure Impacted: Pavement Condition																		

*Estimated Costs left to Complete Project column is for costs that may extend beyond the four years of a STIP. This column is not fiscally constrained and is for information purposes.

Corridor, DES or Project Number	KIN	Facility	FC	Work Type			Location or Description				Project Length	Project AQ Exempt	Estimated Additional Cost to Complete Project
	Federal Funding Category	State Fiscal Year	Phase	Federal Share	% Federal	State Share	% State	Local Share	% Local	Total			

Appendix: 08 - INDOT

1900730	I 70	Interstate		Bridge Thin Deck Overlay			I-70 over Abandoned RR, Access Rd., 2.95 mi W of US 41 (EB)					Exempt	
	NHPP	2022	CN	209,901	90%	23,322	10%			233,223		233,223	
Remarks:													
Total				209,901		23,322				233,223		233,223	
1601076	SR 159	Major Collector		HMA Overlay Minor Structural			From SR 246 N Jct to 0.23 mi S of SR 46				11.51	Exempt	
	STBG	2021	CN	6,097,794	80%	1,524,448	20%			7,622,242		7,622,242	
Remarks:													
Total				6,097,794		1,524,448				7,622,242		7,622,242	
1900176	SR 340	Minor Arterial		Bridge Replacement			SR 340 over Purdy Run, 02.09 E W 40 Jct.					Exempt	
	STBG	2020	PE	176,000	80%	44,000	20%			220,000		220,000	
Remarks: Amend 8_19_Indot													
	STBG	2020	CN	765,392	80%	191,348	20%			956,740		956,740	
Remarks: Amend 8_19_Indot													
Total				941,392		235,348				1,176,740		1,176,740	

As of: 6/23/2020

Appendix I

Additional Studies

Item	Appendix Page
LWCF County Listing	I-1
Hydraulics Memo for 340-11-10492	I-2 to I-3
Bridge Inspection Report	I-4 to I-25

Land and Water Conservation Fund (LWCF) County Property List for Indiana (Last Updated July 2020)

ProjectNumber	SubProjectCode	County	Property
1800336	1800336	Clay	Forest Park
1800369	1800369I	Clay	Harmony Community Park

*Park names may have changed. If acquisition of publically owned land or impacts to publically owned land is anticipated, coordination with IDNR, Division of Outdoor Recreation, should occur.



INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room N642-BR
Indianapolis, Indiana 46204

Eric Holcomb, Governor
Joe McGuinness, Commissioner

12/29/2020

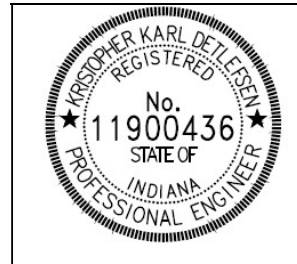
TO: Ann Bishop
INDOT Project Manager, Crawfordville District

FROM: Kristopher K. Detlefsen, P.E.
Consultant Hydraulics Engineer

SUBJECT: HYDRAULIC LETTER FOR BRIDGES
Structure: 340-11-10492 (Old Bridge No. 340-11-01639)
Location: On SR 340, 2.1 miles East of the intersection with US 40
Des. #: 1900176
Crossing: Purdy Run
Consultant: CHA Consulting, Inc.
SPMS Type of Work: Bridge Replacement

ANALYSIS: Kristopher K. Detlefsen, P.E.
Consultant Hydraulics Engineer

REVIEWER: Bill P Schmidt, P.E.
INDOT Hydraulics Engineer



Drainage Area	= 1.62	sq. mi.
Q ₁₀₀	= 950	cfs
Q ₅₀₀	= 1,283	cfs
Elevation @ Q ₁₀₀	= 578.94	ft.
IDNR CIF Permit Needed (Y/N):	Y	
Legal Drain (Y/N):	N	

Existing Conditions:

<i>34.25 ft Single Span Reinforced Box-Beam Concrete Girder Bridge</i>		
Q ₂₅ Headwater Elevation	= 578.62	ft.
Backwater	= 0.41	ft.
Velocity @ Q ₁₀₀	= 5.8	ft./s.
Waterway Opening Below Q ₁₀₀ Elevation (Str.)	= 160.8	sq. ft.
Road Overflow Waterway Area	= 0.0	sq. ft.
Low Structure Elevation	= 582.80	ft.
Skew	= 0.0	deg.



INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room N642-BR
Indianapolis, Indiana 46204

Eric Holcomb, Governor
Joe McGuinness, Commissioner

Proposed Conditions:

<i>36.00ft Single Span Three-Sided Flat-Topped Precast Bridge</i>		
Q ₂₅ Headwater Elevation	= 578.61	ft.
Backwater	= 0.25	ft.
Velocity @ Q ₁₀₀	= 5.8	ft./s.
Waterway Opening Below Q ₁₀₀ Elev. (Str.)	= 164.1	sq. ft.
Road Overflow Waterway Area	= 0.0	sq. ft.
Low Structure Elevation	= 582.80	ft.
Skew	= 0.0	deg.

The existing bridge consists of a single span reinforced box-beam concrete girder bridge with a total clear span of 34.25 feet (ft) and deck width of 34.0 ft. The preferred alternative was selected to meet the hydraulic design criteria published in the IDM while minimizing the anticipated construction and maintenance costs. The preferred alternative consists of a three-sided single span flat-topped structure with a total clear span of 36.0 ft and deck width of 46.0 ft. The preferred alternative will have a 12.0ft rise and will be founded on 2.0 ft thick spread footings. The minimum edge of pavement elevation was estimated to be 584.87 ft. The preferred alternative will be constructed on the same alignment and will maintain the existing low structure elevation. The preferred alternative provides 3.06 ft. of freeboard, 6.26 ft. of serviceability freeboard and 164.6 ft² of net waterway opening. Based on the results of the hydraulic analysis, the cumulative project impacts are less than 0.14 ft and as such, no flood easements beyond the existing right-of-way will be required.

For the purposes of this analysis, a standard bridge alternative and three-sided arch top alternative were also evaluated per INDOT guidance. Based on the results of the hydraulic model, the minimum clear span required to meet the hydraulic design criteria for the bridge alternative (when assuming the typical 3.0 ft berms and 2:1 sloping abutments) was determined to be greater than 50.0 ft. Due to the anticipated cost and impacts to the existing roadway profile, the standard bridge alternative was not recommended. Additionally, when limiting impacts to the existing roadway profile, a 36-foot three-sided arch-top structure was found to encroach the hydraulic opening of the existing structure and increase water surface elevations. As such, the minimum clear span required to meet the hydraulic design criteria for the three-sided arch-top alternative was determined to be 42-foot. Since the perpendicular span for the three-sided arch-top option (42-foot) exceeds that of the flat-topped structure span by more than 4.0 ft, the three-sided arch top option was not recommended as stated in IDM 203-2.05(03).

Since the subject crossing is located just upstream of Sulphur Creek, a Joint Probability Analysis (JPA) was also conducted based on the water surface elevations published in the effective Flood Insurance Study. Based on the model results, the JPA scenarios were not found to govern the hydraulic design at this crossing. Lastly, the abandoned concrete railroad abutments located immediately upstream of the crossing will be removed when the bridge is replaced.

The application of *Revetment Riprap* will be used per E723-CCSP.

If you have any questions or comments, please contact Bill Schmidt at wpschmidt@indot.in.gov or 317-345-1672.

WPS
cc: file

Bridge Inspection Report

340-11-01639 B
SR 340
over
PURDY RUN



Inspection Date: 11/09/2020

Inspected By: Melvin Hughes

Inspection Type(s): Routine

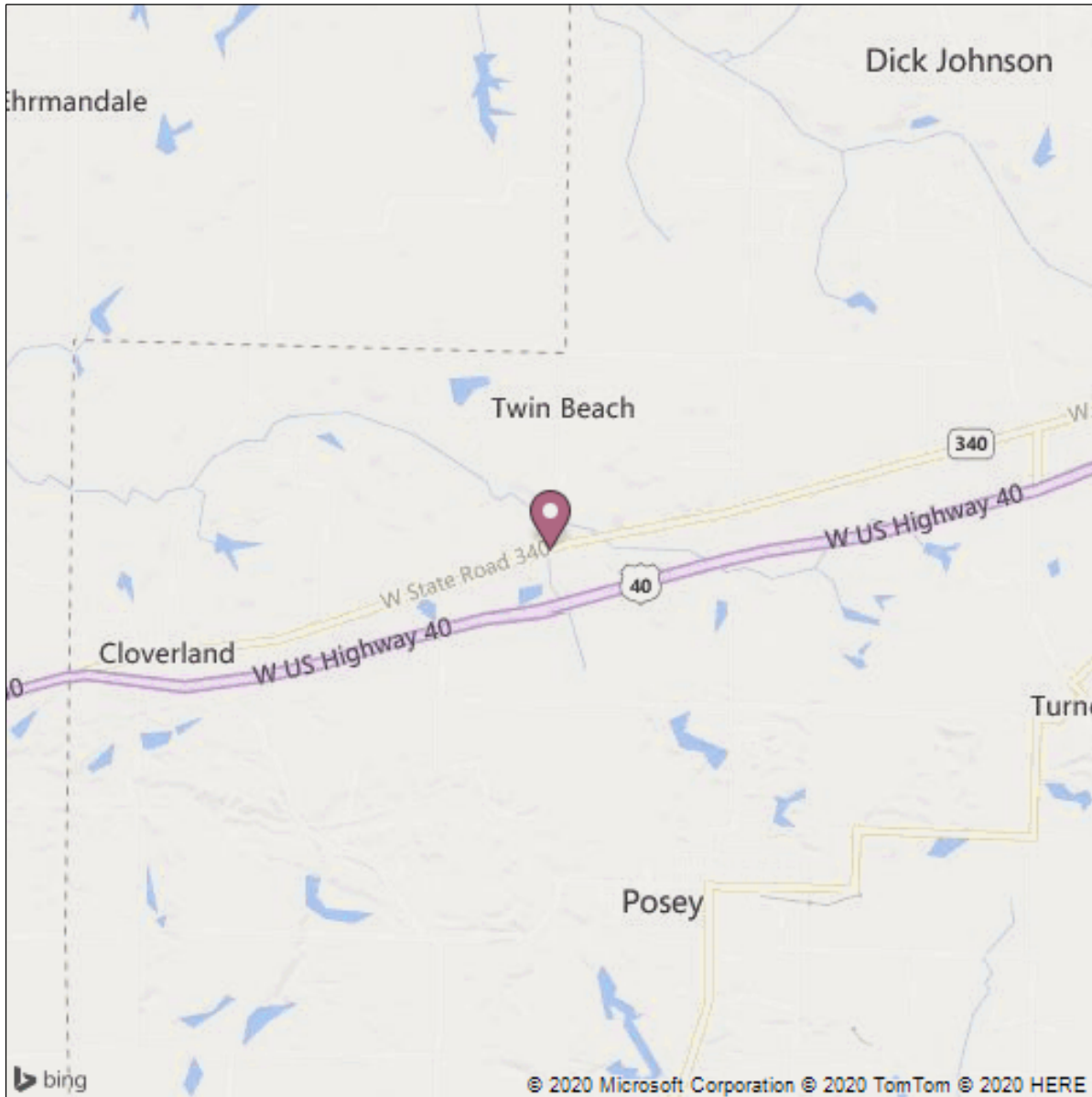
TABLE OF CONTENTS

	PAGE NUMBER
LOCATION MAP	3
EXECUTIVE SUMMARY	4
NATIONAL BRIDGE INVENTORY	5
PICTURES	9
MISCELLANEOUS ASSET DATA	19
LOAD RATING - BRADIN	21
340-11-01639 2020 CHANNEL PROFILE	22

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



Latitude: 39.50780
Longitude: -87.20147

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report

2020 Inspection, The structure is in overall fair condition.

New Bridge / 1920 / Des # and Contract # unknown / Project F,A,6-A-34: Original plans detail a cast-in-place reinforced concrete girder superstructure [A. Marino, Inspection Area Engineer, 12/14/2020].

Rehab A / 1964 / Bridge inspection box beam / Contract # 06179

Rehab B / 1980 / Bridge deck overlay / Contract # 12661: Plans detailed beam rehabilitation work for the adjacent PCBB superstructure and placing a new reinforced concrete deck. Was not able to find the 1964 "A" Rehabilitation plans; suspect project involved replacing the original RCG superstructure with the adjacent PCBB superstructure. The 1980 plans specified removing the bituminous wearing surface, partial depth patching of the top surfaces of the PCBBs, and placing a variable 5" to 7" reinforced concrete deck with one layer of epoxy coated reinforcing. Plans detailed no separate wearing surface; deck has monolithic concrete with sacrificial thickness. NBI Items in 108 updated accordingly [A. Marino, Inspection Area Engineer, 12/14/2020].

Programmed / 2019 / Bridge thin deck overlay / Des # 1602089 / Contract # N/A-40101

Has work scheduled in SPMS / Des # 1900176 / Contract # B-42240 / Letting date 12/13/2023 / Bridge replacement / Program year 2024 / Active.

No maintenance need reported.

Inspector: Melvin Hughes
 Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
 Facility Carried: SR 340

Bridge Inspection Report

IDENTIFICATION

(1) STATE CODE:	185 - Indiana	(12) BASE HIGHWAY NETWORK:	0
(8) STRUCTURE:	031690	(13A) INVENTORY ROUTE:	
(5 A-B-C-D-E) INV. ROUTE:	1 - 3 - 1 - 00340 - 0	(13B) SUBROUTE NUMBER:	
(2) HIGHWAY AGENCY DISTRICT:	01 - Crawfordsville	(16) LATITUDE:	39.50780
(3) COUNTY CODE:	011 - CLAY	(17) LONGITUDE:	-87.20147
(4) PLACE CODE:	00000 - N/A	(98) BORDER	
(6) FEATURES INTERSECTED:	PURDY RUN	A) STATE NAME:	
(7) FACILITY CARRIED:	SR 340	B) PERCENT	%
(9) LOCATION:	02.09 E W US 40 JCT	(99) BORDER BRIDGE STRUCT. NO:	
(11) MILEPOINT:	0002.090		

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:		(45) NUMBER OF SPANS IN MAIN 001 UNIT:	
A) KIND OF MATERIAL/DESIGN:	5 - Prestressed concrete	(46) NUMBER OF APPROACH SPANS:	0000
B) TYPE OF DESIGN/CONSTR:	05 - Box Beam or Girders - Multiple	(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(44) STRUCTURE TYPE, APPROACH SPANS:		(108) WEARING SURFACE/PROT SYS:	
A) KIND OF MATERIAL/DESIGN:	0 - Other	A) WEARING SURFACE:	1 - Monolithic Concrete (concurrently placed with structural deck)
B) TYPE OF DESIGN/CONSTR:	00 - Other	B) DECK MEMBRANE:	0 - None
		C) DECK PROTECTION:	1 - Epoxy Coated Reinforcing

AGE OF SERVICE

(27) YEAR BUILT:	1920	(28) LANES:	
(106) YEAR RECONSTRUCTED:	1980	A) ON BRIDGE:	02
(42) TYPE OF SERVICE:		B) UNDER BRIDGE:	00
A) ON BRIDGE:	1 - Highway	(29) AVERAGE DAILY TRAFFIC:	002170
B) UNDER BRIDGE:	5 - Waterway	(30) YEAR OF AVERAGE DAILY TRAFFIC:	2006
		(109) AVERAGE DAILY TRUCK TRAFFIC:	02 %
		(19) BYPASS DETOUR LENGTH:	001 MI

Inspector: Melvin Hughes
 Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
 Facility Carried: SR 340

Bridge Inspection Report

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0035.0	FT	(35) STRUCTURE FLARED:	0 - No flare
(49) STRUCTURE LENGTH:	00038.0	FT	(10) INV RTE, MIN VERT CLEARANCE:	99.99 FT
(50) CURB/SIDEWALK WIDTHS:			(47) TOT HORIZ CLEARANCE:	032.0 FT
A) LEFT	00.8	FT	(53) VERT CLEAR OVER BR RDWY:	99.99 FT
B) RIGHT:	00.8	FT	(54) MIN VERTICAL UNDERCLEARANCE:	
(51) BRDG RDWY WIDTH CURB-TO-CURB:	032.0	FT	A) REFERENCE FEATURE:	N
(52) DECK WIDTH, OUT-TO-OUT:	034.0	FT	B) MIN VERT UNDERCLEAR:	0 FT
(32) APPROACH ROADWAY	030.0	FT	(55) LATERAL UNDERCLEARANCE RIGHT:	
(33) BRIDGE MEDIAN:	0 - No median		A) REFERENCE FEATURE:	N
(34) SKEW:	00	DEG	B) MIN LATERAL UNDERCLEAR:	000.0 FT
			(56) MIN LATERAL UNDERCLEAR ON LEFT:	00.0 FT

INSPECTIONS

(90) INSPECTION DATE:	11/09/2020	(91) DESIGNATED INSPECTION FREQUENCY:	24 MONTHS
(92) CRITICAL FEATURE INSPECTION:		(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N	A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N	B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	Y 24	C) OTHER SPECIAL INSP DATE:	07/23/2019

CONDITION

(58) DECK:	5 - Fair Condition (minor section loss)	(60) SUBSTRUCTURE:	5 - Fair Condition (minor section loss)
(58.01) WEARING SURFACE:	5 - Fair Condition	(61) CHANNEL/CHANNEL PROTECTION:	8 - Banks are protected
(59) SUPERSTRUCTURE:	5 - Fair Condition (minor section loss)	(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 5 - Fair Condition (minor section loss)
 Comments:
 Variable 5" to 7" reinforced concrete deck with monolithic sacrificial thickness wearing surface and one layer of epoxy-coated reinforcing steel placed in 1980. Cannot see deck underside because the adjacent box beam superstructure.

(58.01) WEARING SURFACE: 5 - Fair Condition
 Comments:
 Medium-width unsealed longitudinal cracking throughout.

Inspector: Melvin Hughes
 Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
 Facility Carried: SR 340

Bridge Inspection Report

(59) SUPERSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:

Box beams 1 through 7 and 9 have hair line cracking. The very north beam has spalled areas where maybe old guard rail post were mounted.

(60) SUBSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:

Both abutments have concrete that had broken away (spalled) from the south ends of the structure exposing the brick from behind. Some bricks have fallen out, more on the west abutment than the east. These masonry bricks are dry laid; no mortar. There are drain tiles in both of these areas. The west abutment has horizontal cracking with efflorescence. Both abutments have vertical cracking. The abutments have had no change in condition from the last inspection.

(61) CHANNEL/CHANNEL PROTECTION: 8 - Banks are protected

Comments:

Banks are protected under the structure.

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	5 - HS 20	(66) INVENTORY RATING:	49
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	3 - Load and Resistance Factor (LRFR)
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open	(66B) INVENTORY RATING (H):	32
(64) OPERATING RATING:	62	(66C) TONS POSTED :	
(63) OPERATING RATING METHOD:	3 - Load and Resistance Factor (LRFR)	(66D) DATE POSTED/CLOSED:	

APPRAISAL

SUFFICIENCY RATING:	82.8	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	0	36A) BRIDGE RAILINGS:	0
(67) STRUCTURAL EVALUATION:	5	36B) TRANSITIONS:	0
(68) DECK GEOMETRY:	4	36C) APPROACH GUARDRAIL:	0
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	N	36D) APPROACH GUARDRAIL ENDS:	0

(71) WATERWAY ADEQUACY: 7 - Slight Chance of Overtopping Bridge

Comments:

Could find water elevations for structure.

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria

Comments:

(113) SCOUR CRITICAL BRIDGES: 8 - Stable for scour conditions

Comments:

No scour seen when walking channel.
 Piles

Inspector: Melvin Hughes
 Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
 Facility Carried: SR 340

Bridge Inspection Report

CLASSIFICATION

(20) TOLL:	3 - On Free Road	(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(22) OWNER:	01 - State Highway Agency	(26) FUNCTIONAL CLASS OF INVENTORY RTE:	07 - Rural - Major Collector
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible	(100) STRAHNET HIGHWAY:	Not a STRAHNET route
(101) PARALLEL STRUCTURE:	N - No parallel structure	(102) DIRECTION OF TRAFFIC:	2-way traffic
(103) TEMPORARY STRUCTURE:		(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	0 - Structure/Route is NOT on NHS
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable	(110) DESIGNATED NATIONAL NETWORK:	Inventory route not on network
(112) NBIS BRIDGE LENGTH:	Yes		

NAVIGATION DATA

(38) NAVIGATION CONTROL:	0 - No navigation control on waterway (bridge permit not required)	(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(111) PIER OR ABUTMENT PROTECTION:		(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
		(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:		(95) ROADWAY IMPROVEMENT COST:	\$ 000000
(75B) WORK DONE BY:		(96) TOTAL PROJECT COST:	\$ 000000
(76) LENGTH OF IMPROVEMENT:	000000 FT	(97) YR OF IMPROVEMENT COST EST:	0000
(94) BRIDGE IMPROVEMENT COST:	\$ 000000	(114) FUTURE AVG DAILY TRAFFIC:	003602
		(115) YR OF FUTURE ADT:	2032

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 1

Description South profile



PHOTO 2

Description Road alignment looking east

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 3

Description Road alignment looking west



PHOTO 4

Description North bridge rail condition

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 5

Description South bridge rail condition



PHOTO 6

Description Wearing surface condition looking east

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 7

Description Longitudinal cracking in the wearing surface



PHOTO 8

Description West abutment condition

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 9

Description East abutment condition



PHOTO 10

Description West abutment cracking with efflorescence and spall

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 11

Description East abutment cracking with efflorescence and spall



PHOTO 12

Description Looking north through the structure

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 13

Description Looking south through the structure



PHOTO 14

Description Beams 1, 2 and 3 longitudinal cracking looking east

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 15
Description Beams 4, 5 and 6 longitudinal cracking looking east



PHOTO 16
Description Beams 7 and 9 longitudinal cracking looking east

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 17

Description Beam 1 has spall where old guard rail was bolted



PHOTO 18

Description Upstream channel alignment looking south

Inspector: Melvin Hughes
Inspection Date: 11/09/2020

Asset Name: 340-11-01639 B
Facility Carried: SR 340

Bridge Inspection Report



PHOTO 19

Description Downstream channel alignment looking north

Miscellaneous Asset Data
Asset Management

031690

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection?

No - Load Rating Update Not Required

Extended Frequency:

Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program.

Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

No Joints Present

N

N

Comments:

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

N - No Bearing(s)

Comments:

Approach Slabs: ** Indicate if present & condition rating.*

N - No Approach Slabs

Comments:

Paint: * Indicate if paint present , year painted & condition rating.

Not Rated

Comments:

Endangered Species: * If yes, add one photo to the dropdown field

Bats: seen or heard under structure? * N

Birds/swallows/nests seen? Empty nests present? * N

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

LOAD RATING - BRADIN

Load Rating Date: 10-JUL-19

National Bridge Inventory (NBI):

(66B) INVENTORY RATING (H):	32	(31) DESIGN LOAD:	5
(65) INVENTORY RATING METHOD:	3	(70) BRIDGE POSTING:	5
(66) INVENTORY RATING:	49	(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(63) OPERATING RATING METHOD:	3	(66C) TONS POSTED:	
(64) OPERATING RATING:	62	(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	2.469
EV3: LEGAL RF:	1.627

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	2.219
SU5: LEGAL RF:	1.702
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

2-Axles:

H20-44: LEGAL RF:	2.058
ALTERNATE MILITARY: LEGAL RF:	1.627

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	2.643
LANE TYPE: LEGAL RF:	99
SU6: LEGAL RF:	1.538

3-Axles:

HS20: LEGAL RF:	1.724
AASHTO TYPE 3: LEGAL RF:	2.135

SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.456

4-Axles:

SU4: LEGAL RF:	1.788
----------------	-------

MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	

TOLL ROAD LOADING NO. 2:
ROUTINE PERMIT RF:

Other Configurations:

H20-44: DESIGN RF:	1.622
NRL: LEGAL RF:	1.383

SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	1.941
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	2.274
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	1.523
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	2.134
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	1.664

Channel Profile for Bridge 340-11-01639 B (RP 2.083)

Box Beam Bridge on ftgs. with wood piles

