



# INDIANA DEPARTMENT OF TRANSPORTATION

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

Eric Holcomb, Governor  
Joe McGuinness, Commissioner

11/26/2018

TO: Nathan Riggs  
INDOT Project Manager, Greenfield District

FROM: Jessica Eichhorst, P.E.  
Consultant Hydraulics Engineer

SUBJECT: HYDRAULIC LETTER FOR BRIDGES  
Structure: 52-70-10277  
Location: 12.9 miles east of SR 9, Rush County  
Des. #: 1006266  
Crossing: US 52 and Mud Creek  
Consultant: HNTB Corporation  
SPMS Type of Work: Bridge Replacement, Other Construction

ANALYSIS: Jessica Eichhorst, P.E.  
Consultant Hydraulics Engineer

<signature>

REVIEWER: Darrin K. Miller, P.E.  
INDOT Hydraulics Engineer



Drainage Area	= 14.44	sq. mi.
Q <sub>100</sub>	= 3,350.00	cfs
Q <sub>500</sub>	= 4,522.50	cfs
Elevation @ Q <sub>100</sub>	= 925.73	ft.
IDNR CIF Permit Needed (Y/N):	= Y	
Legal Drain (Y/N):	= N	

### Existing Conditions:

Q <sub>100</sub> Headwater Elevation	= 928.33	ft.
Backwater	= 2.63	ft.
Velocity @ Q <sub>100</sub>	= 9.15	ft./s.
Waterway Opening Below Q <sub>100</sub> Elevation (Str.)	= 339.44	sq. ft.
Road Overflow Waterway Area	= 0.00	sq. ft.
Low Structure Elevation	= 929.55	ft.
Skew	= 0	deg.

### Proposed Conditions:

Q <sub>100</sub> Headwater Elevation	= 928.09	ft.
Backwater	= 2.44	ft.
Velocity @ Q <sub>100</sub>	= 8.55	ft./s.
Waterway Opening Below Q <sub>100</sub> Elev. (Str.)	= 361.83	sq. ft.



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Road Overflow Waterway Area	= 0.00	sq. ft.
Approximate Low Structure Elevation	= 929.42	ft.
Skew	= 0	deg.
Q <sub>100</sub> Contraction Scour	= 17.30	ft.
Q <sub>100</sub> Total Scour	= 22.10	ft.
Q <sub>100</sub> Low Scour Elevation	= 894.70	ft.
Q <sub>100</sub> Max Velocity	= 11.00	ft /s.
Q <sub>500</sub> Elevation	= 926.29	ft.
Q <sub>500</sub> Contraction Scour	= 22.91	ft.
Q <sub>500</sub> Total Scour	= 27.71	ft.
Q <sub>500</sub> Low Scour Elevation	= 889.09	ft.
Q <sub>500</sub> Max Velocity	= 13.14	ft./s.

The proposed condition model was developed by replacing the existing US 52 bridge with a proposed three span spill through bridge. The proposed bridge opening is 87.5 feet with 2-foot wide piers and an estimated low structure elevation of 929.42 feet NAVD 1988. The low structure elevation will always remain at least 2-feet above the Q100 elevation but is subject to change during the design phase.

Based on the average velocity in the channel (for abutment protection) and the maximum velocity in the channel (for pier protection), the following scour countermeasures are recommended:

Sloping Abutment: Class 1 riprap placed at a depth of 2.0 feet, covering the cone from top to toe, as specified in IDM Figure 203-3B.

Pier: If pier protection is desired, Class 2 riprap placed at a depth of 4 feet and the riprap lay width will be two times the width of the pier or a minimum of 6 feet, as specified in IDM Figure 203-3B.

If you have any questions or comments, please contact me at (317) 917-5310.