



HYDRAULIC FLOOD ANALYSIS
FOR
POLK COUNTY

Inplace Bridge #5767

Sec. 26 T 147 N R 49 W

Data for adequate dimensioning of proposed continuous steel beam bridge:

Stream.....	Red River of the North
Drainage Area.....	23,100 sq. mi.
Maximum Flood on Record	unknown
Maximum Observed Highwater Elevation	unknown
Design/Overtopping Flood (7 Year Frequency).....	27,000 cfs
Road Sag Point Elevation	846.7
Design Stage Elevation.....	846.7
Total Stage Increase	< 0.1 ft.
Headwater Elevation	846.7
Stage Increase of the Inplace Condition	< 0.1 ft.
Minimum Waterway Opening Below Elevation 846.7	13,385 sq. ft.
Low Member At or Above Elevation	844.3
Mean Velocity Through Structure.....	2.0 fps
Main Channel Velocity.....	1.9 fps
Basic Flood (100 Year Frequency).....	75,130 cfs
Road Sag Point Elevation	846.7
Stage Elevation	862.2
Total Stage Increase	< 0.1 ft.
Headwater Elevation	862.2
Stage Increase of the Inplace Condition	<0.1 ft.
Minimum Overflow Area above Sag Point Elevation 846.7 and Below Elevation 862.2.....	47,845 sq. ft.
Mean Velocity Through Structure.....	1.3 fps
Main Channel Velocity.....	1.8 fps
Mean Overflow Velocity.....	1.2 fps
Approximate Channel Flowline Elevation	803.0
Estimated Pier Scour Elevation (overtopping flood).....	797.0
Skew Angle	0°
Scour Code	L

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The elevations listed in this hydraulic report are based on the bridge survey provided by Polk County. The datum from the Polk County survey is 1.1 ft. higher than the HEC-RAS hydraulic model provided by the DNR. The DNR HEC-RAS model is in NGVD 1929 datum.

The waterway opening is the net waterway area measured normal to the direction of flow. The maximum abutment inslope recommended by the geotechnical engineer is 1(V):5(H).

The proposed low member elevation was set at 844.3 per DNR recommendations. This elevation adjusts for the difference in datum between the Polk County Survey and the DNR HEC-RAS model. In the DNR HEC-RAS model (NGVD 1929 Datum), the existing bridge low member is at elevation 843.2.

Per Minnesota Department of Natural Resources, the proposed bridge shall have a 5 ft. wide passage bench on at least one side of the river.

The proposed structure should provide adequate waterway to pass the basic flood with minimal risks of flood damage. The upstream floodplain occurs within a mixture of open fields and cropland. We are not aware of any manmade structures within the upstream floodplain that would present any flood damage potential (this should be verified).

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.



Daniel Krocheski, P.E.

Date: 1/11/17 Lic. No.: 45779