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September 1, 2020

Mr. Joel Lees, Chairman
Stutsman County Water Resource District
PO Box 1727
Jamestown, ND 58402-1727,

RE: Stream Crossing Determination - Montpelier Township - Sections 20 and 29

Dear Mr. Lees:

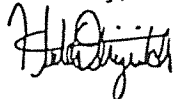
On February 10, 2020, the Office of the State Engineer received a request from the Stutsman County Water Resource District to perform a stream crossing determination for a stream crossing (Crossing) located between Sections 20 and 29, Township 137 North, Range 63 West, Montpelier Township, Stutsman County. The Crossing is located through what is locally known as 52nd Street SE, which is classified as an off-system township road.

Our office analyzed the Crossing according to the minimum stream crossing standards outlined in North Dakota Administrative Code (N.D.A.C.) article 89-14, and determined the required design discharge at the Crossing is **46 cfs** (10-year event for a township road). While this is the minimum design standard required for the Crossing, N.D.A.C. section 89-14-01-03 states that there is no restriction on a road authority to provide even greater capacity.

According to N.D.A.C. section 89-14-01-01, anyone who fails to comply with these standards is not entitled to the immunity provided in North Dakota Century Code sections 24-03-06, 24-03-08, or 24-06-26.1.

Please contact me at 701-328-4958 or hsobrigewitch@nd.gov if you have any questions concerning this correspondence.

Sincerely,



Hunter Obrigewitch
Water Resource Engineer

HO/1348

Cc: Montpelier Township
Sue Backerman
John Fiebeger

TECHNICAL MEMORANDUM

DATE: **August 13, 2020**

TO: **JP** John Paczkowski, P.E., State Engineer (Interim)

FROM: **AC** Aaron Carranza, P.E., Director, Regulatory Division
ML Matt Lindsay, P.E., Manager, Engineering and Permitting Section
HO Hunter Obrigewitch, Water Resource Engineer

SUBJECT: **Stream Crossing Determination, Montpelier Township Road**

On February 10, 2020, the Office of the State Engineer (OSE) received a request to perform a stream crossing determination from the Stutsman County Water Resource District. The stream crossing (Crossing) is located between Sections 20 and 29, Township 137 North, Range 63 West, Montpelier Township, Stutsman County. The Crossing is located on an off-system township road locally known as 52nd Street SE, between 85th and 86th Avenue SE. (See Exhibit 1).

Contained within North Dakota Administrative Code § 89-14-01-03, flood frequency requirements are presented for varying stream crossings. The Crossing is located on an off-system township road, thus requiring the passage of a 10-year recurrence interval flow event within allowable headwater limitations.

USGS Scientific Investigations Report 2015-5096 (Report) was used to determine the peak runoff at the Crossing, see Figure 1. The input parameters, required for the Report's hydrologic zone C regression equation, include the drainage area (0.997 square miles), stream length (1.51 miles), and corresponding maximum and minimum basin elevations (1509 feet and 1483 feet, respectively).

TECHNICAL MEMORANDUM
Stream Crossing Determination, Montpelier Township Road
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Variable	Lower Bound (if applicable)	Value	Upper Bound (if applicable)	Units	Comment
DRNAREA =	0.132 ≤	0.997	≤ 2811.637	square miles	Meets Limitations
ELEVMAX =	N/A	1509	N/A	ft	
MINBELEV =	N/A	1483	N/A	ft	
STREAMLENGTH =	N/A	1.51	N/A	miles	
RUGGED (calculated) =	(STREAMLENGTH/DRNAREA)*(ELEVMAX-MINBELEV)				
	21.309 ≤	40.41	≤ 2264.002	feet per mile	Meets Limitations

From Table 4, Region C, for 2, 5, 10, 25, 50, 100, and 500 year events

$$\log Q_{50\%} = 0.555 + 0.425 \times \log (\text{DRNAREA}) + 0.301 \times \log (\text{RUGGED})$$

$$Q_{50\%} = 10.91 \text{ cu. ft./sec. (CFS)}$$

$$\log Q_{20\%} = 0.988 + 0.460 \times \log (\text{DRNAREA}) + 0.296 \times \log (\text{RUGGED})$$

$$Q_5 = 29.03 \text{ cu. ft./sec. (CFS)}$$

$$\log Q_{10\%} = 1.187 + 0.476 \times \log (\text{DRNAREA}) + 0.294 \times \log (\text{RUGGED})$$

$$Q_{10} = 45.57 \text{ cu. ft./sec. (CFS)}$$

$$\log Q_{4\%} = 1.379 + 0.491 \times \log (\text{DRNAREA}) + 0.292 \times \log (\text{RUGGED})$$

$$Q_{25} = 70.38 \text{ cu. ft./sec. (CFS)}$$

$$\log Q_{2\%} = 1.493 + 0.500 \times \log (\text{DRNAREA}) + 0.291 \times \log (\text{RUGGED})$$

$$Q_{50} = 91.17 \text{ cu. ft./sec. (CFS)}$$

$$\log Q_{1\%} = 1.591 + 0.507 \times \log (\text{DRNAREA}) + 0.290 \times \log (\text{RUGGED})$$

$$Q_{100} = 113.82 \text{ cu. ft./sec. (CFS)}$$

$$\log Q_{0.2\%} = 1.769 + 0.520 \times \log (\text{DRNAREA}) + 0.287 \times \log (\text{RUGGED})$$

$$Q_{500} = 169.58 \text{ cu. ft./sec. (CFS)}$$

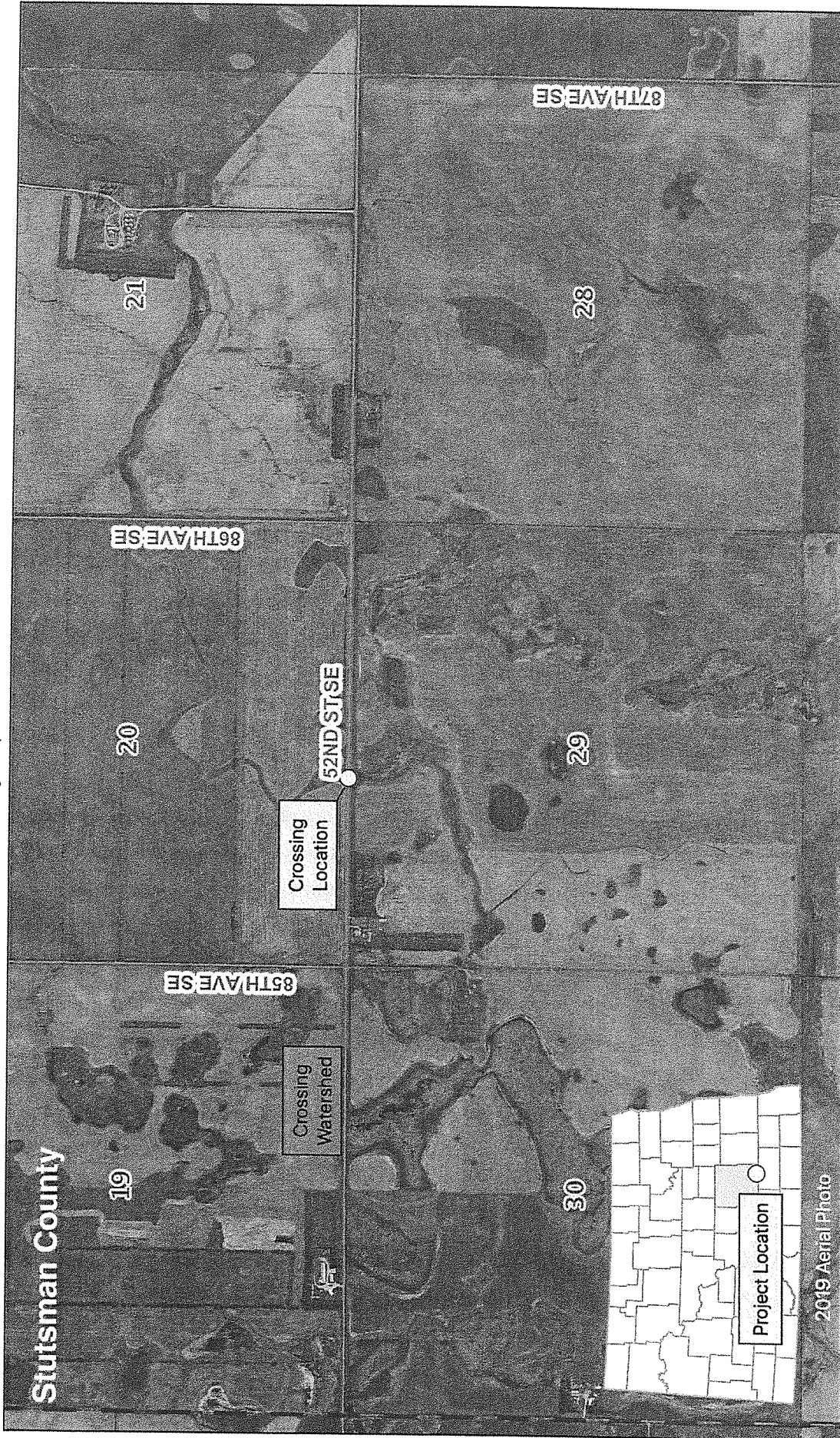
This Location Can Expect To Get:
2 Year Event, in CFS, Q= 11
5 Year Event, in CFS, Q= 30
10 Year Event, in CFS, Q= 46
25 Year Event, in CFS, Q= 71
50 Year Event, in CFS, Q= 92
100 Year Event, in CFS, Q= 114
500 Year Event, in CFS, Q= 170

Figure 1: OSE Regression Calculations for Crossing

Drainage area and maximum and minimum basin elevations were delineated utilizing elevation data from the 2012 James River Basin Phase 1 LiDAR collect. Burnlines were added to the LiDAR where culverts may be so that the flow is accurately represented during delineation. The N.D. Risk Assessment MapService was used to evaluate if the waterbodies in Section 30 and the watercourse or drain immediately south of Section 29 and located in the N ½ of Sections 31 and 32, are contributing areas. After considering the 10-year event, those areas were determined to be non-contributing areas to the watershed. The stream length variable, which is the sum of all mapped streams within the watershed, was determined using the USGS hydrography 24k streams data. The Report's regression equation provided the value for the 10-year recurrence interval and determined to be 46 cfs.

Recommendation

Based on the available information and my analysis, I recommend that the State Engineer determine the 10-year recurrence interval discharge at the Crossing to be 46 CFS.



Date: 8/4/2020
Prepared by: CWN

Exhibit 1 - Stream Crossing Determination

Between Sections 20 and 29, T137N, R63W, Stutsman County

