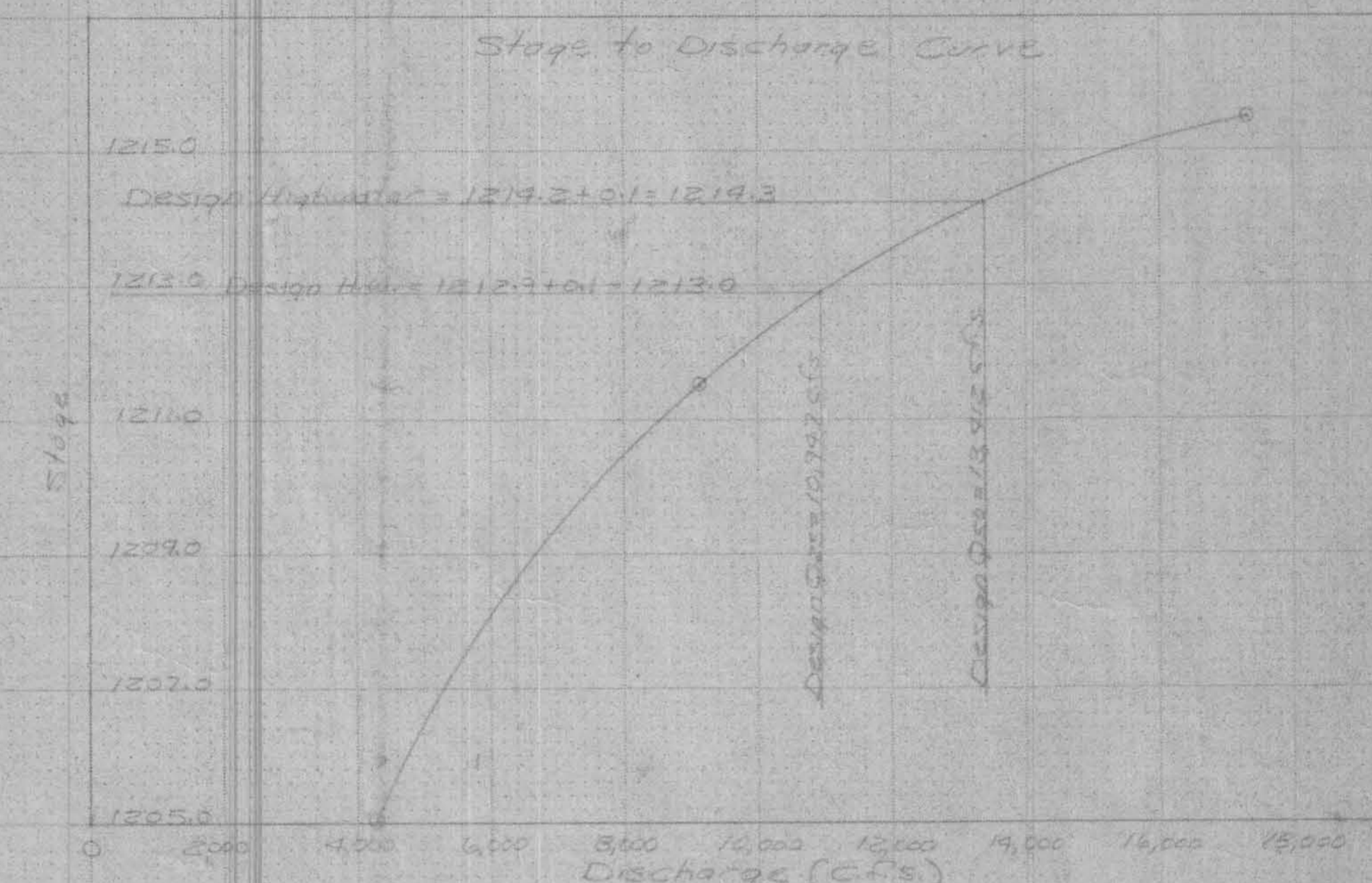
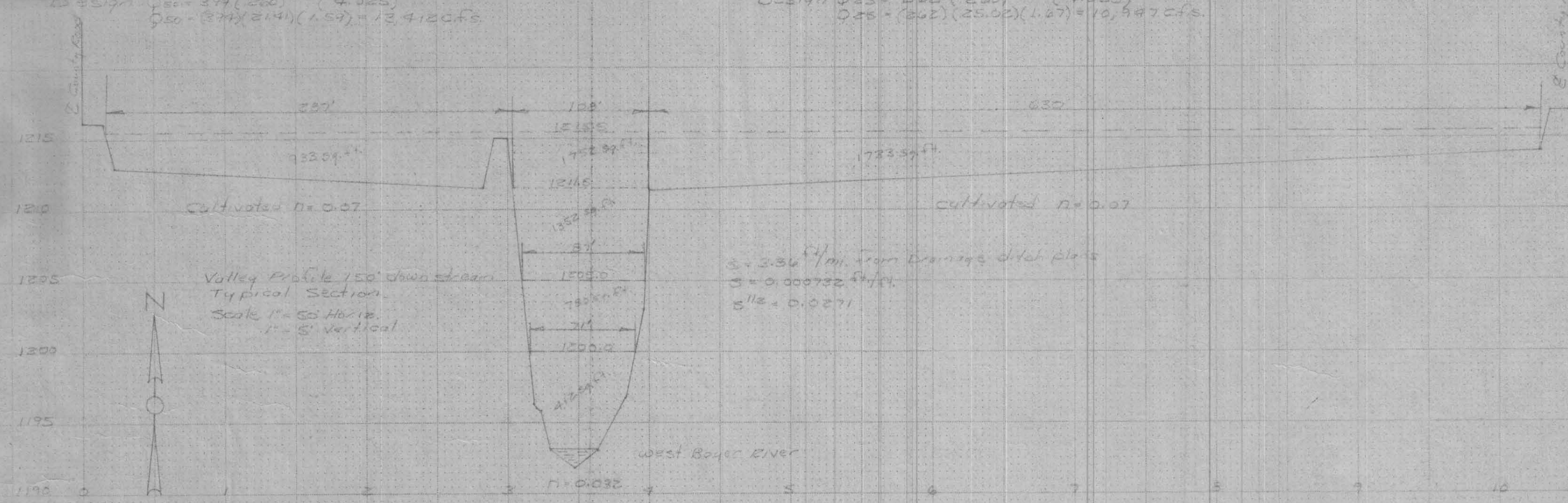


BM #1 Top Outlet 44x13'x31' Bridge NE Sta 0+00 Elev. = 1215.37

Crawford County - Hydraulics  
 Bridge over West Boyer River  
 Between Sects 19-23 Statewide  
 Twp 7 S, R 12 W  
 Sup. 1977 Project No. 179-14

Design D Model No 2 Region No 1  
 10% - 25% slope, Bulletin No. 25 = 4.025<sup>1/3</sup>/mi  
 C.A. Bulletin No. 7 = 360 sq. mi.  
 Design Q = 379 (260) (4.025)<sup>1/3</sup> = 13,412 cfs

Design D Model No 2 Region No 1  
 10% - 25% slope, Bulletin No. 25 = 4.025<sup>1/3</sup>/mi  
 C.A. Bulletin No. 7 = 360 sq. mi.  
 Design Q = 362 (260) (4.025)<sup>1/3</sup> = 10,547 cfs



High water elev. = 1214.5  
 A = 1322 sq. ft.  
 W = 102.7 ft.  
 R = 12.87 ft.  
 V = 1.788 (4.32) (0.027)<sup>1/3</sup>  
 Q = (1322) (4.32) (0.027) = 15,417 cfs

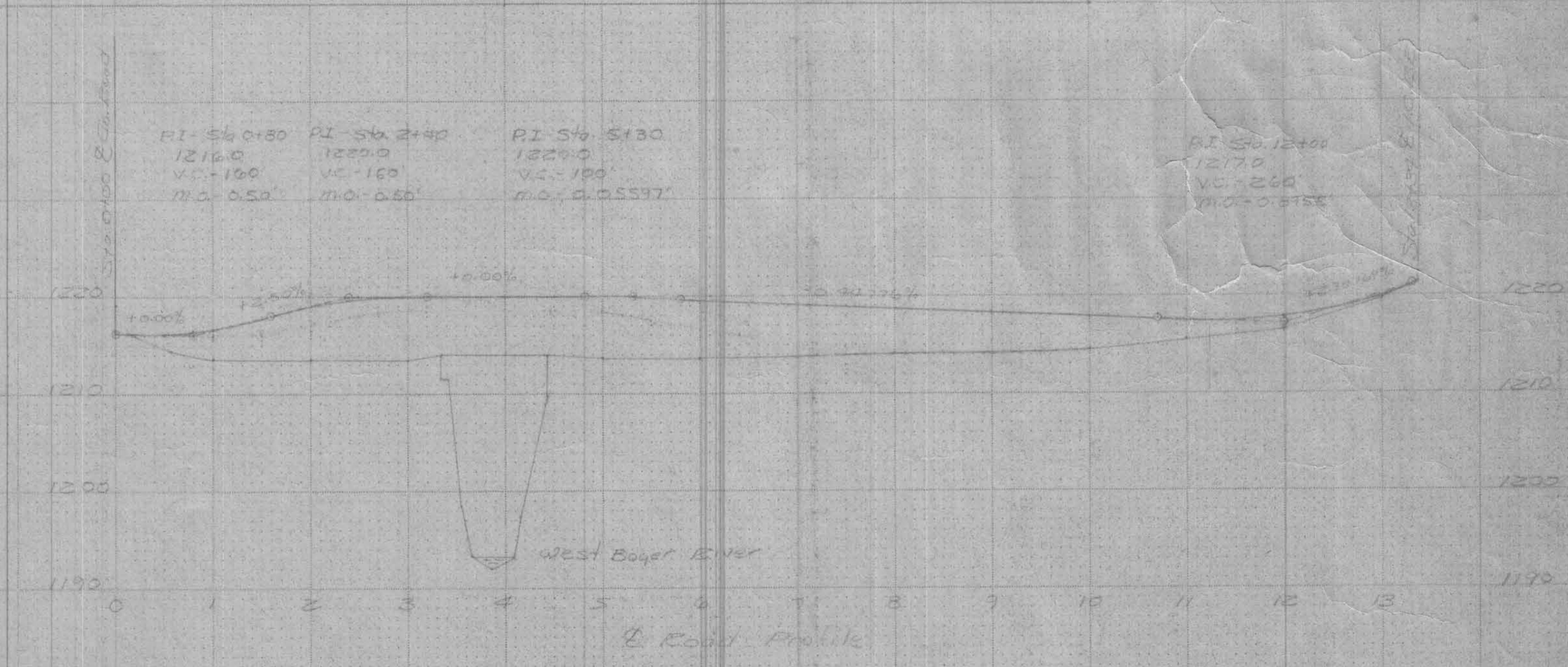
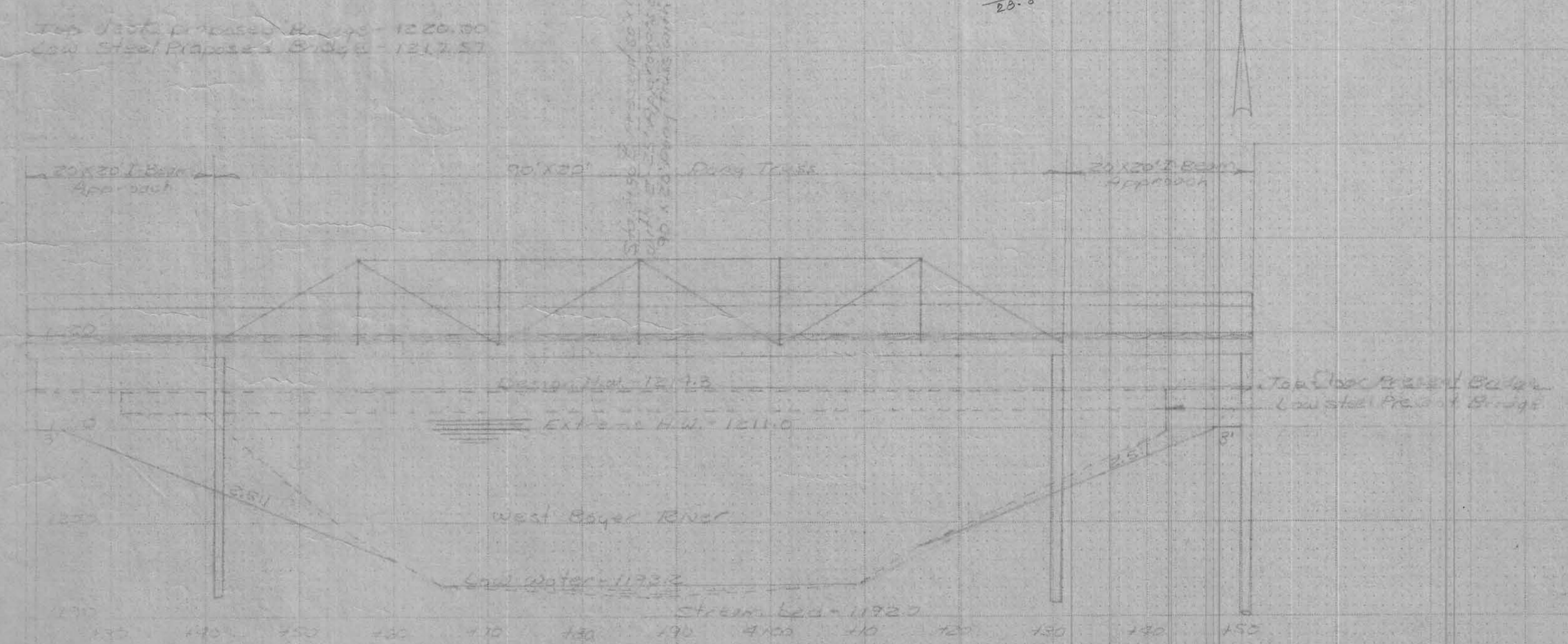
A = 933 sq. ft.  
 W = 78.7 ft.  
 R = 11.98 ft.  
 V = 1.788 (4.32) (0.027)<sup>1/3</sup>  
 Q = (933) (4.32) (0.027) = 11,174 cfs

High water elev. = 1215.5  
 A = 1753 sq. ft.  
 W = 108 ft.  
 R = 16.32 ft.  
 V = 1.788 (4.32) (0.027)<sup>1/3</sup>  
 Q = (1753) (4.32) (0.027) = 19,773 cfs

A = 1723 sq. ft.  
 W = 103 ft.  
 R = 16.32 ft.  
 V = 1.788 (4.32) (0.027)<sup>1/3</sup>  
 Q = (1723) (4.32) (0.027) = 19,373 cfs

High water elev. = 1205.0  
 A = 780 sq. ft.  
 W = 77 ft.  
 R = 11.98 ft.  
 V = 1.788 (4.32) (0.027)<sup>1/3</sup>  
 Q = (780) (4.32) (0.027) = 9,447 cfs

Top of steel proposed bridge = 1220.30  
 Low steel proposed bridge = 1217.57  
 A = 1932 sq. ft.  
 W = 143 ft.  
 R = 13.51 ft.  
 V = 1.788 (4.32) (0.027)<sup>1/3</sup>  
 Q = (1932) (4.32) (0.027) = 23,419 cfs



I hereby certify that this plan, specification or report was prepared by me or under my direct personal supervision and that I am a duly registered Professional Engineer and Civil Engineer, under the laws of the State of Iowa.  
 N. Dale Wright 8-22-77  
 N. DALE WRIGHT, P.E. & L.S. Iowa Reg. No. 675