	SCOUR ANALYSIS AND REPORTING FORM						
	Bridge Structure No. 33268023 Date 7/16/12 Initials Region (ABCD)						
	Site Location nr Blunt on 308 Are $Q_{100} = 60 4310 \text{by: drainage area ratio} \text{flood freq. anal.} \text{regional regression eq. } \times$						
	$Q_{100} = 60$ by: drainage area ratio flood freq. anal. regional regression eq. \times						
	Bridge discharge $(Q_2) = 4310$ (should be Q_{100} unless there is a relief bridge, road overflow, or bridge overtopping)						
	Analytical Procedure for Estimating Hydraulic Variables Needed to Apply Method						
	Bridge Width = 6 ft. Flow angle at bridge = 5 ° Abut. Skew = 6 ° Effective Skew = 5 °						
PGRM: "RegionA", "RegionB", "RegionC", or "RegionD"	Width (W ₂) iteration =						
	Avg. flow depth at bridge, y ₂ iteration =						
V", "F	Corrected channel width at bridge Section = W_2 times cos of flow angle = $10^3 \cdot 6$ ft* $q_2 = Q_2/W_2 = \frac{11}{2} \cdot 6$ ft ² /s						
gionA", "Reg or "RegionD"	Bridge Vel, $V_2 = \underline{4.6}$ ft/s Final $y_2 = q_2/V_2 = \underline{9.1}$ ft $\Delta h = \underline{6.9}$ ft						
"Reg	Average main channel depth at approach section, $y_1 = \Delta h + y_2 = 9.5$ ft						
GRM: "Re 'RegionC",	* NOTE: repeat above calculations until y_1 changes by less than 0.2 Effective pier width = $L \sin(q) + a \cos(q)$						
PG "Re	If y 2 is above LS, then account for Road Overflow using PRGM: RDOVREGA, RDOVREGB, RDOVREGC, or RDOVREGD,						
	Water Surface Elev. = $0-1$, \mathcal{O} ft						
	Low Steel Elev. = 12.6 ft n (Channel) = 0.043						
	n (Channel) = Ocio						
	n (LOB) =						
	Pier Width = $\frac{1.65}{1.65}$ ft						
	Pier Length = 1.7 ft						
	# Piers for $100 \text{ yr} = 30 \text{ ft}$						
	CONTRACTION SCOUR						
	Width of main channel at approach section $W_1 = 10^t$ ft						
PGRM: Contract	Width of left overbank flow at approach, $W_{lob} = $ ft Average left overbank flow depth, $y_{lob} = $ f						
	Width of right overbank flow at approach, $W_{rob} = 0$ ft Average right overbank flow depth, $y_{rob} = 0$ ft						
S.W.	width of fight overbank now at approach, wrong						
PGF	Live Bed Contraction Scour (use if bed material is small cobbles or finer)						
	$x = 0.69$ From Figure 9 W_2 (effective) = 97 ft $y_{cs} = 1.1$ ft						
_	Clear Water Contraction Scour (use if bed material is larger than small cobbles)						
PGRM: CWCSNEW	Estimated hed material $D_{so} = \begin{cases} ft & \text{Average approach velocity, } V_1 = Q_{100}/(y_1 W_1) = \end{cases}$						
WCS	Estimated bed material $D_{50} = ft$ Average approach velocity, $V_1 = Q_{100}/(y_1W_1) = ft/s$ Critical approach velocity, $V_0 = 11/(y_1)^{1/6}D_{50}^{-1/3} = ft/s$						
M: C	If $V_1 < V_c$ and $D_{50} >= 0.2$ ft, use clear water equation below, otherwise use live bed scour equation above.						
GR							
-	$\begin{aligned} &D_{c50} = 0.0006(q_2/y_1^{7/6})^3 = \underbrace{\qquad \qquad \qquad }_{ft} & \text{If } D_{50} >= D_{c50}, \chi = 0.0 \\ &\text{Otherwise, } \chi = 0.122y_1[q_2/(D_{50}^{-1/3}y_1^{7/6})]^{6/7} - y_1 = \underbrace{\qquad \qquad }_{ft} & \text{From Figure 10, } y_{cs} = \underbrace{\qquad \qquad }_{ft} & \text{ft} \end{aligned}$						
0							
Pier	PIER SCOUR CALCULATIONS						
PGRM: Pier	L/a ratio = $\frac{1.03}{0.27}$ Correction factor for flow angle of attack (from Table 1), K2 = $\frac{1}{1.00}$ Froude # at bridge = $\frac{1}{1.00}$ Using pier width a on Figure 11, $\xi = \frac{1}{1.00}$ Pier scour $y_{ps} = \frac{5}{1.00}$ ft						
PG	Froude # at bridge = 6.27 Correction factor for flow angle of attack (from Table 1), $K2 = 1$ Using pier width a on Figure 11, $\xi = 6.9$ Pier scour $y_{ps} = 5.7$ ft						
_	ABUTMENT SCOUR CALCULATIONS						
PGRM: Abutment	Average flow depth blocked by: left abutment, $y_{al,T} = 0$ ft right abutment, $y_{aRT} = 0$ ft						
Shape coefficient K_1 = 1.00 for vertical-wall, 0.82 for vertical-wall with wingwalls, 0.55 for spill-through							
RM:	Shape coefficient K_1 = 1.00 for vertical-wall, Using values for y_{aLT} and y_{aRT} on figure 12, ψ_{LT} = and ψ_{RT} = and ψ_{RT} = through Left abutment scour, $y_{as} = \psi_{LT}(K_1/0.55) =$ ft Right abutment scour $y_{as} = \psi_{RT}(K_1/0.55) =$ ft						
C	Left abutment security $= yt_{-}(K_{-}/(0.55)) = (1.5)$ ft Right abutment security $= yt_{-}(K_{-}/(0.55)) = (1.5)$						

Estimated flow passing through bridge Estimated road overflow & overtopping Consideration Yes No Possibly Yes No Possibly Chance of overtopping Chance of ressure flow Amorted appearance to channel Lateral instability of channel Riprap at abutments? Yes No Marginal Evidence of past Scour? Yes No Don't know what for feet of the past Scour? Poebris Potential? High Med Low 21 2 3 5 5 5 10 9 9 10 9 10 9 10 9 10 9 10 9 1	Route 308 Are Stream		_MRM	Da	ite 7/10/1	Init	ials Rat				
Drainage area = 163 & q sq. mi. The average bottom of the main channel was \(\frac{1}{6} \) ft below top of guardrail at a point \(\frac{30}{20} \) ft from left abutment. Method used to determine flood flows: Freq. Anal. drainage area ratio \(\times \) regional regression equations. Flows Qtoo = Qtoo \(\frac{43}{10} \) Qsso = \(\frac{30}{20} \)	Bridge Structure No. 33294023 Loc	ation nr	Blunt	m30	8 Are						
Drainage area = 163 & q sq. mi. The average bottom of the main channel was \(\frac{1}{6} \) ft below top of guardrail at a point \(\frac{3}{20} \) ft from left abutment. Method used to determine flood flows: Freq. Anal. drainage area ratio \(\times \) regional regression equations. Flows Qtio = Qtio \(\frac{4}{3} \) Q Qtio = Qtio \(\frac{1}{2} \) Qtio \(\frac{1}{2} \)	GPS coordinates: At 44° 30° 27.9" taken from: USL abutment × centerline of 1 MRM end										
Drainage area = 163 & q sq. mi. The average bottom of the main channel was \(\frac{1}{6} \) ft below top of guardrail at a point \(\frac{3}{20} \) ft from left abutment. Method used to determine flood flows: Freq. Anal. drainage area ratio \(\times \) regional regression equations. Flows Qtio = Qtio \(\frac{4}{3} \) Q Qtio = Qtio \(\frac{1}{2} \) Qtio \(\frac{1}{2} \)	W 990 59' 20.8	Datum of coc	ordinates: W	GS84 ×	NAD27		17 (NE. 17				
The average bottom of the main channel was Method used to determine flood flows: Freq. Anal	Drainage area = 103.69 sq. mi.			7							
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Flow	MIS	CELLANE	OUS CONSI	DERATIO	NS						
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Pier scour depth (yps), in feet Left abutment scour depth (yas) in feet					27			1			
Left abutment secur depth (yes) in feet		57			é d			1			
	Left abutment scour depth (yas), in feet	0			132			1			
Right abutment scour depth (yas), in feet	Right abutment scour depth (yas), in feet							1			

1Flow angle of attack