	SCOUR ANALYSIS AND REPORTING FORM						
	Bridge Structure No. 08 145098 Date 6 2 Third Initials Region (ABCD)						
	Site Location 6.5 mi N of Pukwana on 350 Are						
	Q <sub>100</sub> = Q <sub>10</sub> 96% by: drainage area ratio flood freq. anal. regional regression eq. X						
	Bridge discharge $(Q_2) = 969$ (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						
P	Bridge Width = $71$ ft. Flow angle at bridge = $0$ Abut. Skew = $0$ ° Effective Skew = $0$ ° Effective Skew = $0$ ° Effective Skew = $0$ ° Skew =						
PGRM: "RegionA", "RegionB", "RegionC", or "RegionD"	Width (W <sub>2</sub> ) iteration =						
	Corrected channel width at bridge Section = $W_2$ times cos of flow angle = $\frac{71}{ft^*}$ $q_2 = Q_2/W_2 = \frac{13.6}{ft^2/s}$						
"Reg	Bridge Vel, $V_2 = 2.6$ ft/s Final $y_2 = q_2/V_2 = 5.2$ ft $\Delta h = 1$ ft						
', or	Average proin showed doubt at approach section $y_1 = Ab + y_2 = \frac{C}{2}$						
M: I	Average main channel depth at approach section, $y_1 = \Delta h + y_2 = 2$ ft  * NOTE: repeat above calculations until $y_2$ changes by less than 0.2 Effective pier width = $L \sin(q) + a \cos(q)$						
Reg	If $y_2$ is above LS, then account for Road Overflow using PRGM: RDOVREGA, RDOVREGB, RDOVREGC, or RDOVREGD,						
	Water Surface Elev. = $\frac{dry}{dt}$ ft						
	Low Steel Elev. = 5.9 ft						
	n (Channel) = $\frac{G \cdot G \cdot 4 \cdot 5}{G \cdot 63 \cdot 5}$ 3.2 2.7						
	n(ROB) = 0.035						
	Pier Width = $1.65$ ft						
	Pier Length = 1.65 ft						
	# Piers for $100 \text{ yr} = 2 \text{ ft}$						
	CONTRACTION SCOUR						
	Width of main channel at approach section $W_1 = 71$ ft						
act	Width of left overbank flow at approach, $W_{lob} = \frac{7}{ft}$ Average left overbank flow depth, $y_{lob} = \frac{3.2}{}$						
GKM: Contract	Width of right overbank flow at approach, $W_{rob} = \frac{7}{1000}$ ft Average right overbank flow depth, $y_{rob} = \frac{2.7}{1000}$						
Ž.	Width of right overbank flow at approach, $w_{rob} = \frac{77}{100}$ if Average right overbank flow depth, $y_{rob} = \frac{207}{100}$						
Y CK	Live Bed Contraction Scour (use if bed material is small cobbles or finer)						
	$x = 5.66$ From Figure 9 $W_2$ (effective) = 67.7 ft $y_{cs} = 6.0$ ft						
Σ. Σ.	Clear Water Contraction Scour (use if bed material is larger than small cobbles)						
S	Estimated bed material $Q_{50} = ft$ Average approach velocity, $V_1 = Q_{100}/(y_1W_1) = ft/s$ Critical approach velocity, $V_0 = ft/s$						
PGRM: CWCSNEW	Critical approach velocity, $V_c = 11.17y_1^{1/6}D_{50}^{1/3} = $ ft/s						
KW	If $V_1 < V_c$ and $D_{50} >= 0.2$ ft, use clear water equation below, otherwise use live bed scour equation above.						
P	$D_{c50} = 0.0006(q_2/y_1^{7/6})^3 \neq \underbrace{ \qquad \qquad}_{ft} $ $Otherwise, \chi = 0.122y_1[q_2/(D_{50}^{1/3}y_1^{7/6})]^{6/7} - y_1 = \underbrace{ \qquad \qquad}_{ft} $ $From Figure 10, y_{cs} = \underbrace{ \qquad \qquad}_{ft} $						
	Otherwise, $\chi = 0.122 y_1 [q_2/(D_{50}^{1/3} y_1^{7/6})]^{6/7} - y_1 =ft$						
is ci	NED SCOUD GALGUY ATTOMS						
7	PIER SCOUR CALCULATIONS  L/a ratio =   Correction factor for flow angle of attack (from Table 1) K2 =   // Correction factor for flow angle of attack (from Table 1) K2 =   // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor for flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction factor flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of attack (from Table 1) K2 =  // Correction flow angle of						
GRM: Pier	L/a ratio = Correction factor for flow angle of attack (from Table 1), $K2 = $ Froude # at bridge = $6.2$ Using pier width a on Figure 11, $\xi = 6.9$ Pier scour $y_{ps} = 5.9$ ft						
_	Trouble in at oringe Comp per widin a on Figure 11, g The second y <sub>ps</sub> I						
ıı	ABUTMENT SCOUR CALCULATIONS						
utme	Average flow depth blocked by: left abutment, $y_{aLT} = 3.2$ ft right abutment, $y_{aRT} = 2.7$ ft						
Ab	Shape coefficient K <sub>1</sub> = 1.00 for vertical-wall, 0.82 for vertical-wall with wingwalls, 0.55 for spill-through						
GRM: Abutment	Using values for $y_{aLT}$ and $y_{aRT}$ on figure 12, $\psi_{LT} = 11.9$ and $\psi_{RT} = 11.0$						
ĭ	Left abutment scour, $y_{as} = \psi_{LT}(K_1/0.55) = 1.0$ ft Right abutment scour $y_{as} = \psi_{RT}(K_1/0.55) = 1.0$ ft						

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Route 350 At Stream Anterior Ck MRM Date 41212 Initials floor Stream Anterior Ck MRM Date 41212 Initials floor Bridge Structure No. 28 14 29 47 25 14 14 14 14 14 14 14 14 14 14 14 14 14	Route 350 Are FAS 6471 Stream American C	ck	MRM	Da	te 6/2/12	Ini	tials Pat					
GPS coordinates:	Bridge Structure No. 08/45098 Location 0.5 as: 1/ 6 D. L. 32 3604											
Drainage area	GPS coordinates: 1 420 47 7611 taken from: USI abutment & contexting of 1 MPM and											
Drainage area	W 97° 10° 599"	Datum of co	ordinates: W	GS84 \	NAD27	i ii iviidii (						
The average bottom of the main channel was   9.6   1 ft below top of guardrail at a point   5/												
Method used to determine flood flows:												
Flows	Mathed and to determine Good Govern Free And											
Flows	witchiod used to determine flood flowsrreq. Analdramage area ratio regional regression equations.											
Flows	MISCELLANEOUS CONSIDERATIONS											
Estimated flow passing through bridge												
Estimated road overflow & overtopping		769										
Consideration   Yes   No   Possibly   Yes   No   Possibly   3040   100   141   100   100   141   100								/ / /				
Chance of overtopping Chance of Pressure flow Chance of Pressure flow A Marginal Evidence of Pressure flow Riprap at abutments?  Yes No Marginal Evidence of past Scour? Yes No Don't know Small awards of the state		Yes	No	Possibly	Yes							
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Armored appearance to channel  Lateral instability of channel  Riprap at abutments?  Yes No Marginal  Evidence of past Scour?  Yes No Don't know Small amends et contraction, plan abutments?  High Med Low  Does scour countermeasure(s) appear to have been designed?  Riprap Yes No Don't know NA  Does scour countermeasure(s) appear to have been designed?  Riprap Yes No Don't know NA  Bed Material Classification Based on Median Particle Size (D 50)  Material SilvClay Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 1.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  I) Inth OB IC), tridge (act)  Yes Sand Gravel Cobbles Boulders  Size range, in mm < 0.062 0.062-2.00 2.00-64 64-250 >250  Comments, Diagrams & orientation of digital photos  II			1		×				D			
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Evidence of past Scour?	Riprap at abutments? Yes	× No	Marginal		1 L			and the second s				
Does scour countermeasure(s) appear to have been designed?  Riprap  Pes No Don't know NA  Soo 9030  Other Yes No Don't know NA  Bed Material Classification Based on Median Particle Size (D <sub>50</sub> )  Material SilvClay Sand Gravel Cobbles Boulders  Size range, in mm <0.062  0.062-2.00  Comments, Diagrams & orientation of digital photos	Evidence of past Scour? X Yes No Don't know 5 mall amon's ct 1479											
Does scour countermeasure(s) appear to have been designed?  Riprap  Pes No Don't know NA  Soo 9030  Other Yes No Don't know NA  Bed Material Classification Based on Median Particle Size (D <sub>50</sub> )  Material SilvClay Sand Gravel Cobbles Boulders  Size range, in mm <0.062  0.062-2.00  Comments, Diagrams & orientation of digital photos	Debris Potential?  High Med X Low contraction, pier, attended.											
Does scour countermeasure(s) appear to have been designed?   Riprap	2 1990											
No												
Site   Sand   Gravel   Cobbles   Boulders	Disease Vos X No Den's Inner											
Site   Sand   Gravel   Cobbles   Boulders	Niprap Tes / No Doll tkilow NA 100 1432											
Bed Material Classification Based on Median Particle Size (D <sub>50</sub> )   Material   Silt/Clay   X   Sand   Gravel   Cobbles   Boulders     Size range, in mm   <0.062   0.062-2.00   2.00-64   64-250   >250     Comments, Diagrams & orientation of digital photos   Icl. fridge (b.2)   fai, about if gravel - small     21 main cheasel   Ill plear   Cobble   size of took (see problem of the problem of t	Spur Dike Yes No Don't know NA Soo 9030											
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Material   Silt/Clay   Sand   Gravel   Cobbles   Boulders												
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Flow depth at right abutment (yaRT), in feet  Contraction scour depth (ycs), in feet  Pier scour depth (yps), in feet  Left abutment scour depth (yas), in feet  Right abutment scour depth (yas), in feet  II,9  II,0  III,0  IIIIIIII												
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