DESIGN OF PIER FOOTING SUBMERSIBLE BRIDGE

Name Of Work :- Construction of Submersible Bridge on ON KHERWARA - JAWAS - SUVERI ROAD IN KM 9/000, ACROSS RIVER SOM

FOR WIND AT SERVICE CONDITION

Length of footing	l_f	12.00	m		
Width of Footing	l_b	3.80	m		
Width of Pier		1.20	m		
Vertical Load	P	5073.09	kN		
Longitudinal Moment	M_e	328.88	kN-m		
Transverse Moment	M_b	2431.79	kN-m		
Area in Tension = y x l_b			0.00	**m^2**	0.00 %
Maximum Pressure before Redistribution			137.30	**kN/m^2**	
Maximum Pressure After Redistribution = pxK			137.30	**kN/m^2**	
Maximum Stress at Edge of Pier			137.30	**kN/m^2**	
Distance From Face of Pier to the Edge			1.30	m	
Stress at the Edge of Pier			90.33	**kN/m^2**	
Average Stress on Cantilevered Area			113.82	**kN/m^2**	
Area of the Cantilever Portion			1.30	**m^2**	
Distance of Centroid of the Stress in Cantilever Portion			0.69	m	
Moment about the Face of Pier			**102.79**	**kN-m**	
CONCRETE GRADE			**M-25**		
FOR THIS GRADE σcbc			**10**	N/mm2	
m			**9.33**		
σst			**200**		
factor k			0.318		
j			0.894		
R			1.422		
Effective Depth Required			269	mm	
Adopt Total Depth			1000	mm	
Cover			50	mm	
Assume Bar Dia			25	mm	
Keeping A Cover Of 50 mm Effective Depth			938	mm	
Adopt Effective Depth			937.5	mm	
Steel Required Ast			613	mm^2	
Area Of One Bar			491	mm^2	
Spacing S			**800**	**mm**	

Provide Bars Of Dia And Spacing	25 mm	**Adopt spacing as 250 mm**	
Area Of Distribution Steel		2000	mm^2
Dia Of Bar For Distribution Steel		20	mm
Area Of One Bar In Distribution Reinforcement		314	mm^2
Using The Bars Spacing Required		157	mm
Provide Bars Of Dia And Spacing	20 mm	150	mm
Provide Bars Of Dia And Spacing for Top Main Steel	12 mm	150	mm
Provide Bars Of Dia And Spacing for Top Distribution Steel	12 mm	150	mm

CHECK FOR SHEAR (As per IRC 21-1987 Cl. 304.7)

Critical Section is at a distance equal to effective depth from pier face		937.5	mm
Section of Shear from end of pier		0.36	m
Maximum Stress at Edge of Pier		137.30	**kN/m^2**
Stress at the Section for Shear Check		123.48	**kN/m^2**
Average Stress on Cantilevered Area		130.39	**kN/m^2**
Shear Force		47.27	kN
V=V' + M/d tanB	(B=0) Hence V =V'		
Actual Shear Stress		0.05	**N/mm^2**
Percentage Steel	100As/bd	0.07	
Tc		0.23	**N/mm^2**
k=1			
Permissble Shear Stress = k Tc		0.23	**N/mm^2**
		< Actual Shear Stress hence Shear Reinforcement should be provided	
Dia Of two Legged Stirrups		16	mm
Area Of One Bar In Distribution Reinforcement		201	mm^2
Using The Bars Spacing Required s= Asw ts d/V		1594	mm
Provide Bars Of Dia And Spacing	**16 mm**	**Adopt spacing as 250 mm**	