单孔轻载

活载力：$R_1=\frac{1}{16}[2.260\times4\times(1.6\times\frac{6}{2}-0.5)+5.8\times85\times(2.9+11.2-0.5)]=687.8\,kN$

$MR_1=687.8\times0.28\times2=385.168\,(kN\cdot m)$

单孔重载

活载力 $R_2=\frac{1}{16}[5.8\times85\times(2.9-0.5)+250\times4\times(5.8+\frac{9.6}{2}+1.6-0.5)]=805.2kN$

扭矩 $MR_2=806.2\times0.28\times2=450.912\,(kN\cdot m)$

双孔重载

$G_1=G_2=85\times10.66+250\times2=1406.1\,kN$

$R_3=R_4=\frac{1}{16}[2.633\times2\times85\times(5.33-0.5)+2\times250\times(8.53\times2-0.5-3.2)]=691.03\,kN$

$R_3-R_4=R_3+R_4=1382.06\,kN$

$M_{R3-4}=0$

单孔轻载 单孔重载 恒载压力

$N_G=(18.5+0.06)\times2\times38+447.8\times2=1546.16\,kN$

墩底面积 $A_1=\pi\times0.75^2+2.7\times1.5=6.82\,(m^2)$

墩底面积 $A_2=\pi\times0.95^2+2.7\times1.9=7.97\,(m^2)$

墩身体积：$V_{2-2}=\frac{H}{3}(A_1+A_2+\sqrt{A_1A_2})=\frac{8}{3}\times(5.82+7.91+\sqrt{5.82\times7.97})=54.93\,(m^3)$

墩身重：$N_{2-2}=V_{2-2}\times\gamma_{混凝土}=54.93\times23=1263.39\,(kN)$

偏心 $e=\frac{385.168}{2233.96}=0.17$ (单孔轻载)

$e=\frac{450.912}{2351.36}=0.19$ (单孔重载)

$e=0$ (双孔轻载)

墩底截面惯性矩 $\frac{\pi}{64}\times1.9^4\times2+\frac{1}{12}\times2.7\times1.9^3=21.8$

墩身平均 $A_0=\frac{A_1+A_2}{2}=\frac{5.82+7.97}{2}=6.90$

(单孔轻载)(单孔重载)制动力：$P_t=(4\times250+85\times2.9\times2)\times0.1=149.3\ (kN)$

P_t对底部力矩：$M_{Pt}=P_t(H+0.6+0.043)=149.3\times(8+0.6+0.043)=1290.34$

双孔重载制动力 $P_{t1}=691.03\times0.1\times100\%=69.10(kN)$

$P_{t2}=691.03\times0.1\times100\%=69.10(kN)$

$P_t=P_{t1}+P_{t2}=138.2<149.3$

$M_{Pt}=138.2\times(8+0.6+0.043)=1194.46(kN\cdot m)$

计算长度l_0：$2\times(0.6+16)=33.2$　　$E_0=2.4\times10^4$(台部)

单孔轻载：$\alpha=\frac{0.1}{0.2+\frac{2}{n}}+0.16=0.49$

单孔重载：$\alpha=\frac{0.1}{0.2+\frac{0.9}{1.7}}+0.16=0.48$

双孔重载：$\alpha=\frac{0.1}{0.2+\frac{2}{1.7}}+0.16=0.66$

	单孔轻载	单孔重载	双孔重载
	$\frac{\pi\times1.45\times2.4\times10^4\times21}{33.2^2}=2.27\times10^5$	2.27×10^5	2.27×10^5
$\alpha\cdot X$	91254	102180	149820
$\left[\frac{1}{1+\alpha\times\frac{1}{EI\Delta_{0HC}}}\right]$	$91254\times\left[\frac{1}{149125\times1.1\times6.9\times10^{-6}}\right]$		
$N_{cr}=\alpha\cdot X$	$=42542$	44782	50524
动力(kN)(k=2)	6103.36	3764.56	4918.26
动力$\eta_{dy}=\frac{1}{1-\frac{N_0}{N_{cr}}}$	$\frac{1}{1-\frac{6103.36}{91254}}=1.0717$	1.038	1.031
主+附(k=1.1)	4884.288	3011.648	3934.608
主+附$\eta_{MAy}=\frac{1}{1-\frac{4884.288}{9254}}$	$=1.056$	1.0303	1.0269

4 纵向风力

$W = k_1 k_2 800 P_a = 1.1 \times 1.0 \times 0.8 = 0.88$ kPa

1、玻幕风力 $P_{w1} = WA = 0.88 \times 4.4 \times 0.5 = 1.94$ (kN)

P_{w1} 对墩底截面的力矩 $M_{p1} = 1.94 \times (8 + 0.25) = 16.01$ (kN·m)

2、墩身风力 $P_{w2} = 0.88 \times (\frac{4.6+4.2}{2}) \times 8 = 30.98$ (kN)

P_{w2} 作用点至墩底截面的距离

$y' = \frac{8}{3} \times (\frac{4.6 \times 2 + 4.2}{4.6 + 4.2}) = 3.94$ m

$M_{P_{w2}} = P_{w2} \cdot y' = 30.98 \times 3.94 = 122.06$ (kN·m)

桥墩风力：$P_w = P_{w1} + P_{w2} = 1.94 + 30.98 = 32.92$ (kN)

$M_{Pw} = M_{Pw_1} + M_{Pw_2} = 16.01 + 122.06 = 138.07$

$W_{自立} = k_1 k_2 \times 0.8 = 0.3 \times 1 \times 0.8 = 0.24$

$W_{台身} = k_1 k_2 \times 1.4 = 0.3 \times 1 \times 1.4 = 0.42$ kPa