桩承台计算\_序号21

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：300mm

承台x方向移心：0mm

承台y方向移心：0mm

2、桩截面信息

桩截面宽：500mm

桩截面高：0mm

单桩承载力：2500.00kN

3、承台混凝土信息

承台混凝土等级：C30

4.桩位坐标:

桩位表

| 桩序号 | 桩X坐标 | 桩Y坐标 |
| --- | --- | --- |
| 1 | -1000 | -1000 |
| 2 | -1000 | 1000 |
| 3 | 1000 | -1000 |
| 4 | 1000 | 1000 |

5.柱信息:

柱信息表

| 序号 | 截面宽 | 截面高 | 沿轴偏心 | 偏轴偏心 | 相对转角 |
| --- | --- | --- | --- | --- | --- |
| 柱1 | 700 | 700 | 0 | 0 | 0 |
| 外接柱 | 700 | 700 | 0 | 0 | 0 |

6.设计时执行的规范：

《建筑桩基技术规范》 （JGJ 94－2008） 以下简称 桩基规范

《混凝土结构设计规范》 （GB 50010－2010） 以下简称 混凝土规范

# 二、计算结果

1、桩承载力验算

承台及覆土重:

采用公式：

=±±

= Area×H×γ

= 9.0× 24.0

= 216.0 kN

∑ = 4000000.0 ∑ = 4000000.0

当前荷载组合

| 【5】SATWE标准组合:1.00\*恒-1.00\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4791.4kN =17.6kN.m =8.5kN.m =31.8kN =6.3kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1200.14 | 1254.14 | 满足 |
| 2 | -1000.0 | 1000.0 | 1191.32 | 1245.32 | 满足 |
| 3 | 1000.0 | -1000.0 | 1204.40 | 1258.40 | 满足 |
| 4 | 1000.0 | 1000.0 | 1195.58 | 1249.58 | 满足 |

桩总反力= 5007.4 kN; 桩均反力= 1251.9 kN

当前荷载组合

| 【18】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6387.8kN =-27.6kN.m =9.0kN.m =34.0kN =38.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1587.80 | 1641.80 | 满足 |
| 2 | -1000.0 | 1000.0 | 1601.60 | 1655.60 | 满足 |
| 3 | 1000.0 | -1000.0 | 1592.30 | 1646.30 | 满足 |
| 4 | 1000.0 | 1000.0 | 1606.10 | 1660.10 | 满足 |

桩总反力= 6603.8 kN; 桩均反力= 1650.9 kN

当前荷载组合

| 【44】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6086.6kN =-104.4kN.m =13.6kN.m =36.4kN =93.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1492.17 | 1546.17 | 满足 |
| 2 | -1000.0 | 1000.0 | 1544.35 | 1598.35 | 满足 |
| 3 | 1000.0 | -1000.0 | 1498.95 | 1552.95 | 满足 |
| 4 | 1000.0 | 1000.0 | 1551.13 | 1605.13 | 满足 |

桩总反力= 6302.6 kN; 桩均反力= 1575.7 kN

当前荷载组合

| 【45】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5151.9kN =83.4kN.m =4.0kN.m =29.4kN =-40.8kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1307.81 | 1361.81 | 满足 |
| 2 | -1000.0 | 1000.0 | 1266.13 | 1320.13 | 满足 |
| 3 | 1000.0 | -1000.0 | 1309.81 | 1363.81 | 满足 |
| 4 | 1000.0 | 1000.0 | 1268.13 | 1322.13 | 满足 |

桩总反力= 5367.9 kN; 桩均反力= 1342.0 kN

2、承台内力配筋计算

当前荷载组合

| 【54】SATWE基本组合:1.20\*恒+1.40\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7830.6kN =-13.5kN.m =10.8kN.m =41.2kN =32.8kN

承台及覆土重:

= 216.0×1.20= 259.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1951.57 | 2016.37 |
| 2 | -1000.0 | 1000.0 | 1958.33 | 2023.13 |
| 3 | 1000.0 | -1000.0 | 1956.96 | 2021.76 |
| 4 | 1000.0 | 1000.0 | 1963.72 | 2028.52 |

桩总反力= 8089.8 kN; 桩均反力= 2022.4 kN

台阶1 H = 900.00 mm

a、角桩冲切计算：

采用“桩基规范”5.9.8条,公式如下：

≤[

=, =

角桩No.=1

角桩冲切不足，增加承台台阶高度。

新台阶高: 1000.00 mm

= 450. =0.47 = 700.

= 450. =0.47 = 700.

= 950. =0.8312 = 0.831 =0.98 = 1.433

=[( +/2)+ (+/2)]

= 2058.45 kN > = 1951.57(×1.00) kN

角桩No.=2

= 450. =0.47 = 700.

= 450. =0.47 = 700.

= 950. =0.8312 = 0.831 =0.98 = 1.433

=[( +/2)+ (+/2)]

= 2058.45 kN > = 1956.96(×1.00) kN

角桩No.=3

= 450. =0.47 = 700.

= 450. =0.47 = 700.

= 950. =0.8312 = 0.831 =0.98 = 1.433

=[( +/2)+ (+/2)]

= 2058.45 kN > = 1963.72(×1.00) kN

角桩No.=4

= 450. =0.47 = 700.

= 450. =0.47 = 700.

= 950. =0.8312 = 0.831 =0.98 = 1.433

=[( +/2)+ (+/2)]

= 2058.45 kN > = 1958.33(×1.00) kN

b、柱冲切计算：

采用“桩基规范”5.9.7条,公式如下：

≤2[

=, =

柱冲切不足,增加承台台阶高度。

新台阶高: 1050.00 mm

截面净高=1000.mm

X正方向:= 450. =0.450

X负方向:= 450. =0.450

Y正方向:= 450. =0.450

Y负方向:= 450. =0.450

= 700. = 700. = 1.29 = 1.29 = 1.43 =0.979

=2[( + ) + ( + )]

= 8340.53 kN > = 7830.57 × 1.00 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

抗剪计算不足,增加承台台阶高度

新台阶高: 1100.00 mm

=1050. = 802. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3909.89 (\* 1.00) kN

2、右侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3920.68 (\* 1.00) kN

3、下侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3908.53 (\* 1.00) kN

4、上侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3922.04 (\* 1.00) kN

承台阶梯高度：

1阶高： 500mm

当前荷载组合

| 【55】SATWE基本组合:1.35\*恒+0.98\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=8000.6kN =-14.5kN.m =12.0kN.m =45.0kN =36.0kN

承台及覆土重:

= 216.0×1.35= 291.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1993.52 | 2066.42 |
| 2 | -1000.0 | 1000.0 | 2000.79 | 2073.69 |
| 3 | 1000.0 | -1000.0 | 1999.50 | 2072.40 |
| 4 | 1000.0 | 1000.0 | 2006.77 | 2079.67 |

桩总反力= 8292.2 kN; 桩均反力= 2073.0 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

=1050. = 802. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3994.31 (\* 1.00) kN

2、右侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 4006.27 (\* 1.00) kN

3、下侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3993.03 (\* 1.00) kN

4、上侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 4007.55 (\* 1.00) kN

承台阶梯高度：

1阶高： 500mm

3、承台板抗弯计算

X方向配筋计算：

= 2596.30\*1.00= 2596.30 X = -350. H = 1050.

= /(0.9\*\*)/YS = 2596.30/(0.9\*1050.0\*360.0)/3.0= 2543.9 /m

= 2604.07\*1.00= 2604.07 X = 350. H = 1050.

= /(0.9\*\*)/YS = 2604.07/(0.9\*1050.0\*360.0)/3.0= 2551.5 /m

= 2604.07\*1.00= 2604.07 X = 350. H = 1050.

= /(0.9\*\*)/YS = 2604.07/(0.9\*1050.0\*360.0)/3.0= 2551.5 /m

Y方向配筋计算：

= 2595.47\*1.00= 2595.47 Y = -350. H = 1050.

= /(0.9\*\*)/XS = 2595.47/(0.9\*1050.0\*360.0)/3.0= 2543.1 /m

= 2604.91\*1.00= 2604.91 Y = 350. H = 1050.

= /(0.9\*\*)/XS = 2604.91/(0.9\*1050.0\*360.0)/3.0= 2552.3 /m

= 2604.91\*1.00= 2604.91 Y = 350. H = 1050.

= /(0.9\*\*)/XS = 2604.91/(0.9\*1050.0\*360.0)/3.0= 2552.3 /m

计算的钢筋面积：

= 2552./m = 2552./m

# 三、结果汇总

标准组合下桩反力:

最大最小桩反力及对应的标准组合

| 桩号 | 最大反力（非震）(Load) | 最小反力（非震）(Load) | 最大反力（震）(Load) | 最小反力（震）(Load) |
| --- | --- | --- | --- | --- |
| 1 | 1641.80 (18) | 1254.14 (5) | 1546.17 (44) | 1361.81 (45) |
| 2 | 1655.60 (18) | 1245.32 (5) | 1598.35 (44) | 1320.13 (45) |
| 3 | 1646.30 (18) | 1258.40 (5) | 1552.95 (44) | 1363.81 (45) |
| 4 | 1660.10 (18) | 1249.58 (5) | 1605.13 (44) | 1322.13 (45) |

桩平均反力最大值1650.95 (非震)(Load 18)

桩平均反力最小值1251.86 (非震)(Load 5)

桩平均反力最大值1575.65 (震)(Load 44)

桩平均反力最小值1341.97 (震)(Load 45)

基本组合下承台冲切、剪切、配筋计算:

角桩冲切计算：

桩 1: 抗力2058.45 kN 冲切力1951.57 kN ：950 mm (Load:54) H+

桩 2: 抗力2058.45 kN 冲切力1956.96 kN ：950 mm (Load:54)

桩 3: 抗力2058.45 kN 冲切力1963.72 kN ：950 mm (Load:54)

桩 4: 抗力2058.45 kN 冲切力1958.33 kN ：950 mm (Load:54)

抗剪计算：

1左边： 抗力4034.22kN 剪力3909.89kN ：1050mm (Load:54) H+

2右边： 抗力4034.22kN 剪力4006.27kN ：1050mm (Load:55)

3上边： 抗力4034.22kN 剪力3993.03kN ：1050mm (Load:55)

4下边： 抗力4034.22kN 剪力4007.55kN ：1050mm (Load:55)

承台高度：

承台高500

底板配筋计算：

X方向：弯矩2604.07 kN.m 计算钢筋面积2552 /m Load： 55

Y方向：弯矩2604.91 kN.m 计算钢筋面积2552 /m Load： 55