桩承台计算\_序号27

# 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 | 0 | 1983 |
| 2 | 1414 | 569 |
| 3 | 2828 | -845 |
| 4 | -1414 | 569 |
| 5 | 0 | -845 |
| 6 | -2828 | -845 |

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 | 2 | 300 | -988 | -2868 | 90 |
| 柱2 | 100 | 100 | 383 | 1475 | 0 |
| 外接柱 | 2685 | 2513 | 1675 | 268 | 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

= 0.0× 24.0

= 0.0 kN

∑ = 19999998.0 ∑ = 6723858.5

当前荷载组合

| 【3】SATWE标准组合:1.00\*恒-1.00\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6905.8kN =-5479.7kN.m =7401.1kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 2568.38 | 2568.38 | 满足 |
| 2 | 1414.2 | 569.0 | 2080.99 | 2080.99 | 满足 |
| 3 | 2828.4 | -845.2 | 1593.60 | 1593.60 | 满足 |
| 4 | -1414.2 | 569.0 | 1034.31 | 1034.31 | 满足 |
| 5 | 0.0 | -845.2 | 546.92 | 546.92 | 满足 |
| 6 | -2828.4 | -845.2 | -499.76 | -499.76 | >R |

桩总反力= 7324.5 kN; 桩均反力= 1220.7 kN

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当前荷载组合

| 【13】SATWE标准组合:1.00\*恒-1.00\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6993.4kN =-5383.8kN.m =7661.8kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 2552.18 | 2552.18 | 满足 |
| 2 | 1414.2 | 569.0 | 2105.20 | 2105.20 | 满足 |
| 3 | 2828.4 | -845.2 | 1658.21 | 1658.21 | 满足 |
| 4 | -1414.2 | 569.0 | 1021.65 | 1021.65 | 满足 |
| 5 | 0.0 | -845.2 | 574.66 | 574.66 | 满足 |
| 6 | -2828.4 | -845.2 | -508.89 | -508.89 | >R |

桩总反力= 7403.0 kN; 桩均反力= 1233.8 kN

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当前荷载组合

| 【14】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=9815.1kN =-7013.1kN.m =11300.5kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 3421.76 | 3421.76 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 2947.33 | 2947.33 | 满足 |
| 3 | 2828.4 | -845.2 | 2472.90 | 2472.90 | 满足 |
| 4 | -1414.2 | 569.0 | 1349.20 | 1349.20 | 满足 |
| 5 | 0.0 | -845.2 | 874.77 | 874.77 | 满足 |
| 6 | -2828.4 | -845.2 | -723.36 | -723.36 | >R |

桩总反力= 10342.6 kN; 桩均反力= 1723.8 kN

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当前荷载组合

| 【16】SATWE标准组合:1.00\*恒+1.00\*风x+0.70\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=9666.1kN =-6748.7kN.m =11288.2kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 3323.22 | 3323.22 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 2900.48 | 2900.48 | 满足 |
| 3 | 2828.4 | -845.2 | 2477.73 | 2477.73 | 满足 |
| 4 | -1414.2 | 569.0 | 1304.09 | 1304.09 | 满足 |
| 5 | 0.0 | -845.2 | 881.34 | 881.34 | 满足 |
| 6 | -2828.4 | -845.2 | -715.04 | -715.04 | >R |

桩总反力= 10171.8 kN; 桩均反力= 1695.3 kN

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当前荷载组合

| 【34】SATWE标准组合:1.00\*恒+1.00\*活+0.60\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=9762.5kN =-7070.6kN.m =11144.1kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 3431.48 | 3431.48 | >1.2×Ra |
| 2 | 1414.2 | 569.0 | 2932.80 | 2932.80 | 满足 |
| 3 | 2828.4 | -845.2 | 2434.13 | 2434.13 | 满足 |
| 4 | -1414.2 | 569.0 | 1356.80 | 1356.80 | 满足 |
| 5 | 0.0 | -845.2 | 858.13 | 858.13 | 满足 |
| 6 | -2828.4 | -845.2 | -717.88 | -717.88 | >R |

桩总反力= 10295.5 kN; 桩均反力= 1715.9 kN

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当前荷载组合

| 【42】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风x+1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=12607.2kN =-7169.0kN.m =16369.1kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 3852.68 | 3852.68 | >1.5×Ra |
| 2 | 1414.2 | 569.0 | 3761.20 | 3761.20 | >1.5×Ra |
| 3 | 2828.4 | -845.2 | 3669.73 | 3669.73 | 满足 |
| 4 | -1414.2 | 569.0 | 1446.27 | 1446.27 | 满足 |
| 5 | 0.0 | -845.2 | 1354.79 | 1354.79 | 满足 |
| 6 | -2828.4 | -845.2 | -960.14 | -960.14 | >R |

桩总反力= 13124.5 kN; 桩均反力= 2187.4 kN

> 1.2\*

当前荷载组合

| 【43】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风x-1.00\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4442.7kN =-5412.7kN.m =2858.7kN.m =0.0kN =0.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 2209.04 | 2209.04 | 满足 |
| 2 | 1414.2 | 569.0 | 1363.95 | 1363.95 | 满足 |
| 3 | 2828.4 | -845.2 | 518.87 | 518.87 | 满足 |
| 4 | -1414.2 | 569.0 | 959.68 | 959.68 | 满足 |
| 5 | 0.0 | -845.2 | 114.60 | 114.60 | 满足 |
| 6 | -2828.4 | -845.2 | -289.68 | -289.68 | >R |

桩总反力= 4876.5 kN; 桩均反力= 812.7 kN

> 1.2\*

2、承台内力配筋计算

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=11994.6kN =-8851.9kN.m =13526.1kN.m =0.0kN =0.0kN

承台及覆土重:

= 0.0×1.35= 0.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 4264.61 | 4264.61 |
| 2 | 1414.2 | 569.0 | 3605.57 | 3605.57 |
| 3 | 2828.4 | -845.2 | 2946.53 | 2946.53 |
| 4 | -1414.2 | 569.0 | 1692.68 | 1692.68 |
| 5 | 0.0 | -845.2 | 1033.64 | 1033.64 |
| 6 | -2828.4 | -845.2 | -879.25 | -879.25 |

桩总反力= 12663.8 kN; 桩均反力= 2110.6 kN

台阶1 H = 1500.00 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: 1550.00 mm

= 132. =0.25 = 200.

= 1500. =1.00 = 907.

= 1500. =1.2444 = 0.467 =0.94 = 1.433

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

= 4405.66 kN > = 4264.61(×1.00) kN

角桩No.=4

= 132. =0.25 = 200.

= 479. =0.32 = 1045.

= 1500. =1.2444 = 1.078 =0.94 = 1.433

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

= 3800.08 kN > = 1033.64(×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

=1500. =-198. =0.250

= [1.75/(+1.0)]

=0.855\*[1.75/(0.250+1.0)]\*5028.\*1500.\*1.4329\*1.e-3

= 12929.6 kN

> = 6111.69 (\* 1.00) kN

2、右侧抗剪计算

3、下侧抗剪计算

4、上侧抗剪计算

=1500. = 258. =0.250

= [1.75/(+1.0)]

=0.855\*[1.75/(0.250+1.0)]\*6994.\*1500.\*1.4329\*1.e-3

= 17984.5 kN

> = 4264.61 (\* 1.00) kN

承台阶梯高度：

1阶高： 950mm

3、承台板抗弯计算

X方向配筋计算：

= 1936.01\*1.00= 1936.01 X = 332. H = 1500.

= /(0.9\*\*)/YS = 1936.01/(0.9\*1500.0\*360.0)/5.7= 704.2 /m

= 1855.02\*1.00= 1855.02 X = 433. H = 1500.

= /(0.9\*\*)/YS = 1855.02/(0.9\*1500.0\*360.0)/5.7= 674.7 /m

Y方向配筋计算：

= 1954.26\*1.00= 1954.26 Y = 1525. H = 1500.

= /(0.9\*\*)/XS = 1954.26/(0.9\*1500.0\*360.0)/8.1= 498.2 /m

= 1954.26\*1.00= 1954.26 Y = 1525. H = 1500.

= /(0.9\*\*)/XS = 1954.26/(0.9\*1500.0\*360.0)/8.1= 498.2 /m

计算的钢筋面积：

= 704./m = 498./m

当前荷载组合

| 【88】SATWE基本组合:1.20\*恒+1.40\*活+0.84\*风y右 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=12121.8kN =-8758.5kN.m =13858.4kN.m =0.0kN =0.0kN

承台及覆土重:

= 0.0×1.20= 0.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 4254.60 | 4254.60 |
| 2 | 1414.2 | 569.0 | 3641.31 | 3641.31 |
| 3 | 2828.4 | -845.2 | 3028.02 | 3028.02 |
| 4 | -1414.2 | 569.0 | 1681.44 | 1681.44 |
| 5 | 0.0 | -845.2 | 1068.14 | 1068.14 |
| 6 | -2828.4 | -845.2 | -891.73 | -891.73 |

桩总反力= 12781.8 kN; 桩均反力= 2130.3 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

=1500. =-198. =0.250

= [1.75/(+1.0)]

=0.855\*[1.75/(0.250+1.0)]\*5028.\*1500.\*1.4329\*1.e-3

= 12929.6 kN

> = 6112.45 (\* 1.00) kN

2、右侧抗剪计算

3、下侧抗剪计算

4、上侧抗剪计算

=1500. = 258. =0.250

= [1.75/(+1.0)]

=0.855\*[1.75/(0.250+1.0)]\*6994.\*1500.\*1.4329\*1.e-3

= 17984.5 kN

> = 4254.60 (\* 1.00) kN

承台阶梯高度：

1阶高： 950mm

当前荷载组合

| 【96】SATWE基本组合:1.20\*恒+0.60\*活+0.20\*风x+1.30\*地x |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=15487.5kN =-8677.2kN.m =20239.5kN.m =0.0kN =0.0kN

承台及覆土重:

= 0.0×1.20= 0.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 1983.2 | 4694.66 | 4694.66 |
| 2 | 1414.2 | 569.0 | 4618.78 | 4618.78 |
| 3 | 2828.4 | -845.2 | 4542.90 | 4542.90 |
| 4 | -1414.2 | 569.0 | 1756.49 | 1756.49 |
| 5 | 0.0 | -845.2 | 1680.60 | 1680.60 |
| 6 | -2828.4 | -845.2 | -1181.69 | -1181.69 |

桩总反力= 16111.7 kN; 桩均反力= 2685.3 kN

台阶1 H = 1550.00 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

= 132. =0.25 = 200.

= 1500. =1.00 = 907.

= 1500. =1.2444 = 0.467 =0.94 = 1.433

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

= 4405.66 kN > = 4694.66(×0.85) kN

角桩No.=4

= 132. =0.25 = 200.

= 479. =0.32 = 1045.

= 1500. =1.2444 = 1.078 =0.94 = 1.433

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

= 3800.08 kN > = 1680.60(×0.85) kN

# 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 | 3431.48 (34) | 2552.18 (13) | 3852.68 (42) | 2209.04 (43) |
| 2 | 2947.33 (14) | 2080.99 (3) | 3761.20 (42) | 1363.95 (43) |
| 3 | 2477.73 (16) | 1593.60 (3) | 3669.73 (42) | 518.87 (43) |
| 4 | 1356.80 (34) | 1021.65 (13) | 1446.27 (42) | 959.68 (43) |
| 5 | 881.34 (16) | 546.92 (3) | 1354.79 (42) | 114.60 (43) |
| 6 | -499.76 (3) | -723.36 (14) | -289.68 (43) | -960.14 (42) |

桩平均反力最大值1635.85 (非震)(Load 14)

桩平均反力最小值1150.97 (非震)(Load 3)

桩平均反力最大值2101.20 (震)(Load 42)

桩平均反力最小值740.45 (震)(Load 43)

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4405.66 kN 冲切力4264.61 kN ：1500 mm (Load:55) H+

桩 4: 抗力3800.08 kN 冲切力1428.51 kN ：1500 mm (Load:96)

抗剪计算：

1左边： 抗力12929.58kN 剪力6112.45kN ：1500mm (Load:88)

4下边： 抗力17984.52kN 剪力4264.61kN ：1500mm (Load:55)

承台高度：

承台高950

底板配筋计算：

X方向：弯矩1936.01 kN.m 计算钢筋面积704 /m Load： 55

Y方向：弯矩1954.26 kN.m 计算钢筋面积498 /m Load： 55