桩承台计算\_序号105

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：1100mm

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 | 866 |
| 2 | -750 | -433 |
| 3 | 750 | -433 |

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

= 6.3× 24.0

= 151.1 kN

∑ = 1125000.0 ∑ = 1125000.0

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=4785.2kN =95.1kN.m =-24.0kN.m =-16.3kN =-51.0kN

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 | 866.0 | 1521.89 | 1572.27 | 满足 |
| 2 | -750.0 | -433.0 | 1647.64 | 1698.03 | 满足 |
| 3 | 750.0 | -433.0 | 1615.70 | 1666.08 | 满足 |

桩总反力= 4936.4 kN; 桩均反力= 1645.5 kN

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=4790.9kN =80.3kN.m =-40.8kN.m =-21.8kN =-46.5kN

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 | 866.0 | 1535.20 | 1585.58 | 满足 |
| 2 | -750.0 | -433.0 | 1655.10 | 1705.48 | 满足 |
| 3 | 750.0 | -433.0 | 1600.64 | 1651.02 | 满足 |

桩总反力= 4942.1 kN; 桩均反力= 1647.4 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=6355.8kN =47.2kN.m =-31.1kN.m =-21.5kN =-41.9kN

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 | 866.0 | 2082.28 | 2132.67 | 满足 |
| 2 | -750.0 | -433.0 | 2157.54 | 2207.92 | 满足 |
| 3 | 750.0 | -433.0 | 2116.01 | 2166.39 | 满足 |

桩总反力= 6507.0 kN; 桩均反力= 2169.0 kN

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=6352.4kN =56.1kN.m =-21.0kN.m =-18.2kN =-44.6kN

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 | 866.0 | 2074.30 | 2124.68 | 满足 |
| 2 | -750.0 | -433.0 | 2153.06 | 2203.45 | 满足 |
| 3 | 750.0 | -433.0 | 2125.04 | 2175.42 | 满足 |

桩总反力= 6503.6 kN; 桩均反力= 2167.9 kN

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=6062.6kN =47.3kN.m =105.0kN.m =22.6kN =-38.2kN

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 | 866.0 | 1984.44 | 2034.82 | 满足 |
| 2 | -750.0 | -433.0 | 1969.08 | 2019.47 | 满足 |
| 3 | 750.0 | -433.0 | 2109.09 | 2159.48 | 满足 |

桩总反力= 6213.8 kN; 桩均反力= 2071.3 kN

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=5146.0kN =79.0kN.m =-160.6kN.m =-60.9kN =-49.7kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1654.53 | 1704.91 | 满足 |
| 2 | -750.0 | -433.0 | 1852.81 | 1903.19 | 满足 |
| 3 | 750.0 | -433.0 | 1638.65 | 1689.04 | 满足 |

桩总反力= 5297.1 kN; 桩均反力= 1765.7 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=6106.8kN =-65.9kN.m =-36.0kN.m =-23.0kN =-3.5kN

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 | 866.0 | 2086.32 | 2136.70 | 满足 |
| 2 | -750.0 | -433.0 | 2034.22 | 2084.61 | 满足 |
| 3 | 750.0 | -433.0 | 1986.27 | 2036.65 | 满足 |

桩总反力= 6258.0 kN; 桩均反力= 2086.0 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=5101.8kN =192.2kN.m =-19.6kN.m =-15.2kN =-84.4kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 1552.64 | 1603.02 | 满足 |
| 2 | -750.0 | -433.0 | 1787.67 | 1838.05 | 满足 |
| 3 | 750.0 | -433.0 | 1761.48 | 1811.86 | 满足 |

桩总反力= 5252.9 kN; 桩均反力= 1751.0 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=7765.5kN =88.5kN.m =-37.5kN.m =-25.8kN =-61.4kN

承台及覆土重:

= 151.1×1.20= 181.4

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 2520.38 | 2580.84 |
| 2 | -750.0 | -433.0 | 2647.58 | 2708.04 |
| 3 | 750.0 | -433.0 | 2597.56 | 2658.02 |

桩总反力= 7946.9 kN; 桩均反力= 2649.0 kN

a、角桩冲切

= 1050. = 200. =0.25 = 1499. =1.24

= 1050. = 274. =0.26 = 1472. =1.22

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3370.56 kN

> = 2647.58×1.00 kN

上部：

= (2+)×tan(/2)

= 1.22×(2× 1499.+ 274.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3312.91 kN

> = 2647.58×1.00 kN

b、抗剪切计算

承台高度 HCD= 1100.

左侧：

= 1050. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.25+1.0)\* 2698.\* 1050.\*1.4329\*1.e-3

= 5308.79

> = 2647.58 (\* 1.00) kN

承台高度 HCD= 1100.00

上侧：

= 1050. = 316. =0.30

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.30+1.0)\* 2145.\* 1050.\*1.4329\*1.e-3

= 4056.35

> = 2647.58 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2647.58 = 1500. c = 700.

M = (-0.433\*c)/3 = 1056.30 kN.m

= 3104.93

= 833.

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=7962.4kN =90.1kN.m =-39.1kN.m =-26.9kN =-62.6kN

承台及覆土重:

= 151.1×1.35= 204.0

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | 0.0 | 866.0 | 2584.78 | 2652.80 |
| 2 | -750.0 | -433.0 | 2714.91 | 2782.93 |
| 3 | 750.0 | -433.0 | 2662.75 | 2730.77 |

桩总反力= 8166.5 kN; 桩均反力= 2722.2 kN

a、角桩冲切

= 1050. = 200. =0.25 = 1499. =1.24

= 1050. = 274. =0.26 = 1472. =1.22

下部：

= (2+)tan(/2)

= 1.24×(2× 1499.+ 200.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3370.56 kN

> = 2714.91×1.00 kN

上部：

= (2+)×tan(/2)

= 1.22×(2× 1499.+ 274.)×tan(1.05/2)×0.9750\* 1.433× 1050.×1e-3

= 3312.91 kN

> = 2714.91×1.00 kN

b、抗剪切计算

承台高度 HCD= 1100.

左侧：

= 1050. = 200. =0.25

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.25+1.0)\* 2698.\* 1050.\*1.4329\*1.e-3

= 5308.79

> = 2714.91 (\* 1.00) kN

承台高度 HCD= 1100.00

上侧：

= 1050. = 316. =0.30

= \*1.75/(λ+1.0)\*\*\*\*1.E-3

= 0.93\*1.75/(0.30+1.0)\* 2145.\* 1050.\*1.4329\*1.e-3

= 4056.35

> = 2714.91 (\* 1.00) kN

抗剪切承载力 下截面 免校核

承台阶梯高度：

1阶高： 1100mm

c、承台板配筋计算

=2714.91 = 1500. c = 700.

M = (-0.433\*c)/3 = 1083.16 kN.m

= 3183.89

= 833.

# 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 | 2132.67 (18) | 1572.27 (5) | 2136.70 (44) | 1603.02 (45) |
| 2 | 2207.92 (18) | 1698.03 (5) | 2084.61 (44) | 1838.05 (45) |
| 3 | 2175.42 (34) | 1651.02 (13) | 2159.48 (42) | 1689.04 (43) |

桩平均反力最大值2168.99 (非震)(Load 18)

桩平均反力最小值1645.46 (非震)(Load 5)

桩平均反力最大值2085.99 (震)(Load 44)

桩平均反力最小值1750.98 (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3370.56 kN 冲切力2714.91 kN ：1050 mm (Load:55)

桩 2: 抗力3312.91 kN 冲切力2714.91 kN ：1050 mm (Load:55)

抗剪计算：

1左边： 抗力5308.79kN 剪力2714.91kN ：1050mm (Load:55)

2上边： 抗力4056.35kN 剪力2714.91kN ：1050mm (Load:55)

承台高度：

承台高1100

底板配筋计算：

弯矩1083.16 kN.m 计算钢筋面积3184 Load： 55

配筋宽度833 mm

每边受弯筋 AS= 3184. 钢筋级别: HRB400