## 7. RECOMMENDATIONS

The proposed structure may be provided with [1] shallow foundations [rectangular or square] or [2] under-reamed piles. The net allowable bearing pressure of a footing and safe capacities of under-reamed piles of any size and depth may be calculated by standard methods using the relevant BIS Code and soil properties reported herein.

The subsoil up to 3.5 m is soft. Hence the bearing capacity of shallow foundation up to 3 m depth is not likely to give desirable capacity and may not be economical.

The values of bearing pressures / safe capacities of [1] shallow foundations, [2] under-reamed piles of certain sizes and depths have been calculated [vide sample of Calculation in **Appendix - F**] and are given below in Tables [1] and [2] respectively.

**Table 1: Allowable Net Bearing Pressures [ $q_{na}$ ] and Settlements Expected [s]**

| Depth (m) | Width (m) | Net allowable bearing pressure ($t/m^2$) for | | Maximum expected settlement (mm) |
|---|---|---|---|---|
| | | Rectangular footing * | Square footing | |
| 2.0 | 1.0 | 6.3 | 6.9 | 75 |
| | 1.5 | 5.7 | 6.2 | 75 |
| | 2.0 | 5.4 | 5.9 | 75 |
| 2.5 | 1.0 | 7.1 | 7.8 | 75 |
| | 1.5 | 6.3 | 6.9 | 75 |
| | 2.0 | 6.0 | 6.5 | 75 |

*** Length of rectangular footing = 2 x width.**

**Table 2** is given on the next page.

**Table 2. Lengths of U/R Piles giving**
**Safe Capacities = (i) 8 tonnes & (ii) 11 tonnes or a little more.**
(Based upon average values of cohesions of soil layers.)
**[ Bulb diameter = 2.5 times the shaft diameter]**

| Pile length below pile Cap (m) | Stem diameter (m) | Bulb diameter (m) | Number of bulbs | Safe Pile Capacity [tonnes] |
|---|---|---|---|---|
| 5.0 | 0.25 | 0.63 | 1 | 7.7 |
| 5.0 | 0.25 | 0.63 | 2 | 10.4 |
| 6.0 | 0.25 | 0.63 | 1 | 8.9 |
| 6.0 | 0.25 | 0.63 | 2 | 11.7 |

**Since the above table based on cohesion of the soil does not give adequate value of pile capacities, values based on SPT N values are given in Table 3 below : (IS : 2911 Part III - 1980)**

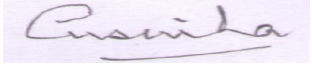
**Table 3. Lengths of U/R Piles giving**
**Safe Capacities = (i) 8 tonnes & (ii) 11 tonnes or a little more.**
(Based on N value.)
**[ Bulb diameter = 2.5 times the shaft diameter]**

| Pile length below pile Cap (m) | Stem diameter (m) | Bulb diameter (m) | Number of bulbs | Safe Pile Capacity [tonnes] |
|---|---|---|---|---|
| 3.5 | 0.25 | 0.63 | 1 | 6.8 |
| 3.5 | 0.25 | 0.63 | 2 | 10.1 |
| 4.0 | 0.25 | 0.63 | 1 | 8 |
| 4.0 | 0.25 | 0.63 | 2 | 11.2 |

**Notes:**

1. If a subsoil condition much different from those reported herein is met with during foundation trenching or piling, suitable steps should be taken.
2. DMC and tremie method of pile concreting should be adopted when the bore holes for the piles are filled with water.
3. Shallow foundations or pile caps should be isolated from the surrounding expansive soil of type CI by layers of compacted local sand.
4. Care should be taken to maintain the verticality and specified dimensions of the piles.
5. As per the provisions of the IS Code, **an appropriate number of piles must be subjected to routine load tests to check the veracity of the above recommended values of the safe capacities of piles.**

For Bihar Foundation Consultants,



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**Chief Consultant.**