

Homework no. 1
Foundation Selection

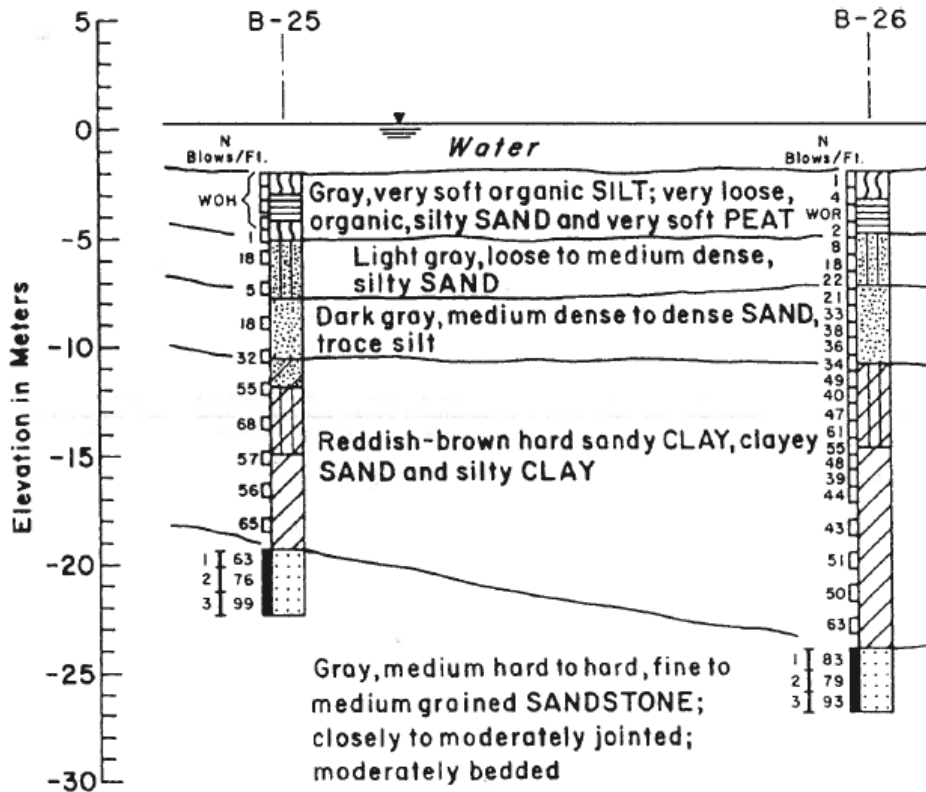
Assigned: Monday, March 12, 2012

Due: Tuesday, March 20, 2012

Note: present your conclusions in a memo style letter with sketches, where needed

Problem 1. Without doing calculations, what foundation type would you expect for a hotel constituted of 10 floors with a usual grid of columns, constructed at each of the following Sites. Explain your choice.

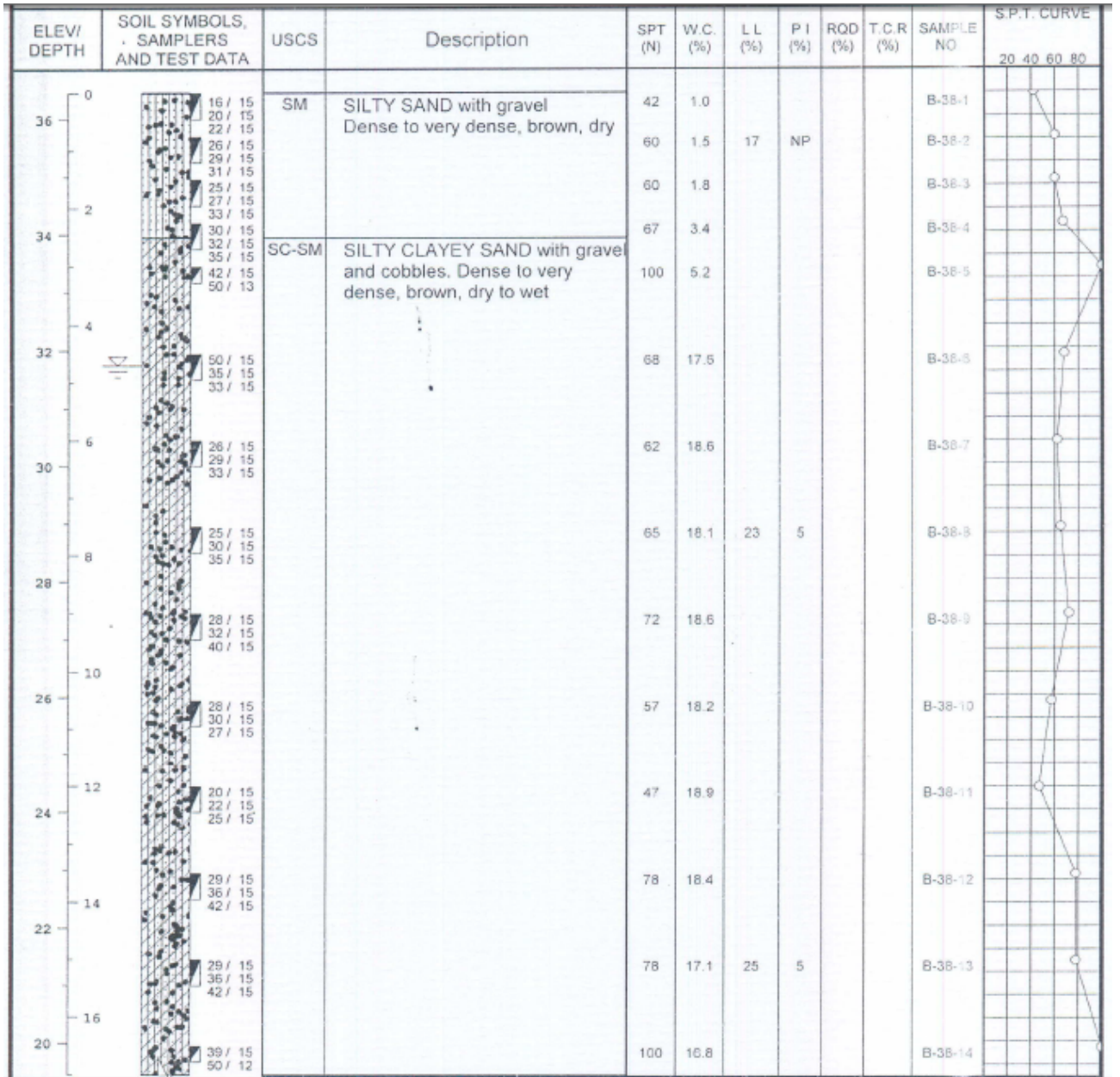
a. Site A: the following boreholes are available.



b. Site B: The following borehole is available.

DEPTH (m)	SAMPLES/ CORE RUNS		SPT Blows for every 0.15m Penetration	DESCRIPTION	SYMBOL	CO ₃ , %	-200, %	UCS, MPa	UDW, kN/m ³ (MC), %	LL (PL), %
	TYPE	No/DEPTH (m)								
1	X	S-1	4/5/5	Loose to medium dense light brown poorly graded SAND with gravel (SP) - silty sand with gravel (SM), 0.0 to 0.75m	0.75					
		S-2	7/7/9							
2	X	S-3	8/7/9	Medium dense to very dense light brown poorly graded GRAVEL with silt and sand (GP-GM)	1.50		7 (2.691)		22 (7.3)	
		S-4	7/8/7							
3	X	S-5	12/14/13							
		S-6	18/26/24- 140mm							
4	X	S-6	18/26/24- 140mm							
		S-7	7/23/25							
6	X	S-8	12/27/23	Dense light brown well graded SAND with silt and gravel (SW-SM)	6.00		9		(9.1)	
		S-9	43/50-60mm							
8	X	S-9	43/50-60mm	Very dense light brown silty SAND with gravel (SM)	7.50					
		S-10	39/50-140mm							
9	X	S-10	39/50-140mm	Very dense light brown poorly graded SAND with silt and gravel (SP-SM)	9.00					
			9.29							

c. Site C: The following borehole is available.



Problem 2. The foundations of a residential building are currently being designed by an Engineering firm. The buildings will be a 12-storey structure with an underground parking basement and will measure 20m by 40m in plan. The building will have a steel frame with brick finish and will be supported on columns spaced at 5m distance on center.

The available geotechnical investigation in the Project area revealed that the subsurface consists of 3m man made fill followed by a soft clay layer 7m thick, underlain by very stiff clay layer of 15m thickness and then Basalt stratum. Ground water table is reported to be at 6m depth below ground level.

Two foundation system types are envisaged for the building:

1- Isolated foundations.

2- Raft Foundation

You have been assigned as a geotechnical consultant on the Project and the following is required from your side:

a- Estimate the column loads.

b- Estimate the average pressure on the raft foundation.

c- Set reasonable criteria for allowable settlements (total and differential settlements and angular distortion) for each foundation alternative.