

Foundation Engineering Design

You are a foundation engineer at a famous multinational environmental engineering design firm. The architect and the structural engineer provided you the plan of a LEED-certified office building for foundation design (Figure 1). The office building would be a three-story building and a sublevel floor for parking garage. You are responsible for designing the foundation that has the dimensions and characteristics shown below and in Table 1. The site profile is illustrated in Figure 2. Assume $f'_c = 3,000$ psf.

Recommend, analyze and justify a cost-competitive foundation design based on your assessment. As a potential partner we will rely on your judgment for information and parameters that are not provided.

Final Deliverables

- A Site Characterization Plan
- A qualitative assessment of alternative designs considered and rationale for design presented
- Actual design of foundation – **Graduate students will prepare two alternate designs**
- Other Considerations - Cost, Site Preparation, Other Advantages of Design – What You Need to Sell YOUR Design

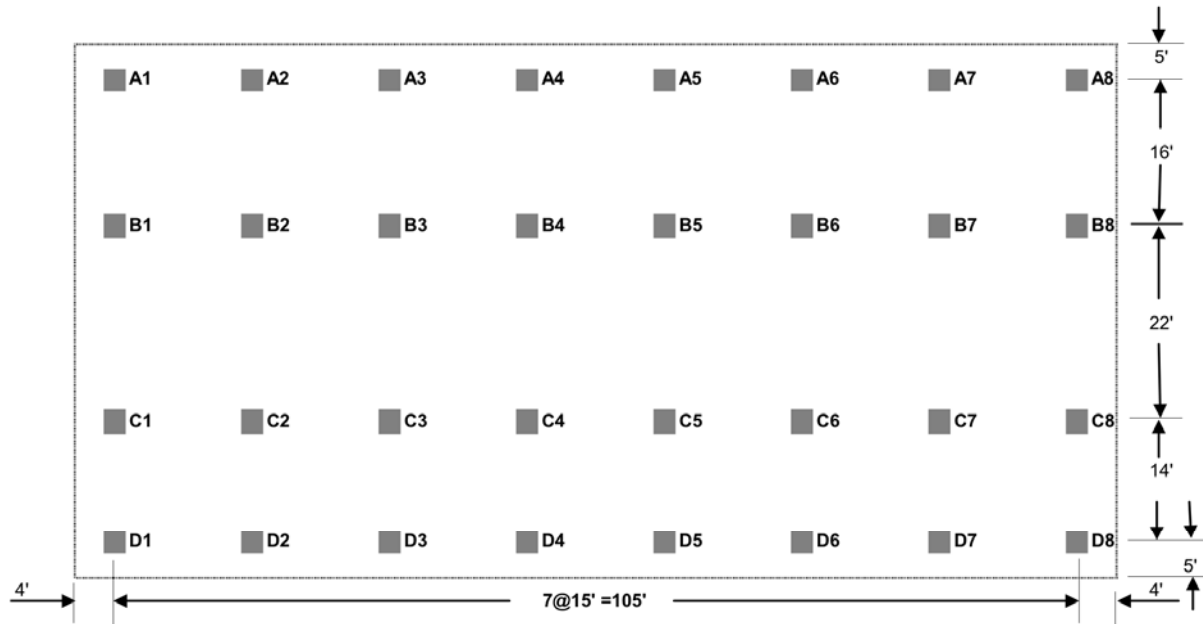
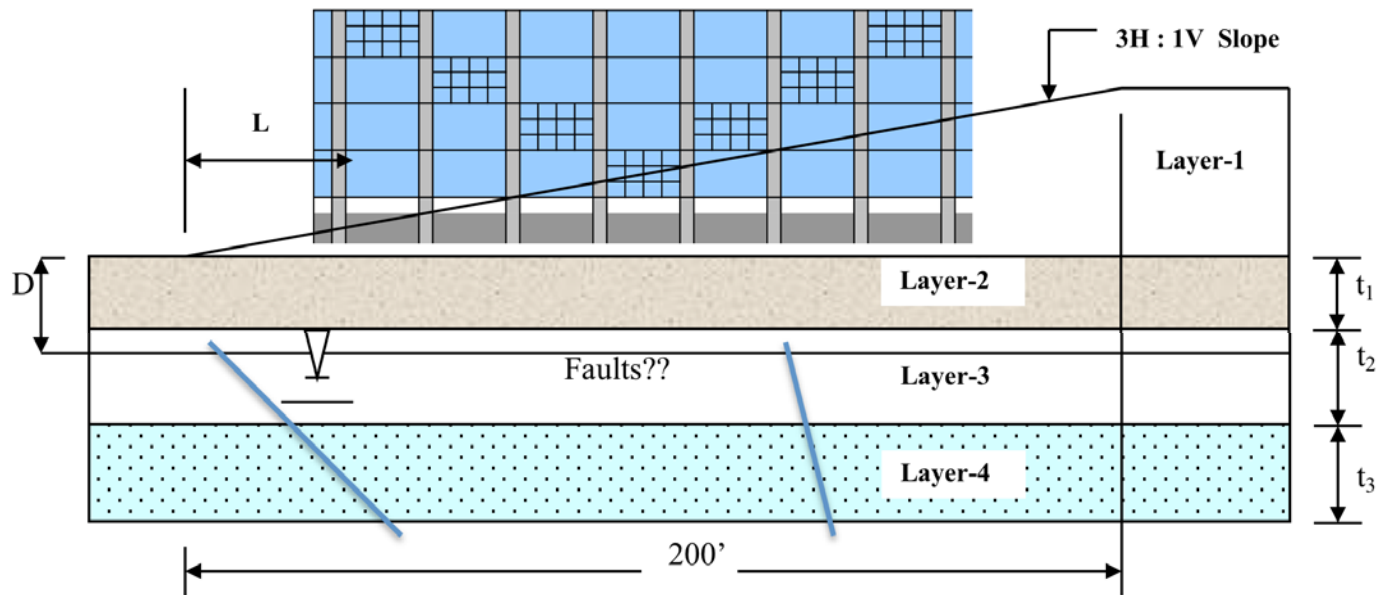


Figure 1: Plan of the Office Building



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Table 1. Load and Size of Each Column

Column	Size (in x in)	Dead Load (kip)	Live Load (kip)	Column	Size (in x in)	Dead Load (kip)	Live Load (kip)
A1	18 x 18	200	120	C1	21 x 24	240	120
A2	18 x 18	250	140	C2	21 x 24	300	160
A3	18 x 18	250	180	C3	21 x 24	290	160
A4	18 x 18	280	200	C4	21 x 24	320	150
A5	18 x 18	280	200	C5	21 x 24	300	150
A6	18 x 18	300	210	C6	21 x 24	280	150
A7	18 x 18	280	180	C7	21 x 24	310	150
A8	18 x 18	280	180	C8	21 x 24	300	120
B1	20 x 26	300	210	D1	18 x 18	270	110
B2	20 x 26	300	210	D2	18 x 18	260	110
B3	20 x 26	320	220	D3	18 x 18	300	110
B4	20 x 26	320	220	D4	18 x 18	300	200
B5	20 x 26	300	210	D5	18 x 18	290	180
B6	20 x 26	280	200	D6	18 x 18	280	160
B7	20 x 26	300	220	D7	18 x 18	290	180
B8	20 x 26	300	200	D8	18 x 18	240	160

The subsurface profile parameter is given in Table 2. L is the length of the parking lot recommended by the architect.

Table 2: Subsurface Profile Parameters

	Thickness (ft)	ϕ (degree)	C_u (psf)	γ (pcf)
Layer 1		30	0	120
Layer 2	7	28	0	114
Layer 3	10	0	600	118
Layer 4	20+	34	0	118
L = 50'	Faults as indicated			
D = 9'				