

## Solved Problem (CE 370)

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**Surveying I (CE 370)**

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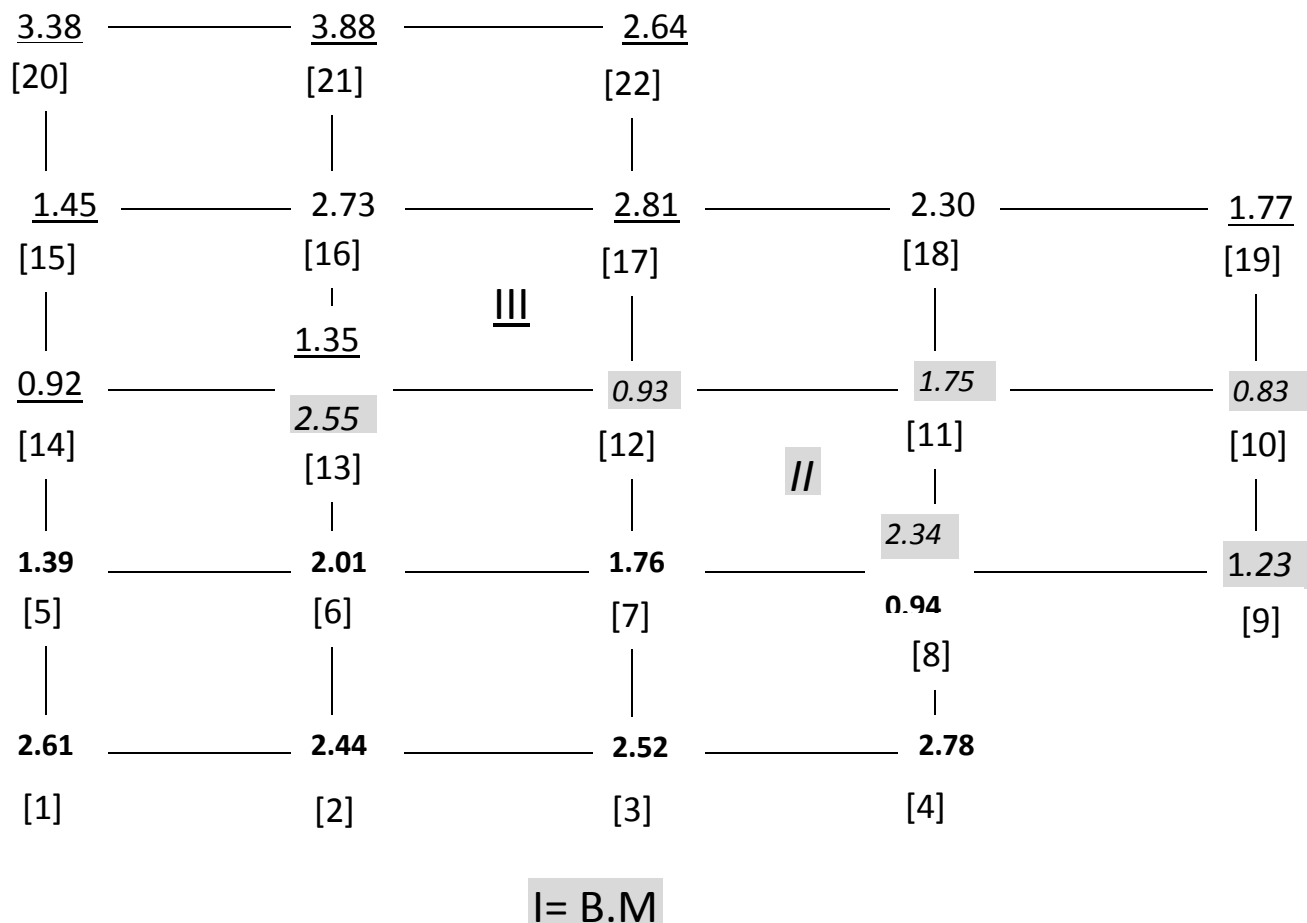
### Problem

In the figure below, if the level stands with height equals 1.48 cm at the bench mark (I) which has an elevation of 18.2 m and the grid level runs as shown in the figure. The rod readings, at each point are:

Readings from Station I= (2.61 - 2.44 - 2.52 - 2.78 - 1.39 - 2.01 - 1.76 - 0.94)

Readings from Station II= (2.34 - 1.23 - 0.83 - 1.75 - 0.93 - 2.55)

Readings from Station III= (1.35 - 0.92 - 1.45 - 2.73 - 2.81 - 2.30 - 1.77 - 3.38 - 3.88 - 2.64).



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- a) Calculate the elevations at all the given points using High of Instrument method. Check your answer.
- b) If the grid area is to be leveled to the lowest elevation. Use the unit area method to find out the volume of earth to be borrowed or removed. Grid spacing is square of 5 x 5 m.
- c) Assume that the density of the soil is 2.64 t/m<sup>3</sup>, calculate the tonnage of the soil.

**Solution :** Calculation of the level of point 1

$$Z_1 = \text{BM} + \text{T.A.H} - \text{T.H}$$

$$Z_1 = 18.2 + 1.48 - 2.61 = 17.07 \text{ m}$$

Station	BS	IS	FS	HI	R.L	Remark
P1	2.61			19.680	17.070	BM
P2		2.44			17.240	
P3		2.52			17.160	
P4		2.78			16.900	
P5		1.39			18.290	
P6		2.01			17.670	
P7		1.76			17.920	
P8	2.34		0.94	21.080	18.740	C.P
P9		1.23			19.850	
P10		0.83			20.250	
P11		1.75			19.330	
P12		0.93			20.150	
P13	1.35		2.55	19.880	18.530	C.P
P14		0.92			18.960	
P15		1.45			18.430	
P16		2.73			17.150	
P17		2.81			17.070	
P18		2.3			17.580	
P19		1.77			18.110	
P20		3.38			16.500	
P21		3.88			16.000	
P22			2.64		17.240	
sum	6.3		6.13			

Check

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No. of BS = No. of FS = 3  
 sum of BS- sum of FS = RL of last point - RL of first point  
 $6.3 - 6.13 = 17.24 - 17.07 = -0.17$   
 0.17  
 0.170

Point	Elev.		C	O	C X O
1	17.07	16	1.07	1	1.07
2	17.24	16	1.24	2	2.48
3	17.16	16	1.16	2	2.32
4	16.9	16	0.9	1	0.9
5	18.29	16	2.29	2	4.58
6	17.67	16	1.67	4	6.68
7	17.92	16	1.92	4	7.68
8	18.74	16	2.74	3	8.22
9	19.85	16	3.85	1	3.85
10	20.25	16	4.25	2	8.5
11	19.33	16	3.33	4	13.32
12	20.15	16	4.15	4	16.6
13	18.53	16	2.53	4	10.12
14	18.96	16	2.96	2	5.92
15	18.43	16	2.43	2	4.86
16	17.15	16	1.15	4	4.6
17	17.07	16	1.07	3	3.21
18	17.58	16	1.58	2	3.16
19	18.11	16	2.11	1	2.11
20	16.5	16	0.5	1	0.5
21	16	16	0	2	0
22	17.24	16	1.24	1	1.24
SUM					111.92

699.5  
1846.68

m3  
 ton

Volume =  $0.25 * 25 * 111.92$   
 tonnage = vol. 2.64

Good luck

Dr. SaMeH