

Chapter 11

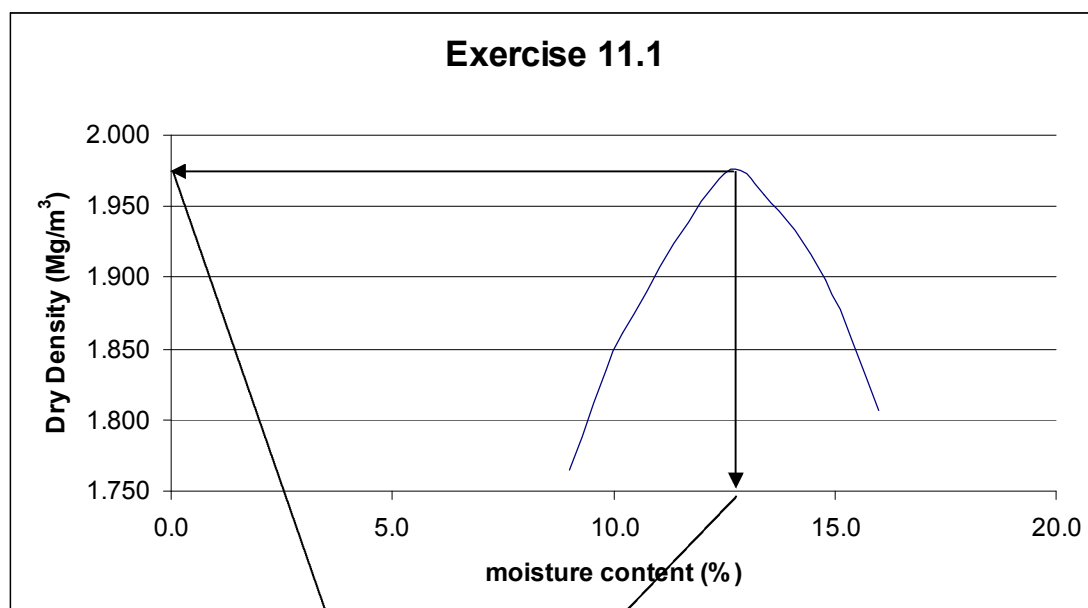
Solutions to Exercises

Exercise 11.1

See spreadsheet "exercise_11.1.xls" for solution.

m/c (%)	9.0	10.2	12.5	13.4	14.8	16.0
bulk density (Mg/m ³)	1.923	2.051	2.220	2.220	2.179	2.096
dry density (Mg/m ³)	1.764	1.861	1.973	1.958	1.898	1.807

Plot:



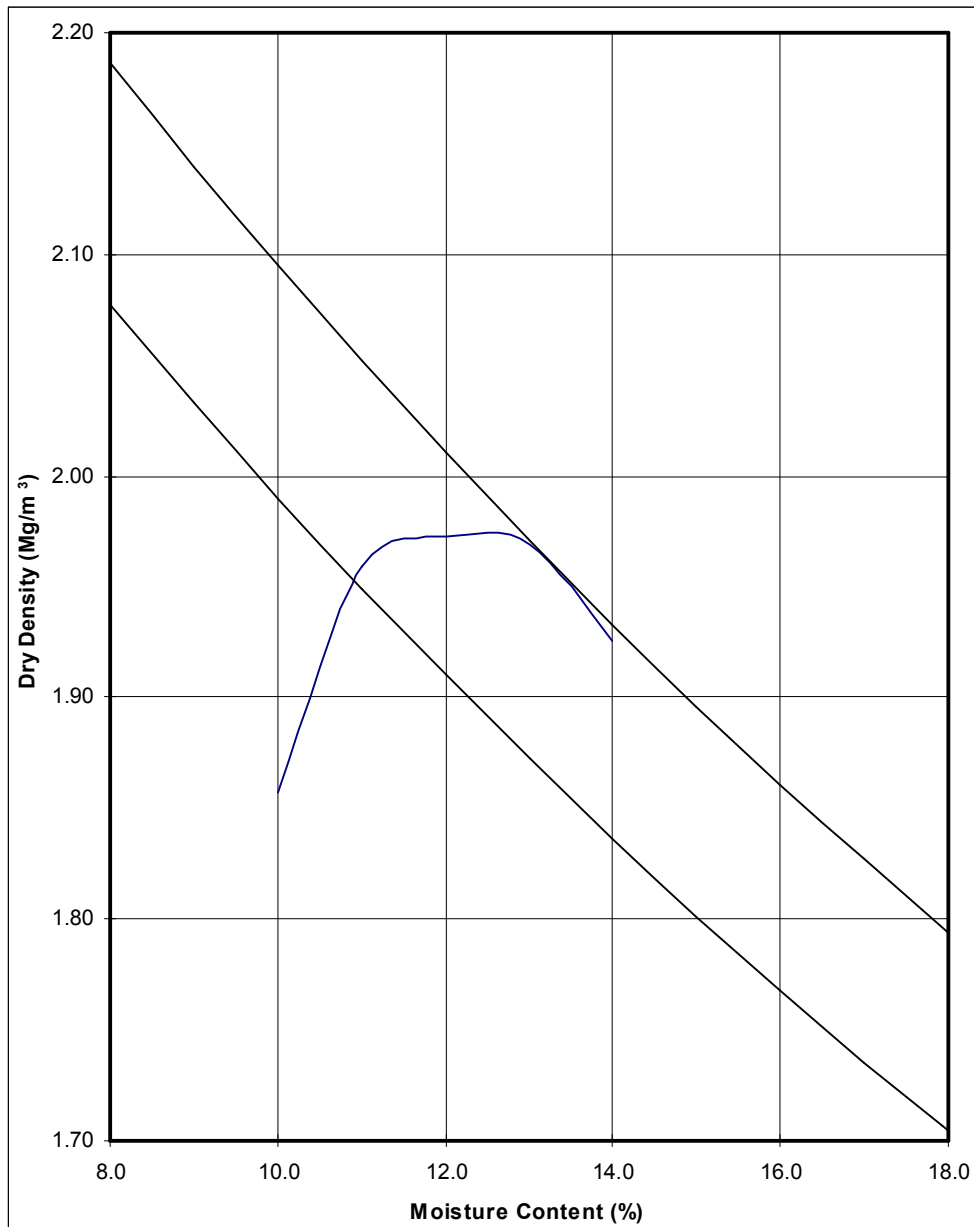
Maximum dry density = 1.97 Mg/m³

Optimum moisture content = 13 %

$$V_a = 1 - \rho_d \left(\frac{1}{G_s} + w \right) = 1 - 1.97 \left(\frac{1}{2.68} + 0.13 \right) = 1.0\%$$

Exercise 11.2

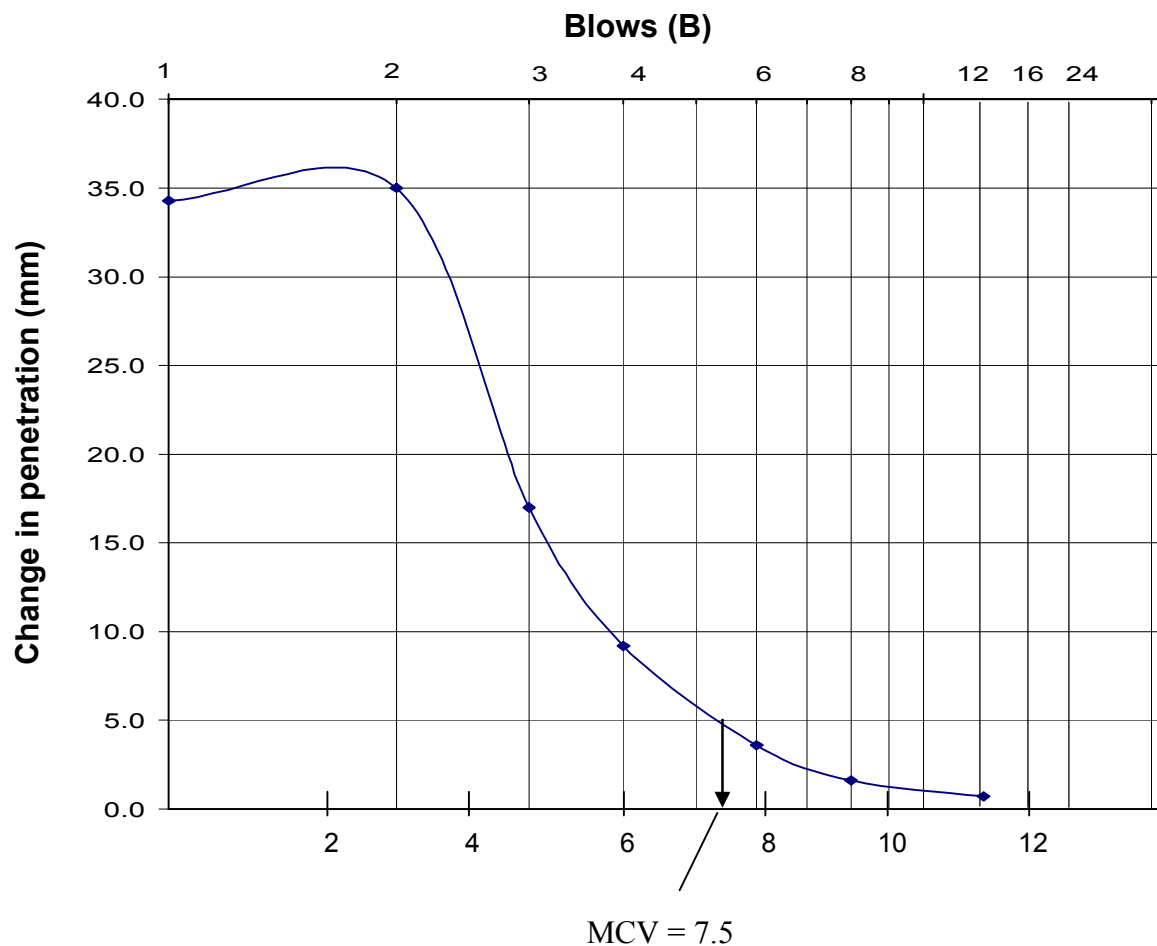
See spreadsheet "exercise_11.2.xls" for solution.



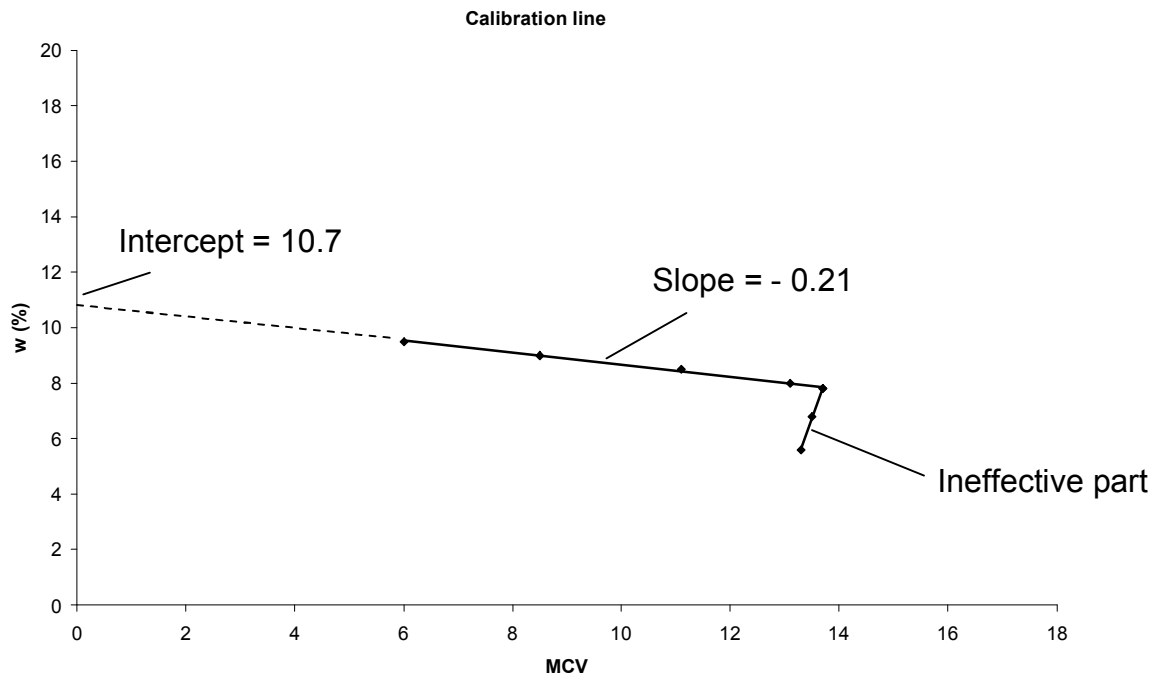
From test: $\rho_{dmax} = 1.97 \text{ Mg/m}^3$; OMC = 12 %
 $\rho_{dmax} = 2.03 \text{ Mg/m}^3$; OMC = 11 %

Exercise 11.3

No. of blows, B	Penetration (mm)	change in penetration, 4B - B (mm)
1	38.0	34.3
2	45.1	35.0
3	64.0	17.0
4	72.3	9.2
6	78.1	3.6
8	80.1	1.6
12	81.0	0.7
16	81.5	
24	81.7	
32	81.7	
48	81.7	



From the plot it can be seen that the test could have been stopped after 24 blows since by that stage the change in penetration was less than 5mm. Therefore, plotting the curve as the text progresses can readily inform the operator when to stop the test.

Exercise 11.4

Equation of line = $10.7 - 0.21 \text{ MCV}$

Sensitivity = $1/\text{slope} = 1 / 0.21 = 4.8$