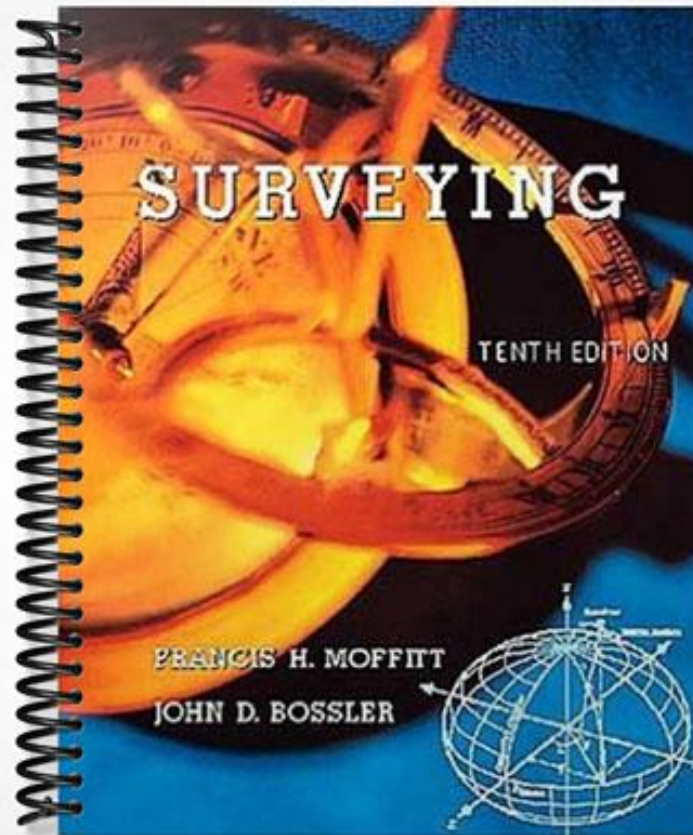


SOLUTIONS MANUAL



SOLUTIONS MANUAL

to accompany

SURVEYING

Tenth Edition

Francis H. Moffitt

University of California, Berkeley

 **ADDISON-WESLEY**

An imprint of Addison Wesley Longman, Inc.

Menlo Park, California • Reading, Massachusetts • Harlow, England
Berkeley, California • Don Mills, Ontario • Sydney • Bonn
Amsterdam • Tokyo • Mexico City

Copyright © 1998 by Addison Wesley Longman, Inc.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or any other media embodiments now known or hereafter to become known, without the prior written permission of the publisher. Manufactured in the United States of America.

ISBN 0-673-97132-5

1 2 3 4 5 6 7 8 9 10—VG—01 00 99 98 97

Addison Wesley Longman, Inc.
2725 Sand Hill Road
Menlo Park, CA 94025

CONTENTS

Chapter 1	1
Chapter 2	2
Chapter 3	6
Chapter 4	11
Chapter 5	14
Chapter 6	23
Chapter 7	25
Chapter 8	26
Chapter 9	45
Chapter 11	55
Chapter 12	68
Chapter 13	75
Chapter 14	86
Chapter 15	89
Chapter 16	96
Chapter 17	99
Chapter 20	104

CHAPTER 1

- 1-1. 6.9323 ha. 1-2. 17.130 acres. 1-3. 746,180 sq.ft. 1-4. 2,641.32 ft. 1-5. 805.07 m. 1-6. 90,361.978 ft. 1-7. 90,361.797 ft.
- 1-8. (a) $26^{\circ}54'$; (b) $196^{\circ}13'$; (c) $63^{\circ}27'50''$; (d) $312^{\circ}09'16.6''$; (e) $19^{\circ}31'29.86''$
- 1-9. (a) 29.9^{g} ; (b) 218.03^{g} ; (c) 70.516^{g} ; (d) 346.8384^{g} ; (e) 21.69440^{g}
- 1-10. (a) 16.62° ; (b) 254.2783° ; (c) 96.87064° ; (d) 35.78801° ; (e) 174.821342° .
- 1-11. (a) 18.47^{g} ; (b) 282.5314^{g} ; (c) 107.63404^{g} ; (d) 39.76446^{g} ; (e) 194.245936^{g}
- 1-12. (a) 14° ; (b) 23.6° ; (c) 247.10° ; (d) 354.747° ; (e) 25.1500° ; (f) 33.71585°
- 1-13. (a) 14° ; (b) $23^{\circ}36'$; (c) $247^{\circ}06'$; (d) $357^{\circ}44'50''$; (e) $25^{\circ}25'00''$ (f) $33^{\circ}42'57.06''$
- 1-14. (a) $11,434 \text{ m}^3$; (b) 99079 m^3 ; (c) $1,946.3 \text{ m}^3$; (d) $13,909.29 \text{ m}^3$
- 1-15. (a) 714 yd^3 ; (b) $3,727.9 \text{ yd}^3$; (c) $1,943.17 \text{ yd}^3$; (d) $55,529 \text{ yd}^3$
- 1-16. 36.7767^{g} ; 114.5701^{g} ; 48.6531^{g}
- 1-17. $10^{\circ}09'38''$; $81^{\circ}29'32''$; $88^{\circ}20'50''$
- 1-18. 66.7740 ha
- 1-19. 165.002 acres
- 1-20. 963.985 m ; 104.7145^{g} ; 59.6493^{g}
- 1-21. 882.127 m ; $9^{\circ}26'00''$; $155^{\circ}11'14''$
- 1-22. 70.3136 ha; 173.748 acres
- 1-23. 10.0906 ha; 24.9342 acres
- 1-24. 179.289 ft; 311.073 ft
- 1-25. 689.781 m
- 1-26. 12.82"
- 1-27. 0.00396^{g}

CHAPTER 2

2-1. Avg pace = 34.78. $\frac{34.78}{100} = \frac{x}{20 \times 66}$; x = 459 paces

2-2. Avg pace = 57.00. $\frac{57.00}{50} = \frac{x}{450}$; x = 513 paces

2-3. H = 962.21 cos 3°16' = 960.65 ft

2-4. dH = -962.21 sin 3°16' × 2/(60 × 57.2958) = 0.03 ft

2-5. s = 850.00/cos 2°58' = 851.14 ft

2-6. H = (16.264² + 343.516²)^½ = 343.901 m

2-7. H = 148.264 cos 4°16' = 147.853 m

2-8. dC = $\frac{16.264 \times 0.022}{343.516} = 0.001$ m

2-9. H₁ = (30.000² - 1.792²)^½ = 29.946

H₂ = (30.000² - 0.930²)^½ = 29.986

H₃ = (18.520² - 0.966²)^½ = 18.495

H₄ = (30.000² - 3.075²)^½ = 29.842

H₅ = (12.422² - 0.660²)^½ = 12.404

120.673

H = 120.67 m

2-10. C_a = 0.04 ft

0.04 × 2.80 = 0.11 ft

0.04 × 5.60 = 0.22 ft

Lay out 280.11 ft by 560.22 ft

2-11. 0.04 × 6.8225 = 0.27 ft. Lay off 681.98 ft

2-12. Slope distance = $\left[(430.000)^2 + (0.05 \times 430.000)^2 \right]^{½} = 430.537$ m

C_a = 0.010 m/tape; C_a = 0.010 × $\frac{430.537}{30} = 0.144$ m

Lay off 430.537 - 0.144 = 430.393 m

2-13. C_t = 748.25 × 0.0000065 (84-72) = +0.058 ft

C_p = $\frac{(18 - 10) \times 748.25}{0.006 \times 28,000,000} = +0.036$ ft

Continued

$$C_s \text{ for } 700 \text{ ft} = 7 \left(\frac{2.00^2 \times 100}{24 \times 182} \right) = -0.360$$

$$C_s \text{ for } 48.25 = \frac{0.02^2 \times 48.25^3}{24 \times 18^2} = -0.006$$

$$C_{\text{total}} = -0.272 \text{ ft}$$

$$\text{Length of line is } 748.25 - 0.27 = 747.98 \text{ ft}$$

$$2-14. C_t = 30 \times 0.000015 \times (13.5 - 20) = -0.0023 \text{ m}$$

$$C_s = \frac{0.012^2 \times 30^3}{24 \times 8.5^2} = -0.0022 \text{ m}$$

$$-0.0045 \text{ m}$$

$$\text{Distance } 0-30 \text{ m} = 29.9955 \text{ m}$$

$$2-15. C_a = 5.15 \times (-0.010) = -0.052 \text{ ft}$$

$$C_t = 515.68 \times 0.0000065 \times (42-68) = -0.087 \text{ ft}$$

$$-0.139 \text{ ft}$$

$$\text{Correct distance} = 515.68 - 0.139 = 515.54 \text{ ft}$$

$$2-16. 0.204 w \sqrt{AE} = 0.204 \times 1.80 \times \sqrt{0.0056 \times 28,000,000} = 145.40$$

$$\text{Try } 20 \text{ lb } P_n = \frac{145.40}{\sqrt{20 - 10}} = 45.98$$

$$\text{Try } 40 \text{ lb } P_n = \frac{145.40}{\sqrt{40 - 10}} = 26.55$$

$$\text{Try } 32 \text{ lb } P_n = \frac{145.40}{\sqrt{32 - 10}} = 31.00$$

$$\text{Try } 31.5 \text{ lb } P_n = \frac{145.40}{\sqrt{31.5 - 10}} = 31.36 \text{ or } P_n = 31 \frac{1}{2} \text{ lbs}$$

$$2-17. C_s = \frac{0.024^2 \times 50^3}{24 \times 2.2^2} = + 0.6198 \text{ m}$$

$$C_p = \frac{50(6-2.20)}{0,038 \times 2,100.600} = + 0.0024 \text{ m}$$

$$C_a = - 0.0138 \text{ m}$$

$$\text{Tape measures } 50.6084 \text{ m } C_{\text{TOTAL}} = + 0.6084 \text{ m}$$

$$2-18. \frac{9.20 \text{ dh}}{100^2} = \frac{1}{10,000}; \text{ dh} = \frac{1}{9.20} = 0.109 \text{ ft}$$

$$2-19. \frac{2.840 \text{ dh}}{30^2} = \frac{1}{25,000}; \text{ dh} = \frac{900}{25,000 \times 2.840} = 0.0127 \text{ m}$$

$$2-20. \quad dV'' = \frac{206,265}{20000 \tan 3^{\circ}54'} = 151'' = 2'31''$$

$$2-21. \quad dV'' = \frac{0.005 \times 206,265}{342.535 \sin 2^{\circ}24'} = 72'' = 1'12''$$

$$2-22. \quad n_g = 1 + \left(287.604 + \frac{4.8864}{0.5500^2} + \frac{0.068}{0.5500^4} \right) 10^{-6} = 1.0003045$$

$$n_a = 1 + \frac{0.359474 (1.0003045-1) \times 29.00 \times 25.4}{273.2 + (88 - 32) 5/9} = 1.00026496$$

$$2-23. \quad n_g = \left(1 + 287.604 + \frac{4.8864}{0.6328^2} + \frac{0.068}{0.6328^4} \right) 10^{-6} = 1.0003002$$

$$n_a = 1 + \frac{0.359474 (1.0003002 - 1) \times 725}{273.2 + 20} = 1.0002668$$

$$2-24. \quad (n_r - 1) 10^6 = \frac{103.48}{273.2+18.9} (29.2-0.51) \times 25.4 + \frac{86.26}{273.2+18.9} \times$$

$$\left(1 + \frac{5748}{273.2+18.9} \right) 0.51 \times 25.4$$

$$n_r = 1.0003373; \quad v_r = \frac{299,792.5}{1.0003373} = 299,691.4 \text{ km/sec.}$$

$$\lambda = 299,691.4/30 \times 10^6 = 0.009989714 \text{ km} = 9.98714 \text{ m}$$

$$2-25. \quad v_a = \frac{299,792.5}{1.00026495} = 299,713.1 \text{ km/sec}$$

$$\lambda = 299,713.1/30 \times 10^6 = 0.00999043637 \text{ km} = 9.99043637 \text{ m}$$

$$2-26. \quad v_a = \frac{299,792.5}{(1.0002668)} = 299,712.5 \text{ km/sec}$$

$$\lambda = 299,712.5/30 \times 10^6 = 0.0099904167 \text{ km} = 9.9904167 \text{ m}$$

$$2-27. \quad (n_r - 1) 10^6 = \frac{103.49}{289.2} (749-7.2) + \frac{86.26}{289.2} \left(1 + \frac{5748}{289.2} \right) 7.2$$

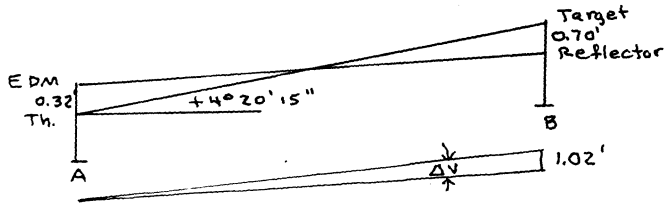
$$n_r = 1.0003103; \quad v_r = \frac{299,792.5}{1.0003103} = 299,699.50 \text{ km/sec}$$

$$\lambda = 299,699.5/75 \times 10^6 = 0.00399599338 \text{ km} = 3.99599338 \text{ m}$$

$$2-28. \quad C_I = 1219.28 - (796.16 + 423.25) = -0.13 \text{ ft}$$

$$\text{Length of line is } 2946.22 - 0.13 = 2946.09 \text{ ft}$$

2-29.

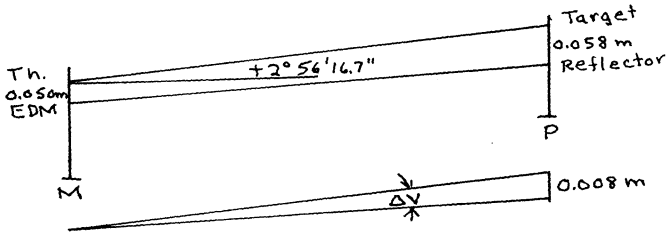


$$\Delta v'' = \frac{1.02 \cos 4^{\circ}20'15''}{3451.55 \times 0.000004848} = 61'' = 1'01''$$

$$v' = 4^{\circ}20'15'' - 1'01'' = 4^{\circ}19'14''$$

$$H = 3451.55 \cos 4^{\circ}19'14'' = 3441.74'$$

2-30.



$$3.2644^{\circ} = 2^{\circ}56'16.7''$$

$$\Delta v'' = \frac{0.008 \cos 2^{\circ}56'16.7''}{975.26 \times 0.000004848} = 1.7''$$

$$v' = 2^{\circ}56'16.7'' - 1.7'' = 2^{\circ}56'15''$$

$$H = 975.26 \cos 2^{\circ}56'15'' = 973.98 \text{ m}$$